Dynamic Capabilities on Big Data Analytics' Explosion: Changing Decision-Making Process in the Organization

Nathaniel C. Ozigbo
Department of Business Administration
University of Abuja, Abuja – Nigeria

Abstract

This study discusses the dynamic capabilities of utilizing Big Data and advanced analytical techniques on the quality of decision-making to achieve performance excellence. In essence, the objective of the study is to examine the impact of the emerging technology and how it affects decision-making in the organizations. The unitilization of big data analytics provide a mechanism for analyzing a large volume of data to retrieve meaningful insights from data and used the recognized data pattern to predict future performance. Today, many organizations are leveraging data to automate processes, optimize selling strategies and enhance the overall efficiency of the business activities. This study shows that most organizations have improved with the implementation of Big Data and similarly career field has become significantly enhanced when the ability to collect and analyze Big Data is added to the mix. The study noted that the ability to develop Strong Big Data analytics capabilities would be needed for realizing the potential of Big Data analytics for decision-making and performance improvement. We found in our study that decision making is becoming more transparent, accurate, and efficient and to some extent faster. The study concluded that as more organizations move towards a data-based decision-making approach, it is essential that organizations foster learning and invest in their employees to gain value-added certifications in this domain. In addition, the study noted that the organizations should take initiatives in sponsoring employee for relevant training programs on analytical tools and techniques that arm them with the knowledge and skills required to leverage data for informed decision-making.

Keywords: *Dynamic Capabilities, Big Data Analytics and Decision-Making Processes*

Corresponding Author: Nathaniel C. Ozigbo

Background to the Study
The world has become excited with the emergence of Big Data and advanced analytics not just because the Data are Big, but also because the potential for impact is Big. Today, many organizations are collecting, storing and analyzing amounts of data. This data is commonly referred to as Big Data, because of its volume, the velocity with which it arrives and the variety of forms it takes. It is creating a new generation of decision-support data management and most business are recognizing the potential value of this data and are putting the technologies, people and processes in place to capitalize on the opportunities. Big Data is creating new jobs and changing existing ones. The volume of data in the world is increasing exponentially. By some estimates, 90% of the data in the world has been created and it is projected to increase by 40% annually (Jeblz 2016). Data is growing because it is increasingly being gathered by inexpensive and numerous information sensing and mobile devices and other devices. It has been observed that Big Data shed light on disparities in society that were previously hidden. Data gathering is becoming advanced and so is our ability to analyze and understand copious amount of it. It is important to note that better computational strength and enhanced connectivity are driving the information revolution.

According to an estimate by IBM, predicted that there might be over 300 times more information than we found in 2022. Understanbly, there are immense possibilities which arise from proper utilization of this data. Big Data usefulness is in its ability to help businesses understand and at on the environmental impact and their operations. Some of these are within their boundaries while others are outside their direct control. Moreover, Big Data is also useful in assessing environmental risks, also assisting to understand the demand for energy and food as the world population increases and climate change reduces, those resources by every passing year. Notwithstanding, Big Data can be integrated into government policies to ensure better environmental regulations. Most governments have started to implement the latest sensor technology and adopt real-time reporting of environmental quality data for effective decision-making processes. This data could be used to monitor the emissions of large utility facilities, and if required put some regulatory framework in place to regularize the emissions. In the business world, Big Data is actively, helping create a change, cut costs and boost long term profitability in a resource constrained world (Dyche 2014). This is the real objective that every corporate world should be aiming towards.

Objectives of the Study
Based on the background of the study, the following were the objectives; first, we want to verify claims made primarily in the Literature that Big Data analytics leads to better decision-making processes and competitive advantage. Second, we intended to verify to what extent Big Data analytics create additional incentives for managers to base their decisions on analytics. Finally, we want to uncover any mediating and/or moderating effects of Big Data Intensity on the above relationships.

Research Questions
Based on the above objectives, the following research questions were postulated to guide the study:

i.   How does discrimination of Big Data analytics affect decision making in analytics affect decision making in the selected organizations.
ii.   To what extent managers in selected organization incorporate Big Data Analytics
iii.   To what extent organizational scholars wanted to expand their knowledge in the dissemination of Big Data analytics and its effect n decision-making.

Review of Related Literature

In the section of the study, we reviewed the extent Literature on Big Data analytics for decision-making. Boyd and Crawford (2012) defined Big Data as cultural, technological and scholarly phenomenon, while Fan et al (2014) defined Big Data as the Ocean of Information. Kitchin (2014), Big Data is defined as huge volume of structured and unstructured data. Waller and Faweett (2013) defined Big Data as data-sets that are too large for traditional data processing systems and therefore required new technologies to process them. According to Dyche (2014) the concept of Big Data for many people is just millions of data which can be analyzed through technologies. Big Data analytics emerged as an important tool for supporting managerial decision-making. Dyche (2014) suggested that Big Data discovery efforts reveal unknown findings which result in insight that are helpful for managerial decision making. Big Data analytics has a significant effect on business value and firm performance, leading to savings, reduce operating costs, communication costs, improve customer retention and developing new business plan.

Big Data analytics gives the business organization the ability to collect customer's data, apply analytics and immediately identify potential problems before it's too late. It is a blanket term for the non-traditional strategies and technologies needed to gather organize, process and gather insights from large data-sets. Dun et al (2015) noted that Big Data definition were difficult to nail down because projects, vendors, practitioners and business professionals use it quite differently. With that in mind, defined Big Data as:
i.   Large data-sets
ii. The category of computing strategies and technologies that are used to handle large data-set.

In this context, large data-set means a data-set too large to reasonably process or store with traditional tooling or on a single computer. Another way in which big data differs significantly from other data system is the speed that information moves through the system. Data is frequently flowing into the system from multiple sources and is often expected to be processed in real-time to gain insight and up-date the current understanding of the system.

Big Data is characterized by huge amount of data coming from a variety of sources with a huge speed of generation (Davenport 2013). The kind of data is incorporated into our daily lives as most people use it indirectly every day. It is estimated that every day, we create over 2.5 quintillion bytes of data with such massive amount of data being generated, captured in efficiently high speed and derive real-time information that is vital for organization use. Schrage (2016) noted that it is when organizations actually use data in their decision-making that they are becoming data driven.

Big Data is divided into two categories; structured and unstructured data. Structured data refers to the data that is already filtered, has a predictable format and is defined by a set of rules (Mcafee 2012), with unstructured data, there are no rules and as such it does not have a predictable format. Sources of unstructured data may be social media, text, photos or videos. This variety of sources makes the data unmanageable for traditional processing. What separates Big Data analytics; from traditional data processing is the difference in information technology and analytical tools required to make proper use of the information to rive insights. Big data is approximately 80 – 90% unstructured, making sense of the unstructured data is vital for organizations in order to drive insights from information they gather (Pence 2014). Russom (2011) argued that analyzing unstructured data is the fundamental concept of Big Data, hence the ability to make sense of unstructured data through analysis enables organizations to incorporate valuable insights about their business into their everyday routines, processes and decisions.

This means that organizations need to gather data, analyze it, turn it into insights and then make sure that the insights are acted upon. Barton (2012) noted that If this is done efficiently, organizations could gain competitive advantage from being well-informed about their business and possibly increase their performance in order for Big Data to achieve its full potential, it should be incorporated into organization strategy and decision-making. Being able to utilize the knowledge gained through Big Data analytics might enable organizations to make faster and better decision. Thus, Big Data analytics enables what until recently was impossible, the ability to know exactly what people want and the organizations to be able to make decisions with higher accuracy based on the knowledge of Big Data Analytics.

Cukier (2013), noted that Big Data provides an unparalleled opportunity to exact information that could lead to increase business results. This is causing organizations to invest in Big Data analytics capabilities in the pursuit of gaining competitive advantage. Jeble (20167) noted that organizations are becoming data driven and instead of asking 'what do we think", start asking "what do we know". This new accessibility to insights derived from Big Data analytics is arguably changing the competitive nature in many organizations. Decision making has long been characterized by the intuition and expertise of decision makers, but when incorporating data in the decision-making could lead to better informed decision. Today, organizations have the opportunity to excel if they successfully manage to make sense of this newly produced knowledge and extract value from Big Data analytics.

Duan (2015), pointed that it is not enough to simply conduct an analysis of data, that it has to be efficiently disseminated to the people in the organization in order for it to influence decisions and put data instead of intuition at the heart of the decision-making processes.
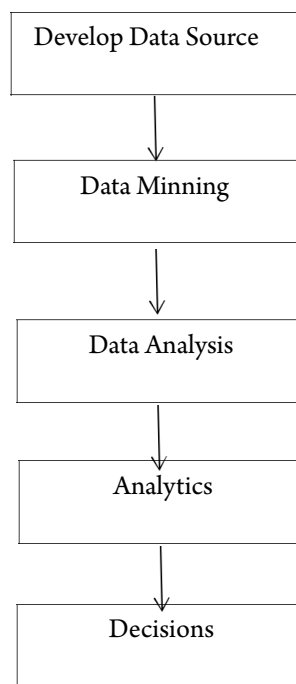
As such, Big Data comes with big promises and its effect on decision-making have been studied by several scholars. However, due to the fact that it is relatively new phenomenon, more empirical studies in specific organizations are deemed necessary to contribute to the research of what effect Big Data analytics have on decision-making. We observed that many organizations are going through crises and other are fighting back with the help of Big Data

analytics to resolve their problems. For example, the Newspaper industry in Nigeria are going through crisis of patronage. This arguably makes the industry a front-runner in the field of Big Data analytics. How organizations are using Big Data analytics as a way of adapting and what effect it has on both decision-making and other outcomes for organizations becomes the interest.

Conceptual Framework on Big Data and Decision-Making Processes:
In this section of the study, we describe conceptual framework for organizations which would like to develop analytics practices for their business to support business decision as shown below:

Fig. 1

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        │   Develop Data Source    │
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        │      Data Minning        │
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        │      Data Analysis       │
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        │        Decisions         │
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Source: Adopted from Kitchin (2014).

It's stated before, the term Big Data refers to vast sets of digital information use to analyze ad reveal patterns, trends and associations as they relate to human interactions and behaviours. Based on facts instead of intuition or past personal experience, this evidence-based information could be used to automate processes, gain insight into target audiences and improve performance using readily available feedback.

Big Data is a term that is used to describe data that is high volume, high velocity, high variety which require new technologies and techniques to capture, store and analyze it and use to enhance decision making, provide insight and discovery and optimize processes (Zhong 2013). Russon (2011) noted that organizations are gaining unprecedented insights to customers and operations because of their ability to analyze new data sources and large

volumes of high detailed data. This data is bringing more context and insight to organizational decision making.

We develop this framework to assist organization to adopt analytics for the suppose(s) of gaining competitive advantage and to bring them to mainstream business practices. We recommend that once analytics practice is established in the organization this function can be headed by a senior erective to ensure that critical insights gain from data, analysis are used for decision-making. The figure above clearly depicts the path from Big Data to decision-making.

i. **Develop Data Sources:** Data sources include traditional data sources such as enterprise systems, customer data, supplier data, social media data, and logistics trajectory. As a first step, organizations need to have information systems infrastructure and process in place to collect data through variety of sources.

ii. **Data Minning:** Data minning is a process of discovery pattern in large data sets using various statistical techniques, computer programs and data base systems. It helps in getting meaningful information from the data. Once data sources are established based on analytics requirement from different departments, data warehouse is developed to store multi-dimensional data for query and analysis purpose. Minning these data sets helps in finding previously unknown patters, correlation and association between different variables.

iii. **Data Analysis:** In this stage, organizations need to develop capabilities in analytics to get insight from the data, that is, the organizations need to develop a team of analytics professionals with several inter disciplinary skills. With the help of domain knowledge and data analysis, various opportunities of analytics could be identified.

iv. **Analytics:** In this stage, organizations would take advantage of neither the descriptive, predictive and prescriptive to develop their requirements based on opportunities of acquiring new customers, retention of existing customers or identifying risks. Business analytics uses a set of principles, statistical tools and computer algorithms to extract knowledge from the data.

v. **Decision-Making:** Business analytics is a potential tool for organizations to improve their business performance in terms of customers services, customer retention and acquisition. In this case, predictive analytics helps to predict what can happen based on certain available information. This gives a competitive advantage for the organization to plan ahead. Patterns from data, correlations and associations are helpful for improving sales performance, identifying rights of customers for products or segmenting markets.

From this discussion, we recommend that firms/organizations should use analytics in all aspects of conducting their business to reap the benefits of analytics based decision-making. This framework could be a starting point for further analysis, enhancement and future research opportunities.

**Challenges, Opportunities and Benefits with Big Data Analytics**

Big Data analytics have become a term used to describe the experimental growth, availability and use of growth, availability and use of information as explained by Dyche (2001). Hence, Big Data is characterized by huge amounts of data coming from a variety of source with a high speed of generation. This kind of data is incorporated into our daily lives as most people use it indirectly every day. It is important to recognize that Big Data analytics are modern panacea for the development of challenges and the diffusion of data science to the real constituted a genuine opportunity to bring powerful new tools to fight against poverty, hunger, and disease.

Big Data for development is about turning imperfect, complex often unstructured data into actionable information. This implies leveraging advanced computational tools to reveal trends and correlations within and across large data sets that would otherwise remain undiscovered. Above all, it requires human expertise and perspective. This section of the study outlines the opportunities and challenges. The study built on source of the most findings in the field of data science and findings from our own collaborative research projects. Information collection and analysis are not an easy process and include many steps, which include the following:

1. Goal identification
2. Creation or improvisation
3. Data Collation
4. Data refinement
5. Tools implementation
6. Process Execution

As an organization, we can adopt the Big Data steps and process in various business-related processes. The analysis of Big Data involves multiple distinct phases as shown below, each of which introduces challenges.

Fig. 2
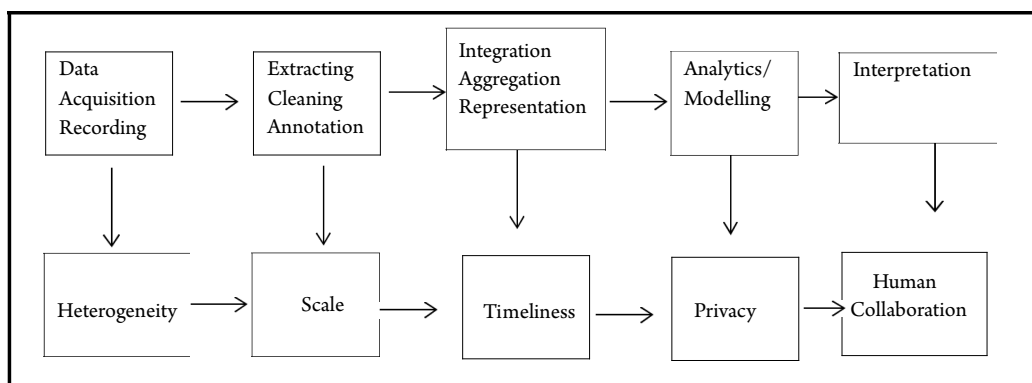
Sources: Adopted from Koscielniak (2015) with some modifications

Big Data does not arise out of vacuum. It is recorded from some data generating sources and require on-line analysis techniques that could process each streaming data. Data analysis is considerably challenging than simply locating, identifying, understanding and citing data. Other challenges of big data is shown above like Heterogeneity, Scale, Timeliness and others. Big Data has made it necessary to run heterogenous workloads on a single infrastructure that is sufficiently flexible to handle all these workloads.

In today's complex, world, it takes multiple experts from different domains to readily understand what is going on, in which Big Data analysis system support input from multiple human experts and shared exploration of results, notwithstanding a number of organizations are working to overcome the challenges and create the incentives structures needed for cross sector co-operation. For example, Global pulse is creating a network of Pulse Laboratory to bring together experts in government, academia, the development sector and private companies to pioneer new approaches to using data for development challenges. The organizations are actively engaging with partners around what Robert Kirkpatruck Gills data philanthropy, where corporations are encouraged to share anonymized data for use by the public sector to protect vulnerable populations. These organizations are driven partly by the recognition that more effective policy action could lead to greater resilience from economic shocks and therefor translate into better business continuity.

Opportunity for Big Data analytics is different industries according to Pence (2014) include the following:

i. Automobile Insurance: Involves pricing, client risk analysis, fraud detection, faster claims processing etc.
ii. Telecommunication: Analysis of patterns of series across social networks, profitability of customers, social network, profitability of customers, social networks etc.
iii. Manufacturing, distribution and retails, tracking availability, assessing the impact of promotional campaign, inventory management, pricing.
iv. Utilities: Analysis of Smart grid data to determine variables pricing models, smart meters to forecast energy demand, customized rate plans for customers.
v. Gaming: Game play analysis to provide feedback to game producers, opportunities for in-game offers. Law enforcement: identifying people linked to known trouble groups, determining the location of individuals and groups.

In essence, data is the life-blood of decision-making and the raw materials for accountability. In most private sector, analysis of Big Data is common-place with consumer profiting, personalizing service and predictive analysis being used for marketing, advertising and management. These techniques could be adopted to gain real-time insights into people's well-being and to target aid interventions to vulnerable groups. These techniques if applied responsibly could enable more agile, efficient and evidence-based decision-making and could better measure progress on the sustainable development goals in a way that is both inclusive and fair.

Risk: Organization today are exposed to immense risk from structured data and unstructured data. By leveraging risk analytics, companies find themselves in a better position to quantify measure and predict risk. By establishing a standard base-line for measuring and managing risk, companies have been able to incorporate risk considerations into their core strategic decision-making process and predict likely scenarios.

Big Data has the potential to revolutionize not just research but also education. In a broad range of application areas, data is collected at unprecedented scale and decisions that previously based on guess work or on painstakingly constructed models of reality could now be made based on the data itself. With the recent technology, Big Data analysis now drives nearly every aspect of our modern society, including mobile services, retail, manufacturing, financial services, life sciences and physical sciences.

The significance evolution of Big Data analytics changes the paradigms for what kinds of decision could be supported. Big data is the fourth generation of decision support data management and its ability to capture, store and analyze high volume, high velocity and high variety of data allow decisions to be supported in new ways and also creating new data management challenges. Hence, its volume of the created data constitutes the back bone of Big Data with such massive amounts of data generated to capture its efficiency in high speed and drive relative information is vital for organizations today. As noted by Anderson (2015), it is when organizations actually use data in their decision making that they are becoming data drivers. In fact, in order for big data to achieve its full potential, it should be incorporated into organization strategy and decision making and re-define their processes and way of doing things. Being able to utilize its knowledge gained through big data analytics would enable organizations to make faster and better decisions. Data is the newest source of information and when filtered and put into a context, it becomes usable information and when the information is subjected to experience, reflection or acted upon, it becomes knowledge

Big Data Analytics Role for Decision Making Process
In this era of digital devices, waves of big Data have spread all around. Firms in every sector are heavily flooded with data and the tides of big data are brilliantly exploited to provide an extensively deep understanding of valuable insight to improve productivity, brings innovation and achieve competitive edge over its peers using the right organizational resources and tools (dave port etch 2016). The concept of big data has evolved over several decades based on the rule of four vs volume (large amount of data, variety (any type of data), velocity (high changeability), and value (assessment). Big data reflects a vast amount of disordered data collected by different types of business.

Big data analytics provides evidence-based decision support system in various organizations. Data based decision making requires the appropriate principles, processes and techniques are utilized in collecting, analyzing, examining and interpreting data to extract meaningful information and knowledgeable from data generated from variety of source to support decision making and plays a critical role as an agent on the 4th industrial revolution.

According to Jeble et al (2016) note that the analysis of big data is studied by Seven V's of volume, velocity, variety, veracity, value, variability and visualization. Volume refers to the amount of date accumulated by a vast majority of the world population using internet connected digital devices such as mobile phone, desk top, laptop computers. Velocity is the speed at which data is transferred and processed in real time. Variety refers to diverse sources and formats of data, include text pictures, film and sound, variety is the quality and source of data and its conformity to facts and authenticity. Big data velocity reflects the period peaks associated with highly inconsistent data flows, while data visualization is the means of intensive, exploring and analyzing data to effectively identify patterns and draws conclusion about relationships and causalities to support decision making.

In essence, the leadership of the organization has the responsibility to develop a fact based and data driven culture to ensure that decision making is guided by information and knowledge. Hence, the quality of the volume and diverse sources, the transfer, process and visualization system, the authenticity of data and big data analytics capacities of the organization determine the quality of decision making.

The table below indicates the stages of supporting decision making processes based on the data set.

Table 1.
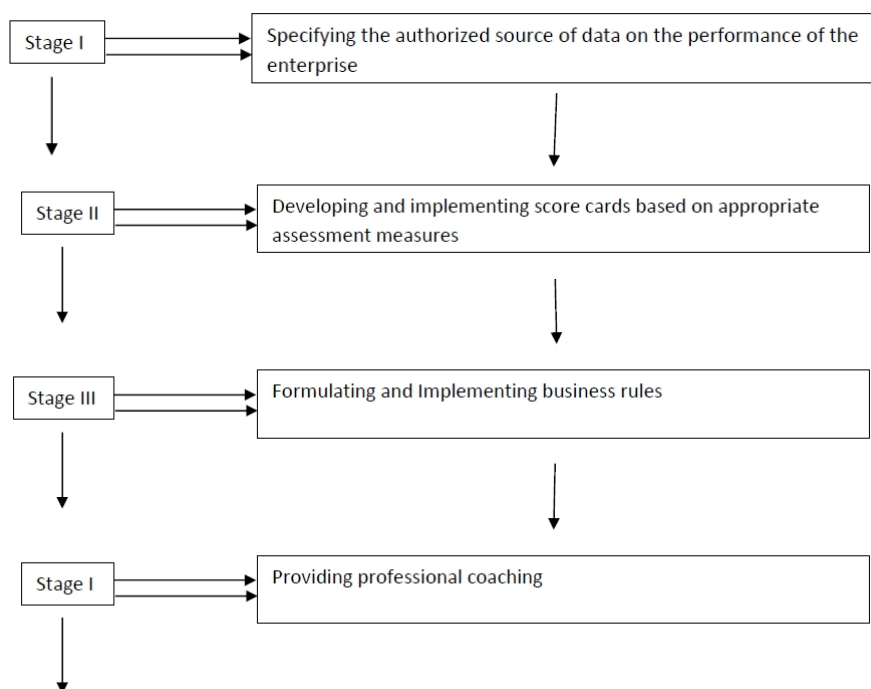
Source: Adopted from Fanetal, 2014 with modifications

According to Anderson (2015) decision making has long been characterized by the instruction and expertise of decision makers but when incorporating data in the decision

making, it led to better informed decision. Today, organizations have an opportunity to excel if they manage to make sense of newly produced knowledge and thus extract value from Big Data analytics. Mahanty et al (2013) noted that being able to utilize the knowledge gained through big data analytics might enable organizations to make faster and better elections and that the biggest obstacle the organization(s) might be facing is to investigate the data driven insight into their day-to-day business processes. Thus, Big data analytics enables what until recently was impossible, the ability to know exactly what they need. Anderson (2015) noted that if Big Data analytics is disseminated efficiently that it will likely have some kind of impact on their decision making. Fundamental Big Data analytics changes the way business compete and operate. Organizations that invest in it, successfully, derive value from the data and have a distinct advantage over the competitors, a performance gap that will continue to grow as more relevant data is generated. While there is no doubt that Big Data revolution has created substantial benefits to businesses and consumers alike, here are commensurate risks that go along with using Big Data as shown below:

Fig. 3
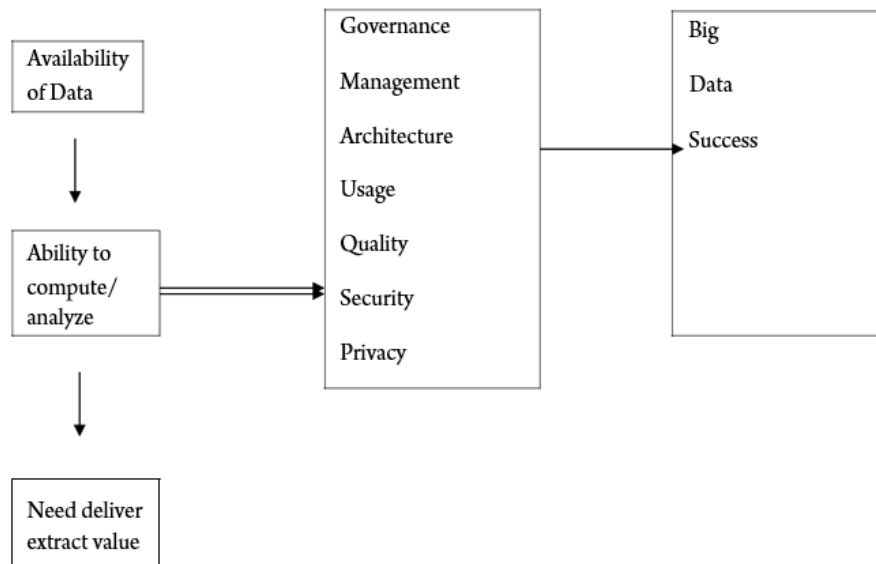
In essence, the key success factor organization is the availability of relevant information at the right time from the figure above, good governance is vital to the success of big data initiatives in any organization and it encompasses consistent guidance, procedures and clear management decision making. For management, organizations need to manage data through different sources and integrate its usefulness through a range of technologies in the market. Big data technologies release organizations from the traditional accuracy by enabling them to store data at the lowest level of detail, keeping all data history under reasonable costs and with less effort. Moreover, data architecture is set on to break down internal silos, enabling the sharing of key data set across the organization and to ensure that learnings are being captured and relayed across to the right set of people in the organization in a timely and accurate manner.

In case of usage, the result of big data could be beneficial to a wide range of stake holders across the organizations as well as customer facing departments like sales and marketing. The key challenge is having the ability to interpret the huge amount of data that could be collated from various sources. Moreover, the quality of data sets and the inference drawn from such data sets are increasingly becoming more critical and organization need to build quality and monitoring functions and parameters for big data. The quality of the data might have a direct effect on driving new key insight in creating high quality outcomes.

Furthermore, security is a major concern with Big Data. To make more sense from the Big Data, organizations need to start integrating parts of their sensitive data into the bigger data and to do this, organization need to start establishing security policies which are self configurate. These policies should leverage existing trust relationships while ensuring that data analytics are optimized and not limited because of such policies. Finally, the increased use of Big Data challenges the traditional frameworks for protecting the privacy of personal information, hence forcing the organization to audit the implementation of their privacy policies to ensure the privacy is being properly maintained

Conclusion
Big Data is a game changing thing and successful organization are achieving business advantages by analyzing Big Data. The techniques of Big Data analytics have received attention in recent year but some challenges are one of the major causes of diminishing the growth of organization. The huge or enormous form which cannot be processed by the conventional database symptoms and utilize to provide letter usage of resources and storage, reduce the time of computation and good business decision-making.

This study was based on the randomly selected organization located in Lagos, Nigeria, where data applications were used in different organizations. We found that in each organization, everything was dependent on the decisions of the policy-makers and their decisions were dependent on the data mining techniques, data mining algorithms and frameworks of Big Data. Also, by integrating data mining with Big Data frameworks, the policy makers get more accurate business decision. From the study, we found that most organizations required the tools to analyze and arrange different data types from different sources to analyze and from many sources. The outcome was deeper and reliable information about business trends, values and patterns. In addition, we envision Big Data changing business and business changing society and believes that the benefits outweigh the draw backs and organizations should embrace data alongside a healthy respect for its limitations. The point with Big data is that we could do novel things and one of the most promising ways the data put to use is in the area of machine learning. This is a branch of artificial intelligence, which is a branch of computer science. The idea of machine learning has led to some spooky findings that seem to challenge the primary of human being as the fount of understanding in the world. The value of this Big data is immense and it going to steal our jobs. For example, a study by researcher at Oxford universally predicted that as much as 47% of works that is do ne today is at the risk of being taken over by computerization. The benefit is that Big Data will bring about great things to society and we will become voga instructors and baristas to a small group of millionaire computer scientists.

In conclusion, Big Data has been around for years and few would dispute the benefits it brings to organizations that have more data stated than ever before ready to be put to use for that competitive edge. Most organizations now understand that if they capture all the data that streams into their business, they can deploy Big Data analytics to get significant leverage to understanding their customer, forecasting business trends reducing operational costs and realizing more information.

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