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Impact of Data Warehouse on Organization Development and Decision making (A Case study of United Bank for Africa and Watchlocker PLC)

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Abstract: The study analyzes the impact of data warehouse on organizational development and decision making. A case study of United Bank for Africa. The objective of this study is to investigate the relationship between data warehouse and organization development, to investigate if the implementation of data warehouse in the organization help in minimizing inconsistency report of the organization, to investigate if data warehouse help to integrate multiple system or business into one common data source, to determine if data warehouse help to increase data security and integrity of an organization data and also to determine the impact of data warehouse on decision making of an organization. To carry out this research the survey research design was adopted and population size was 100 staffs of the above organization, we make use of a well-structured questionnaire which was administered and 84 copies was filled and returned, so a total number of 84 respondent was analyzed. The data collected was analyzed using simple percentage and frequencies. From the result of analysis it was gathered that there is a significant relationship between data warehouse and organizational development and data warehouse help to increase organization decision making.

I. Introduction

The role played by database technology in companies and enterprises has only been that of storing operational data, which is generated by daily routine operations carried out within business processes such as selling, purchasing and billing. On the other hand, managers need to access quickly and reliably the strategic information that supports decision making in an organization. Such information is extracted mainly from the vast amount of operational data stored in corporate databases, through a complex selection and summarization process. The exponential growth in data volumes made computers the only suitable support for the decisional process run by organizations. Thus, starting from the late 1980s, the role of databases began to change, which led to the rise of decision support systems that were meant as the suite of tools and techniques capable of extracting relevant information from a set of electronically recorded data. Among enterprises and organizations support systems data warehousing systems are probably those that captured the most attention from both the industrial and the academic world. Data warehouse (DW) hastens the process of retrieving information needed for decision-making. DW technology has emerged as a key source and powerful tool for delivering and accessing information for decision-makers (A. Aljanabi, A. Alhamami, and B. Alhadidi, 2013).

The concept of data warehousing was introduced in 1988 by IBM researchers Barry Devlin and Paul Murphy. The need to warehouse data evolved as computer systems became more complex and handled increasing amounts of data. Data warehousing is used to provide greater insight into the performance of a company by comparing data consolidated from multiple heterogeneous sources. A data warehouse is designed to run query and analysis on historical data derived from transactional sources, once the data has been incorporated into the warehouse, it does not change and cannot be altered since a data warehouse runs analytics on events that have already occurred by focusing on the changes in data over time. Warehoused data must be stored in a manner that is secure, reliable, easy to retrieve and easy to manage

Business Organizations can turn their data into insight and make smart, data-driven decisions with the use of data warehouse (DW), it is a digital storage system that connects and harmonizes large amounts of data from many different sources. Its purpose is to feed business intelligence (BI), reporting, and analytics, and support regulatory requirements. Data and analytics have become indispensable to businesses to stay competitive. Business users rely on reports, dashboards, and analytics tools to extract insights from their data, monitor business performance, and support decision making. Data warehouses power these reports, dashboards, and analytics tools by storing data efficiently to minimize the input and output (I/O) of data and deliver query results quickly to hundreds and thousands of users concurrently, they are solely intended to perform queries and analysis and often contain large amounts of historical data. The data within a data warehouse is usually derived from a wide range of sources such as application log files and transaction applications.

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Problem Statement

The development and maintenance of a data warehouse costs five times more than the hardware and the software (Agosta 2000). Connolly et al. (1999) mention that there are some problems associated with development of data warehouse. They claim that during the development of a data warehouse it is possible that there may emerge some previously unknown problems in the source system, such as business processes that cannot produce the required data.

Business organization understand the role that data driven decision-making plays in their overall effectiveness, many fail to either fully utilize the data they collect, or they make the wrong inferences from the data collected. Business intelligence and analytics can provide businesses and organizations with the information that managers can use to improve the business and increase revenue, thus making the data warehouse an essential piece of any business intelligence strategy. However, while the concept of a data warehouse is simple, it can be very challenging to implement.

Most business organization lacks help on supporting business needs, improving bottom line, ensuring consistency and making better business decisions. Businesses and organizations needs to embrace the idea of data warehousing as a central part of their business intelligence strategy which leads to the investigation of the Impact of data warehouse on organization development and maintenance.

One universal problem of not having an Enterprise Data Warehouse is how users consume the data in the form of actual reports. So often, those who need the information or require knowledge from the data they utilize must wait for a report based on someone else's schedule. Furthermore, once they get the report, they may have to manipulate data within an application such as Microsoft Excel to fit their needs, and this can often lead to error or miscommunication. As both public and private organizations recover from the corporate fraud of the last decade, it is now more important than ever to report results correctly, which calls into question the current procedures of utilizing data warehousing in an organization. It becomes easier for executives or managers of an enterprise to be able to get information stored in the data warehouse personally rather than waiting on workers or departments to bring report from their individual database.

Objectives Of Study

The goals and objectives of this study are as follows:

1. To determine the relationship between data warehouse and organization development.
1. To investigate if the implementation of data warehouse in the organization help in minimizing inconsistency report of the organization.
2. To investigate if data warehouse help to integrate multiple system or business into one common data source.
3. Determine if data warehouse help to increase data security and integrity of an organization data.
4. Determine the impact of data warehouse on decision making of an organization

II. Literature Review

The Management Decision making Process (MDMP) ensures all the conditions are set for starting the project and gives a "consistent reference point for judging the project's ongoing success" (Nolan, 2001); since it is important to remain focused on the goals set forth by the management. With the availability of data warehousing, decision makers can gain access to information that was previously unavailable, and untapped. Once the information is analyzed, it assists the end user in developing trends, forecasting demand, and evaluating their business performance overall. This is a great tool that gives organizations a competitive advantage.

Decision makers can evaluate their business on a continuous basis, by assessing how their business is performing over time, and identifying warning signals (red flags) that will appear through the reports that are generated in a timely manner due to availability of data from which pattern and decision could be automated (Ige & Adewale, 2022b) to get valuable insight while at the same time also adopting the use of artificial intelligence (Ige & Adewale, 2022a) for future data based prediction based on changes and update in the amount of data in the data warehouse. The reports will contain up to date information that is accurate, valid, and relevant to the credibility of the decisions. The decision makers will be able to retrieve both detailed and summarized reports depending on their needs.

Having the reports available decision makers can contemplate alternatives and choose the appropriate option for better business returns. The data warehouse assists in the buildup of a corporate memory with initiatives and results. The results become a significant source of information for future business initiatives.

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Over the years Chaudhuri & Dayal (1996) mentioned that organizations have struggled to develop computer systems that automate business processes. Companies that have been successful in their development of computerized systems have gained competitive advantage. Inmon et al. (1999) state that these early computer systems were perfectly suited for gathering and storing data, but they were not adjusted to analyze the data.

With the quick evolution of information and communication technologies and dissemination of computer use, most of large and medium size organizations are using Information Systems (IS) to implement their most important processes. As time goes by, these organizations produce a lot of data related to their business, but the data is not integrated. Such data are stored within one or more platforms and constitute the resource for the organizations, but are rarely used for decision-making process. Traditional information systems are not projected to manage and store strategic information. They are formed by crucial data, operational data needed for daily transactions. In terms of decisions, data are empty and without any transparent value for the decision process of organizations (Domenico, 2001). Decisions are taken based on administrators experience and sometimes based on historical facts stored in different information systems.

Nowadays companies are searching for an approach to use operational data to support decision making, which is supposed to result in new competitive advantage (Harding & Yu, 1999), all these are in addition to the fact that both security can be enhanced and element of terrorism can be countered by the availability of data in the data warehouse which could be accessed by intelligent system for decision automation (T. Ige et al. 2023).

Data Warehouse Implementation for organization development

In this information age, optimizing data usage is crucial for more effective decision making in organizations. Technology is expected to assist users in utilizing the available tools and submitting the required information at the right place, time, and appropriate cost. Companies are constantly struggling to keep up with the changing business conditions and to stay ahead of competition. In order to succeed companies should be able to analyze, plan and react in a faster manner to changes in the environment.
Companies are realizing that information is the key to achieving a competitive advantage and for survival. The data warehouse is used for strategic decision making where management in the organization will utilize existing information to make decisions that have an impact on the future. Thus it is important to have information that is valid, accurate, and relevant on hand at all times. Enhancing data quality is what makes the data warehouse a necessity in today's business.

Business Processes

Business processes According to Kimball et al. (1998), a business process is a set of activities, intended to create a value for a customer. This view of business processes is commonly used, and is supported by Rummler & Brache (1995), Willoch (1995), Davenport (1993) and Harrington (1991). Business process are often overlapping with other business processes, and as a result of this, Kimball et al. (1998) choose to view a business process such as a helpful grouping of information resources with a consistent theme. In order to illustrate a business process, Eriksson & Penker (2000) use activities inside the business and show how the business process narrates to and cooperate with resources in the business. This is done to accomplish a certain aim for the business process. Franke (1999) gives a bit more general description of business processes, and claims that a business process simply characterizes the way things are done in an organization.

“A business process is a sequence of coordinated activities, which creates value to the customer. By using resources, a process is transforming input to output, aimed for an external or internal customer” The definition given focuses on presenting that a business process is a process that creates value. An important aspect of the definition is that the customer may be internal or external.

This is important since everything produced in an organization is not aimed directly to an external customer who pays the organization money. The customer may in many cases be an actor in the organization who needs a service of some kind.

Data Warehouse for organization’s decision making

Watson et al. (2002), observes that one of the key developments in the information system field is data warehousing. Data Warehouse is a subject-oriented, integrated, non-volatile, time variant and non-updatable collection of data to support management decision-making processes and business intelligence Inmon (2002). Ralph Kimball (2005) gives a more concise definition of DW as a copy of transaction data specifically structured for query and analysis. Although data warehousing gurus Inmon, Kimball et al define Data Warehouse differently the concepts and achievements are the same, it depends on the area of focus. Hence a data warehouse inferred from Inmon (2002) and Kimball .et al. (1998) is a centralized database that captures information from various parts of an organization’s business processes to support predictive analysis, and data mining. Data Warehouses are widely perceived as valuable devices for acquiring information from multiple sources and delivering it to managers and analysts who may be using different software or computer platforms with special features and capabilities, Subramanian et al (1997). DWs are meant to support managers with answers to important business questions that require analytics such as pivoting, drill-downs, roll-ups, aggregations,

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data slicing and dicing Ramamurthy et al (2008). Moreover, all levels of management decision-making processes are supported by Data Warehouse through the collection, integration, transformation, interpretation of both internal and external data Negash (2004). Alshawi et al. (2003), conceptualizes that DW provides valuable information and knowledge at a strategic, management control, knowledge and operational levels.

According to Daniel (2012), a data warehouse is a database designed to support decision making in organizations. It is updated in batches or in real-time and it is structured for rapid online queries and for providing managerial summaries. Data warehouses contain large amounts of historical data. Han and Kamber (2001), defines a Data Warehouse as a repository of information collected from multiple sources, stored under a unified scheme and which usually resides at a single site. In educational terms all past information available in electronic format about a school such as budget, payroll, students' achievement and demographics are stored in one location.

According to Paul (2003), a data warehouse is a relational database that is designed for query and analysis rather than for transaction processing. It usually contains historical data derived from transaction data but can include data from other sources. Data warehouses separate analysis workload from transaction workload and enable an organization to consolidate data from several sources. Reddy et al. (2010), asserts that data warehousing is a collection of decision support technologies, aimed at enabling the knowledge workers to make better and faster decisions. It serves as a physical implementation of a decision support data model and stores the information on which an enterprise needs to make strategic decisions.

III. Research Methodology

For this study, hundred questionnaire (100) copies of questionnaire were administered. In the process of collection, Eighty four (84) copies of the questionnaire were returned representing 84% of return rate. Data collected with the questionnaire were presented and analyze using simple percentage table and conclusions were drawn from the analysis.

IV. Analysis of Respondents Based On Demography in Section A Of The Questionnaire

Table 1.0 **Gender**

	Frequency	Percent	Cumulative Percent
Male	53	63.1	63.1
Female	31	36.9	100.0
Total	84	100.0	

Table 4.1 above represents the gender distribution of the respondents. 63.1% of the respondents were male while 36.9 were female.

Table 1.2 **Age**

	Frequency	Percent	Cumulative Percent
19-24	28	33.3	33.3
25-30	36	42.9	76.2
30-Above	20	23.8	100.0
Total	84	100.0	

Table 4.2 above represents the age distribution of the respondents. 33.3% of the respondents are of age range 19-24, 42.9% are of the age range 25-30% while 23.8% are 30 years and above.

Table 1.3 **Marital Status**

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		Frequency	Percent	Cumulative Percent
	Single	44	52.4	52.4
	Married	29	34.5	86.9
	Divorced	11	13.1	100.0
	Total	84	100.0	

Table 4.3 above represents the marital status of the respondents. 52.4% are single, 34.5% are married while 13.1% are divorced.

Table 1.4 **Qualification**

		Frequency	Percent	Cumulative Percent
Valid	H.N.D	20	23.8	23.8
	B.Sc.	45	53.6	77.4
	MSc-Above	19	22.6	100.0
	Total	84	100.0	

Table 4.4 above represents the educational qualification of the respondent. 23.8% are H.N.D qualified, 53.6% are BSc qualified while 22.6% are MSc and above.

Table 1.5 **Years of experience**

		Frequency	Percent	Cumulative Percent
Valid	1-5	49	58.3	58.3
	6-10	22	26.2	84.5
	10-Above	13	15.5	100.0
	Total	84	100.0	

Table 1.6 represents the years of experience of the respondent. 58.3% have 1-5 years' experience, 26.2% have 6-10 years' experience while 15.5% of respondent have above 10 years of experience.

Analysis of Respondents Based On research question in Section B of the Questionnaire

Table 4.6 We Implement data warehouse in the organization

		Frequency	Percent	Cumulative Percent
Valid	Strongly Agreed	50	59.5	59.5
	Agreed	22	26.2	85.7
	Disagree	12	14.3	100.0
	Total	84	100.0	

Table 4.6 represents the replies from the respondents on question 1 of section B. 59.5% of the respondent Strongly Agreed, 26.2% agreed while 14.3% disagreed that their organization implement data warehouse in their organization.

Table 4.7 Data Warehouse is Important in the organization

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		Frequency	Percent	Cumulative Percent
Valid	Strongly Agreed	56	66.7	66.7
	Agreed	25	29.8	96.4
	Disagreed	2	2.4	98.8
	Strongly Disagreed	1	1.2	100.0
	Total	84	100.0	

Table 4.7 represents the replies from the respondents on question 2 of section B. 66.7% of the respondent Strongly Agreed, 29.8% agreed, 2.4% disagreed while 1.2% strongly disagreed that data warehouse is important in an organization.

Table 4.8 Data Warehouse has impact on organizational development

		Frequency	Percent	Cumulative Percent
Valid	Strongly Agreed	46	54.8	54.8
	Agreed	31	36.9	91.7
	Disagreed	6	7.1	98.8
	Strongly Disagreed	1	1.2	100.0
	Total	84	100.0	

Table 4.6 represents the replies from the respondents on question 3 of section B. 54.8% of respondent strongly agreed, 36.9% of respondent Agreed, 7.1% disagreed while 1.2% of respondent strongly disagreed that data warehouse has impact on organizational development.

Table 4.9 The relationship between data warehouse and organization development is positive

		Frequency	Percent	Cumulative Percent
Valid	Strongly Agreed	38	45.2	45.2
	Agreed	41	48.8	94.0
	Disagreed	4	4.8	98.8
	Strongly Disagreed	1	1.2	100.0
	Total	84	100.0	

Table 4.9 represents the replies from the respondents on question 4 of section B. 45.2% of respondents strongly agreed, 48.8% agreed, 4.8% disagreed while 1.2% of the respondents strongly disagreed that the relationship between data warehouse and organizational development is positive.

Table 4.10 Data Warehouse helps in minimizing inconsistent data report in the organization

		Frequency	Percent	Cumulative Percent
Valid	Strongly Agreed	34	40.5	40.5
	Agreed	38	45.2	85.7
	Disagreed	9	10.7	96.4
	Strongly Disagreed	3	3.6	100.0
	Total	84	100.0	

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Table 4.10 represents the replies from the respondents on question 5 of section B. 40.5% of respondents strongly agreed, 45.2% agreed, 10.7% disagreed while 3.6% of the respondents strongly disagreed that data warehouse helps in minimizing inconsistent data report in the organization.

Table 4.11 The organization employ necessary machines to implement data warehousing

		Frequency	Percent	Cumulative Percent
Valid	Strongly Agreed	33	39.3	39.3
	Agreed	23	27.4	66.7
	Disagreed	19	22.6	89.3
	Strongly disagreed	9	10.7	100.0
	Total	84	100.0	

39.3% of respondents strongly agreed, 27.4% agreed, 22.6% disagreed while 10.7% of the respondents strongly disagreed that the organization employ necessary machines to implement data warehousing.

Table 4.12 The cost of implementing data warehouse is high

		Frequency	Percent	Cumulative Percent
Valid	Strongly Agreed	17	20.2	20.2
	Agreed	48	57.1	77.4
	Disagreed	17	20.2	97.6
	Strongly Disagreed	2	2.4	100.0
	Total	84	100.0	

20.2% of respondents strongly agreed, 57.1% agreed, 22.2% disagreed while 2.4% of the respondents strongly disagreed that the cost of implementing data warehouse is high.

)ata warehouse integrate multiple information from other branch of the organization into a single data source.

		Frequency	Percent	Cumulative Percent
Valid	Strongly Agreed	24	28.6	28.6
	Agreed	45	53.6	82.1
	Disagreed	14	16.7	98.8
	Strongly Disagreed	1	1.2	100.0
	Total	84	100.0	

Table 4.13 represents the replies from the respondents on question 8 of section B. 28.6% of respondents strongly agreed, 53.6% agreed, 16.7% disagreed while 1.2% of the respondents strongly disagreed that data warehouse integrate multiple information from other branch of the organization into a single data source.

Data security in the organization is increased with the implementation of data warehouse.

		Frequency	Percent	Cumulative Percent
Valid	Strongly Agreed	30	35.7	35.7
	Agreed	29	34.5	70.2
	Disagreed	23	27.4	97.6
	Strongly Disagreed	2	2.4	100.0
	Total	84	100.0	

Table 4.14 represents the replies from the respondents on question 9 of section B. 35.7% of respondents strongly agreed, 34.5% agreed, 27.4% disagreed while 2.4% of the respondents strongly disagreed that data security in the organization is increased with the implementation of data warehouse.

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Table 4.15 Data warehouse increased the integrity of data in the organization

		Frequency	Percent	Cumulative Percent
Valid	Strongly Agreed	24	28.6	28.6
	Agreed	27	32.1	60.7
	Disagreed	18	21.4	82.1
	Strongly Disagreed	15	17.9	100.0
	Total	84	100.0	

28.6% of respondents strongly agreed, 32.1% agreed, 21.4% disagreed while 17.9% of the respondents strongly disagreed that data warehouse increased the integrity of data in the organization.

Table 4.16 Data warehouse ease the retrieval of data for reporting in the organization

		Frequency	Percent	Cumulative Percent
Valid	Strongly Agreed	36	42.9	42.9
	Agreed	34	40.5	83.3
	Disagreed	7	8.3	91.7
	Strongly Disagreed	7	8.3	100.0
	Total	84	100.0	

Table 4.16 represents the replies from the respondents on question 11 of section B. 42.9% of respondents strongly agreed, 40.5% agreed, 8.3% disagreed while 8.3% of the respondents strongly disagreed that data warehouse ease the retrieval of data for reporting in the organization.

Table 4.17 Data warehouse help in proper decision making

		Frequency	Percent	Cumulative Percent
Valid	Strongly Agreed	54	64.3	64.3
	Agreed	15	17.9	82.1
	Disagreed	11	13.1	95.2
	Strongly Disagreed	4	4.8	100.0
	Total	84	100.0	

64.3% of respondents strongly agreed, 17.9% agreed, 13.1% disagreed while 4.8% of the respondents strongly disagreed that data warehouse help in proper decision making.

V. Discussion on Findings

The results gotten from the research question are as follows;
Table 4.8 and Table 4.9 above pointed to the research question one which states that "Is there any relationship between data warehouse and organization development?"

54.8% of respondents strongly agreed, 36.9% of respondent Agreed, 7.1% disagreed while 1.2% of respondent strongly disagreed that data warehouse has impact on organizational development and 45.2% of respondents strongly agreed, 48.8% agreed, 4.8%

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disagreed while 1.2% of the respondents strongly disagreed that the relationship between data warehouse and organizational development is positive.

From the result higher percentage of response from the respondents indicates that there is positive relationship between data warehouse and organizational development

Table 1.10 above pointed to the research question two which states that "Does the implementation of data warehouse in the organization help in minimizing inconsistency report of the organization?"
40.5% of respondents strongly agreed, 45.2% agreed, 10.7% disagreed while 3.6% of the respondents strongly disagreed that data warehouse helps in minimizing inconsistent data report in the organization.

From the result higher percentage of response from the respondents indicates that the implementation of data warehouse in the organization helps in minimizing inconsistency report of an organization.

Table 4.13 and Table 4.16 above pointed to the research question three which states that "Does data warehouse help to integrate multiple system or business into one common data source?"
28.6% of respondents strongly agreed, 53.6% agreed, 16.7% disagreed while 1.2% of the respondents strongly disagreed that data warehouse integrate multiple information from other branch of the organization into a single data source.
From the result higher percentage of response from the respondents indicates that data warehouse help to integrate multiple system or business into one common data source for easy retrieval.
Table 4.15 above pointed to the research question four which states that "Does data warehouse help to increase data integrity of the organization data?"
28.6% of respondents strongly agreed, 32.1% agreed, 21.4% disagreed while 17.9% of the respondents strongly disagreed that data warehouse increased the integrity of data in the organization.

From the result higher percentage of response from the respondents indicates that data warehouse help to increase data integrity of the organization data.

Table 4.17 above pointed to the research question five which states that "Does data warehouse help in decision making in the organization?"
64.3% of respondents strongly agreed, 17.9% agreed, 13.1% disagreed while 4.8% of the respondents strongly disagreed that data warehouse help in proper decision making.

From the result very high percentage of response from the respondents indicates that data warehouse helps in decision making in the organization

VI. Conclusion

In this research work, five (5) objectives were raised which includes: To determine the relationship between data warehouse and organization development; To investigate if the implementation of data warehouse in the organization help in minimizing inconsistency report of the organization; To investigate if data warehouse help to integrate multiple system or business into one common data source; Determine if data warehouse help to increase data security and integrity of an organization data; Determine the impact of data warehouse on decision making of the organization from the information gathered it was ascertain that:

1. There is positive relationship between data warehouse and organizational development
2. Implementation of data warehouse in the organization helps in minimizing inconsistency report of an organization.
3. Data warehouse help to integrate multiple system or business into one common data source for easy retrieval.
4. Data warehouse helps to increase data integrity of the organization data.
5. Data warehouse helps in decision making in the organization

From the research work it was concluded that data warehouse has been widely implemented by large organization to integrate multiple information from different sector and branches of the organization, though it was also concluded that the cost of implementation of data warehouse is high but it is very important in an organization to;

- Minimize inconsistency of data
- Easy retrieval of data for reporting, and;
- Data warehouse help in proper decision making

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VII. Recommendation

Based on the study conclusion, the following recommends are made; Large organization to employ the implementation of data warehouse as it help in integrating different data source into one accessible storage for decision making and organizational development.

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