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Framework for Evaluating Organizational Readiness in Adopting Big Data for Optimal Performance: The National Health Insurance Scheme (NHIS), Nigeria in Perspective

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ABSTRACT

With the trends observed in the developed economies of Europe and America, there is growing realization in developing countries about the use of big data to enhance the business process, modules and activities. The increasing complexity of the business operation, especially for regulatory organizations in the case of the National Health Insurance Scheme which manages over 100 Health Maintenance Organizations, Public and Private Hospitals of different capacity with an enrollee base of over 20 million lives are complex operations that can only be managed with advanced tools, such as BIG DATA. Prominent in the development of information technology, is the emergence of big data which is fast becoming a trend in every sector of the economy. As a result, businesses in the financial sector, education, healthcare and governance in both developing and developed economies can become more efficient, achieve productivity and become more sustainable. Although, big data technologies also has its limitation in terms of efficiency, utilization, flexibility to the needs of the organization and other conventions, it remains the most important convention for businesses that are able to align their internal system and processes with the ideals of big data. As such, the problem is not really about the limitation of the big data but the capacity of the organization or users to explore its strength. Despite the acknowledgment of the potentials of big data systems, there is poor integration of big data in the operations of the health insurance system of Nigeria. This research seeks to explore the prospects for developing capabilities in big data on the performance optimization of the National Health Insurance Scheme (NHIS), Nigeria. From a positivist standpoint, this thesis will be based on the framework of the Unified Theory of Acceptance and Use of Technology (UTAUT) framework as a tool for management to effectively leverage on such technologies to achieve their organizational goals through the interrelationship between effort expectancy, performance expectancy, social influence and facility condition., and the Technology – Organization – Environment (TOE) Theory. However, the case study research design was selected for the research. The findings of the study will contribute to knowledge on big data potentials in the health sector and the overall public sector that is desirous of efficiency in public service delivery. More importantly, the research would set the platform for assessing the big data capabilities of firms while contributing to best practice for utilization in redefining big data development process.

Keywords: Big Data, National Health Insurance Scheme, UTAUT, TOE, Health Management Organizations.

1. INTRODUCTION

It is unarguably true that the development of information technology (IT) has been the major force influencing the improvement of human life and corporate organizations (EY, 2014). Virtually every facet of human existence is dependent on computer application and computerized systems. Therefore, businesses are either compelled by reality and the proven results of engaging IT systems to either incorporate information technology with their current operation or go out of extinction (Sheahan, 2014). In the perspective advanced by Chen, Chiang and Storey (2012), the developments in information technology has led to the proliferation of tools which could be utilized in every sector of the economy. As a result, businesses in the financial sector, education, healthcare and governance in both developing and developed economies can become more efficient, achieve productivity and become more sustainable. Some of these information technology features include automation of processes, effective communication, storage, analytic capabilities, and record management among others (Sheahan, 2014). Prominent in the development of information technology is the emergence of big data which is fast becoming a trend in every sector of the economy.

To express the emergence and place of big data in the current economic system, Shao and Lin, (2016) asserted that big data is an efficient digital technology that can be found everywhere. The everywhere connotation of big data suggests its relevance in every system, group or organization. Without big data integration in the modern world, it would be difficult to achieve real-time data synthesis, management of user-generated information, round the clock communication and generation of insight from huge data which has been supported by other technologies before the emergence of big data (George et al, 2014). As conceptualized by Frizzo-Barker et al (2016), big data is the current stage in the development of data technologies, business intelligence and analytical tools which is highly recommended for business. Although, big data technologies also has its limitation in terms of efficiency, utilization, flexibility to the needs of the organization and other conventions, it remains the most important convention for businesses that are able to align their internal system and processes with the ideals of big data. As such, the problem is not really about the limitation of the big data but the capacity of the organization or users to explore its strength.

It is not only information technology systems that are evolving, the healthcare systems around the world are also evolving and the Nigerian healthcare sector is no exception. The health sector has evolved to the point of health insurance which is regulated, managed and coordinated by the National Health Insurance Scheme (NHIS). Consequently, the NHIS has to manage data of millions of insured patients through diverse hospitals, health maintenance organizations and pharmacies with great difficulty without big data capabilities. That notwithstanding, there is a need to focus more on capacity development, considering the multi-sectorial potentials of big data to transform operational efficiency and outcomes (Frizzo-Barker et al. 2016). In support of these prospects, Milliken (2014) reported that the use of big data tools and techniques would assist health sector organizations to collect, analyze and transform both unstructured and structured data into useful information for decision making on improving health sector delivery, monitoring service delivery and measuring the impact of funds expended in the insurance sector. Also, Frizzo-Barker et al (2016) maintained that big data allows health institutions and organizations to gain mastery of their operational process to identify loopholes and determine avenues for improvement. With the constant advancement of the health insurance sub-sector, big data capabilities would contribute to the efficiency, growth and sustainability of health insurance organizations including the NHIS.

In light of the foregoing, this research looks at the potentials of developing the capacity to leverage big data for optimal performance of the National Health Insurance Scheme (NHIS).

2. RELATED WORKS

2.1 Overview of Big Data

Big data is fast becoming rhetorics in the IT parlance. As defined by Driscoll (2010), big data refers to a set of data that is bigger than a terabyte. For other scholars such as Marr (2015), big data refers to data with a large volume, variety and velocity. In other words, big data are complex data which cannot be managed by simple tools. Even from the perspective advanced by Johnson (2012), these are large data sets that are complex in nature as they may include data on consumer behavior, system outcomes, an output from complex process and data covering broad geographical areas and multiple segments. Since data is the foundation of every organization, big data is the framework of a growing, developing and resilient organization.

With big data, companies and users of data are able to create value due to the in-depth insight they can generate from the data. More so, they can increasingly manipulate the data for research and analytical purposes which would obviously form the basis for system improvement, identification of variation and discover grey areas in operations. For Fisher et al (2012), big data allows complex as well as a simple analytical function which may replace or support effective decision making of human beings, considering also the prospects for the use of automated algorithms in the big data framework. In the perspective of Griffin and Mark (2014), big data serve as the basis for the development of new product and service, based on the identification of loopholes in existing systems and process which could have been difficult to observe in a traditional or small data environment. Therefore, the development in data collection tools and new information technologies such as the cloud computing system, Internet of Things and Mobile Internet would not be effective to meet the needs of any organization without corresponding big data capabilities. In this regard, Zhou et al (2016) shared the view that a large amount of data generated from the evolving data collection and storage tools can only be used to make an informed decision through big data capabilities.

2.2 A summary of the literature on big data

Paper	Focus	Theory/Method	Research Method	Gap identified
Deepak (2018)	Evaluating the evolution of big data and the research challenges	No Theory	Qualitative	Modernised approach to big data technology utilisation
Ming and Gunilla (2017)	Investigate the utilisation and benefit of big data in the library	No theory	Qualitative	Procedure for developing the capacity for big data utilisation
Vishanth et al (2017)	Determinant of big data utilisation in the public sector	Data capability model	Qualitative	The benefits of big data to the public sector
Frizzo-Barker, J., Chow-White, P. A., Mozafari, M., & Ha, D. (2016)	The use of big data in coordinating student scholarships	No model	Systematic review	Drawbacks in the use of big data not specified
Laura et al (2016)	The implication of big data utilisation in health system pharmacy	No model	Conceptual paper	Lack of emphasis on the broad influence of big data on insurance and its linkages with the health system pharmacy

Paper	Focus	Theory/Method	Research Method	Gap identified
Moon-Koo and Jong-Hyun (2016)	The prospects and challenges of big data in the health sector	No model/theory	Quantitative/Qualitative	Lack of framework for developing capacity for big data utilisation in the health sector
Ralph (2016)	Challenges and opportunities for big data in business	No theory	Qualitative	Focus on the commercial sectors of the economy without inclusion of the health sector.
Scott et al.(2016)	Examine the potentials to leverage modern data analytic to build organisational science	No Theory	Conceptual paper	Lack of specificity on a type of organisation
Shao, B. & Lin, W (2016)	Assessment of the output performance of information technology service industry	No Theory	Qualitative/Quantitative	Lack of information on the role of information technology service industries in enhancing the capacity of user organisation.
Son et al (2016)	Investigate the potentials to Leverage small data and big data in front line management	Absorptive Capacity Framework	Conceptual paper	Lack of information on the modalities for developing capacity to leverage on small or big data.
Zhou, K., Fu, C., & Yang, S (2016)	Examine the potentials for using big data to ensure smart energy management	No Theory	Conceptual paper	Poor information on the modalities for developing capacity to leverage on the big data systems.
Hargittai, E. (2015)	Investigate the potential biases of big data derived from social networking sites	No Theory	Qualitative method	Lack of information on the best approach to generating big data for the organisation.
Jin, D., Kevin C. Moffitt, and Paul B. (2015)	Evaluate the prospects of big data in accounting practice	No Theory	Qualitative method	Failed to specify the capacity for developing and use of big data in accounting practice.

2.3. Conceptual Approach To Big Data

From the figure above, there are new perspectives to big data which were advanced from research in different context which forms the basis for the insight provided on the above. In the case of Deepak (2018), big data is a concept that is more relevant to the academic system as it plays a key role in the development, efficiency and performance of the academic institutions. Still in line with this recognition of big data as a method of transforming the educational system, Ming and Gunilla (2017) saw the big data system as the main driver of the transformation of library system, enabling undergraduates to access huge database of information from just a simple click while administrators can ensure the efficiency of the system.

Using a systematic review on corporate organisation, Frizz-Barker et al (2016) was also able to contribute to the advancement of the use of big data technologies within the standpoint of corporate organisations. Also conspicuous from the figure above is the fact that Vishanth et al (2017) was able to assess the utilisation of big data in the public sector through the lens of the big data capability model and in tandem with that, Son et al (2016) investigated the potentials to Leverage small data and big data in front line management using an absorptive capacity framework. It is generally acknowledged from the research that big data is fast becoming a trend and is recognised as playing a significant role towards the advancement of virtually every sector of the economy.

2.4 Research Gaps

There were some major gaps in the reviewed literature which forms the preliminary basis for this research as highlighted below.

1. There has been poor emphasis on the strategies for developing capability to leverage big data towards the development of organisations. From the research of Ming and Gunilla (2017), Vishanth et al (2017) and Moon-Koo and Jong-Hyun (2016) among others, the focus is on the prospects for utilisation of big data in organisation whereas nothing significant has been done in establishing the capability to leverage the big data systems.
2. There has been poor research on the use of big data in the contemporary health sector which is deriven by the trends of health insurance with its data challenges. Even though Moon-Koo and Jong-Hyun (2016) and Laura et al (2016) has set the pace in the health sector through their respective focus on the pharmaceutical sector and the general health sector, the prospects for big data utilisation remains unknown. What do you mean by POOR RESEARCH – change that expression to something more academic.
3. Also, most of the research that has been conducted on different aspect of big data utilisation failed to advance certain theoretical standpoints and grounded model which may have accounted for the loopholes and gaps identified from such research (Deepak, 2018; Ming and Gunilla, 2017; Frizzo-Barker, J., Chow-White, P. A., Mozafari, M., & Ha, D., 2016; Laura et al, 2016; Moon-Koo and Jong-Hyun, 2016). Therefore, this research intends to use the Use of Technology model (UTAUT 1 and 2) for the study.

2.5 Problem Statement

With the trends observed in the developed economies of Europe and America, there is growing realization in developing companies about the use of big data to enhance the business process, modules and activities. The increasing complexity of the business operation, especially for regulatory organizations in the case of the National Health Insurance Scheme which manages over 100 Health Maintenance Organizations, Public and Private Hospitals of different capacity with an enrollee base of over 20 million lives are complex operations that can only be managed with advanced tools. In spite of the acknowledgment of the potentials of big data systems, there is poor integration of big data in the operations of the health insurance system of Nigeria.

Most of the activities relating to patient health information, provider information, service utilization and health data are managed traditionally through the filling of paper forms and other documents that have to a large extent affected the efficiency, performance and development of the health insurance practice in Nigeria. The critical question that needs to be addressed by the industry players and other stakeholders is the extent to which the National Health Insurance Scheme (NHIS) has been able to develop its capacity to utilize big data for its operations. Also critical is the process and roadmap for its efficient development in the organization and the potential benefits to be derived from the system? In answering the question of capacity development in terms of big data utilization to enhance the performance of the National Health Insurance Scheme (NHIS), there are other salient questions that cannot be ignored.

These include the level of infrastructure and orientation of the organization towards utilization of big data as the development of capabilities in any aspect of technology cannot be effective without creating the right environment and putting the right infrastructure in place. Corroborating this fact, Zhou et al (2016) expressed that the major threat to the development and benefit of big data in organizations is the lack of efficient institutional infrastructure and commitment to the development and utilization of big data systems. Perhaps, such inconsistencies as noted by Frizzo-Barker et al (2016) are due to the poor realization and awareness of the prospects of big data integration in the performance improvement of the organization. This poor awareness of the prospects of big data in the National Health Insurance Scheme may have accounted for the poor integration over the years.

It is against the backdrop of the foregoing issues that the research seeks to explore the prospects for developing capabilities in big data on the performance optimization of the National Health Insurance Scheme (NHIS).

3. RESEARCH DIRECTIONS

3.1 Research Question

How can the National Health Insurance Scheme (NHIS) develop capability to leverage big data for optimal performance?

3.2 Aim

To investigate the capability of the NHIS to leverage big data for optimal performance.

3.3 Objectives

Examine the big data Capacities of the NHIS (Input),
Evaluate the Big Data Capacity Development Process,
Identify the benefit of Big Data to the optimal performance of the NHIS

4. RESEARCH FRAMEWORK

The research will be based on the framework of the Unified Theory of Acceptance and Use of Technology (UTAUT) framework and modified framework of the Unified Theory of Acceptance and Use of Technology (UTAUT2) which is hinged on the paradigm of Venkatesh, Morris, Davis, & Davis (2003) as discussed herein

4.1 The justification for UTAUT and UTAUT2 framework

As new information technologies continue to proliferate global businesses and institutions, there is a need for management executives in the public and private sector to determine the right approach to the identification, use, management and integration of information technology to enhance their operation (Williams et al., 2015). Therefore, Venkatesh et al (2003) proposed the UTAUT framework as a tool for management to effectively leverage on such technologies to achieve their organisational goals through the interrelationship between effort expectancy, performance expectancy, social influence and facility condition. This is premised on the dynamic influence of name, age, gender and experience. With the trends in the industry, Venkatesh et al (2012) re-modified the original UTAUT theory through the introduction of hedonic motivation, price value and habit as other modifying variables that determine the extent of technology utilisation.

Put together, Fong (2014) noted that the UTAUT and UTAUT2 model could contribute to explaining up to 70% of technology utilisation factors, including those relating to leveraging big data technologies which is the core of the study. The UTAUT framework is shown below.

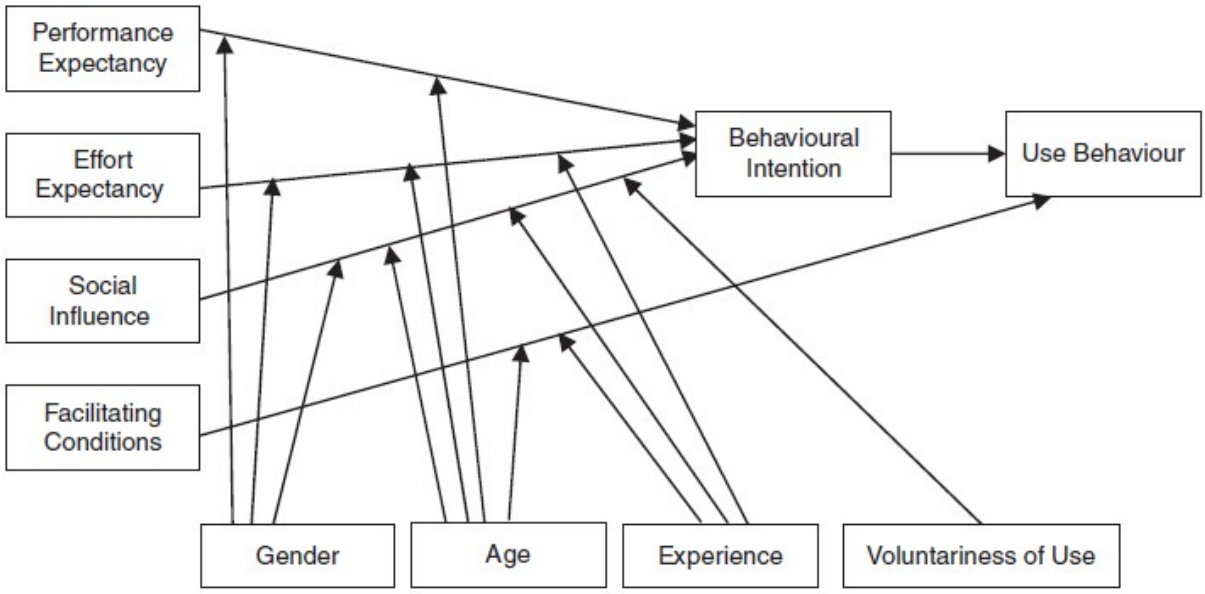

Fig 1: The UTAUT Framework
Source: Venkatesh et al (2003)

Performance expectancy: this relates to the user anticipated benefit from the use of the system.

Effort expectancy: relates to the internal modification that is required for the organisation to use such system.

Social influence: includes the external factors that influence the use of such systems.

Facilitating condition: the prevalence of certain enabling factors for the use of the system, including policies, facilities etc.

These are moderated by the gender influence on the usage, age influence, the experience especially relating to previous use of related systems and the willingness or non-coercion in utilisation. In the next figure below, the UTUAT2 model is presented, highlighting the new addition to the original UTUAT Model.

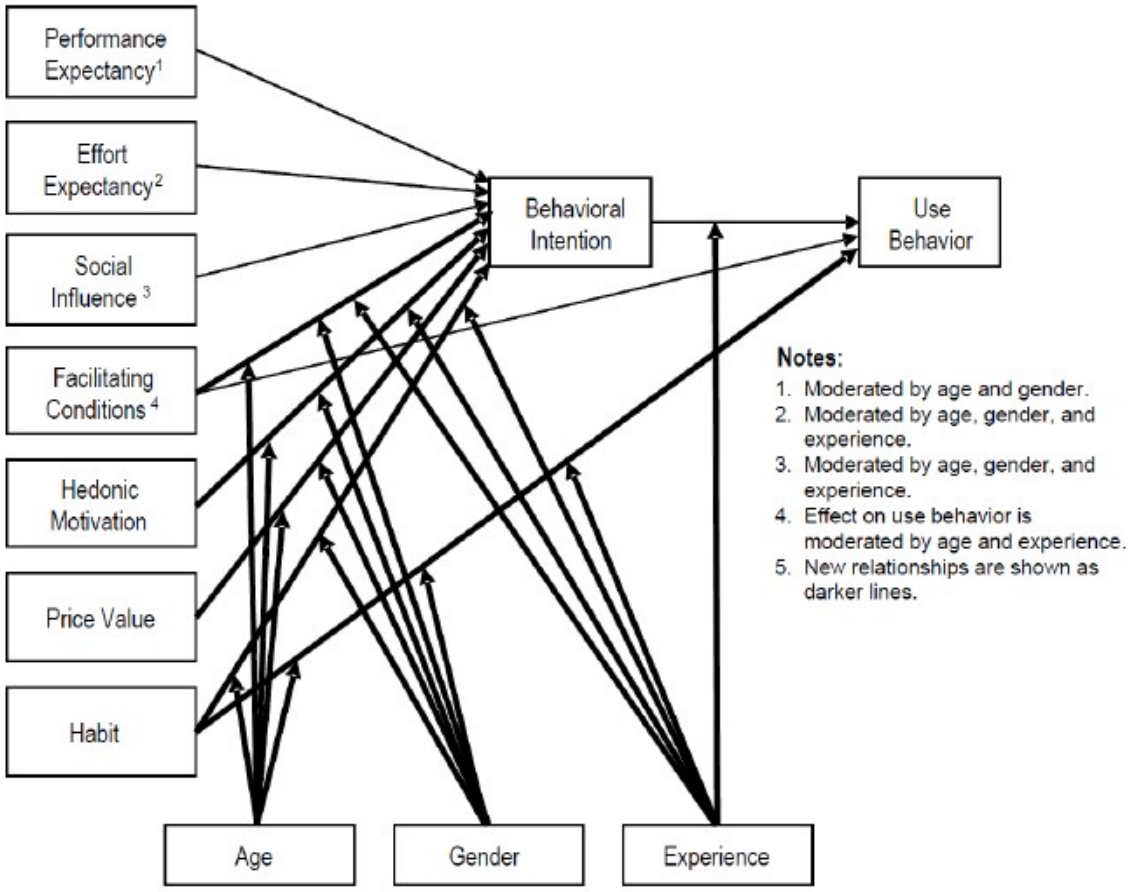

Fig 2: UTUAT2 model
Source: Venkatesh et al (2012)

4.2 A conceptual framework for this study

The UTAUT2 model which incorporates the standard of the original UTAUT model is used for the research. It is assumed that the comprehensive model is sufficient to achieve the research objective, hence, the need to use the construct as it is. Therefore, the hypothesis of the study is derived thus.

Performance Expectancy

This involves the potential benefit the NHIS seek to gain from the use of the big data system. This should include the cost saving benefit, quality of medical services and better management of insurance premiums.

H1: The perceived benefit will have a positive impact on the intention to use big data

Effort Expectancy

The user perception on the ease of using the big data system will influence its utilisation. The ease of use includes the ease of learning the system and ease of setup. Therefore, the hypothesis below.

H2: The Perceived Ease of Use (PEOU) will have positive impact on NHIS intention to use the big data system

Social Influence
Through this construct, the researcher will investigate the environmental factors that can influence NHIS use of big data, including the use of big data in other organisations and other health insurance regulators around the world. This will influence the user perception on how the system should be utilised (Fong, 2014).

H3: the social influence will have positive impact on the NHIS intention to use the big data system

Facilitating Condition
It is believed that the right facilities, infrastructure and framework will influence the big data utilisation by the NHIS.

H4: Facilitating conditions will have positive impact on NHIS usage of the big data system

Hedonic Motivation
The gains and pleasure from the big data system in terms of seamless operations, convenience etc. will influence NHIS use of the big data technology

H5: Hedonic motivations will have positive impact on the actual use of the big data system

Price Value
The cost burden of big data utilisation will determine whether the NHIS will use the big data technology or not, given the budgetary allocation of the organisation.

H6: Price value will have positive impact on the actual use of the big data system

Habit
Habit relates to the disposition of the NHIS towards the use of information technologies, given its antecedents.

H7: Habit will have positive impact on the actual use of the big data system

5. METHODOLOGY/ RESEARCH DESIGN

5.1 Research Design
The research design which offers a roadmap for the commencement, execution and conclusion of the research project (Ononiwu, 2015). It is the methods and techniques employed by the researcher to provide answer to the research questions. Research designs may be an action research, descriptive research, case study research or exploratory research (Cresswell, 2013), depending on the focus of the research. The research adopts the case study research which is more effective for indepth assessment of the research questions from a given context, the National Health Insurance Scheme. In justification, Near (2016) described the case study approach as ideal for IT and scientific researches where in-depth approach is required.

5.2 Research Method
The research method provides a specific framework for the collection, analysis and interpretation of data generated from the case study which has been selected. Research method could also refer to the design implementation strategy. The research considered the observation, experimental, interview, focus group and survey research method

among others (Yin, 2013). However, the case study research design was selected for the research. In justification, Easton (2010) described survey approach as ideal for generating objective, accurate and measurable data in IS research.

5.3 Research Methodology

Research methodology in the view of Jackson (2013) provides a set of process in which the research will be executed especially in the field of IS. To this end, the research adopted the retroductive methodology which allows for the development of hypothetical models to assess the state and functioning of mechanisms that result in a phenomenon; in this case, the mechanisms relating to developing the big data capabilities of the NHIS.

Following this methodology;

- Through conceptual and theoretical literature, the researcher would identify the dynamics of big data capabilities and utilisation in the NHIS.
- From the theoretical perspective of the UTAUT and UTAUT2 Model, the researcher would provide a framework for examining the big data capabilities of the NHIS.
- Based on the two activities, the researcher would attempt to provide answers to the core research question of the NHIS capacity to leverage big data for operational efficiency.

Therefore, the overall methodology for the research will be strictly quantitative as it will enable the researcher draw sufficient meaning from the data generated through triangulation to achieve the objectives of the research.

5.3.1 Philosophical Underpinning

The following philosophical framework from the IS perspective were considered in the design of the research methodology;

- The positivism allows for the testing of IS theories using deductive approach to hypothesis testing. This usually results in generalisation of the findings (Jackson, 2013).
- Interpretivism philosophy studies the subjective experience of people relating to their perception of IS systems and how they relate with it (Fisher, 2010)
- Critical realism supports the in-depth assessment of a variable using multiple methodologies to understand the contributions of IS to the contemporary world (Mingers et al., 2013).

These philosophical standpoints has their drawbacks; Interpretivism is subject to bias whereas the critical realism does not favour the application of IS theories (Near, 2016). Therefore, the research adopted the positivism research paradigm which offers a scientific approach to the generation of real data that would help understand the research phenomenon.

6. CONCLUDING REMARKS

In this discourse, we have set the stage for a research that seeks to explore the prospects for developing capabilities in big data on the performance optimization of the National Health Insurance Scheme (NHIS), Nigeria. From a positivist standpoint, this thesis will be based on the framework of the Unified Theory of Acceptance and Use of Technology (UTAUT) framework as a tool for management to effectively leverage on such technologies to achieve their organizational goals through the interrelationship between effort expectancy, performance expectancy, social influence and facility condition., and the Technology – Organization – Environment (TOE) Theory. The findings from the study will contribute to knowledge on big data potentials in the health sector and the overall public sector that is desirous of efficiency in public service delivery and develop[p metrics for assessing the big data capabilities of firms.

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