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The Study of the Impact of Business Intelligence in the Banking Industry of Ghana

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Abstract—

The competiveness of businesses today depends how timely they can process data to make informed decisions in strategising for a competitive advantage in the global market. This data can reside in data centres or be distributed over geographical areas in localised servers. Most organisations with data warehouses seems to benefit from implementing data mining techniques to analyzing data in extracting information from them to align businesses to achieve their goals. In our work, we focus on a very critical sector in the financial market, which is the banking sector to assess the impact of business intelligence in adoption and how it has benefit them in achieving their goals. Our focus geographically was on Ghana's banking sector which has experienced a shift in adoption of informed analytic techniques in evaluating the financial markets to inform their investment ventures. At the end of our study, those who adopted the approaches in business intelligence has completive advantage and dominance in the market.

Keywords—Business intelligence, information systems, banking, Technology Acceptance Model, information management

I. INTRODUCTION

Information and Communications Technologies (ICTs) have changed the way most industries and organizations transact businesses to meet the growing demands of their customers. The banking industry is one of the key business areas that have been largely influenced by technology in recent times. This has been evident in the way banking operations have evolved from the sheer exchange of cash, cheques and other negotiable avenues to the application of Information Technology (IT) to transact business in the banking industry . According to Mensah (2012), the promise of ICTs in the banking sector has been realized in terms of its potential to increase customer base, reduce transaction costs, improve the quality and timeliness of response, enhance opportunities for advertising and branding, facilitate self-service and service customization, and improve customer communication and relationship [1].The concept of Business Intelligence (BI), is one that has been widely known for helping decision-making bodies in organizations to manage data and make factual decisions. Its popularity is due to the abilities it possesses to mitigate risks and increase certainty in the midst of recent global economic turbulence. Businesses and organizations that are interested in adding value to their decision making processes have therefore embraced the concept of BI and have integrated it into their major business processes. Similarly, the banking industry which is known for managing large volumes of data are also adopting this concept of BI [2]. Business Intelligence (BI) and other Management Information Systems that support decision making, predictive analytics, demand management, role-based intelligence and revenue modelling within organizations are very critical to the survival of any business in today's fast growing competitive business world. Some have introduced BI as a process of turning data into meaningful information and subsequently into knowledge. Golfarelli et al., 2004 indicated that this concept has become a popular trend for businesses which are interested in adding value to their decision making processes. This has therefore made the applications of Business Intelligence in various Ghanaian industries known, and has increased significantly in recent years [3].

Currently, there have been several indications on the use of BI concepts and processes across the Ghanaian banking industry. Indeed, the emergence of Business Intelligence systems and technologies has prompted many banks to re-examine their IT strategies in order to stay in competition. Hence the adoption of Business Intelligence in the Ghanaian banking industry cannot be overemphasized. This is largely due to the fact that the adoption and application of BI technologies are usually a basic requirement for most global banks that Ghanaians work for. This study thus reports finding of research into the impact of adopting Business Intelligence on the banking industry in Ghana, and propose a variety of factors that are likely to be involved in its adoption.

II. LITERATURE REVIEW

Many businesses and organizations today still rely on obsolete data analytics and reporting tools to perform their major operations. In spite of the rapid gains in Business Intelligence and Decision Support Systems, most businesses and organizations continue to rely on legacy systems. These systems are usually not integrated with other systems and sometimes do not have predictive and analytic capabilities. According to Rahman, studies have indicated that less than twenty percent (20%) of any given analytics applications are being used recurrently within a business process workflow standpoint [4]. Business Intelligence brings about the gathering of data from both internal and external data sources, as

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well as the storing and analysis thereof to make it accessible to assist in better decision making [5]. According to Negash (2004), the demand for Business Intelligence applications continues to grow even at a time when demand for most Information Technology (IT) products are soft. This view was justified to the extent that, while the term BI is relatively new, computer-based Business Intelligence systems which are naturally embedded or inherent in computer programs, i.e. software, continue to evolve by the day. Hence, industries such as the banking industry which have adopted the use of computer-based systems are inadvertently applying Business Intelligence in their activities to make them more efficient and effective [6].

BI technologies and tools are relatively new concepts which have made its way in the business design of many organizations due to its power of leveraging substantial amounts of data through improved analysis, reporting and query tools. Azvine et al categorized the normal BI technologies and software features into three main categories, i.e[7].:

- Predictive modelling tools (which is usually used to analyse most likely future scenarios).
- Reporting and visualization, trend analysis (used for both historical and emerging).
- Customer behaviour analysis.

According to him, Business Intelligence requires three major categories of technology, i.e. data warehouses, analytical tools and reporting tools. He explained data warehouses as tools for gathering data from unrelated sources which could be databases and unstructured text, and integrate them for further analysis. In his view, the analytical tools could be, for example, data mining tools. This is because these tools can analyse data and derive insights. Visualization and reporting tools are typically used to create outputs that are designed for the information consumer who is usually the business end user, and not an analyst. These reporting tools are able to generate reports with different degrees of details and with drilldown capabilities.

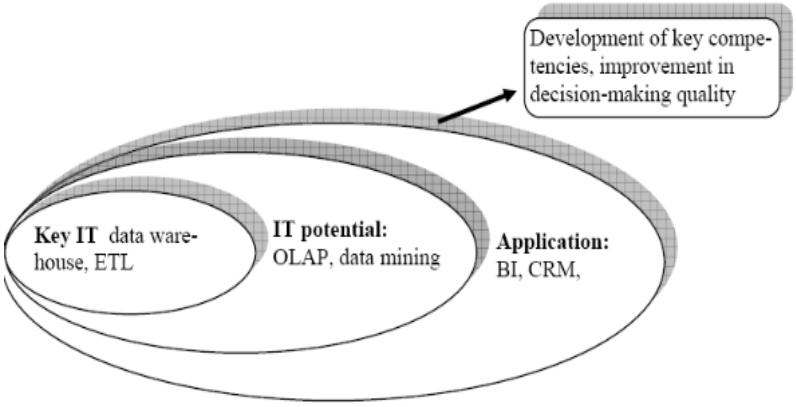

Figure 1: BI systems as IT infrastructure that support organizational decision making Source: Tabatabaei (2009) [8]

BI has various tools that can be used to produce several features of a business' views through the control of existing data that have been captured by the organization's information systems. Business Intelligence accomplishes decision making tasks in organizations by utilizing data mining and warehousing and Online Analytical Processing (OLAP) techniques. Cody 2002 described data warehousing as a process of collecting relevant data into a repository, where it is arranged and authorized so it can serve decision making purposes. Most businesses and organizations rely on data warehousing tools to load various types of business data, transform and load from transactional systems into the data warehouse itself. One of the important processes that are carried out in the data warehouse is the data cleaning process where variations in data schemas and data values from different transactional systems are determined.

Data warehouses are one of the BI tools that support organizational decision making. According to Herscheland 2005, a multidimensional model can be created to support stretchy drill down and roll-up analysis in a data warehouse, i.e. progressively higher level subtotals and grand totals can be created with this tool [9].

III. METHODOLOGY

There has been widespread adoption of various technologies in the banking industry of Ghana in order to remain competitive. However, the proliferation of technology and its rapidly changing trends are forcing industry players to move along with the emerging technologies. The banking industry is one of the industries which have been recognized globally to have real need for information and knowledge. Hence, moving along technological lines in order to be efficient and effective in business cannot be overemphasized. Yet, it is perceived that people in developing countries are slow to adopt new technologies. The study therefore seeks to identify factors that influence the adoption of technology in the banking industry of Ghana.

This research adopts the Technology Acceptance Model (TAM) by Davis [10] to examine the factors that influence the adoption and impact of Business Intelligence on the banking industry in Ghana. According to Baraghani [11] , a diffusion of innovative technology is highly related to communication channels, individuals, organizational members, and social system except for technology itself. Since the research focuses on BI in the banking industry, which is considered as an innovative technology in Ghana, organizational and social systems such as peer and superior influence, self-efficacy in computing or related IT systems, and external source constraints would play significant roles in determining the acceptance/adoption of BI in the Ghanaian banking industry.

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The research investigates the use of BI within the context of the banking industry of Ghana and uses a research framework that is based on the Technology Acceptance Model (TAM). A theory was developed to identify factors that affects the adoption of BI in the banking industry. Factors that were considered included Awareness, Perceived Usefulness, and Perceived Ease of Use of BI systems and technologies. A survey was conducted to gather thirty seven (37) valid questionnaire data from twenty two (22) banks in Ghana. A contingency co-efficient test was used to examine the relationships that existed between the three proposed constructs. Results showed that awareness, perceived usefulness, and perceived ease of use have significant influence on users' adoption of BI technologies in the banking industry.

The Technology Acceptance Model (TAM) by Davis is possibly one of the most frequently used model in conducting IT research. This theoretical model is based on the Theory of Reasoned Action (TRA) which is a general model concerned with individuals' intended behaviours. According to the Theory of Reasoned Action, an individual's performance is determined by the individual's attitude and subjective norms concerning the behaviour in question (Abu-Dalbouh, 2013) [12]. Technology Acceptance Model determines the user acceptance of any technology's perceived usefulness (PU) and perceived ease of use (PEOU). The theory suggests that user perceptions of usefulness and ease of use determine attitudes towards using a system, and behavioural intentions to use a system determines the system's actual use, which is consistent with the Theory of Reasoned Action.

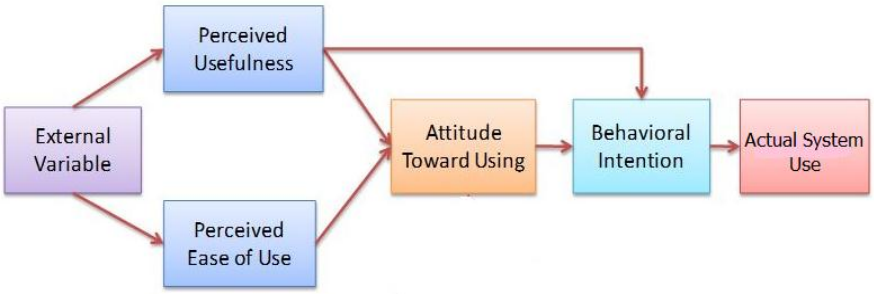

Figure 2: Technology Acceptance Model, TAM by Davis (1989)

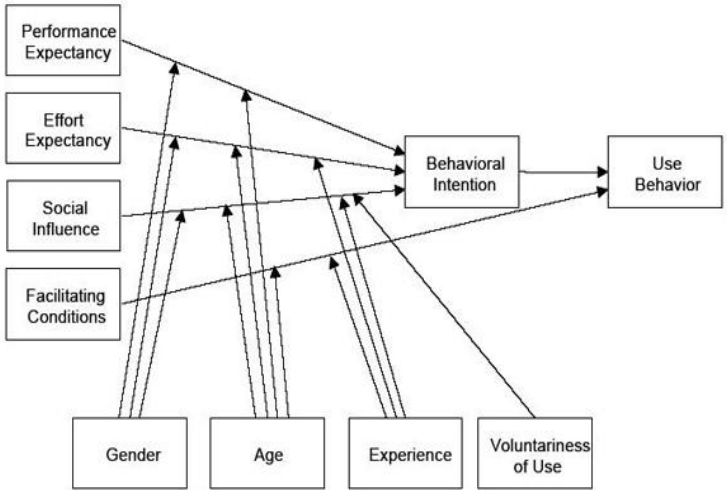

Figure 3: User Acceptance of Information Technology (2003) [13]

The entire process for this study is formulated in the conceptual design below, i.e. the Research Project Lifecycle. The project was designed in five main phases with the most important deliverables of each phase, summarized in the boxes below each phase.

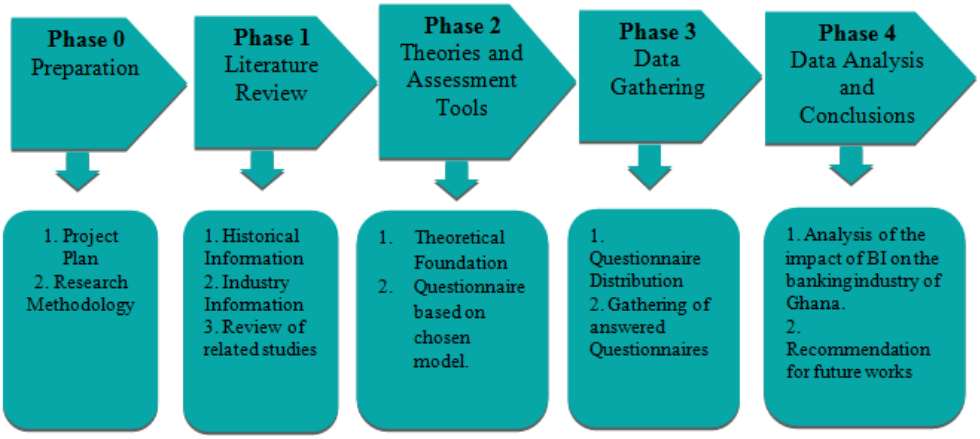

Figure 4: A summary of the entire research process

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IV. RESULTS AND ANALYSIS

Since the researcher had no control over the actual behavioural proceedings of the various banks, a survey was found to be most appropriate for the study by way of random sampling. Sampling process was chosen in order to make the results generalizable for the entire banking population in Ghana. The following results were obtained from the data gathered :

Table 1: Respondents' Educational Profile

Respondents' Education	**Percentage (%)**
Certificate (Professional, diploma, etc.)	2.7
Undergraduate	0
Graduate	73
Postgraduate	24.3

The table above gives the distribution of the educational profile of the respondents. From the analysis, it was observed that majority of the users of IT systems including BI technologies in the banking industry were graduates or had had a postgraduate study. Again, the responses from these individuals showed that most of them learnt about Business Intelligence and its benefits before entering into the banking sector although a few of them learnt about the use of these systems on the job. This indicates that, level of education and age are also factors that can contribute to the awareness of a new technology.

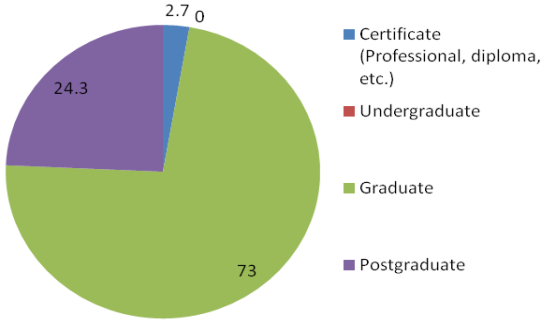

Figure 5: Respondent's Educational Level

Table 2: Organizational Level Profile of Respondents

Organizational Level	Percentage (%)
Strategic Level	5.4
Business Level	62.2
None	32.4

The table above gives a distribution of the organizational level representations of banking staff who were involved in the use of BI systems and technologies. From the data gathered and analysis made, it was observed that 62.2% were represented at the business level in the banking industry. This implied that the highest number of BI systems and technology users were not at the represented at the strategic level where major decisions are made. Only 5.4% out of the total number of respondents were represented at the strategic level. However, 32.4% out of the total number of respondents whose responses would have had an effect on the analysis refused to answer this part of the questionnaire. This, as a result, didn't help in getting the right responses for this particular category.

Table 3: Popular BI systems and technologies being used by respondents

BI Tools & Technologies	Percentage (%)
Business Objects. (Popularly known as "BO")	37.9%
Oracle Business Intelligence (Also Known as Oracle BI)	16.2%
QlikView BI and Reporting tool	5.4%
SQL Server Reporting Services	2.7%
Moody's Risk Analyst	2.7%
Other Management Information System (MIS)	2.7%
BO and Oracle BI	18.9%
None	13.5%

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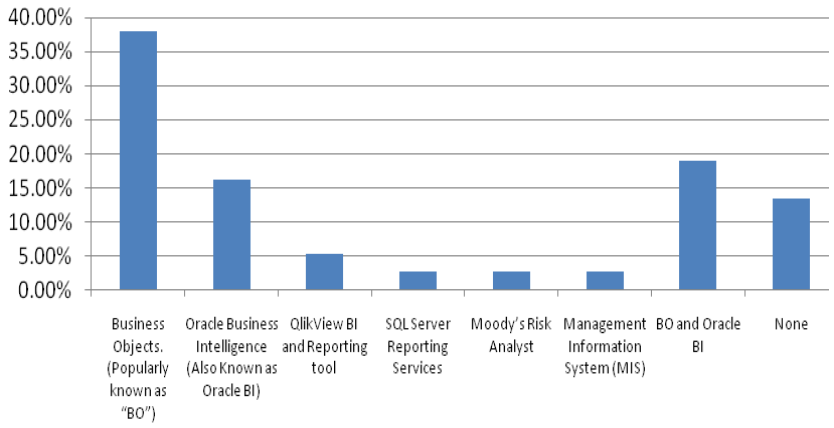

Figure 6: Popular BI systems and technologies being used by respondents

Table 4a: Easy Usage of BI systems and technologies and interest in continues usage.

			Continues adoption				
			disagree	neither agree nor disagree	Agree	strongly agree	Total
Easy to use	disagree	Count					
		% of Total	.0%	.0%	2.7%	2.7%	5.4%
	neither agree nor disagree	Count					
		% of Total	2.7%	2.7%	2.7%	5.4%	13.5%
	agree	Count					
		% of Total	5.4%	10.8%	18.9%	24.3%	59.5%
	strongly agree	Count					
		% of Total	.0%	2.7%	5.4%	13.5%	21.6%
Total		Count					
		% of Total	8.1%	16.2%	29.7%	45.9%	100.0%

Table 4b: Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.[a]
Nominal by Nominal	Contingency Coefficient	.289			.948
Interval by Interval	Pearson's R	.117	.145	.696	.491[c]
Ordinal by Ordinal	Spearman Correlation	.150	.157	.900	.374[c]
N of Valid Cases		37			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.

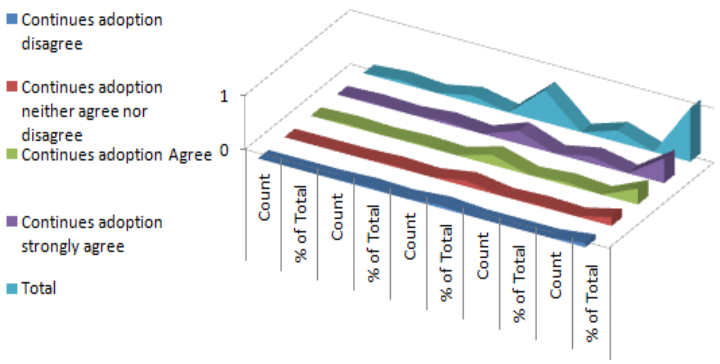

Figure 6: Easy Usage of BI systems and technologies and interest in continues usage

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V. CONCLUSIONS

The research examined behaviour towards the adoption of BI systems and technologies in the banking industry. Two of the main variables under study were adopted from the TAM model which provided a basis for conducting a survey which targeted BI users at twenty two banks in Ghana. The study proved that awareness of an innovation can be an important factor for determining the adoption of an innovation. From the study, it was apparent that some additional factors such as educational background were key contributors that could affect users' awareness of a technology. Measurements of the Perceived Usefulness and the Perceived Ease of Use also came to confirm technology's adoption. These parameters were tested using the users' behavioural intensions to use or adopt the use of Business Intelligence in their operations. The overall impact of adoption of BI systems and technologies was generally high, which meant that the banking industry in Ghana has really adopted Business Intelligence.

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