THE IMPORTANCE OF BUSINESS INTELLIGENCE AS A DECISION-MAKING TOOL: —CASE STUDY ELECTRICITY COMPANY OF GHANA (E.C.G)

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Benjamin Twum Amoako

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Author/s: Benjamin Twum Amoako

Abstract

Demand and technology are driving competition to its best if not to the edge, blurring the industrial boundaries and resulting in a substantial re-arrangement of businesses. The advancement in information technology has also made it possible for organisations to hoard large volumes of data from multiple sources through their business processes. To remain competitive in the face of these changing times and fierce competition, a tool is needed which has the capability to allow a holistic view of the operating environment of the organisation, by taking advantage of the huge body of accumulated data and thereby allowing decision makers to be spontaneous with their decision-making.

Business Intelligence offers these capabilities and more, for instance the possibility to perform analytics operations about event(s) that demands more clarity on their behaviour.

Research in this area, though young, is gradually gaining attention in academia, although still scanty in Africa. This thesis investigates if the adaptation of Business Intelligence (BI) systems can help in an organisation's strategic decision-making in the context of the Electricity Company of Ghana (E.C.G), operating in the utility industry in Ghana.

A qualitative approach, employing interviews with seven selected managers at E.C.G was adopted. The results indicate that BI, or a similar system, has never been adapted by E.C.G, though the company creates huge data through its operations. Further, the organisation's information system is not linked together to allow possible discovery of some intelligence that would be worthwhile to influence strategic decisions. The dispersed nature of the current systems is not only causing delays in quest of information from other departments, but also affecting decision-making and progress of work. E.C.G is a prime candidate for the adaptation of BI to leverage on its huge data and also/additionally reduce production waste and costs and to help provide an efficient supply of electricity to its customers. Such a tool would prove to be indispensable.

Keywords: Business Intelligence, Information systems, Decision-making, Information, Data.
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1 INTRODUCTION

1.1 Background

The global economic down-turn, globalization and current nature of demand are seriously challenging the way businesses/organisations are run today. A slight glitch, for example, a war in developing/emerging market, which produces oil can have some influence on world fuel prices or a financial error by a C.E.O at the financial market can also affect lots of businesses around the world. Demand and technology are also driving competition to its best if not to the edge, challenging the industrial-age management approach of running organisations to give way to the information-age approach.

The 21st century has already seen a lot of drastic changes, for example, breaking the access to and use of information and thereby making it possible for any individual located even in the remotest part of the world the ability to pick and choose or contribute to issues that may concern them. Continental market demand has gradually shifted towards customer-demands, challenging organisation’s decision makers to explore alternative strategies to meet complex demands. The competitive environment is getting highly unstable and organisations have to deal with the capricious conditions surrounding it (D’Aveni, 1994). The introduction of IT and the emergence of globalisation of industries have succeeded in blurring of the industrial boundaries resulting in a substantial re-arrangement of businesses (Hitt et al., 1998).

Decision-making is everyday life activity and according to (Kent, 2012) “it is the essence of management” be it programmed/non-programmed. Global executives have little time to deliver results than ever (Kent, 2012). Managers who are faced with non-programmed decisions, which is ambiguous and lack any routine to arrive at a solution, need to rely on judgement, creativity and intuition (Kopáčková and Škrobáčková, 2006). In decision-making, techniques and tools can be employed, such as increase knowledge, de-bias judgement, be creative, use intuition and don’t over-stress the finality of decision (Ibid). The use of tools (specifically Information Technology) in decision-making has been in use over the years and in different forms (Power, 2002; Wixom and Watson, 2010; Kopáčková and Škrobáčková, 2006) and has increased in complexity to an extent of self-autonomous state or supporting managers in decision-making. Over the past 50 years computers has played important role in decision-making, for example the use of spreadsheets to summarise transaction data, however, it is not enough to provide company-wide detailed view.

The advancement in information technology has also made it possible for organisations to accumulate large amounts of data either internal, external or both through their business processes. For the continual existence of any organisation, it must have a survival strategy in the face of fierce competition, especially current turbulences in the market environment. Eliminating waste, reducing costs and delivering efficient and reliable products or services is currently the prerogative of any organisation and in doing so, they are turning to these large accumulated data for valuable insights. These insights also known as intelligence, what management needs in taking strategic actionable decisions in this ever changing business environment, which requires organisations to have a reactive response and changing competence (Pirttimäki, 2007). The current business environment allows very little room for having some truth or truth in pieces which again may not be readily available when needed due to either time/location constraints. Decision-makers are able to drive their organisations’ goals forward by relying on a single version of the truth from a holistic view of the organisation. According to (Lynch, 2012) “for C.E.O’s, using technology to spot the ‘unknown unknowns’ during this time of economic uncertainty will be regarded as a
superpower’, helping them to make better business decisions and ultimately beat the competition”.

Business Intelligence (BI) possesses the capabilities that support superior business decision-making through past, present and predictive composition/trends of organisations’ operations. Business intelligence is not a product, technology and or methodology, but a combination of all to leverage information assets within key business processes to achieve improved business performance (Williams and Williams, 2010). BI enables business information combined with business analysis to help businesses to increase revenues and/or reduce costs, similarly it’s also permit the public sector to work within its limited budget and manage resources wisely (Williams and Williams, 2010). For example; the largest Scandinavian hospital operating with over 2700 beds in 165 wards, 17000 thereabout workforce and one of Sweden’s centres for critical cranial surgery, Sahlgrenska University Hospital in Gothenburg pride itself with the use of BI in its operations (Computerworld, 2007). With the support of BI systems at the hospital, a physician can perform analysis on a patient database with possible results to determine the appropriate decision to take; this saves the physician the time to go through numerous paper records (Computerworld, 2007). The hospital has also achieved tremendous results in “reducing complication rates to zero, reduce costs and unnecessary tests, improve the treatment of critically ill patients and saving patient lives” (Computerworld, 2007). BI is a requirement for any organisation (Sabherwal and Becerra-Fernandez 2011).

Electricity Company of Ghana (ECG) is a utility company in Ghana charged with the responsibility of distribution and supply of electricity from the middle-belt of the country to the southern regions (Ashanti, Central, Eastern, Western, Greater Accra and Volta regions). Customers have higher expectations of sufficient and regular supply of electricity, which will also meet their economic expectations as well. To satisfy such needs of their customers, though, infrastructural needs of the organisations are equally important, a sufficient seamless flow of information backed by analysis are needed to support management decision-making. As if that is not enough, the organisation has to battle with the current economic situation as described earlier as any organisation trying to entrench itself in the mist of all these acting forces. With the future in perspective and global competition increasing, it is crucial for the ECG to strategically adopt industrial proven solutions like BI.

1.2 Statement of problem

Business Intelligence (BI) is gradually gaining popularity both in the business world and the academia. Though the stakes are high in adopting the BI systems; Continental Airlines (Waston et al., 2006), Pilot Flying J, Super 8 Hotels Co. Ltd. and Towne Park (Microsoft Case Study, 2012), Wal-Mart, Harrah’s, Marriot and Capital One (Viaene, 2008), have succeeded and benefitted from the system.

According to the Gartner report for 2012 (Gartner, 2012), BI remains the most favoured on the list of the technological tools of the Chief Information Officer’s (CIO’s). The growing need for adopting BI technologies due to current economic trends and customers demand as described earlier, it’s a system not just for automating or administering processes but also been sources of value (Gartner, 2012). Thus, the need to look internally for answers has become apparent.

Research in BI is not as immense (e.g. Antti and Virpi, 2006; Pirttimäki, 2007; Watson and Wixom, 2007; Watson et al. 2006; Viaene, 2008; Davenport and Harris, 2007; Anderson-
Lehman, et al. 2004; Viaene et al., 2009; Azoff, 2004) as Knowledge Management. A literature review indicates studies in BI, though young have been encouraging in the advanced countries, but fairly in the emerging economies like Africa. South Africa, is, however spearheading research in BI (e.g. Nkuna, 2012; Plessis and Boon, 2004; Pellissier and Kruger, 2011; Venter and Tustin, 2012). Though technology has influenced business processes greatly in Africa, very little research has been carried out to investigate the importance BI can play in organisations business processes especially in Ghana. Furthermore, it is important, but maybe easier, for example for E.C.G to create customer databases, however, the organisation needs a system that can support multiple sources of data, work together with its business rules, offer the ability to look at issues from a holistic viewpoint and as such probe farther from multiple viewpoints when the need be.

1.3 Purpose of the study

As it has been established in the previous sections of this chapter of little BI research in Africa, especially in Ghana, based on that, the main purpose of this thesis is to increase our understanding of the importance of BI as a decision support tool for E.C.G (in Ghana) and also for managing directors at E.C.G to appreciate the benefits of BI adaptation.

Ghana’s economy saw a positive growth of 14.4% in 2011 according to a World Bank report (The World Bank, 2012) and due to the world economy slowing down, the country’s economic growth rate is expected to be 7.5% for the year 2012 (The World Bank, 2012). Projections for the year 2013 are expected to be 6.15% (Economic Watch, 2012). All these rates are influenced largely by Ghana’s discovery of oil, making the country one of the fastest growing economy in Africa. This has had a cascade effect on development and as such causing demand for the uninterrupted abundant supply of electricity for both domestic and industrial consumption.

Electricity supply in Ghana has not been generally stable, this situation has the following as the contributing factors; Ghana has over the years relied heavily on hydro energy production, which depends on rainfalls and according to (Owusu et al., 2008) rainfalls in Ghana has declined since 1970. The state has, however, invested in other hydro dam projects and couple of thermal plants, which are, however expensive to run due to the volatility of oil prices (Kemausuor et al., 2011). Population growth and national electrification project by the government of Ghana as at 2008, has archived 55% access to electricity (World Bank, 2009), however reliability remains a big issue as demand keeps increasing.

E.C.G as a company also make loses through its business and technical (during distribution of electricity to consumers) processes. Technical losses are very common due to irregular maintenance of infrastructures or the continual use of outmoded systems. The company’s inability to deal with illegal connections and the huge non-payment of electricity bills by institutions, industries and individuals have as well incapacitated E.C.G from delivering.

The lack of reliable, timely information is the root cause for all these problems facing the organisation and loses and costs thereof. Without reliable information at hand, management lacks the ability to perform good analysis of current situations based on the past and therefore are unable to plan strategically for both short and long term possibilities. The need for information systems that can allow ordinary users without well-versed knowledge in information technology to acquire data and filter it to produce actionable information is
undisputed. Such information are useable by management in taking a strategic decision in
time and or to perform critical analysis to examine why situations are the way they are or
otherwise.

E.C.G armed with apt information can collaborate with all concerning institutions to act in
time to meet increasing demands, reduce costs through its internal business processes,
minimise technical loses from distribution and illegal connections, derive alternating
possibilities for revenue collection and at the same time remain profitable to provide reliable
and uninterrupted electricity to all customers.

This thesis will add to the literature of BI in the field of Informatics in the perspective of Sub-
Sahara Africa. The research can offer initial insights to other utility companies in the same
industry not only in Ghana but also in other Sub-Saharan African countries. As a qualitative
case study research can be used as preliminary studies for further research in relating issues
by researchers. Further, to determine the implementation of BI systems will improve decision-
making in operational efficiency and thereby save costs. Again to determine factors that have
an influence on the single version of the truth of a request to the current system and to finally
explore the current state of the organisations’ information systems if it’s enough to support
decision-making (with the current speed of change)

1.4 Research questions
The research questions of this thesis are:

1. To what extent can BI adaptation help in management decision-making
2. Do the organisations’ operations demand BI implementation
3. What are the possible hindrances that can prevent BI implementation and or cause its
   failure

1.5 Target Group
Since, E.C.G represents a brilliant case, to study how BI adaptation can support and improve
the organisations’ operations with respect to decision-making processes for top managers and
sectional-managers; obviously they are the target group for this research. Policy makers (both
in the organisation and in government) also stand to benefit as well, since they will be fed
with accurate and up-to-date information on Ghana’s electricity status.

1.6 Delimitations
The purpose of this thesis is to generally understand the benefits E.C.G can gain by adopting
BI as a decision support tool and therefore findings are restricted to the organisation. The
thesis focused on the general overview of BI and therefore did not pay detailed attention to its
specific components such as data mining, data analytics, data warehousing or data
visualisation. Further, BI tools (software) and selection procedure for the case were not
considered in this thesis. The actual implementation process and its challenges of BI are
outside the scope of this thesis.
1.7 The authors’ experience and background

My feet have not been in many camps, and that makes it easy to place me firmly in the Information Technology field, since I graduated with bachelors in IT. Returning to the academia after some few interns to study Informatics, my horizon has not been same. Taking courses like Business Design, Scandinavian management and information systems & business processes and others has enabled me to appreciate the dynamic relationships and the interplay between humans and technology and its purpose for the collective future.

Though the author does not possess any practical field experience in the field of Business Intelligence, the theoretical exposure gained, especially from Data Mining and Business Intelligence courses and together with experiences gained from writing term papers has offered the author enough impetus to conduct this thesis.

1.8 Structure of the thesis

Chapter 1 provides the reader with the introduction of the thesis, a statement of the problem, the purpose of the study, research questions, justification and significance of the study, target group and delimitations of the study. The structure of the study is presented in Figure 1.

Chapter 2, this chapter presents the research design and justification for the methodology to approach this thesis. Further, this chapter describes and justifies the appropriate data collection method for this thesis. This chapter also outlines how the collected data would be analysed, strategies for validating the thesis findings and method of presentation.

Chapter 3 presents overview of relevant literature within the context of this master thesis-explains what the Business Intelligence System is and its benefits.

Chapter 4 presents the results of the empirical studies of this thesis

Chapter 5 provides the analysis of the empirical studies and construed within the context of extant literature

Chapter 6 presents general conclusions, implications and possibilities to generalization of this study. Finally, the thesis culminates with speculations and ideas for future research.
Figure 1. Model of Thesis Structure
2 RESEARCH DESIGN

Our desire to confront the unknown through the known is stirred by our inquisitive instincts, and that is the premise of the research.

Therefore, this chapter discusses the selected research approach and its justification for the subject matter. Justification for the selected case is also elaborated here as well as the data collection and analysis procedures.

A research strategy can be either qualitative or quantitative or in some circumstances both. The choice of a research strategy is influenced by a single or a combination of factors, such as, the research topic and questions, previous research in the area of interest (Pirttimaki, 2007) or personal values of the researcher (Bryman and Bell, 2011).

Quantitative research is deductive, numeric biased, deeply rooted in the natural sciences (positivism) and support “social reality as an external objective reality” (Bryman and Bell, 2011). According to Denzin and Lincoln (2000) quantitative research “emphasizes the measurement and analysis of causal relationships between variables, not processes”. Its objective is to explore the causes and effects to acquire knowledge through mathematical models, statistical tables and graphs. For reliability and predictability to be achieved, variables are controlled and constraints (in search for some relationships or correlation) allow deductive analysis to be drawn, which is free from rich word description.

Qualitative research on the other-hand is basically inductive, interpretivism and opposes the objectivism ontological orientation of quantitative research strategy, but rather constructionism (Bryman and Bell, 2011). Marshall and Rossman (1999) assert that qualitative research is “an inquiry which attempts to increase our understanding of why things are the way they are in our social world and why people act the way they do”. Similarly, Benoliel (1984) also defines qualitative research as “modes of systematic enquiery concerned with understanding human beings and the nature of their transactions with themselves and with their understandings”.

Though the debate on these two main paradigms has been on-going, in Newman and Benz’s (1998) view, they stand to oppose the dichotomous debate, since research rest on the “unified philosophy of science”, research approach can therefore be considered as an interactive continuum.

However, this research shall be conducted as a qualitative research, since it enables studying a phenomenon and draw up generalizations. The premise for selecting this method lies in the research topic, the statement of the problem (see section 1.1) and obviously the research questions, all in chapter 1.

The purpose of qualitative research is to describe, understand, and interpret a phenomenon with a focus on quality (nature and essence) (Merriam, 2009). To make sense or interpret a phenomenon, the studies on a subject (s) /object (s) is conducted in its natural settings (Denzin and Lincoln, 1994). Qualitative research focuses on qualitative phenomena (Kumah, 2011), thus immeasurable qualities (unlike counting, amount, frequency, etc.) and non-experimental events and processes (Denzin and Lincoln, 2011). According to Merriam (2009), qualitative research is characterised by knowing that: “the focus is on process,
understanding, and meaning; the researcher is the primary instrument of data collection and analysis; the process is inductive; and the product is richly descriptive”. Qualitative research starts from empirical to conceptualisation, as the opposite is the case for quantitative research (Newman and Benz, 1998).

2.1 Case study
This research shall be carried out as a single case study to allow the researcher dive deep to uncover known and unknown possibilities that could allow BI systems implementation as a decision support system.

Though case study has been heavily used in the positivism epistemological tradition, hence its association with qualitative research (Bryman and Bell, 2011), they further argue that this assertion is not always true since case study can also be applied in quantitative research. Yin (1994) considering case study in the perspective of a process, defines it as "an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident". The methods' strength lies in its ability to allow intense examination of an entity/object under study (Bryman and Bell, 2011). A qualitative case study research aims to make sense of a phenomenon in its context without a direct influence or disturbance on variables of interest (Cavaye, 1996). Case study allows several data collection methods (interviews, observation, documents) and sometimes can include quantitative data collection methods (Yin, 1994). Qualitative case study is not the same as field studies (Cavaye, 1996) or should it be confused with, when employed as a teaching device (Yin, 1994). A qualitative case study can result in a rich description of phenomena, development or testing of theories (Darke et al., 1998) or a revelatory knowledge which was previously inaccessible (Cavaye, 1996).

According to Bryman and Bell (2011) “with a case study, the case is an object of interest in its own right, and the researcher aims to provide an in-depth elucidation of it” and the ultimate goal of the researcher is the revelation of the case’s uniqueness. The intricacy of social phenomena is made clear through case study, since “it allows investigators to retain the holistic and meaningful characteristics of real-life events...” (Yin, 2002).

According to Merriam (1998) case study is characterised as “particularistic”; that is, its pays attention to a specific complex entity, situation or some occurrence. The selected case (ECG) is worthwhile to investigate due to its symbolism and what it might hold. ECG is the sole agency with the national responsibility to acquire and distribute electricity from the middle sector of the country to the southern sector, which are six out of the ten total regions. How the organisation is able to meet its information needs to facilitate top management, strategic decisions with their current information systems, is the prime interest of this research.

“Descriptive;” means detail accounts (thick description1) of an event, entity or a situation and recorded whilst considering multiple variables as possible over a certain period of time (Merriam, 1998).

“Heuristics;” this means, the results from such studies brings respective enlightenment explaining all the how’s and why’s raised questions. Its further serves as an eye-opener to other perspectives that were earlier inaccessible and thus, becomes an opportunity to take

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1 Thick description is a borrowed word from anthropology meaning, the complete, literal description of the incident or entity being investigated (Merriam, 1998)
advantage of (Merriam, 1998). It is the ultimate goal of this research to operate in the confines of these (Particularistic, Descriptive and Heuristics) characteristics.

Eriksson and Wiedersheim-Paul (2001) categories the purposes of the case study into four groups as: an illustration, an aid to create a hypothesis, a method for change and an aid to create theories. This research fits into the second category, since the subject matter (Business Intelligence) in context of the case (ECG) itself and other factors mentioned earlier in this section, presents it as a case for exploratory research.

2.1.1 Case Sampling
Case sampling is an important task to perform in qualitative research, since it has direct influence on the validity of the research. Though, qualitative sampling selection process does not involve extensive statistical methods, based on probability theory (Curtis et al., 2000), they further argue that, there is a lack of consensus on what it’s supposed to be, since, a school of tort (Glaser and Strauss, 1967; Strauss and Corbin, 1990) suggest ‘theoretical’ sampling against the ‘purposive’ sampling school of tort (Miles and Huberman, 1994). Generally, selecting a case for qualitative research should be tied to the objectives of the research (Mills et al., 2009). According to Stack (1994), where case selection becomes eminent in qualitative research, “... nothing is more important than making a proper selection of cases. It is a sampling problem”.

According to Mills et al. (2009), “In qualitative sampling the focus is on selecting information-rich cases for in-depth study, to enhance the richness, validity, and depth of information”. Hence, the selected case for this research is a single case (Electricity Company of Ghana, ECG), obviously based on purposeful sampling and specifically critical. Critical sampling allows better understanding of whether a proposition will hold or not (Bryman and Bell, 2011).

2.2 Data Collection
Guided by the research questions and or subject under study, the researcher, either for qualitative or quantitative purposes collects/gathers respective data that will allow either inductive or deductive inference to be made. Richards (2005) argues that, for example techniques like observation and communication allow huge data to be accumulated and further states that, it’s easy to collect qualitative data unlike quantitative data. The researcher is, rather, faced with the enormous task of making the collected data ‘useful, valuable and relevant’, with respect to the subject matter (Richards, 2005). Since it is not easy to make only needed data available for qualitative research, according to (Richards, 2005) what is important “is a body of data from which you can derive an adequate answer to your research questions...”.

The general definition of what data is, inhibit some level of assumptions that a researcher(s) should/know what their likely data are, this somehow causes problems for young researchers, argues (Richards 2005). Richards, further posit that “you make something data for your study by focusing the event or process, recording it and considering its meanings”.

Numeric facts (data) are collected about an event (s) /entity/object (s) in quantitative research to allow conclusions to be drawn. However, in qualitative research, (Richards 2005) argues that, the researcher is in part ‘making’ data.
Collecting/making data in qualitative research can be either participating in the setting, observing directly, interviewing in depth and analysing documents or in combination as it may fit the research work. This research shall employ both interviews and analysing documents as a data collection/making method.

2.2.1 Interviews
Interview, is a well-used method for collecting data in qualitative research (Bryman and Bell, 2011; King and Horrocks, 2010). Qualitative interview, either formal or informal is a “conversation with a purpose, in which the interviewer aims to obtain the perspectives, feelings and perceptions of the participant(s)” (Holloway, 1997). According to (Kvale and Brinkmann, 2009) it’s a dialogue to uncover and unfold a subjects’ world prior to scientific explanations. Exploratory, descriptive and explanatory data are possible outcome of qualitative interviews, which can or cannot lead to theory generation (Hesse-Biber and Leavy 2005). Though, looks simple and easy to conduct, since it’s a normal human characteristic (i.e. asking questions and expecting answers), could end up empty, when not done right (Hesse-Biber and Leavy, 2005; Richards, 2005; King and Horrocks, 2010).

Interviews, however, shares some similarities with surveys, yet they differ as interviews aim to gain detailed data from a particular source, whiles surveys aims at standardized data from a given population/group to enable generalization (Halperin and Heath, 2012).

Generally, interview falls into three main groups: structured, unstructured and semi-structured interviews (Halperin and Heath, 2012). Structured interviews are made up of precise, simple, short (usually closed-ended) questions asked in sequential order with no room to stray away from the prepared questions (Halperin and Heath, 2012). Unstructured interviews consist of loose, elaborate and complex (usually open-ended) questions asked when the interviewer deem necessary (Ibid). Semi-structured interview is a resulting combination of structured and unstructured interview forms.

Since this research uses qualitative case study, it is therefore acceptable to employ a semi-structured interview approach; it’s flexible and allows the researcher to prepare interview guides and as and when it’s required, supplementary questions are also asked normally based on interviewee’s answers. This enables the researcher to explore more into the phenomena under study (Ibid). Since, participant’s questions may differ; resulting data may suffer from a generalisation. Pitfalls like leading questions, complex questions or inability to question reality are identified with semi-structured interviews (Kvale and Brinkmann, 2009). Craftsmanship and expertise of the interviewer have great influence on the quality of the interview (Ibid). According to (Ibid) the quality of “an interview technique depends on the content and the purpose of the interview”.

Specifically, data will be collected through telephone interview (recorded) with the selected case. Though, this method is not widely used like a face-to-face interview, with respect to collecting qualitative data (Berg and Lune, 2011). This is convenient for the researcher as it offers the advantage of distance. This is so as a result of the researcher’s geographic location (in Europe) as the case company is located in West Africa (Ghana).

2.2.2 Documents
Documents such as internal reports, newspapers, magazines, etc. are termed as secondary data sources for research purposes. Primary sources are materials of first-hand accounts of an
event(s) (Halperin and Heath, 2012). While secondary sources are accounts of after event(s) and usually such materials have been “interpreted, commented, analysed or processed in some way” (Ibid). In an organisation, either public or private, mountains of records (annual reports, financial accounts, personal documents, etc.) either in prints or virtually (on the web pages) or in the archives are produced by managers, administrators, engineers, accountants etc. and consumed publicly or privately (internally) (Silverman, 1997). How an organisation constitutes ‘reality’ and forms of knowledge appropriate to it hangs on its communication practices (Bloomfield and Vurdubakis, 1994). Documents, however official it may be, offers sneak-peeks of how the organisation function. They are created at a particular time and for a particular purpose (Silverman, 1997) and once they are gathered “considerable interpretive skills is required to ascertain the meaning of the materials that has been uncovered” (Bryman and Bell, 2011).

Documents offer the time advantage due to its availability, but (Bryman and Bell, 2011) argue that, this is not always the case, since sometimes collecting relevant documents for research can be a long painful task.

Documents alone, since they cannot be considered as an authoritative evidence of full function of an organisation (Silverman, 1997), it is used in this research as a complementary data collection technique with earlier stated (interview) technique.

2.3 Ethical issues
Interview in research embody ethical concerns, since, “researching private lives and placing accounts in the public arena” (Mauthner et al. 2002) should be practically injected in the entirety of the research (Kvale and Brinkmann, 2009).

In pursuit of this agenda, the researcher seeks to approach this process in such a manner that it shall be ethically and morally justified. Selected subjects for interviews will be made aware that, discussions are purely for academic purpose. Also, they will be informed about the recording of the interview conversations and assured that their confidentiality will be fully respected and protected. A Letter of consent will be signed where necessary as to the company’s policy in terms of giving out information. Where such information is deemed to be sensitive for public consumption, they are required to caution the researcher and advise on how they will want such information to be published.

2.4 Data recording procedures
The actual process of recording data to the study-case is fully elaborated here.

General and background information about the organisation are gathered from the organisation’s website and documents. Participants for this research will be head of departments (mangers) in the selected organisation whose work or efforts contribute significantly to the decision making process. The selected participants will be engaged in interviews for data collection for this research. The organisation’s website, documents shall also be used where necessary.

Prior to the interviews, email stating the purpose of the interview and reasons for selected participants’ inclusion in this research will be sent to respective participants. The telephone interviews with participants will be organised over a four week period in February 2013. On the average, interviews will last about 45 minutes per participant. All interviews will be
recorded and participants will be fully informed. Notes will be taken alongside the interviews for possible failure of the recordings. Since it’s a telephone interview, participants will be allowed to fix their date and time.

Participants, before an interview start, would be given a quick introduction and reasons for their inclusion in this research, lasting about 3 minutes. During the interview supporting documents will be requested based on the discussion and only if the participant is willing to make it available.

2.5 Data Analysis Procedures
The recorded interviews will each be transcribed by the researcher by listening to each of the interviews many times to give the vivid accounts of participants. All transcriptions of recorded interviews will be cross-referenced with the respective participants, where all miss understandings and clarities are sorted out. This is important as it has an influence on the validity of the collected data and as well analysis of results, which is discussed in the following sections.

The collected data through interviews of selected participants will be analysed by adopting the third (cross-case analysis) level of Cope’s (2005) four level of analysis.

Cross-case analysis in respect of this research shall be cross-participants analysis, since the issue of concern is the views of participants in the selected case and as a matter of facts it’s a single case study. The researcher focuses on the uniqueness and similarities through content analysis (Stake, 1994).

2.6 Strategies for Validating Findings
Validity is about the truth (Shank, 2005; Silverman, 2010; Creswell, 2003). Though validity is locked in academic debate, Shank (2005) suggests that “all those issues are a matter of observer effects”, thus, irrespective of one’s position, what is important is the observer’s accurate accounts. “Validity is how accurately the account represents the participants’ realities of a social phenomenon and is credible to them” (Schwandt, 1997). To satisfy the credibility of a qualitative research in the academia, member checking, researcher reflexivity, triangulation, disconfirming evidence, prolonged engagement in the field, collaboration, the audit trial and thick, rich description are the alternatives that can be applied, either as a single procedure or in combinations dependant on the researcher (Creswell and Miller, 2000).

Member checking shall be employed as the strategy for validating this qualitative inquiry finding. Selected participants will be further engaged in this research after the interview process, to allow them to be the judges of the interpretations of their world by the researcher. Transcripts of participants’ interviews and findings will be shared with them for their respective authentication. The researcher shall maintain a close collaboration with the participants through this process in order to avoid deviation and misinterpretations from both sides and as well use their comments where necessary in the final narrative.
2.7 Result Presentation Method

In quantitative research, data may be collected through a sample of a certain population and with the support of statistical or mathematical methods is applied to draw generalisations to the population and present results in tables, figures or in charts. Qualitative research on the other hand, seeks deeper understanding of a situation or an event by gathering data through case study, focus group or observation and trophy in thick text description of findings. Since this thesis is guided by qualitative research approach, presentation of results shall be in text. A detailed description of how data is collected and how it will be analysed shall be included.
3 THEORETICAL STUDY

3.1 Data, Information and Intelligence

Fuld (1991) argues that clear distinction between data, information and intelligence should be established for organisations which want to succeed in implementing Business Intelligence (BI).

3.1.1 Data

Data: pieces of raw facts recorded about (an) event(s). There is still ongoing debate on the word data usage as a singular, plural or mass noun. It is certainly not in the interest of this thesis to engage in this debate and would rather allow the usage of the word as either a mass noun or plural whenever possible. “Data is a representation of facts, concepts or instructions in a formalised manner, suitable for communication, interpretation or processing by humans or automatic means” (Hicks [1993] quoted by Checkland and Holwell [1998]). In organizations’ operations, data in a structured manner will explain transactions of events. The pieces of facts of an event in that state in themselves have no meaning (Introna, 1993; Davenport, 2000) but together possess the potentials that some meaning can be drawn from. Recorded facts should embody in its self the characteristics of objectively taking stock of facts that will enable it to be explained as it is by all and in an accepted format that will facilitate its recording, transmission and use in any communication. Davenport (2000) suggests data as the building blocks for creating information. Data when manipulated to the point that they carry meaning (e.g. Total purchase of a particular market segment), this becomes valuable information to management (Introna, 1993). Organisations have enormous possibilities of acquiring data from both internal and external sources. Especially with its internal sources, proper methods (that defines the organisational needs) of recording data ought to be effective, since it’s a cascade effect on information and decision making (Lucey, 2004).

3.1.2 Information

Information just like food is one of the necessities of man’s survival since man’s existence on earth. To sustain life, both for humans and animals, information is so vital being it where, when and how to strategically for example to find food, hunt, sow or reap, make settlement or re-locate. Organisations’ business survival today, rest heavily on having the appropriate information and at the right time to enable it take advantage of its opportunities to remain competitive. The function of information has become transparent, since it is an integral part of any organisations’ operations (Choo, 1996). It is therefore important to critically examine the significance of what information is.

Information is considered as “processed data that is of some real or perceived value to the receiver thereof” (Senn, 1990; Davis, 1985; Ahituv and Neumann, 1990). Information can be
“part of a general sense-making process and be found in a distinctive way a person has come to understand the world” (Boland, 1987). Making sense of information “must be conceived as part of the process of coming into being of meaning, in which the significance of all statements is formed and made complete” (Gadamer, 1975). Avison and Fitzgerald (1995) also define information as “having a meaning that comes from selecting the data, summarizing it and presenting it in such a way that it is useful to the recipient”. Bocij et al. (2006), further suggest that information helps bring down uncertainty surrounding (an) event(s). To answer why organisations process information, (Daft and Lengel, 1986) also advocate for uncertainty and equivocality (see fig. 1).

According to Galbraith (1973) uncertainty is “the difference between the amount of information required to perform the task and the amount of information already possessed by the organisation”. In a given situation where information abounds, the uncertainty level is low. Thus, high uncertainty requires that more questions have to be asked and more information needs to be acquired to learn the answers (Daft and Lengel, 1986).

Equivocality is defined as “ambiguity, the existence of multiple and conflicting interpretations about an organisational situation” (Weick, 1979; Daft and Macintosh, 1981). Equivocality is said to be high when there is confusion and lack of understanding (Daft and Lengel, 1986). Equivocality is evident when a simple yes/no questions cannot be answered (Daft and Lengel, 1986). According March and Olson (1976) equivocality is present, where “participants are not certain about what questions to ask, and if questions are posed, the situation is ill-defined to the point where a clear answer will not be forthcoming”.

Daft and Lengel, (1986) state that, “Uncertainty is a measure of the organisation’s ignorance of a value for a variable in the space, as equivocality is a measure of the organisation’s ignorance of whether a variable exists in the space”. Daft and Lengel (1986) further assert that “when uncertainty is low, the organisation has data that answer questions about the variables in the space (see fig. 1) and when equivocality is low, the organisation has defined which questions to ask by defining variables into space” (see fig. 1). Bocij et al. (2006), also argue that uncertainty is reduced rather than completely eliminated.
### Figure 2. Hypothesized Framework of Equivocality and Uncertainty on Information Requirements (Daft and Lengel, 1986)

<table>
<thead>
<tr>
<th>Equivocality</th>
<th>Uncertainty</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>Low</td>
<td>Occasional ambiguous, unclear events, managers define questions, develop common grammar, gather opinions</td>
</tr>
<tr>
<td>High</td>
<td>High</td>
<td>Many ambiguous, unclear events, managers define questions, also seek answers, gather objective data and exchange opinions</td>
</tr>
<tr>
<td>Low</td>
<td>Low</td>
<td>Clear, well-defined situation, managers need answers, gather routine objective data.</td>
</tr>
<tr>
<td>Low</td>
<td>High</td>
<td>Many, well-defined problems, managers ask many questions, seek explicit answers, gather new, quantitative data.</td>
</tr>
</tbody>
</table>

### 3.1.2.1 Value of Information

Value from pragmatic economist’s viewpoint, an addition to the best outcome equals value. The price placed on a product determines its value (Matthew, 2002). According to (Bocij et al., 2006) it is likely to measure the tangible value of information directly, for instance, when information about a reduced request from a customer is acquired, production can be re-adjusted in time to save costs. Though money is often the price tag on tangible value of information, again, it is not possible in most occasions as a measure (Bocij et al., 2006). Matthew (2002) support this opinion by arguing that money as a measure of the value of information is problematic since information its self does not depreciate in value with respect to the amount of use. In Matthew (2002) view, value-in-use which is connected to wants, usefulness, satisfaction, demands, etc. is the perceived benefits (sense) of information to the user. The intangible “value of information, then, has meaning only in the context of its usefulness to users” (Taylor, 1986). Lucey (2004) also argues that accuracy of information should not be confused with its precision. Having a precise information would not certainly mean it is accurate.
3.1.2.2 Information Quality

Quality has been defined as fitness for use, or the extent to which a product successfully serves the purposes of consumers (Juran et al., 1974). According to Eppler (2006), the definition of quality has subjective or absolute (e.g. successfully server's purpose) and an objective or relative dimension (e.g. fitness for use). Eppler (2006) further argues that, these two components of quality had to be considered even where information quality is applied. Lesca and Lesca (1995) define Information Quality (IQ) as “characteristic of information to be of high value to its users”. Huang et al. (1999) also in their book defined it as “information that is fit for use by information consumers”; according to Kahn et al. (2002) it is the characteristic of information to meet or exceed customer expectations.

The eminence of information can be qualified by several characteristics and, when almost all these characteristics are either satisfied, then information can be judged as good else it’s bad (Bocij et al., 2006). The issue of what a good information is supposed to be, is an important quest for both practitioners and researchers (Grotz-Martin, 1976; Deming, 1986; Baker and Fraser, 1995; English, 1999; Ferguson and Lim, 2001; Crump, 2002; Lee et al., 2002; Eppler, 2006) in medicine, information technology, marketing, management, cartography, etc. and especially to decision-makers since information quality is crucial to their consumption. Several criteria and frameworks to qualify information quality in IT management, communication and communication have been suggested by researchers (Lesca and Lesca, 1995; Morris et al., 1996; Davenport, 1997; Kahn et al. 2002; Eppler, 2006). Information quality is subjective to use of information (Huang et al. 1999).

A careful review conducted by Eppler (2006) resulted in 16 criteria for examining information quality both in content and access (see Table 1).
Table 1. Information quality criteria (source: Eppler, 2006)

<table>
<thead>
<tr>
<th>Criterion name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comprehensiveness</td>
<td>Is the scope of information adequate? (not too much nor too little)</td>
</tr>
<tr>
<td>Conciseness</td>
<td>Is the information to the point, void of unnecessary elements?</td>
</tr>
<tr>
<td>Clarity</td>
<td>Is the information understandable or comprehensible to the target group?</td>
</tr>
<tr>
<td>Correctness</td>
<td>Is the information free of distortion, bias, or error?</td>
</tr>
<tr>
<td>Accuracy</td>
<td>Is the information precise enough and close enough to reality?</td>
</tr>
<tr>
<td>Consistency</td>
<td>Is the information free of contradictions or convention breaks?</td>
</tr>
<tr>
<td>Applicability</td>
<td>Can the information be directly applied? Is it useful?</td>
</tr>
<tr>
<td>Timeliness</td>
<td>Is the information processed and delivered rapidly without delays?</td>
</tr>
<tr>
<td>Traceability</td>
<td>Is the background of the information visible (author, date etc.)?</td>
</tr>
<tr>
<td>Maintainability</td>
<td>Can all of the information be organized and updated on on-going basis?</td>
</tr>
<tr>
<td>Interactivity</td>
<td>Can the information process be adapted by the information consumer?</td>
</tr>
<tr>
<td>Speed</td>
<td>Can the infrastructure match the user’s working pace?</td>
</tr>
<tr>
<td>Security</td>
<td>Is the information protected against loss or unauthorized access?</td>
</tr>
<tr>
<td>Currency</td>
<td>Is the information up-to-date and not obsolete?</td>
</tr>
<tr>
<td>Accessibility</td>
<td>Is there a continuous and unobstructed way to get to the information?</td>
</tr>
<tr>
<td>Convenience</td>
<td>Does the information provision correspond to the user’s needs and habits?</td>
</tr>
</tbody>
</table>

According to (Eppler, 2006) information quality offers a competitive advantage to knowledge-intensive firms.

3.1.2.3 Information needs

The need for information to support decision-making at management level in all organisations is eminent. In an organisation, decisions are taken at different managerial levels and the need for usable and accessible information is critical for controlling the business operations, initiate change and improve performance, which will lead to the business success. Information need is as an anomalous state of knowledge (Belkin et al, 1982) whiles in Drevin and Nilan (1986) view, information needs are evident when certain moment presents itself and there is a missing link between (gaps in) sense-making. In Wilsons’ view, when an individual expresses information need, there is a motive behind it (Wilson, 1977). Information needs “arise from the problems, uncertainties, and ambiguities encountered in specific organisational situations and experiences” (Choo, 2002). Choo (2002) further, made it clear that in organisations’ situations and experiences, concerns both the subject matter factors and also the contextual factors (organisational style, degree of risk, functional constraints, amount of control, professional norms, etc.). According to MacMullin and Taylor (1984) problems also considered as the total information-use environment, which contains the appreciable requirements of the use environment, “defining dimensions may allow the information professional to infer needs for information in a more structured, systematic way”.
The nature of the decision maker’s work has direct influence on his decisions and as such his informational needs (Butcher, 1998). In Butcher’s (1998) view, some characteristics of information being ambiguous and contradictory may not allow information to be perfect at certain instances. Managers most often are not able to express their information needs explicitly when necessary to facilitate decision making (Morris, 1994; Butcher, 1998), reasons being according to (Butcher, 1998):

- They are unaware of what information is available
- They do not understand how such information can be used
- They are unaware of the delivery method options

According to Newell and Simon (1972), “Most human decision-making, whether an individual or an organisation, is concerned with the discovery and selection of satisfactory alternatives; only in exceptional circumstances is it concerned with the discovery and selection of optimal alternatives”. Most often, information needs are circumstantial. When it comes to human’s reasoning and conduct, especially in decision-making, there are multiple variables involved that interplay in complex situations (Simon, 1960). Thus, predicting one's information needs is not realistic. Forester (1961) argues that routine decision-making can be supported by mathematical analysis, but can barely support the everyday decision-making of manager’s.

The business environment, information and as well managers are all under constant change and when manager’s information needs are addressed appropriately, it turns to have a positive influence on the organisation as a whole.

3.1.2.4 Management hierarchy and information needs

Each organisation is unique and according to Pirttimäki (2007) “it is difficult, if not impossible, to list information needs generically”. Managers at different levels in any organisation needs information, either to evaluate results, consider alternative options, predict some possibilities in the future or taking a certain course of action, they have varying information needs that imitate the environment in which the organisation exist, and need to be addressed accordingly. The exactness and packaging of information varies and dependant on the position and current work at hand (Butcher, 1998). According to (ACCAGlobal, 2006), “It is difficult and expensive to gather, store, validate and make available the various types of management information required for decision making”. It is, therefore, worthwhile discussing this issue.

Generally, organisational information needs are either internal or external (Ewusi-Mensah, 1981). According to Ewusi-Mensah (1981) “Internal information is generated within the organization to satisfy its decision-making functions, whiles External information originates outside the boundaries of the organization - from the surrounding environment in which the organization is embedded”. Ewusi-Mensah (1981) further asserts that both information needs types are critically interdependent. In Höglund and Persson (1985) also expressed their views on the information needs of which; subjective needs- is where the individual considers the information to be personally connected to his/her decision-making, and objective needs- are the required information necessary to the subject area. According to Swanson (1978), organisational information is classified according to whether it is;
a) “Inner- or other-directed”, that is, the information is used either internally or to influence factors external to the organization;
b) “Internally- or externally-based”, that is, the information is produced either internal or external to the organization;
c) “Self- or other-referencing”, that is, the information refers to the organization itself or to others outside.

Managerial decision-making is divided into three groups; strategic, tactical, and operational as shown in fig. (3). Though, Anthony’s management triangle (1965) is currently challenged by flat management approach, it is widely in use in most organisations. Management information varying needs are as well are organised in this order which helps business information systems developers to a larger extent, to clearly understand these needs. Pirittimäki (2007) however, argues that, in practice the decisions between the management levels are complex.

![Figure 4. Information needs (Based on Anthony's Management Triangle (1965))](image)

Strategic management of any organisation is charged with the responsibility of identifying the vision, values, mission, objectives and goals the organisation would want to pursue or is pursuing, that will offer it a competitive edge over its environment and thus require managers in such positions to be fed with critical information. Porter’s model is largely employed here by many organisations to clearly understand the organisation, its self and as well its environment (Butcher, 1998). In Harwood’s (1994) opinion, information pointing to future events is of much interest to strategic management since it enables them to take predictive more than reactive measures. According to Butcher (1998) “any information may be regarded as strategic to the extent that it is used as part of the strategic planning process or to provide a business opportunity. As such, the information which those involved in strategy formulation will perceive that they require will depend on their ability to isolate those variables which will determine the future of the organisation”. Strategic management activities are unscheduled resulting in infrequent demand for information.
Table 2 Information requirements by Management level

<table>
<thead>
<tr>
<th></th>
<th>Operational</th>
<th>Tactical</th>
<th>Strategic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data Source</td>
<td>Internal</td>
<td></td>
<td>External</td>
</tr>
<tr>
<td>Data Scope</td>
<td>Certain &amp; Narrow</td>
<td>Vague &amp; Broad</td>
<td>Summarized</td>
</tr>
<tr>
<td>Aggregation</td>
<td>Detailed</td>
<td>Future</td>
<td></td>
</tr>
<tr>
<td>Time Horizon</td>
<td>Historical</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Data Currency</td>
<td>Highly Current</td>
<td>Quite Old</td>
<td></td>
</tr>
<tr>
<td>Required Accuracy</td>
<td>High</td>
<td>Low</td>
<td></td>
</tr>
<tr>
<td>Frequency of Use</td>
<td>Very Frequent</td>
<td>Infrequent</td>
<td></td>
</tr>
</tbody>
</table>

[Source: Davis and Olson (1985)]

From Table 2, at the strategic level in many organisations, the focus on information for strategic activities is more external than internal as the case of operational management. According to Butcher (1998), information for strategic management “is often loosely structured (vague and broad), it need not be completely accurate (low and summarized), it should be predictive (future) rather than historical – it may take the form of trends – and it is likely to be qualitative rather than quantitative”.

In Fig. 2 above, the tactical management is located below strategic management in a hierarchy, which means it’s receives strategic information from above and uses it as a guide to devise and implement processes and methods to satisfy the overall goals and objectives of the organisation. Information is also received from operational managers at short intervals which are normally semi-structured. Such information allows managers at this level to address issues like speed up production, maintain or improve production, cancel or receive more orders to meet set targets. According to Butcher (1998) “the specific type of information sought for the purpose of tactical management will depend to a large extent on the functions or process for which the manager is responsible, but may include information about the productivity of the workforce, use of raw materials and equipment and benchmarking against other similar operations both within the organisation and against the best sector”.

According to Gorry and Morton (1971) “the task orientation of operational control requires information of a well-defined and narrow scope”. In table 2, Davis and Olson (1985) have indicated that information for operational management are acquired internally and have to be certain and narrow in scope; since managers at this level prepare and perform their own work, the need for their information to be certain and narrow is eminent (Pirrtimäki, 2007). To enable monitoring of current progress and also scheduling of future events as Butcher (1998) points out, information at operational level also needs to be highly current, accurate and frequently accessible (Davis and Olson, 1985) for tactical managements. According to Butcher (1998) “such information is often produced directly as a by-product of the operational process itself, often in real-time or very soon after the event”.

3.1.2.4.1 Some impediments to managing information use

Organisational dysfunction, problems with the information itself and the manager’s cognitive limitations are factors identified by Minzberg (1975) to prevent management from using information in their task. The effects of these factors may not act in isolation and the degree of their influence on a decision-maker varies depending on the activity undertaking and the premises (Butcher, 1998).
3.1.2.4.1.1 Cognitive limitations influence on manager’s use of information

According to USA Department of Transportation (2012) cognitive limitation is “limitation of the ability to perceive, recognise, understand, interpret, and or respond to information”. Manager’s cognitive capacity is under daily scrutiny by their unstructured and complex tasks. In Butcher (1998) view; too much information, too little time, stress and fatigue, and pressure of other demands are some of the limitations that are very common with people. Further, Butcher (1998) explains that, “tendency of the brain to filter information in line with predetermined patterns and beliefs”, “discomfiture and threat when information disagrees with current beliefs” and “lack of information literacy resulting in as inability to understand what might constitute relevant information”, though they may not be evident, they have influence on information processing capabilities of anyone.

3.1.2.4.1.2 Processing ability of managers

Change in any form is inevitable, but does not always come easy. When confronted with it, can be perceived to be threatening (Butcher, 1998) and people can express their inflexibility (Staw et al., 1981). For instance, a manager who is well abreast with the shape ‘square’ when confronted with an irregular polygon of seven sides, though both are polygons, the manager is taken aback and possibly will reject totally the new polygon ‘information’. This is due to his/her current beliefs, ideas and culture of the individual, acquired over time, where the new polygon ‘information’ does not reinforce the previous known polygon ‘information’ (Butcher, 1998). Scholars (e.g. Mintzberg, 1975; Wilson & Walsh, 1996) argue that when there is a disparity between information and existing beliefs, experience, values and attitudes of people there is a tendency for them to filter it. Butcher (1998) argues that though managers need to ask questions, but in strategic processes, such questions cannot be that clear and due to that clear answer cannot also be anticipated, making collection of information for such task likely to be difficult. According to Butcher (1998) “it is not surprising, therefore, that information which is sought for strategic planning might not initially be recognised as useful”.

Stress, according to researchers, is variations in an individual’s mental or physical state as to how they react to situations (stressors) that pose challenges/threat (Krantz et al., 1985; Zimbardo et al., 2002). Since it has a link with an individual’s cognitive abilities, in Butcher’s (1998) view, it adds another dimension to the problems of information processing. According to Cryer et al. (2003), workplace stress has increased by 10% since 2001.

3.1.2.4.1.3 Information overload

The ability to create and distribute information today is in the high speed of all time. According to Blair (2010), “the total amount of information created on the world’s electronic devices is expected to surpass the zettabyte mark this year 2010”. Nicholas (2010) expresses his concerns that “the flood of digital information is changing not only our habits, but even our mental capacities: Forced to scan and skim to keep up, we are losing our abilities to pay sustained attention, reflect deeply, or remember what we’ve learned”. In Blair’s (2010) view, information overload dates back to the 15th century, when the printing press industry caused the book-boom and information technology has continued the trend to its fullest height today.

Information overload as points out, by Butcher (1998), can be explained in many ways, thus cannot be universally defined. Butcher defines it as having more relevant information than one can assimilate. Arguing from the time perspective of information overload, (Schick et al., 1990), state that “information overload occurs for an individual when the information
processing demands on time information load to perform interactions and internal calculations exceed the supply or capacity of time available information processing capacity for such processing”. Butcher (1998) identified seven reasons why managers and individuals suffer from too much information: as paraphrased here by (Edmunds and Morris 2000):

- they collect information to indicate a commitment to rationalism and competence which they believe improves decision-making;
- they receive enormous amounts of unsolicited information;
- they sought more information, to check out the information already acquired;
- they need to be able to demonstrate justification of decisions;
- they collect information just in case it may be useful;
- they play safe and get all information possible;
- they like to use information as a currency – not to get left behind colleagues

Information overload in its intensity creates health problems. A number of disturbing health issues have been linked to information overload: stress and anxiety (Butcher, 1998), increased tension (Li and Li, 2011), deficit trait (Hallowell, 2005), distraction and impatience (Robinson and Bawden, 2009), cognitive overload (Kirsch, 2000), continuous partial attention (Stone, 2009). Information overload has a negative effect on managers work efficiency and quality (Butcher, 1998). The multiple factors leading to information overload makes it complex and therefore leaves no easy solution or any single ‘quick fix’ solution (Robinson and Bawden, 2009).

3.1.2.4.1.4 Information literacy deficiency

Information technology today makes it possible to create large amounts of data that is underutilized or gets users muddled with it, in an attempt of sense making. Information literacy is “broadly defined as the ability to recognise information needs and to identify, evaluate and use information effectively” (Bruce, 1999) and it has been heavily discussed in the disciplines of library studies and Behrens (1994) calls for its application in fields of studies. According to Daniels (1993) "Relatively few people are information literate and even fewer understand the relevance of information to their business visions". In Mutch’s (1997) view, since those in authority to make use of data lack the prerequisites to derive meaning and knowledge out of it, an increase in data leads to overload and paralysis. Bruce (1999) argues in agreement with Mutch (1997) that there is confusion of information literacy with computer and information technology literacy and according to Butcher (1998), information literacy is a much wider concept than computer literacy, it’s a stage above computer literacy (Kanter, 1992); it implies an appreciation of technology as an enabler, rather than as a simple tool with which to automate functions (Butcher, 1998). The inability of organisations to chance on the outputs of their information technology is partially a failure of investment in the system (Mutch, 1997). A manager who has in-depth understanding of information literacy, strategise the organisation’s information and business needs to detect its information technology and as well benefit from its future advancements and prospects (Butcher, 1998). Being an information literate does not just happen, it demands that an individual has an understanding; of the components of information; all the nitty-gritty that affects the conducts of creation, dissemination, and operationalisation of information; how information is varied, made available or shaped by its social actions with respect to its environment (Lloyd, 2011).
3.1.3 Intelligence

The word intelligence dates back to the 14th century and deeply rooted in the military discipline. It has become a common term due to its association with many fields, most especially the business and IT industries. According to IFPO (2005) "Intelligence is a product created through the process of collecting, collating, and analysing data, for dissemination as usable information that typically assesses events, locations or adversaries, to allow the appropriate deployment of resources to reach a desired outcome". Bouthillier and Shearer (2003) also defined intelligence as "the ability to understand and apply knowledge". From the definitions above, intelligence is a process and a product that can be attained by having the skills or capacity to manipulate (filter, examine, enhance and analyse) information and also to make sense beyond it. The analytic component of intelligence distinguishes from data and information. Intelligence is a problem solving tool, but depends on the assessment and integration of information and knowledge (Bouthillier and Shearer, 2003). When information becomes unique to a group or solves a peculiar question(s) that elude all, such information can be termed as intelligence (Freeman, 1999). In Choo’s (2002) view, intelligence relates to the possession and creation of knowledge and characterises an adaptive behaviour. Intelligence is the interpretation and meaning that can be drawn from analysis to enable a decision-maker establish their conclusions. Freeman (1999) argues that "intelligence, if used properly, can be the basis of strategic decision-making".

3.2 Business Intelligence

The principles of intelligence applied to business are referred to as Business Intelligence (BI) (Marren, 2004). The word intelligence which BI is based on, according to Encyclopaedia Britannica Online (2012) "is used to refer to the collection, analysis, and distribution of such information and to secret intervention in the political or economic affairs of other countries, an activity commonly known as 'covert action'. Intelligence is an important component of national power and a fundamental element in decision making regarding national security, defence, and foreign policies".

BI is a concept and there are several definitions depending on the school of tort, according to Moss and Atre (2003) "it’s neither a product nor a system. It is an architecture and a collection of integrated operational as well as decision-support applications and databases that provide the business community easy access to business data". Thomas Jr. (2001) also states that, it’s a systematic process that collects, analyses, and organizes the flow of critical information, focusing it on important strategic and operational issues. Pirittimaki (2007) argues that, the concept is dualistic by referring to:

a) The refined information and knowledge that describe the business environment, a company itself, and its state in relation to its markets, customers, competitors and economic issues
b) The process that produces insights, suggestions and recommendations (i.e. the refined information and knowledge) for management and decision-makers.

BI development, stretches forty years back (see DSSResources, 2007), the term, it’s self is very current (Negash, 2004), but the core activities of BI are not really new (Mendell, 1997). Tyson (1986) argues that BI encapsulates a number of intelligence:

- Customer intelligence
- Competitor intelligence
• Market intelligence
• Technological intelligence
• Product intelligence
• Environmental intelligence

Similarly, Thomsen (2003) suggests the term BI has replaced: decision support, executive information systems, and management information systems.

As mentioned earlier in section 2.2 of BI being defined according to school of tort, English (2005) defines the BI environment as: “quality information in well-designed data stores, coupled with business-friendly software tools that provide knowledge workers timely access, effective analysis and intuitive presentation of the right information, enabling them to take the right actions or make the right decisions”. Brackett (1999) also considers BI as "series of concepts, methods and process that enables e.g. monitoring of economic trends and effective utilization of the business information on strategic and tactical decision-making", and further rise the importance experiences and hypotheses of employees a similar concern of English (2005). It can be still argued, though, from English’s definition that, the sources of data and information (business information) are not considered, which is acquired from both internal and external sources of the organisation (Pirittimaki, 2007). BI demands both internal and external information needs (Herring, 1994). From an analytic point of view, BI enables business users to understand, improve and optimize business operations (White, 2005). Negash (2004) also argues from a time perspective (the availability of information when required) and states that “it refers to shrinking the time frame so that the intelligence is still useful to the decision maker when the decision time comes”. Time and quality are important components of the decision-making process and to aid management in such cases, BI provides actionable information in time, in the right form and at the right time (Negash, 2004). According to Pirittimaki (2007), "the main idea in BI lies in identifying information needs and processing the data and information gathered, into useful and valuable managerial knowledge and intelligence". According to Thomas Jr. (2001), fundamentally BI enables an organisation to: avoid surprises, identify threats and opportunities, understand where your company is vulnerable, decrease reaction time, out-think the competition and also protect intellectual capital.

Ponniah (2010) considers BI to encompass two environments and they complement each other, as shown in fig. 4:

• Data warehousing (Data to Information): data are acquired from multiple sources, extracted, integrated, cleansed and transformed into information
• Analytics (Information to Knowledge): analytical tools applied by users to turn information into knowledge
According to Pirttimaki (2007), Thierauf (2001) carefully divides BI into strategic intelligence, tactical intelligence and operative intelligence, as shown in fig. 5. In Thierauf (2001) view, more-to external as little-to internal information are required at the strategic level, whiles the opposite is the case at the operative level. The scope of information at the strategic level are required to be broad and integrated to enable management to deal with upcoming events, whiles at the operative level, information here are detailed, specific and historical (Thierauf, 2001). At the tactical level, information requirement is a good balance between the strategic and operational levels, as shown in fig. 5 (Thierauf, 2001).

### 3.2.1 Benefits of Business Intelligence (BI)

According to Thomas Jr. (2001) “BI is both an offensive and defensive system”. It provides a better understanding of the competitive environment and at the same time acts as a protection for intellectual property (Thomas Jr., 2001). Gibson et al. (2004) group benefits of BI into tangibles (e.g. Return on Investment and Cost savings) and intangibles (e.g. better information, better strategies, better tactics and decisions, and more efficient processes). They further argue that the intangibles benefit out-weighs the tangibles, since BI falls under IT, where its benefits cannot be clearly identified. BI has lots of influence on strategic activities and where traditional evaluation techniques are applied in respect to projects with strategic benefits, success rates is very low (Irani and Love, 2001). As users advance in skills of BI tools, such users can e.g. be very instrumental in making strategic decisions, for instance, for the organisation not to pursue a particular market group; the level of BI benefit here is global in scope (see fig. 6) and not so obvious to identify and measure (Watson and Wixom, 2007).
Productivity paradox, according to Gibson et al. (2004), is when “investments in IT, although considerable, are yet to produce significant improvements in industrial productivity”. A situation where managers are not able accounts for their investments in IT (Willcocks, 1992). Traditional methods like Net Present Value (NPV) and Cost-Benefits Analysis (CBA) have not succeeded (Parker and Benson, 1988) at identifying and measuring the benefits of IT investments and techniques like: Return of Management (ROM) Strassmann (1990); Negotiation and Imputation (NI) Remenyi et al. (2000); Information Economics (IE) Parker and Benson (1988); Investment Feasibility Framework (IFF) Willcocks (2001), have been proposed by researchers.

Tools in BI enable possibilities for users to rapidly discover information to queries relating to their work. Timely answers to business questions, improve operational efficiency, eliminate report backlog and delays, negotiate better contracts with suppliers and customers, find root causes and take action, identify wasted resources and reduce inventory costs, leverage your investment in your ERP or data warehouse, improve strategies with better marketing analysis, empower sales force, provide quick answers to user questions and challenge assumptions with factual information, are some of the benefits to be gained from BI implementation (Ritacco and Carver 2007).

### 3.2.2 BI and other intelligence concepts

BI has varying definitions depending on the school of tort (academia, vendor, or a developer) (Golfarelli et al. 2004; Zeng, Xu et al. 2006; Gangadharan and Swami 2004) and shares similarities with other intelligence concepts: competitive intelligence (CI), corporate intelligence (CI), environmental intelligence (EI), market intelligence (MI), consumer intelligence (CI) and new terminologies comes up as intelligence in the corporate world advances (Global Intelligence Alliance, 2004). Sometimes, the concepts are used interchangeably. BI is an inward an inward looking function (Negash, 2004), whiles the other concepts mainly deal with the external environments of the organisation. According to Gray (2003) “BI is a natural outgrowth of a series of previous systems designed to support decision making”. Turban (2008) also states that “BI is an umbrella term that includes tools, databases, applications and methodologies...”. BI embodies EI, MI, CI and organisational intelligence (OI) (Cavalcanti, 2005). In Pirttimaki’s (2007) view, the principles behind the intelligence process remain the same, though the disparity between BI and the other intelligence concept.
may waver. An element of unambiguousness is evident when intelligence is applied to (strategic intelligence (SI), customer intelligence (CI), technology intelligence (TI)) as a field (Global Intelligence Alliance, 2004). Pirittimaki (2007) somewhat clarifies the terminology blurred-in as, BI to Europe as CI (which, normally emphasises on sources of information and environment outside the organisation) to North America. Thomas Jr. (2001), defines BI as "a systematic process that collects, analyzes and organizes the flow of critical information, focusing it on important strategic and operational issues" and Prescott (1995) also defines Competitive intelligence (CI) "as the process of developing actionable foresight regarding competitive dynamics (the moves and countermoves between competitors, suppliers, customers, alliance partners) and non-market factors (government regulation, tariffs, and the culture of a country) that can be used to enhance competitive advantage". Though both definitions draw from different perspectives, they point to the same basic concept of collecting, analysing data and distribution of information. CI as a strategic tool helps management to drive sound strategic processes (Global Intelligence Alliance, 2004). To maintain equilibrium with the changing markets and avoid the pitfalls CI provide an important role in any organisation not only aid in identifying competing stimuli, but also to interpret them (Patton and McKenna, 2005; Anderson and Hoyer, 1991). Among the collections of intelligence in the field of business, "CI is the broadest" with respect to the whole external environment and as well, focusing on strategic, tactical and operational decision-making, argues (Global Intelligence Alliance, 2004). In Sharp's (2009) view, BI is internally focused and software related as CI enables in-depth understanding of quantitative and non-quantitative issues. Sharp (2009) further argues that, the inability to make a distinction between competitive and competitor intelligence prevents an organisation from gaining the full potential of competitive intelligence and its accompanying prospects. According to Vitt et al. (2002), BI "covers a broad range of technologies, software platforms, specific applications, and processes". In a defined sector/industry where a competitor and or competitive analysis need to be investigated, CI is broader and is employed in this perspective (Sutton, 1988). Choo (2002) argues that BI is much broader in scope and incorporates both competitor (highly specific) and competitive intelligence processes including analysis of potential acquisitions and mergers as well as risk assessments (Gilad and Gilad, 1988; Sutton, 1988). Cavalcanti (2005) also states that BI helps an organisation to improve its competitive advantage through monitoring the business environment, avoid surprises, and proactively seek out opportunities and further argues that BI (covers both micro and macro environments) is broader than competitive intelligence (CI) which usually focus on micro environments.
As shown in fig. (7) Competitor intelligence (C_pI) is narrow in terms of scope of information gathering (Choo, 2002) and mainly at the product level (Freeman, 1999). Competitive intelligence (CI), however, is in the middle, focusing mainly on the competitive environments. BI’s scope of information gathering spans from the micro to the macro environment (Cavalcanti, 2005). C_pI activities which centres on tactical operations of an organisation has a shorter-term planning orientation as to the long-term planning dimension of BI, whose activities have strategic benefits.

Market intelligence (MI) is a process geared towards the market environment that an organisation operates in and differentiates itself from market research with the analytic capabilities (Sharp, 2009). Market intelligence is decision-centric and as expressed by some marketing executives, it’s a subset of BI (1st-Resource, 2009). According to Quirk’s (2004) “it’s a holistic knowledge of all aspects of the marketplace”. It’s a culmination of market and market research, argues (Jenster and Soilen, 2009). BI on the other hand, extends further; it’s a culmination of major systems technologies that presents a thorough understanding of an organisation’s current and future operations to enable decision-makers to be proactive rather than reactive (Thierauf, 2001).

Huosong et al. (2003), defines Knowledge Management (KM) to consist of management activities which develop and utilize an organization’s knowledge resources efficiently and improve a firm’s creative ability. KM is propelled by an organisation's competitive strategy to leverage knowledge of its intangible assets to produce value (Liebowitz, 2006). Karl (1997) suggests that there is no single approach to managing knowledge and identifies four notions: managing explicit knowledge using technical approaches, another notion is management of intellectual capital, managing all important knowledge concerning the organisations viability and success and the final notion sums up all the notions mentioned earlier together with all other knowledge-related concepts. Though both concepts (BI and KM) support common high
level objectives of enhancing business performance, their differences are found in their approach (InsideKnowledge, 1999). BI is worthwhile as a decision-making tool, whereas Knowledge Management is very significant in supporting an organisation to realize, capture and reuse knowledge to solve current problems (InsideKnowledge, 1999). KM concept can improve BI (Liebowitz, 2006; Haimila, 2001). According to Herschel and Jones (2005) "KM and BI, while differing, need to be considered together as necessarily integrated and mutually critical components in the management of intellectual capital". Liebowitz (2006) argues that since KM supports learning from previous success and failures, it is critical for BI strategy formulation and implementation. InsideKnowledge (1999) basing their argument on Thomas Stewart's rationale of intellectual capital; when applied to both KM and BI, both concepts "are one and the same activities", they assert. There is somehow an argument against this assertion, that basically the concepts are different. Thus, the idea behind KM sharing knowledge is opposite to BI's 'need to know' principles (InsideKnowledge, 1999).

For organisations to succeed in taking advantage of their opportunities, there is a need for a critical examination of their strategic intelligence (SI), that is, meeting strategic decision-makers informational needs at the right time (Xu, 2007). SI sums all the intelligence concepts (KM, BI, CI) in the business setting (Liebowitz, 2006), to "provide a company with the information it needs about its business environment to be able to anticipate change, design appropriate strategies that will create business value for customers and create future growth and profits for the company in new markets within or across industries" (Xu, 2007). For organisation’s to succeed by taking advantage of opportunities that presents itself, there is a call for a critical examination of their strategic position. According to Xu (2007), the purpose of SI as illustrated in fig. (8), is located at point C on the sigmoid curve, as a moment that an organisation takes advantage of the period from point A to B in fig. (8) to gain from the experiences and to anticipate the future market opportunities before the competition (Marchand, 1997).

![Figure 9. Sigmoid Curves (SOURCE: Xu, 2007)](image-url)

Traditionally, SI is influenced by the old-military model of operational intelligence (Liebowitz, 2006; Xu, 2007), where 'need to know' information sharing is strongly emphasized (Xu, 2007). Xu (2007), argues further, that the success of SI, which is effective use of information is influenced by people’s behaviours and values, information management practices, and information management technology practices.
Generally, all the basic processes of intelligence (collecting, analysing and distribution) are supported by all the intelligence concepts that relate to decision making (Global Intelligence Alliance, 2004).

3.2.3 BI initiation and implementation

BI holds the promise of enabling organisations to improve their decision-making and as well have a strategic advantage over their respective competitors (Borking et al., 2011). According to Borking et al. (2011) somehow about 50% of BI projects fail, although organisations who implement such systems have what it takes to be identified by the word intelligence, but lacks the potential in practicing intelligence: that is, to gather information and gain valuable insights. Loshin, 2003; Borking et al., (2011) cites different motives of some individuals or group either within/outside the organisation as the driving force behind BI implementation, that may either stems from a vendor who want to sell at all cost or internal developer(s) who is just excited by cool technologies. Such motives certainly do not result in a successful implementation of BI. Building BI systems is not a simple process, it’s required breaking strong holds; organisational work culture, lack of general knowledge about intelligence and resistance to change (Herring, 1988). The complexity and financial demands of BI investments obviously does not allow it to escape from the personal and political hurdles that other IT projects suffer (Loshin, 2003). It is therefore imperative to secure a senior - level (management) sponsorship in BI projects to ‘impose governance on the program’ and to ‘establish a vested stake in the success of the project’ among other factors (Loshin, 2003; Vitt et al., 2010). Yeoh and Koronios (2010), in their research categorised success factors of BI systems into three major groups; Organisational, Process and Technology. BI systems cut across departmental boundaries and can succeed with full top management support and sponsorship. A clear vision and well instituted business case that intertwines with the strategic goals of the organisation are a necessity to anchor top management unflinching support (Yeoh and Koronios, 2010). At the process level, having identified a clear business case and with an incremental delivery approach, BI implementation team needs a team constituent of (Business experts, who have in-depth intelligence in their business area and can foresee future changes and trends, users, etc.) all who will have something to do with the system and not just a team of technical experts (Yeoh and Koronios, 2010). Success can be achieved at the technical with a “flexible and scalable infrastructure design allows for easy expansion of the system to align it with evolving information needs” (Olszak and Ziemba, 2007).

Borking et al. (2011) argue that, BI projects are of certainty to fail, if organisations tends to choose the last option of selecting BI tools (software) first instead of starting with an architecture of the system. According to SearchBusinessAnalytics (2010) "BI architecture is a framework for organizing the data, information management and technology components that are used to build business intelligence (BI) systems for reporting and data analytics". It is an important part of any BI project as argued by Borking et al. (2011) earlier. BI, when it’s well implemented, in spite of its complexity, yield positive results, though the financial demands are enormous (Watson et al., 2004). Shen (2011) identifies two types of BI architectures: Traditional BI architecture and Analytics- Oriented BI architecture, as indicated in fig. (9) and fig. (10).
In the presentation layer of the Traditional BI architecture (as shown in fig. 9), it is very heavy on reporting, but light on advanced analytics (Shen, 2011). In Shen’s (2011) view, it’s clear the traditional BI architecture support the distinction between BI and Business Analytics (BA) myth. Since the traditional BI architecture does not include BA capabilities, business users had to perform their analytical processes externally, however, this approach leads to “uncontrollable process and questionable data, that seriously hamper BA effort” (Shen, 2011).
According to Shen (2011) “An integral solution combines advanced analytics with powerful data visualization and reporting capabilities to support fact-based and data-driven decision-making” as shown in (fig. 10). Shen (2011) further argue that, it is eminent for BI vendors to include a more user-friendly BA capabilities (predictive analytics, data mining, text analytics, simulation, decision analytics and advanced modelling, see fig. 10) in the BI framework which will allow the majority of BI users who do not possess high technical (analytic) skills to perform their task ‘without lots of IT support’.

3.2.4 BI Process
The BI cycle has a strong connection to the military intelligence cycle due to their history. The process is basically similar to the military intelligence procedure (Endrulat, 2003). It is a systematic process driven by organisational needs, to gain the utmost from the decision-making process (see fig. 11 below). The basic intelligence process itself has outlived the tools (computers and knowledge database software) Thomas Jr. (2001). According to Pirttimaki (2007) “the focus of BI process is typically more on business-oriented issues and analysis, enrichment of raw data and information into actionable knowledge and intelligence”. Shades of BI process models have been suggested by researchers (Thomas Jr., 2001; Vitt et al., 2010; Fleisher and Bensoussan, 2003) and similarly organisations BI process model can vary accordingly due to its generic nature (Pirttimaki, 2007). Pagels-Fick (1999) categories BI process into generic and decision-oriented (see fig.). Gilad and Gilad (1985) and Vitt et al. (2002) similarly divide the BI process into systematic or ad hoc. The generic/systematic BI process is continuous effort to gather knowledge, with no limitations, but flow alongside the organisation’s prevailing competitive circumstances, purposely to discover opportunities and threats (Pirttimaki, 2007).

Figure 12. Generic BI and Decision-Oriented BI (SOURCE: Pagels-Fick, 1999)
Ad hoc or decision-oriented BI process on the other hand is more precise, that is, an identified threat(s) or a business opportunity(ies) for example, is considered worthwhile to pursue by the organisation with the aim of performing specific analysis to support a particular decision (Pagels-Fick, 1999). Most often it serves a one-time intelligence need (Pirttimaki, 2007).

From (fig. 12) Planning is the first phase of BI process, by clearly identifying decision-makers needs. As described earlier, corporate needs are not usually easily identifiable and can have either a direct positive or negative influence on the success of the BI process. This phase is crucial to the whole project and it is important to dedicate ample time to sift through all the hierarchy of decision-makers to clearly make-out their business needs from their related problems, questions and prevailing working conditions.

The second phase is the data collection stage; applicable data are ethically gathered, be it qualitative or quantitative or both from the organisation’s internal sources or external or both sources, which can be primary or secondary (Pirttimaki, 2007). According to Pirttimaki (2007) it is important to have a “proper understanding of the external environments” and it “can be achieved only when external information is carefully structured and combined with the internal know-how of employees”. The collected data are warehoused by ensuring that they are integrated, business-focused, non-volatile (flexible and stable) and time-variant (Watson and Wixom, 2007). Dependant on which approach to employ, be it top-down, which is from data warehouse to feed data mart or a bottom-up approach, which is of a narrow scope (a single business process, departmental or geographical location): data mart to data warehouse, it’s an important issue to be dealt with (Ponniah, 2010).

![Figure 13. The Business Intelligence Cycle [SOURCE: Thomas Jr. (2001)]](image)

Single version of the truth stems from having an up to date and quality database centrally located (Watson and Wixom, 2007). BI success is highly affected by data quality. The information processing and storage phase, basically involve, gathering data and according to Watson and Wixom (2007) “it is the most challenging aspect of BI”. About 80 percent of BI time effort (Watson and Wixom, 2007) is dedicated to this process to prepare, evaluate, clean, integrate and store all acquired data from all sources and in doing so it is also important to be guided by the business rules2.

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2 Business rules are literally the encoded knowledge of your business practices; and from an IT perspective, a business rule is an atomic piece of reasonable business logic (Ross, 2003)
In the Analysis and production phase, data are carefully analysed by employing analytic tools and methods with the ultimate aim to interpret, explain and make sense of discovered phenomena’s, which will enable strategic actionable decisions to be taken.

The Dissemination phase enables the valuable intelligence produced to be made available, with tools and in a form (reports, intranet, internal databases, newsletter or portal: Pirttimaki, 2007), which is clear and understandable enough for the required decision-makers (Thomas Jr., 2001).

Finally, the whole process ends only successfully with all preceding phases functioning up and right to enable decision-makers to fully access the system to address their respective needs adequately. The cycle starts or continue again as the need arise.

Herring (1996) identifies four major groups of human-resource at each stage of the BI cycle phases (library-acquire, organise and store information; collectors-gather intelligence for analyst; analyst-perform analysis; and users-make use of discovered intelligence) that is critical for the process. Herring (1988) point out that “converting intelligence cycle principles and existing activities in a BI system is not a straightforward process” and therefore organisation’s should “overcome their own cultural barriers, the natural resistance to institutional change, and a general ignorance about intelligence”.

3.2.5 Business Intelligence Competency Centre (BICC)

According to a Gartner survey (Hostmann, 2007) about 33% respondents indicated they have established BICC and on the Gartner BI maturity curve, 7% of companies are on level four, on the curve have BICC (see fig. 13), suggesting that at this stage the organisation gains strategic insights that have direct influence on strategic decision-making.

![Figure 14. Gartner’s BI and Performance Management Maturity Model](SOURCE: Hostmann (2007))
According to the Gartner survey, though organisations that have implemented BI may be at various maturity stages and need to overcome encountered barriers to improve their maturity levels, there is a clear indication that, development of BICC offers the best option (Hostmann, 2007). BI and performance management succeed by bringing together organisation’s business, people, processes, services and technologies (Hostmann, 2007). “BICC is a team of people established to promote collaboration and the application of BI standards and best practices across the organisation” (Oracle, 2012). The team effort created by BICC spans across departments and encompasses “three groups of participants (see fig. 14):

- Analysts, who define and carry out domain-specific and ad hoc analysis
- The user, who consume analytic results and associate information for making decisions and managing performance
- IT staff that define, develop and support the technology components” (IBM, 2013).

![Figure 15. Essential BI Competencies and Skills integrated with BICC (SOURCE: Hostmann (2007))](image)

Any organisation seeking to benefit from its BI investments and matured to the strategic level and beyond, needs BICC that continually evolve with the business and people (Hostmann, 2007) to continually create and share information and the best practices across the organisation and move it towards fact-driven culture.

### 3.3 Summary of theoretical findings

The literature review has revealed that intelligence has long roots in military operations and has been applied in many fields. BI is however new in adopting the intelligent approach and combing it with business and information technology to facilitate decision-making processes. Given the need for information for actionable decision-making, similar approaches have been adopted dependant on peculiar needs.

Information (gained from data) are important ingredient of decision-making to an organisation to take advantage of its opportunities and withstand the competition. The availability of information helps reduce uncertainty and equivocality to a decision-maker. BI
systems, comes in handy, since it’s allowed the systematic process of collecting huge data that are generated by the organisation’s processes. Has it organised and powered by analytics capabilities to perform drill-down operations to gain deeper and finer details to articulate, informed decision-making in time (or at certain occasions in real-time) and coupled with richer presentation of results. The system combines concepts, methods, processes and software’s that allows monitoring, effective use of resources and information on strategic and tactical decision-making, thereby saving cost. BI systems enable users to discover unknown trends that cannot be achieved easily with the traditional systems, contributing hugely to strategic decisions. Other benefits with BI systems includes, timely answers to key business questions, improved operational efficiency, elimination of the backlog and delays of reports, ability to find root causes of problems and take appropriate actions.

The literature review indicates that, BI basically depends on data that is acquired from both internal and external sources held in a warehouse and the inability to gather huge quality data obviously will impede achieving Single version of the truth, since all the other processes will draw from it. Lack of top management support and sponsorship leads to unsuccessful implementation of BI and to convince top managers, a clear vision carefully aligned to the organisation's business rules that fits into its strategic goals needs to be established.

A BICC is equally important to be established, being a mix of competencies including business people, analysts and IT personnel drive strategic decision-making, a shift towards facts-driven culture.

3.4 Arguments for an empirical study
BI is a complex, expensive and needs ample time to implement. Its development and application makes it unique to each case, hence the need to investigate the selected case to understand more of its intricacies in respect of BI implementation.
4 EMPIRICAL STUDIES

This chapter presents the empirical findings of the study. The first section of this chapter presents a brief introduction about the case company. The continuing sections present a brief description of the selected departments and followed by their respective interview transcriptions.

4.1 The organisation (Electricity Company of Ghana-ECG)

The company was established in 1967 as the Electricity Corporation of Ghana and until 1997 changed its name to the Electricity Company of Ghana still as a public institution but operate as a limited liability company. ECG makes bulk purchases of electricity from the Volta River Authority (VRA), is the major electricity generator and the sole distributor. The Ghana government through its many energy restructuring programmes over the years, charged ECG to acquire and distribute electricity to the southern sector (including Greater Accra, Central, Western, Eastern, Ashanti and Volta region) of the country. The population density in the southern sector is heavy (about 73.5% of the national population) including almost all the heavy and light industries. Since demand for electricity in this area is much higher and to serve its customers (which are categorized as residential, commercial and industrial) ECG has regional offices in all the six regions, which is further divided into 79 operational districts.

As at 2010, out of 6,771.3 GWh energy purchased from VRA, ECG sold 4,972.4 GWh to 2,120,564 customers with 26.6% system losses (ECG, 2010). The energy demand growth over the period was 11.0%. However, ECG posted 1.15m GH¢ net profit after tax (ECG, 2010). According ECG, in the urban communities, the average no. of outages per customer per year was 282 resulting in 65.6 hrs. whiles in the rural communities, 266 average no. of outages per a customer resulting in 104.1 hrs. in time per a customer (ECG, 2010).

The significant positive indicators in the year 2010 annual report, especially in finances, came about mainly as a result of both stable political and economic environments (e.g. stable interest rates, inflation and exchange rates), high rainfall within the year and mid-year electricity tariff review (ECG, 2010).

According to the ECG mission statement “To provide quality, safe and reliable electricity services to support the economic growth and development of Ghana” has not been achieved so far and the organisation is engaged in several alternative approaches to fully realise its mission (ECG, 2010).

4.2 Sampling

Decision making capabilities are in the hands of top managers in any organisation. Considering the organisational structure of E.C.G and the department’s respective operations, seven managers (Engineering, Operations, Finance, Customer Service, ICT, Human Resource and Corporate Planning Division) were identified by the researcher as crucial for this study.

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2 2010 Ghana population census
Accessed 2.2.2013
with respect to decision making and BI. The managers were selected based on the stated criterion in section (3.4).

4.3 The Interviews

To facilitate a smooth interview process, the researcher prepared two interview guides (see Appendix I & II). Since the ICT department plays more of a supportive role to all other departments and as the custodian of the organisation’s information infrastructure, its interview guide is different, focusing more on information infrastructure, request and support. The interview for other departments, focused on information request (need) and its effects on decision making and systems support for information acquisition and use.

The researcher consulted three friends who are working in similar job positions and used them as test cases for the interview guides. The interview guides were fine-tuned after the test interviews. The researcher also learnt a lot from this exercise especially, when to ask a follow up questions. The researchers’ confidence had improved by the end of the third test interview.

Each of the respondents (actual interviews) was given a three minute introduction about the research and its objectives, the reasons for them in particular and their inclusion in this exercise.

Generally, the questioning was followed sequentially, though in some instances, some questions are skipped to be asked later. This was done to allow the respondent’s to relax and allow a seamless flow of the interview. Follow-up questions were also employed to allow for clarification or confirm earlier statements by respondents.

To enable the researcher to be able to conduct constructive analysis on data, all respondents were made to understand their respective conversation through Skype to their phones will be recorded. Though there were few call drops due to internet connection, generally it was a success.

4.3.1 Engineering Department description

This department is tasked to oversee all major electrical and civil works projects in the interest of ECG. Its responsibilities and functions are clearly defined to include the following; Preparation and updating of Network Development Plans, Preparation of major investment proposals, Design of Networks and substations, Implementation of projects (when financing is secured), Development and Continuous updating of Equipment Specifications, Construction Standards and Design Guidelines. Implementation of Civil works development and maintenance projects, Development and operation of the Corporate Wide Area Network and associated applications. Implementation of the corporate network database project, Distribution Engineering Geographic Information System (DEGIS), Providing technical support to the Government of Ghana in the implementation of the National Electrification Scheme, Assists the Managing Director in the development of strategic plans, policies and procedures and budgets for the approval of the Board, Prepares and implements programmes for the continuous development of subordinate staff and as usual Prepares periodic reports for the Managing Director (ECG, 2013).

The Engineering department (Eng. Dept.) occasionally make information request to the ICT department. The information request results from the ICT department are considered not
enough and the reasons for such situations can be many, “either am not well understood or am not clear enough or could be a combination or possibly forgetfulness” according to the director (Eng. Dept.). Information are also sort from other departments and as well vice-versa, “we operate in the same organisation and departmental interdependencies are to be expected”. The information from other departments are considered ordinary in terms of quality.

The response time of information request according to the director “it’s very slow”, reasons can be either the department is in waiting as well or the information is just not readily available. There is a snowball effect of delays, which, according the Engineering Department (Eng. Dept.) highly affects its work progress. To measure the quality of information, the director of Eng. Dept. identified the following criterion; Comprehensiveness, Conciseness, Clarity, Correctness, Accuracy, Consistency, Applicability and Timeliness. Information from the Eng. Dept. highly contributes to the organisations strategic decision making.

According to the director of Eng. Dept. the current state of the organisation’s information systems does not allow a single version of the truth to be accessed and used by all managers. This is as a result of the organisation not having a centralised information system. Smart or intelligence decisions are not supported by the current information systems. Information acquisition and, use and distribution are critical for the Eng. Dept.’s work, but in the director’s view, information transparency in the organisation is not open.

The director of Eng. Dept. strongly agrees that the capabilities, BI offers, if implemented, will significantly improve and positively influence the department’s work processes, leading to timely intelligent decision making. Although alarmed by its huge implementation cost, with respect to all the benefits offered by BI systems “as the director of this department and a decision maker, I will advocate and support the implementation of such a system”.

### 4.3.2 Corporate Planning Division description

This department works in close partnership with top management to drive the established strategic goals of ECG to achieve its desired outcome. To succeed at such a mission the department responsibilities are split in to two divisions; Strategic planning, whose responsibilities include: Develop corporate and annual roll over plans in conformity with ECG Board and Management’s Strategic objectives, Gather and analyse relevant corporate information for target setting, Maintain corporate vital statistics database, Develop models to analyse and define strategic direction and paths to corporate growth and profitability, Prepare Corporate Annual Reports, and Provide inputs for updating the corporate website and intranet. Whilst Monitoring and Evaluation is responsible for Monitoring corporate performance against planned/set targets, Monitor the operational performance of all Districts and Regional Offices, Conduct variance analysis and prepare reports, Liaise with the State Enterprises Commission (SEC) to prepare and sign annual performance contracts, and Prepare annual budgets for the Division (ECG, 2013).

Information are requested from the ICT department frequently and request results are considered to be average most of the time. The department’s responsibilities also allow it to constantly request information from all other departments. “Generally, we plan and monitor, which requires our department to actively coordinate with all the departments” according to the director of corporate planning. The information request results from other departments in terms of quality, according to the director “certainly it’s cannot be 100 percent, approximately moderate, that is the best I can think of”.

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When the information requested are put forward, the response times are normally very slow, leading to more delays, which highly affect the work progress of the department and according to the director “sometimes such delays can affect some strategic decisions or you are forced to execute too early based on some factors and scanty information available”. The director of corporate planning considers the following as the criterion for information quality; Comprehensiveness, Conciseness, Clarity, Correctness, Accuracy, Consistency and Applicability. To enable strategic decisions to be made in the organisation, according to the director “is the absolute reason for setting up this department and therefore it is our core duty and for that matter our work and information highly affect strategic decision-making”.

ECG information systems at the moment are not centralised and therefore single version of the truth cannot be accessed and used by managers. Making smarter or intelligent decisions with the current information systems at ECG cannot be supported. In respect of the core responsibilities of the corporate planning department, it considers all the stated capabilities of BI; Quick delivery of information to other managers, Shorten report preparation time, Web-based report distribution, Ability to perform more analytical tasks, Drill down capabilities (e.g. the ability to get detailed understanding of some numbers) and Key metric reporting alerts, to enhance its work processes. If management considers implementing BI systems and needs managers supports in making a decision on it, the director considers the following benefits; Quicker time for management to analyse current information, Key performance indicator (KPI) alerts to identify cost overruns early, Improve administrative process efficiencies, Less time to prepare information for managers, Eco-friendly processes, e.g. more online reports and analysis to reduce printing cost, to influence the department’s decision.

4.3.3 Operations Department description

The Operations department as one of the functional units of ECG, this department seeks to deliver quality reliably and safe supply to our customers, Maintain our network regularly to reduce the number of interruptions, outages and respond quickly to faults (ECG, 2013). The operations department’s responsibilities are the following: Provide a structure that will ensure the Operation and Maintenance of the distribution systems, to give continuous, safe and reliable supply of power to ECG Customers. Co-ordinate all the activities in the Directorate, including administrative responsibility of all Regional Directors and Divisional Managers at Head Office. Ensure efficient and smooth running of the Regions and Districts. Prepare inputs for the Directorate’s Annual Plans of the Strategic Plan. Coordinate the preparation of Annual Budget of the Directorate. Set Operating Standards and monitor same for 33kV, 11kV and LV Systems. Ensure a high standard of Safety for staff, equipment and public and inculcate a good safety and healthy atmosphere in the organization. Ensure good corporate image of the Directorate and ECG at large. Provide adequate resources for the regions and divisions to perform efficiently. Liaise with other Head Office Directors. Supervise Street Lighting activities on behalf of the Ministry of Energy. Submit timely reports (quarterly and annually) (ECG, 2013).

Sometimes the Operations Department makes information request to the ICT department and quality of such results are more often normal. Dependency on other departments for information are also said to be irregular. Generally, information request results “is ordinary, based on personal observations” according to the director.

Time as a factor in terms of response to information request in the director’s opinion is average and there are average delays, that is to say, work progress is averagely affected.
Quality of information is important “especially for managers and therefore cannot be compromised” as according to the director and totally in agreement with Eppler’s (2006) quality of information content criterion. Strategic decision-making in the organisation “is non-functional without the input of the Operations Department” emphatically stated by the director.

The director of Operations does not agree that single version of the truth can be accessed and used by managers, in that “the organisation’s information systems do not allow information from all the departments to be consolidated at one place”. The current information systems “cannot allow intelligent/smarter decision making simply due to lack of consolidated data or information”. Should ECG consider implementing BI, the director of Operations agrees on all the stated capabilities of BI; Quick delivery of information to other managers, Shorten report preparation time, Web-based report distribution, Ability to perform more analytical tasks, Drill down capabilities (e.g. the ability to get detailed understanding of some numbers) and Key metric reporting alerts, to strongly have a positive impact on its work processes and output. Based on these benefits delivered by BI; Quicker time for management to analyse current information, Key performance indicator (KPI) alerts to identify cost overruns early, Improve administrative process efficiencies, Less time to prepare information for managers, the director of the Operations department pledges an unflinching support should ECG decides on BI implementation.

4.3.4 Finance Department description

The financial affairs of ECGs are sorted out by the Finance department by preparing and presenting apposite accounts and delivering financial information to management and stakeholders to enable informed decision making.

Information request to the ICT department of the Finance department is seldom and quality of results is “so-so”. According to the director “Occasionally a request for some detailed information is just not possible”. Information request to other departments “is affirmative, else our work will be incomplete and obviously won’t get done to take the necessary actions” and results quality-wise is in the middle. In the director’s opinion “you almost always have to work on such information and or have to make further requests”.

Response time to information requests as according to the Finance director “sporadically the extremes do happen”. When there are delays in information requests, progress of the work of the department is somehow affected. The organisation’s strategic decision making can be effectively executed with the inclusion of the Finance department’s information.

In the director’s opinion “Single version of the truth at the moment is not supported by ECG’s information systems”. Current status of ECG’s information systems does not allow smarter/intelligent decision making. Quick delivery of information to other managers is considered by the director as the single most important capability of BI to relate to the department’s operations. Quicker time for management to analyse current information is the benefit of BI, that the director of Finance will consider to build his reasons to support the implementation of BI should ECG ever via for such a system. Both benefits and capabilities of BI presented were appreciated later.
4.3.5 Customer Service Department (CSD) description

The Customer Service department has the mission to ensure ECG valued customers in its operational area are satisfied with the provided services (i.e. Production of accurate bills, Prompt delivery of bills to our customers, Accurate metering of every customer and Operation of quality Customer Relations Management).

The department's operations are achieved with the support of six sub divisional offices, which includes; Billing and Revenue (B&R), Commercial Data Processing Division (CDPD), Metering and Technical Services (MTS), Sales and Marketing (S&M), Management Information System (MIS) and Revenue Protection (RP) (ECG, 2013).

CSD constantly makes information request to the ICT department, though quality of information requests results are said not to be enough. Information requests to other departments in the CSD’s director’s opinion “is heavy and constant, as a department that acts as go-between for customers and the organisation, it’s our job to share information on a daily basis with other departments”. Information request results from other departments are said to be insufficient. According to the director “let me cite an example, a customer makes an enquiry, we then put such request through to the appropriate department and depending on the issue, feedbacks are either returned to us or to another department or to the customer directly”. Information request delays highly affect work progress, “delays almost bring our work to a halt, when it does happen”.

Response time is said to be “unexceptional” but according to the director “a prompt response will be excellent”. Clarity as criteria of information quality is enough to qualify information to or from the CSD department in the director’s opinion. “ECG existence is due to its valuable customers, it is therefore the prerogative of this company to deliver as and when the customers demand. We do so by providing management with our understanding of our customers to allow strategic decision making”.

ECG information systems at present do not support a single version of the truth accessibility. Intelligent or smarter decision-making capabilities of the current information systems are absent. Among the capabilities that BI offers; Quick delivery of information to other managers will be a plus to the CSD operations. With eco-friendly processes as a benefit of BI implementation, it will totally influence CSD support for such information systems. Upon detailed explanation about the system all other options were selected.

4.3.6 Information Communication and Technology (ICT) Department

Information requests put through by the directors of departments are clearly stated. “When directors make a request they want their results almost immediately, that is to say, response time is extremely urgent”. However, the ICT department is able to averagely respond to information requests. Occasionally the ICT department is able to discover some unusual insights that management can fall on in making strategic decisions, with the current information systems.

Continuous monitoring processes are currently not possible with the information systems to quickly communicate alerts to the appropriate offices to influence decision-making. “Currently, all the departments are disconnected and lack of consolidated systems means key business questions cannot be answered”. According to the director, “the previously mentioned conditions again, do not allow adequate competitive information to answer key business
questions”. BI systems and data warehouse have never been implemented by ECG. Knowledge level in Data Analytics, Data Warehouse, Extract Transform Load (ETL) software and Data Mining are considered to be low according to the director of the ICT department.

Single version of the truth, is simply not possible with the current system since, the information systems is not centralized according to the director of ICT. Intelligent/smart decision-making is not achievable with the existing information systems.

4.3.7 Human Resource Department (HR) description


The department of HR occasionally sends information request to the ICT department and results are described to be fairly good. The department in its work collaborates effectively with all other departments and therefore information request to and from the department is a must. Information request results from other departments are not different from the ICT department.

“Immediate responses to requests, would be appreciable but in our case response time is generally slow” according to the HR director. Delays in quest of information to get work done on the other hand tremendously pulls back the department’s work progress. Quality of information as according the HR director “is best described by its applicability”. Information from this department extensively contributes to the whole strategic decision-making in ECG, since it’s responsible for the entire workforce in the organisation.

Single version of the truth is absolutely not accessible with the current information systems of the organisation. Intelligent or smarter decision-making capabilities are presently not applicable with the information systems at ECG. The work definition of the HR department allows it to consider Quick delivery of information to other managers as the single most important capability of BI that its work can relate to. Putting all the stated benefits of BI into perspective to support the implementation of BI as a manager, according to the HR director “improve administrative process efficiencies, would be the most important tangible reason to support BI implementation”, however, the other options were considered later after much explanation was offered.

4.4 Empirical research results

The purpose of the empirical studies was to enquire from directors at ECG as decision makers about their acquisition and use of information with the current information systems.

ECG is charged by the government of Ghana to acquire, distribute and maintain electricity to the six regions (73.5% of the national population) creates enormous data in carrying out their responsibility. With a customer base of 2,120,564 (domestic, commercial and industrial) and annual energy demand of 11%, the organisation data are scattered in systems all over in its regional offices and departments.
All directors (managers) firmly affirm to the acquisition and use of information in their respective operations. There are strong interdependence of information use and acquisition between the departments and quality of information request results are generally average. All directors admit to at least making an information request to the ICT department and quality of such requests are average. Generally, response time to information request is also average. Delays in information requests highly affect the progress of work. Information needed in making strategic decisions at the corporate level at ECG are required from all the departments.

All directors unanimously agree that single version of the truth is unattainable with present information systems at ECG. Though the director of the ICT department assets that the department occasionally discover some unusual information with the current system that influences strategic decision-making, the director (ICT) shares a similar opinion with the other directors that intelligent/smart decision-making with the present information systems is not possible. Given the options of BI capabilities that can influence the work processes of the departments, two departments considered all the options to relate to their work processes, whilst the rest initially considered only one option that connects to their work processes. Similarly, two of the directors almost considered all given options of benefits of BI to influence their decision to support BI implementation should ECG opt for it, whiles the rest initial support for BI was based on only one option but corrections were made upon further details about the system.

The ICT director admits that BI or similar system and Data Warehouse have never been implemented by ECG. Competencies in Data Analytics, Data Warehouse, Extract Transform Load (ETL) software and Data Mining are said to be low.

The next chapter presents the cross-analysis of participants and findings within the parameters of the literature.
5 ANALYSIS AND RESULT

5.1 Information Needs
The work nature of the selected departments indicates they create enormous data which generates into information (Senn, 1990; Davis 1985; Ahitus and Newman, 1990) to enable decision-making. As decision makers, their need for information arises when there is a missing link between sense-making (Drevin and Nilan, 1986) or in Choo’s (2000) view “arise from problems, uncertainties and ambiguities encountered in a specific organizational situation and experience”. All departments’ informational needs are for both internal operations and external purposes (Ewusi-Mensah, 1981) as acknowledged by the customer service department (CSD) director and the operations department director. The directors unanimously acknowledge their need for information and where the interdependencies between the departments are stronger, the need for information is equally demanding. According to Pirttimaki (2007), "the main idea in BI lies in identifying information needs and processing the data and information gathered, into useful and valuable managerial knowledge and intelligence”.

5.2 Processing ability of Information with respect to Education and Experience
The selected directors have Bachelor degrees in their respective fields as follows; Master’s degree (Dir. of Eng.), three executive Masters’ degree (Director of Operations, Human Resources and ICT dept.); Chartered Accountancy (Director of Finance) and a Doctorate degree (Director of CSD); and until their current positions have served not less than five years in various positions and involved in several projects. All directors have held their current positions for not less than two years, except the director of finance who has served for only a year. Managing director's education and experiences accumulated over the year, is a clear indication of their ability to identify their business information needs, evaluate and use them effectively (Bruce, 1999).

Though the director of ICT states managing directors' requests is clearly stated, Butcher (1998) argues the opposite, that is, in strategic process their questions cannot be clear and therefore answers cannot be anticipated. This is in agreement with all directors’ indication that information requests results are average. However, according to (Mintzberg, 1975; Wilson and Walsh, 1996) there is a tendency to filter requests results when there is disparity between that and what is known (education), beliefs, experiences, values, attitudes, etc.

5.3 Perceived quality of Information
Quality of information is important to the productivity of managers (Baker and Fraser, 1995; Crump, 2002; Eppler, 2006) and all participating managing directors in this research were undivided about it. Eppler (2006) posits quality of information has both subjective and objective dimensions which are well supported by director’s opinions; for e.g. according to the Director of Finance “you almost always have to correct such information and or have to make further requests”. Directors presented with Eppler (2006) criteria of information quality
to define this subject matter, their answers confirmed Eppler’s (2006) subjective and objective dimension they apply in their judgment of information quality. However, except in ideal situations that all Eppler (2006) criteria can be met as the director of corporate planning division suggest “certainly it cannot be 100%...”.

5.4 Response Time

There is a general consensus by all the directors that response time to information request is ordinary, resulting in a cascade of delays which according to the directors affect the progress of work. The reasons behind this situation cited by the director of engineering “either the department is either waiting as well or the information is just not readily available”. These findings are obvious since the organization information systems are scattered in all the departments and offices. ECG information systems is not centralized (Dir. of Engineering, Dir. of Corporate Planning Division). Time is an important quality of information and decision-making, which offers a competitive advantage, Applier (2006) argues. BI is neither a product, nor a system (Atre, 2003), a systematic process (Thomas Jr., 2001) based on a centralized business data and according to Negash (2004) provides actionable information in time, in the right form and at the right time.

All managing directors emphatically confirm their department important contribution to the whole organization’s strategic decision-making, thus delays in the system with respect to information request and unconsolidated information systems, which partly affects their operation certainly have direct effects on ECG strategic decision-making. This apparently translates into costs, since the organization is not able to take advantage of its opportunities and threats (Thomas Jr., 2001).

5.5 Information Systems support for information acquisition and use

The information systems in E.C.G are sparsely located in its departments located in all six regional offices. The organisation does not operate centralised information systems as confirmed by all interviewed managing directors. Data and information are locked down in isolated departments and in different regional offices which obviously creates delays and multiple versions of the truth, unlike the BI systems which enables single version of the truth (Watson and Wixon, 2007), and as all managing directors also agree is unattainable with the current information systems at E.C.G. The ICT department is responsible for E.C.G’s information systems and as well provide other IT support services to the entire organisation and with such quantum of responsibilities it is clear then why the department is not able to give spontaneous responses to information requests that are directed to it daily.

E.C.G apparently operating a disintegrated information system, is unequivocally agreed by all managing directors that current information systems is unable to support intelligent/smart decision making. On the contrary BI enables the collection of data from disperse or multiple locations, integrated, cleaned up, thereby making it possible to perform analytic operations on them to generate information to make it commonly available (Ponniah, 2010). Though the director of ICT admits occasionally the department is able to make some unusual discoveries to support strategic decision-making with the current information systems, this is possible since, the ICT department plays a supporting role to all other departments by receiving and processing all sorts of information requests, it’s obvious to uncover some unknowns. This is a
clear manifestation that with BI systems, E.C.G can uncover more insights that can reduce cost at the operational and tactical levels and highly influence the whole organisation strategically.

With current information systems at E.C.G not been integrated, continuous monitoring process are not available to communicate alerts to managers. Adequate competitive information to answer key business questions are not available for management use, according to the ICT managing director. BI on the other hand, provides these capabilities and not only that but as well empower managing directors and sectional to acquire the required information that answers their respective business questions, at the right time and further perform drill-down enquiries when necessary to better understand the results and produce ad hoc reports, all without or little IT supports (Ritacco and Carver, 2007). This can allow the IT department to be re-deployed into other projects (Ibid).

5.6 BI, BICC and corporate support
Though interviewed managing directors did not explicitly showed their knowledge about BI, the ICT managing director was an exception. The ICT director had a general good knowledge about BI. From interviews with managing directors from the Engineering dept., Operations dept. and Corporate Planning dept. had some ideas about BI and fully appreciated its capabilities and benefits it can offer. Initial deductions from the interview with managing directors of Finance dept., Human Resources dept., and Customers Relations dept., indicted they had no knowledge about BI and therefore showed little appreciation for its potentials and benefits, this contradicts Lloyd (2011) assertion that being an information literate does not just happen, it demands that an individual have an understanding of the components of information; all the nitty-gritty that affects the conducts of creation, dissemination, and operationalization of information. A further brief detailed explanation about BI systems to managers of Finance dept., Human Resources dept., and Customers Relations dept., and once equipped with better insights they reviewed their answers and showed more appreciation for the system.

BI specific competencies in Data Analytics, Data Warehouse, Extract Transform Load (ETL) and Data Mining is said to be low according to the ICT managing director. This is obvious since E.C.G has never had BI or similar system or had ever implemented Data Warehouse systems (ICT managing director), the bedrock upon which single version of the truth (Watson and Wixon, 2007) can be achieved. Clearly BICC (Oracle, 2002) is currently non-existent at E.C.G to enable the benefits of BI, which all managers agree, in that key business questions are not answered and continuous monitoring processes not in place with the current information systems to allow alerts to be communicated quickly for swift actions to be taken by managers.

BI researchers (Loshin, 2003; Vitt, Luckevich et al., 2010; Yeoh and Koroios, 2010) have suggested the importance of securing top senior level management sponsorship to ensure successful implementation of BI and all interviewed managing directors have confirmed their unflinching support based on the benefits and capabilities of BI, should the organisation decide to opt for the system.
5.7 Results Summary

E.C.G plays a very important role in Ghana’s emerging economy and charged with the responsibility for distribution of electricity to the southern sector, which is about 73.5% of the country’s population.

The organisation purchase, distribute and maintain electricity to 2,120,564 customers (residential, commercial and industrial) (E.C.G, 2010). The quantum of customers and the job description of E.C.G allow the organisation to create a huge data through all its operations. To enable E.C.G to leverage on its resources, especially data and information to reduce costs, losses and remain competitive to supply reliable and uninterrupted electricity to its valuable customers, the organisation needs an information system that offers a 360° view and can provide actionable information at the right time for strategic decision-making.

The current information system at E.C.G is scattered among the various departments creating unnecessary delays for decision-makers; information delayed means a decision delayed resulting in losses and costs. The current information system again does not allow a single version of the truth to be accessed by all managers and further more creates inconsistencies for both managers and policy makers. Quick drill down of figures to better understand and offer further explanations or adequate competitive information to answer key business questions cannot be supported by the current system. Without a data warehouse at E.C.G suggests there is a lack of analytic capabilities of its current information system to allow its benefits thereof. Top management, however have pledged their willing support of BI system if the need be. Competency level in BI being low, especially in the IT department is understandable since tools for its use and practice is currently totally non-existent as well as a general lack of BI awareness in the organisation.
6 DISCUSSION

6.1 Conclusions

Intelligence is steadily making its way in the business world, combining business processes, technology and best practices to offer managers insights that guides strategic decision-making based on the accumulated data. Though expensive and needs ample time to implement and matures, it’s improved decision making, helps reduce cost and identify new business opportunities. Organisations, whose operations results in the large accumulation of data (e.g. a utility company) and needs better understanding of the past, present and to influence future decision-making are adopting BI systems.

The interest of the academia in BI use in organisations is gradually gathering momentum in recent years. However, research into BI adaptation in organisations in Africa is far behind. The purpose of this research was to investigate E.C.G a utility company in Ghana and its operations warrants the need for BI systems in support of strategic decision-making. Three objectives were identified in this research; first, to determine if implementation of BI systems will improve decision-making in operational efficiency and thereby save costs. Second, to determine factors that have an influence on the single version of the truth with the current information system and finally, to explore the current state of the organisation's information systems is enough to support quick decision-making. This section presents these objectives based on both the literature review and the empirical studies.

E.C.G operating as a utility company and with a customer base over two million, the organisation creates lots of data. However, these data are dispersed in various departments and offices. This situation makes E.C.G a prime candidate for BI: an architecture and a collection of operational, decision support applications and databases that provides the business community easy access to business data (Moss and Atre, 2003). The need for quality information in the right form and in time is inevitable as all managing directors at E.C.G have confirmed, especially where business questions need to be answered either for internal or external purposes as discussed in the literature (Drevin and Nilan, 1986; Choo, 2000; Ewusi-Mensah, 1981).

All participating managing directors in this research confirmed the dispersed nature of the current information systems of the organisation resulting in poor quality and delays in quest of information, and subsequently affecting progress of work. This result contradicts the literature about BI, whose operation is based on pulling data from multiple sources into a data warehouse. The lack of centrally located information systems (database) suggests possible multiple version of the truth, since each department has its own database and any updates of such databases does not affect others, thereby compromising a single version of the truth. Critical information locked down at different locations within the organisation prevents gaining valuable insights that enable decision-making based on data. The lack of centrally located database at E.C.G is a hindrance to BI implementation. However, it is equally an opportunity to build a BI architecture fully based on the organisation's business vision.

The current information systems at E.C.G does not allow decision-making where the bigger picture of the organisation is not visible enough for managing directors to consider all the interdependencies and how their intricacies interplay, especially within their business area.
The ability to dive deeper into figures to understand and explain in time (Ritacco and Carver, 2007) e.g. why a particular region/an entity revenue collection seems to be divergent from previous collections or from other regions/an entity and therefore respond in time with the optimum strategies to mitigate the situation and backing it with rich ad hoc reports. Such capabilities cannot be provided by the current information systems at E.C.G, which can result in cost savings and further avoid clients piling up debts.

The low BI competency level as the result indicates, it’s surely a hindrance for BI implementation at E.C.G. Therefore, should the organisation decides to opt for a BI systems, all possible users will need tutorial training in the respective use level that they may be identified with and as well intensify the general knowledge about the system in the entire organisation. The results indicate all interviewed managing directors pledged their support for BI systems. In the literature, top management support is a critical success factor for BI implementation (Loshin, 2003; Vitt, Luckevich et al., 2010; Yeoh and Koronios, 2010) and to gain their continual support it is important to establish a precise vision of BI within the confinement of the organisation’s business mission.

The current information system at E.C.G is at the traditional information systems level, where it’s mostly used as office support tools and had not been fully integrated into the organization’s operations to enable it deliver its full potential. There is the urgent need to shift from the traditional approach towards a decision support approach, where judgment, creativity and intuition (Kopackova and Skrobckova, 2006) is backed by analytics results.

6.2 Implications for Informatics

The findings of this research indicate managing directors have identified the worth of information for decision-making and the active importance information systems play in the production and use of information.

Designing information systems that can produce information that server the user community purpose is not a simple task for the developer community. Information systems has established itself over the years in the business world as a vehicle to drive business missions and as well to make them competitive and take advantage of their opportunities by taking the appropriate strategic decisions. It is obviously clear now, that having a disintegrated database in an organisation makes it almost impossible to gain valuable insights across the organisational operating environment in time and this generally affects decision-making. For the developer community questions like this:

- Does the organisation have a data integration process to gather data from multiple sources
- Does the organisation have a data warehouse in place
- Is there enough information to answer key business questions
- How are alerts and information communicated quickly to appropriate decision-makers
- Does analytic capabilities exist with the current systems and can it be performed

ought to be asked with respect to BI and if it not answered, it becomes an opportunity worth to be explored.
BI has become an important tool for top managers lately (Gartner, 2012) and although organisations may have what it takes to gain from their investments in such systems, it is important to break strongholds like organisational work culture, lack of general knowledge about intelligence and resistance to (Herrings, 1998). Securing top management level commitment is a prerequisite to establishing vested stake in the success of the project (Loshin, 2003) and can be achieved by instituting a clear vision of BI and align it to the organisation’s business vision. Further, a competency centre based on a co-design approach needs to be installed to enable full appreciation and benefits of BI investment.

The user community has a job to do and can so with the right tools that can empower them to have total control and the flexibility over their actions and decisions they make. BI offers the capability to collect, access and analyse data and information about the organisation’s operations to enable better understanding of their activities. Attaining such success in BI requires significant changes, which needs to be accepted. Users will need training and support to use the system, that results in reducing their time that formerly employed in chasing and rationalising issues, to rather increase their time to solving problems and taking decisions based on intelligence. Users attaining maturity in the use of the system with time are able to create actionable intelligence since facts themselves only informs. According to Eckerson (2009) “as organisations mature in their ability to manage systems and adaptation, they have the potential to provide users with the same (or a greater) level of productivity through standards, as they would have had working separately”.

6.3 Method Evaluation

In conducting a research, there is no readily available literature to address a particular problem, however, once a problem is identified and worth to be investigated, a theoretical research must be conducted and the selection of theories must be dependent on its correctness, relative ease of use and explanatory power. In conducting this research relevant literature on data, information and most especially on Business Intelligence were considered in the perspective of the research problem. Sources for the literature were acquired from articles both in scientific and academic journals, thesis, relevant websites and subject relating textbooks to formulate the theoretical framework, which allowed the researcher not only to bond with the prevailing knowledge, but also to discover the confines to those generalisations and as well to grasp the sense, the essence and challenges of the phenomenon under study. Further, the framework permitted the researcher to interpret the research data and in text contributing to existing knowledge in the respective subject matter.

A single case methodology employed in this research allowed for deeper insight into the phenomenon under study. Although organisation may exist in an industry, they are unique in many ways and therefore, applying a single case qualitative research approach was appropriate in that, BI systems are tailored to the unique needs of any organisation that employ their use. E.C.G in Ghana was the case study and in collecting valuable data for further analysis, interview as a collection technique was the most suitable option. Though a face-to-face interview would have been the best option, since it allows the researcher to capture the not so visible information that normally are under the blanket of emotions those participants’ exhibits during the interview sections. A telephone interview offered the convenient option due to the researcher’s location and the case under study. Generally, in all the telephone interviews with the selected managers, the telephone calls dropped couple of times and as a result either questions or answers had to be repeated again when connections are re-established. The interview with the Human Resources managing director had to be
rescheduled again due to bad telephone connections. Similarly, two other interviews were also rescheduled due to interruptions which were work related. However, data were patiently collected leading to critical analysis thereafter.

6.4 Result Evaluation
Rigour in qualitative research is very important and without it a research suffers acceptance. The researcher made a conscious effort to make an accurate transcription of interviews with participants and since that was not enough to enhance credibility of this research, participants were offered the opportunity to review their respective transcripts to allow analyses to be performed and draw findings based on data collected from them. The necessary corrections were made accordingly and findings and transcripts were again presented to the participants for their comments. Whiles collecting data through interviews, the researcher also performed triangulation through probe questions with subsequent interviews.

6.5 Possibilities to generalize
To generalize means to posit that a situation in time and or place in a sample can be same in the universe. In quantitative research, generalisation is easily achieved through statistical strategies, but it is however complex in qualitative research, since the logic is to gain much deeper understanding, for example through a single case study (Lincoln and Guba, 1985). Bryman and Bell (2011) also argue that, generalisation in qualitative research is impossible to achieve, to cite an example, a case study does not represent the population or selection of participants for an interview, and are not based on the idea of them being a representation of a population. According to (Ibid) “it is the quality of the theoretical inferences that are made out of qualitative data that is crucial to the assessment of generalisation”. To this end, the findings of this research must be applied in related settings that this research has been performed. The findings of this thesis confirm the identified theoretical results, that intelligence information is much achievable with the appropriate methodology, relying on large data accumulated centrally from different sources.
Furthermore, this thesis can be relevant for any utility organisation similar in size in Ghana or located in the West-African region seeking to implement BI systems as its information systems. Similarly the research findings may be especially beneficial to small-to-medium-size companies as a preliminary research; however the business rule and industry structure ought to be critically observed.

6.6 Ideas for continued research
Managing an organisation in this era and to see it grow with time requires having an eagle eye that allows decision-making and strategy formulation based on all the environmental perspectives surrounding the business. BI provides the ability to collect information from all sources both within and outside, of any organisation to allow decision-makers to gain intelligence to strategize to either reduce cost/losses or to gain competitive advantage.

During this research a number of ideas for further research were identified. Further studies into the implementation of BI at E.C.G and its influence on decision-making and work culture of users will complement this research and increase our understandings of the system, both in the academia and in practice, should E.C.G opt for the BI systems. BI can be developed either in-house or acquired from the vendors, further studies into which of these options, offers the best results and factors that may influence such a choice. Another question that comes into
mind, especially in the context of Africa, where a good number of companies are still state owned and enjoy absolute monopoly, should such organisations BI information gathering strategies be internally/externally focused or both. Finally, in an organisation, decision-making can be very problematic just at a particular department, would it be profitable to just target this department with BI systems or should be across the entire organisation.

6.7 Speculations for the future
As the world globalises, the rate of change is at clock speed, driven by information technology. Top managers will be under intense pressure to react spontaneously to these changes and with the appropriate decisions. The need for better decision-making under such conditions will drive the need for BI systems to new heights not just for top management use only but totally assimilated across the organisation. Data creation and its accumulation are going to be much easier making it possible for analytic decision-making culture in organisations the order of the day. These effects will consequently affect analytic tools to become more user-friendly and easier to perform analytic operations with little or no expert support. The proliferation of BI systems in organisations will reduce their cost of implementation and therefore become profitable in their use.
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APPENDIX I

Interview guide for Managers

1. Department: ____________________________________________.

Information request (need) and use and its effects on decision-making

2. Do you make information request from the ICT department

3. If Yes, what is your take on the quality of information request result (follow up question)

4. If NO, any particular reason(s) (follow up question)

5. Do you make information request from other departments (e.g. Finance, Engineering, Procurement, Corporate Planning Division)

6. If Yes, what is your take on the quality of information request result (follow up question)

7. If NO, any particular reason(s) (follow up question)

8. What is the response time to information request?

9. If there are delays to information request, to what extent does it affect the progress of your work?

10. How would you classify an/information as quality

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<thead>
<tr>
<th>Criterion name</th>
<th>Description</th>
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<tbody>
<tr>
<td>Comprehensiveness</td>
<td>Is the scope of information adequate? (not too much nor too little)</td>
</tr>
<tr>
<td>Conciseness</td>
<td>Is the information to the point, void of unnecessary elements?</td>
</tr>
<tr>
<td>Clarity</td>
<td>Is the information understandable or comprehensible to the target group?</td>
</tr>
<tr>
<td>Correctness</td>
<td>Is the information free of distortion, bias, or error?</td>
</tr>
<tr>
<td>Accuracy</td>
<td>Is the information precise enough and close enough to reality?</td>
</tr>
<tr>
<td>Consistency</td>
<td>Is the information free of contradictions or convention breaks?</td>
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<tr>
<td>Applicability</td>
<td>Can the information be directly applied? Is it useful?</td>
</tr>
<tr>
<td>Timeliness</td>
<td>Is the information processed and delivered rapidly without delays?</td>
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</table>

11. To what extent do you think information from your department influence strategic decision-making in the organisation
Systems support for information acquisition and use
12. Does current information system of the organisation allow single version of the truth to be accessed and used by all managers *(single version of the truth* - means, information are centrally located and same no matter who accesses it, such that e.g. figures are miss quoted by managers)?

13. Does the current information system enable intelligent/smarter decision to be made?

14. Business Intelligence (BI) provides the following capabilities, which of these would you consider, especially relating to your area of expertise

- Quick delivery of information to other managers
- Shorten report preparation time
- Web-based report distribution
- Ability to perform more analytical tasks
- Drill down capabilities (e.g. ability get detailed understanding of some numbers)
- Key metric reporting alerts

Management support for the System

15. BI enable the following benefits, which of these would you consider to influence your decision to support its implementation

- Technology to supplement people with reduced workforce
- Quicker time for management to analyse current information
- Key performance indicator (KPI) alerts to identify cost overruns early
- Improve administrative process efficiencies
- Less time to prepare information for managers
- Eco-friendly processes, e.g. more online reports and analysis to reduce printing cost
APPENDIX II

Interview Guide for ICT Department

Information request and support
1. When managers make a request for information, are they clearly stated
2. How urgent are you required to respond to such a request?
3. Are you able to deliver such request as expected
4. Does the current information system allow you to discover some unusual insights that might influence strategic decision-making

Information about Infrastructure
5. Are continuous monitoring processes in place to allow alerts to be communicated immediately to those who need to take action?
6. Are the key business questions being answered about your business areas of responsibility?
7. Do you have adequate competitive information to answer key business questions?
8. Has BI been implemented by ECG before?
9. If YES, what is the name of the system (name of the software)
10. If YES, how would you consider the success rate?
11. Has ECG implemented Data Warehouse before?
12. If YES, what is the success rate?
13. In your department or in the organisation, how would you consider the knowledge level in respect to the following

<table>
<thead>
<tr>
<th></th>
<th>No Skills</th>
<th>Low Skills</th>
<th>Medium Skills</th>
<th>High Skills</th>
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</thead>
<tbody>
<tr>
<td>Data Analytics</td>
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<tr>
<td>Data Warehouse</td>
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<tr>
<td>Extract Transform Load (ETL) software</td>
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<tr>
<td>Data Mining</td>
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</table>

14. Does current information system of the organisation allow single version of the truth to be accessed and used by all managers (*single version of the truth*- means,
information are centrally located and same no matter who accesses it, such that e.g. figures are miss quoted by managers)?

15. Does the current information system enable intelligent/smarter decision to be made?
University of Borås is a modern university in the city center. We give courses in business administration and informatics, library and information science, fashion and textiles, behavioral sciences and teacher education, engineering and health sciences.

In the School of Business and IT (HIT), we have focused on the students' future needs. Therefore we have created programs in which employability is a key word. Subject integration and contextualization are other important concepts. The department has a closeness, both between students and teachers as well as between industry and education.

Our courses in business administration give students the opportunity to learn more about different businesses and governments and how governance and organization of these activities take place. They may also learn about society development and organizations' adaptation to the outside world. They have the opportunity to improve their ability to analyze, develop and control activities, whether they want to engage in auditing, management or marketing.

Among our IT courses, there's always something for those who want to design the future of IT-based communications, analyze the needs and demands on organizations' information to design their content structures, integrating IT and business development, developing their ability to analyze and design business processes or focus on programming and development of good use of IT in enterprises and organizations.

The research in the school is well recognized and oriented towards professionalism as well as design and development. The overall research profile is Business-IT-Services which combine knowledge and skills in informatics as well as in business administration. The research is profession-oriented, which is reflected in the research, in many cases conducted on action research-based grounds, with businesses and government organizations at local, national and international arenas. The research design and professional orientation is manifested also in InnovationLab, which is the department's and university's unit for research-supporting system development.