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Business Intelligence (BI); A System to Optimize Business Performance

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Abstract:

Many Organizations struggle in collecting data, retrieving information and making sound decisions within good time. With a very high increase in data collection due to the growing global market and customization, the decision making process needs to be fast and more accurate. The research was conducted at the National Identification Authority which is a Government Identity Management Institution. A survey method and a Stratified Random Sampling method of data collection were used. In looking at the possibility to optimize Business performance through Business Intelligence, it was expedient to investigate the current BI tools used by the organisation under study. Find out the awareness of Business Intelligence to some critical staff and their perception on the adaptation of a full scale Business Intelligence system by the organisation. It was found out that the institution does not have a BI system in operation and about half of the respondents interviewed acknowledged the need of using a Business Intelligence system. They were however concerned about Business Intelligence capital intensiveness, the need for intelligent planning, highly skilled technocrats to man such a system as the main challenges. In addressing these concerns some recommendations are outlined which would go a long way in helping the National Identification Authority.

1. Introduction

Mankind has always developed processes, techniques and tools for collecting and analyzing intelligence to support decision making, especially during times of war (Kinsinger, 2007). Data is a valuable asset to a company or institution. As a matter of fact, the flow of information within a company is an essential factor to its success. Many companies today are collecting and storing a mind-boggling amount of information. Within a short period of time, the popular epithet of data volumes has grown from megabytes to gigabytes to terabytes (a trillion bytes) and so on. The size of some corporate databases is even approaching one petabyte. Data can be seen as the basic fabric of Business Intelligence. The notion of intelligence is defined as "the ability to apprehend the interrelationships of presented facts in such a way as to guide action towards a desired goal." (Luhn, 1958). Business Intelligence is as an umbrella term that encompasses tools, architectures, databases, data warehouses, performance management, methodologies, and so forth, all of which are integrated into a unified software suite. Turban *et al.* (2007). Simply put, it is a terminology in the business and computer science fields which refer to the collection of software platforms, applications, and technologies that aid decision makers function effectively and efficiently.

1.1. Business Intelligence (BI) and Decision Making

BI supports a range of business applications such as data mining, querying, analysis, and management reporting. A decision making process consists of making judgments regarding several investments and resources based on the quantitative and qualitative data. There are several different systems like data warehouse, Enterprise Resource Planning (ERP), etc. Decisions are not made by Computers but by man and that is why data/BI is necessary in making accurate decision making. This typically involves senior managers and analysts because the problems are highly complex, non routine, and require creativity (Gorry and Scott Morton, 1971). Business Intelligence systems can help business users wade through a sea of data to generate valuable information. Business Intelligence has many advantages. It makes evaluation of company progress very easy. It can also be used to create a hierarchical performance metric, which analyses the performance of businesses across various key areas such as time, cost, resources, scope, quality and actions. The performance metric is designed to keep track of various markers that are important to shareholders, executives, employees, and customers and ensure that the company remains healthy, efficient, and profitable.

Good and Fast Decision making is a daily affair and has varying quality. Good decisions provide benefits. Bad decisions provide no benefits - they may even cause you losses. Business Intelligence systems help make better decisions by: providing decision makers with rich, exact and up-to-date information and letting them dive into data for further investigation. Fast decision making helps top management in responding Faster to opportunities and threats as time between thought and action is reduced considerably. Business Intelligence reduces inventory cost and identifies wastage of resources. Activity and costing based methods can be used in BI to fish out hidden cost, missed opportunities. Inventory levels at every stage of production can be monitored and allocation of resources can be controlled as well. By using a well-built web based services BI can help reach out to the right customer at the right time.

Information is sent or sold to those who matter. BI can be used to make current and accurate market analysis which helps the organization to position well. Business Intelligence is complex in nature due to huge amounts of data storage, processing and analysis involved and needs attention paid to the very last details. Business Intelligence requires huge sums of money to build and maintain. Highly skilled technocrats are used in building and manning Business Intelligence.

1.2. BI for a Government Institution

This research was done at the National Identification Authority due to its uniqueness in Identity data management. The National Identification Authority (NIA) of Ghana is a Technology and Security driven institution mandated by the National Identity Register Act, 2008 (Act 750) to establish a national data centre and manage a national database, set up a system to collect, process, store, retrieve and disseminate personal data on the population (Ghanaian citizens - both resident and non-resident, and legally and permanently resident foreign nationals), ensure the accuracy, integrity and security of such data, and to issue and promote the use of national identity cards in Ghana (NITA, 2011). The institution is also mandated to make data in its custody available to persons or institutions authorized by law to access the data. A BI system would help the National Identification Authority (NIA) to consolidate data into one repository for queries, report generation and real time updates at middle, senior and executive management level. As NIA advances in becoming the backbone of biometric data warehouse in Ghana, it would be a central pivot in linking up all government and private institutions that utilizes personal Identification (ID) information. An efficient NIA would help the immigration services to track immigrants and those who stay of permit has expired. It would enhance the operations of the Police and security services in tracking down criminals and theft. Also, the Internal Revenue Service would be able to track tax payment defaulters and fish out those who do not pay tax to the government. A BI system for NIA would help data analyst in knowing specific national data at the push of a button.

2. Statement of Problem

A national data hub like the NIA has the viability of generating revenue thereby enhancing economic growth. With it sophisticated technological systems, it would be interesting to find out how reports and decision making are done at various departments and levels of management. Is Business intelligence in such a big institution operational? Well, it might be in fragments or not at all. With the large amount of data being generated on nanoseconds basis and the need for real time access to relevant data, the use of Business Intelligence is a necessity for monitoring operations, taking strategic decisions and for general business success and growth

3. Objectives

The main objectives for this study are to find out how the staff of NIA perceives Business Intelligence. Secondly, to evaluate the operations and performance of NIA and finally, to address the benefits and challenges of adopting Business Intelligence in NIA

4. Literature Review

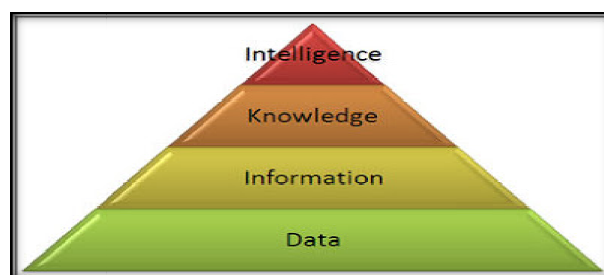
According to Lönnqvist & Pirttimäki (2006), BI has evolved into a managerial philosophy and a business tool, which can be used to refer to as: "An organised and systematic process by which organisations acquire, analyse, and disseminate information from both internal and external information sources significant for their business activities and for decision-making". Cognos (2007) suggest that, Business intelligence brings people and data together, offering a variety of ways to see the information that backs fact-based decision-making.

4.1. Technology

Technology is critical to BI success, although it is not the only driving force (Clark et al., 2007). Research has extensively examined how technology impacts BI success (Watson et al., 2006). BI technologies integrate a large set of various resources such as tools, packages, platforms, systems and applications. Findings suggest that having the right technology for supporting decision making can help an organization increase its decision-making capabilities (Arnott and Pervan, 2005).

4.2. Business Intelligence Architecture

Business intelligence 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.



*Figure 1: Business Intelligence Architecture Pyramid
Source: Mark Cudmore (2008)*

The data in this context can be described as the set of values or variables that support the running of a business or company. The Information level comprises of two or more set of data that gives a meaning to a person. Knowledge here refers to the cognitive awareness of information. Intelligence is the effective application of knowledge acquired. BI combines data warehouse technology with on-line analytical processing (OLAP) and data mining, and also has an input from knowledge management systems, decision support systems and other information systems present in an organization (Negash 2004). More specifically, data-warehousing technology is used to systematically collect and store relevant business data (internal and external) into a single repository (March and Hevner 2007).

4.3. Gathering and Storage Technologies

In terms of gathering and storage technologies, the opinions converge primarily on the idea that BI systems gather and store data. Particularly, Negash (2004) distinguishes two main dimensions of data, the source of data and the type of data. There are two main sources of data: internal data about the internal environment of an organization and external data about the external environment of an organization. Internal data are produced within an organization, either by the transactional systems the organization owns (Negash 2004) or data included in documents, email, and intranet communications produced by the organization's employees.

4.4. Processing and Analysis Technologies

These technologies aimed at fulfilling different needs related to the search for and use of information, ranging from report extractors to dashboard applications and sophisticated techniques for exploration (Baars and Kemper 2008). The report extractor technologies are used on a more detailed informational level. Dashboard technologies are used to consolidate within a single control panel the information linked to performance factors in a largely summarized level. Exploration techniques are used to build predictive business models and include data mining, text mining, document visualization, browsing methods, web community, and knowledge maps. Stored in a warehouse, they are ready for analysis and presentation in a form that is useful for business decision-making. BI tools such as reports, OLAP, and data mining assist in the analysis of the collected data. These analytic tools have the potential to provide actionable information (March and Hevner 2007). However, according to Negash (2004) and Baars and Kemper (2008), business intelligence tools are mainly concerned with the analysis of structured data. The analysis of unstructured data continues to be an issue in BI (Chung et al. 2005).

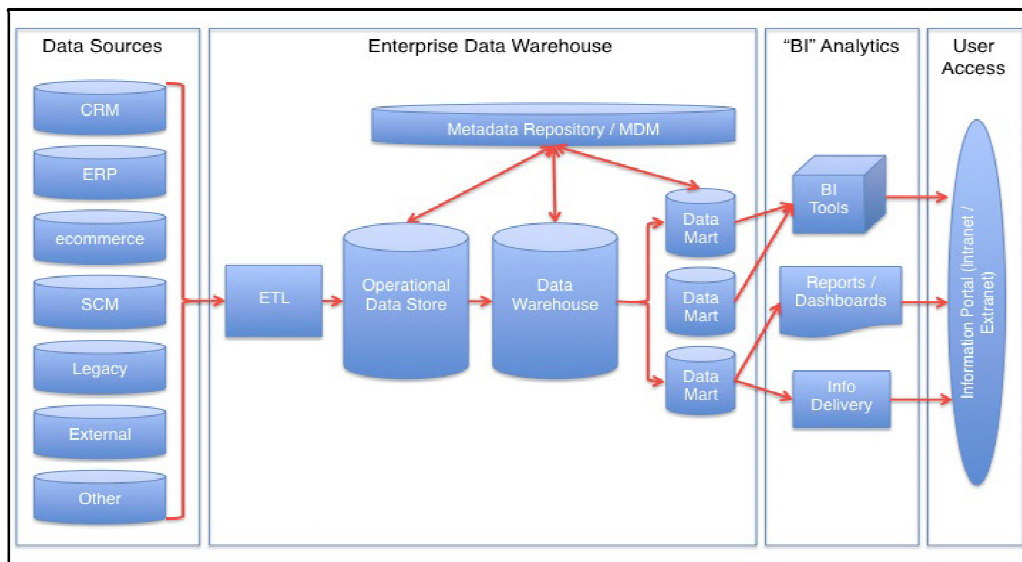


Figure 2: Business Intelligence Architecture Diagram
Source: Google images (2016)

4.4.1. Business Intelligence Systems Components

- ETL: data from both operational databases and dispersed data sources allowing for the collection of volumes of data (Schink, 2009) which allows for: near real-time information access and uniform data type in which to analyze.
- Data Warehouses: Used as repository for all data relevant to an organization to support the decision-making process (Matei, 2010) by: gathering relevant and context aware data and providing multiple dimensions to data
- OLAP Techniques: Used to analyze and report data from huge data sources (Olszak & Ziemba, 2006) by: providing user access to data warehouses and creating data models.
- Data Mining: Used to identify patterns and relationships within a data warehouse and creates detailed reports (Hevner & March, 2005) allowing for: predictions based on historical data and graphing and calculating to create formulas to analyze data

5. Methodology

A Survey methodology was employed in this research. For the purpose of gathering data from every department of the institution, a Stratified Simple Random Sampling method was used. Based on this adopted sample technique, the population was grouped into various departments namely, Technology/IT, Administration/HR, Operation, Finance and Client service. The researcher relied solely on primary data collected through the use of questionnaire and face to face interview. The data collected was analyzed with the aid of Microsoft office suit and Statistical Package for Social Scientist (SPSS).

6. Findings & Discussion

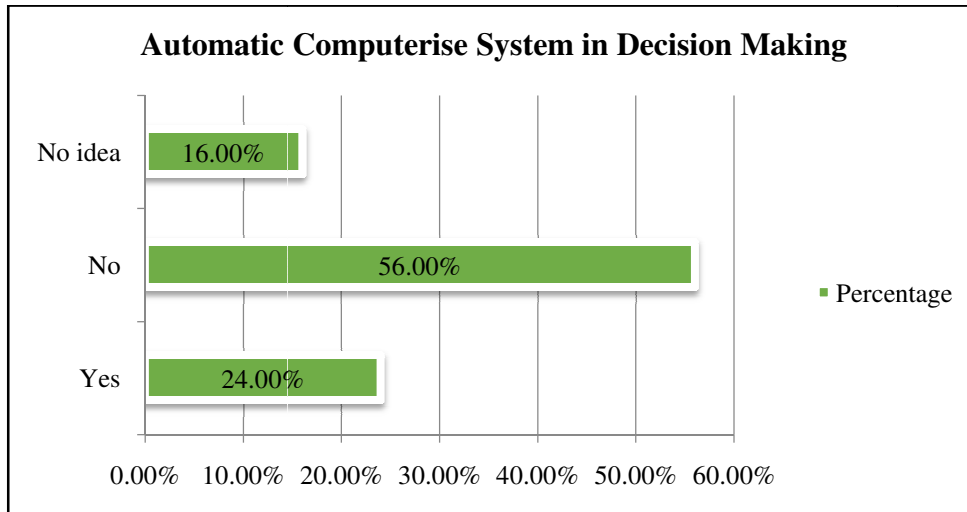


Figure 3: Decision making regarding work done with the aid of an automatic computerized system
Source: Field Survey

With reference to figure 3, 16% has no idea if an automatic computerize system is used in decision making, 56% do not agree that there is an automatic computerize system in decision making with 24% agreeing to the usage of such a system. This shows that majority of the population disapprove the fact that the institution has a computerize system that aid decision makers in decision making.

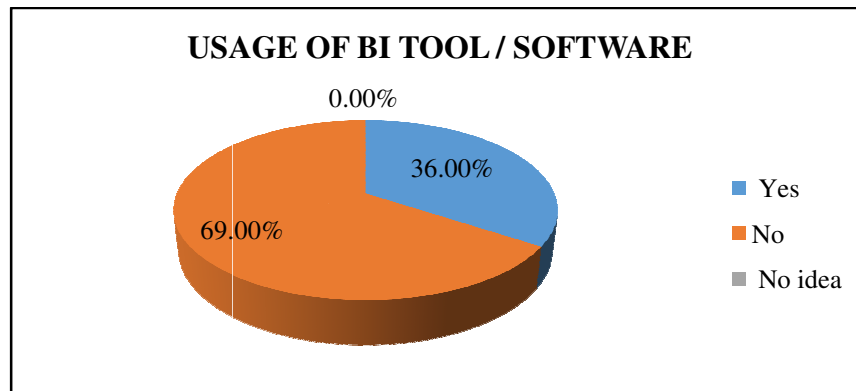


Figure 4: Usage of BI tool/Software
Source: Field Survey

From figure 4, 36% of workers agree of using BI software and 69% of their co- workers disapprove of the usage of such a system. Two people stated that the BI software they operate with is AFIS and GIFMIS.

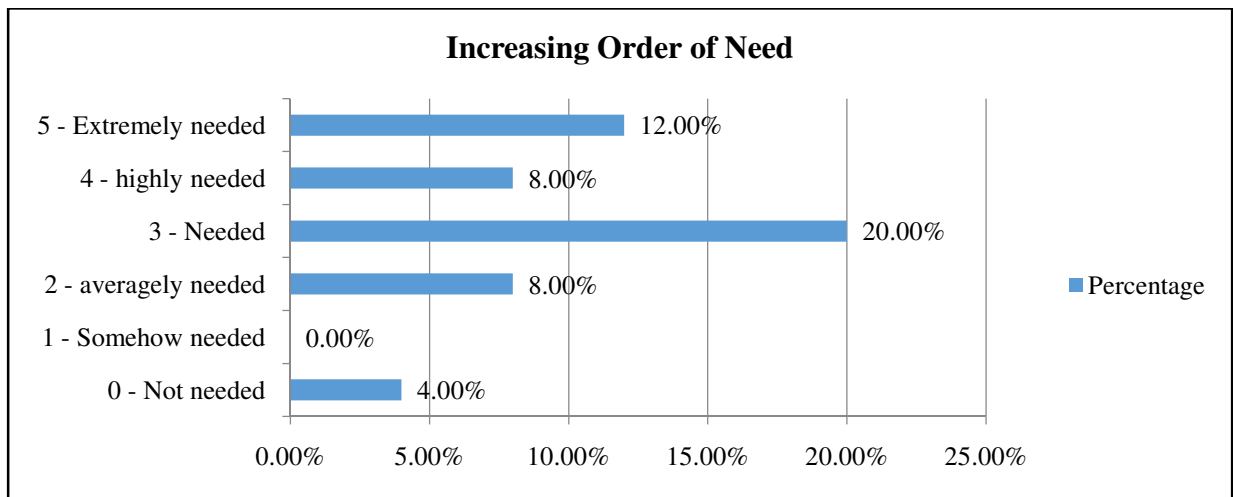


Figure 5: Need for BI software
Source: Field Survey

Figure 5 reveals that 4% of staff does not need a BI tool, none were in doubt whether they need it or not. 8% averagely needed it, 20% said they needed it, 8% said BI tools were highly needed with 12% stating that it is extremely needed. It can however be seen that majority of staff indicates the need of a BI tool.

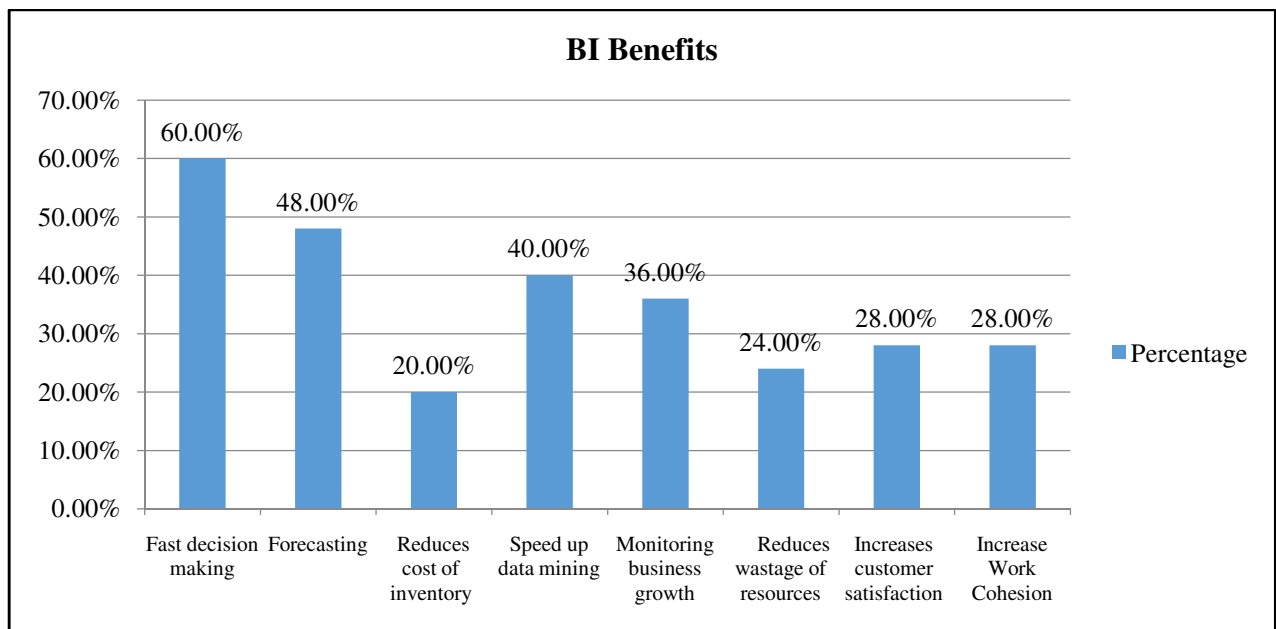


Figure 6: Benefits derived from Using BI
Source: Field Survey

From the above figure, 60% of the population see fast decision making as one of the benefits derived from using Bi, 48% chose forecasting, 20% went for inventory cost reduction, 40% said that it speed up data mining, 36% chose monitoring of business growth, 24% said it reduces wastage of resources, 28% said it increases customer satisfaction and 28% agrees that it increases work cohesion.

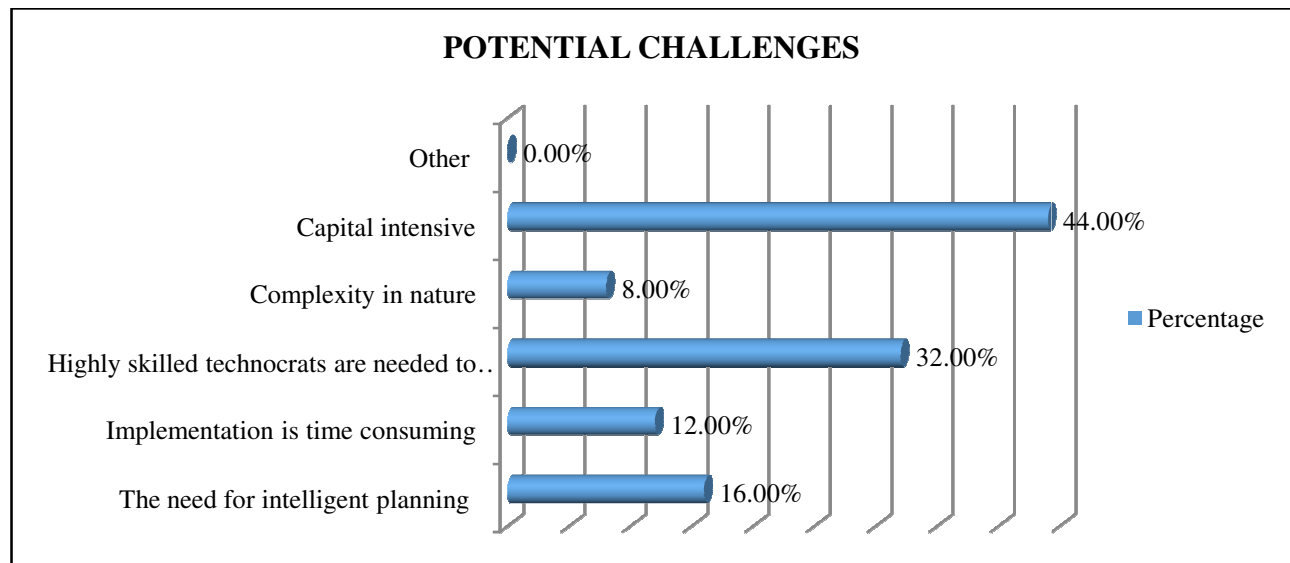


Figure 7: Potential Challenges in using a BI System
Source: Field Survey

From the above pictorial view 16% sees the need for intelligent planning as a challenge to N.I.A. 12% said implementation is time consuming, 32% said highly skilled technocrats are needed to maintain the BI system, moreover 8% see it complexity to be a challenge, and 44% was of the view that it is capital intensive in nature.

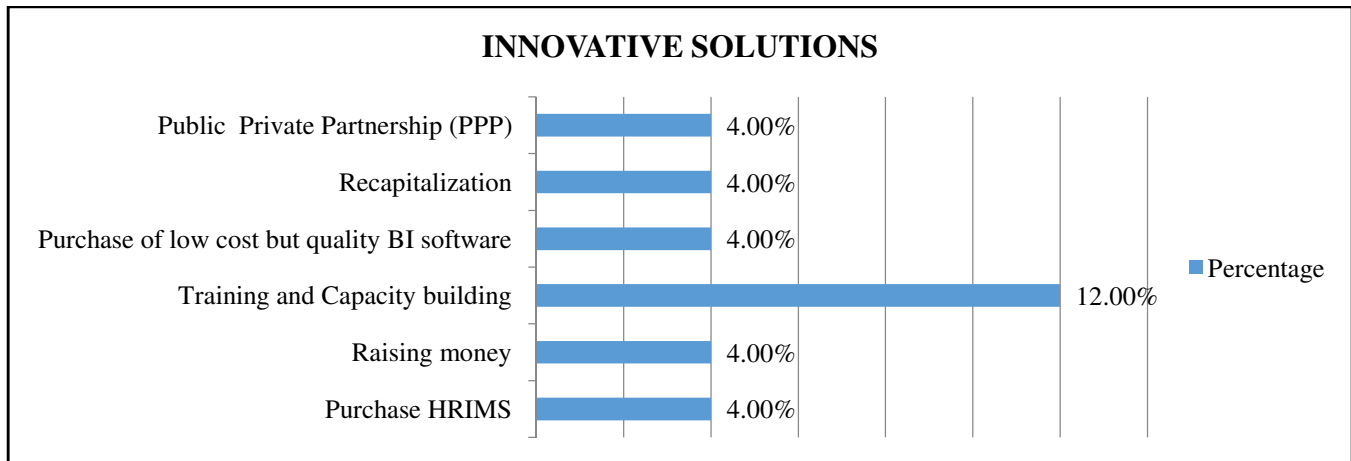


Figure 8: Innovative Solutions in addressing identified Challenges of adopting BI at N. I. A
Source: Field survey

Figure 8 talks about innovative solutions in addressing the identified challenges. 4% of staff suggested public private partnership, Recapitalization, purchase of low cost but quality BI software, raising money and purchase of HRIMS.

6.1. Expert Opinion

All the experts (such as, Foreign Identity Management System Consultant, Senior Database Administrators) interviewed at different locations and at different time, think alike and gave remarks that moves in the same direction. These were professionals who had a very good understanding in the area of Business Intelligence. It was found out that Business Intelligence systems are not in use at National Identification Authority. There are other software’s which are in use like the AFIS system but it is not a BI tool or software in nature. Lack of funds is the main challenge to the institution in implementing a BI system. Due to the operations of the Institution, management should see the need of BI usage since it has many benefits and advantages.

7. Conclusion

It is obvious from respondents that Business Intelligence is very beneficial as it helps in fast decision making, speed up data mining, forecasting and monitoring business growth. The absences of the usage of an automatic computerize system in decision making by such a big Government institution could hamper smooth business running. It is evident that the need for intelligent planning, capital intensive and highly skilled technocrats will be the main challenges to be faced by the institution in its attempt to fully implement/Use a BI System. Few workers of NIA had an idea about innovative solutions of solving perceived challenges, however majority of the

staff are willing to be trained on the usage of BI Systems. This shows their willingness to adapt to change, technology or new methods of doing work. Moss and Hoberman (2004) explain that Business Intelligence helps turn data into information, information into knowledge and knowledge into plans that drive profitable business action. The management of National Identification Authority should start planning of implementing a Business Intelligence system. Management should sell this idea to Government and private stake holders for financing the project, since it has the capabilities of helping the institution to mobilize and maximize revenue. There is really the need for a BI system to be in place, Strategic staff should be trained on Business Intelligence system, specifically its implementation and usage. These would help the institution take a big leap in its daily operations and corporate performance.

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