Technological Advancement and Risk Management in Composite Insurance Companies in Nigeria

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A B S T R A C T

Purpose: The study focused on the effect of technological advancement on the Risk management of insurance companies in Nigeria. The study's objectives were to examine how technological innovations enhance the identification of policyholder risk by insurance companies and evaluate how information technology has improved the identification of risks inherent in investment by insurance companies.

Methodology: A survey research design was employed in this study. The study focused on the 14 composite insurance companies in Nigeria, only five of which were selected based on gross premium written and retention ratio. The targeted population of the study was 1569, while the sample size was 181 employees of the selected insurance companies. A well-structured questionnaire was formulated and administered, out of which 163 were filled and used for analyses using regression analysis with the SPSS (IBM 23) package.

Results and Findings: The results showed that technological innovation had enhanced insurance companies' identification of policyholder risks. In contrast, information technology has not improved the identification of risks inherent in investment by insurance companies. Thus, the study recommended, among others, that insurance companies should invest more in information technology to help achieve better results.

1. INTRODUCTION

Risk management within the insurance industry entails a robust governance structure to enable the board and management to be aware of how risks are being managed and the danger embedded in undermining the independence of various departments in the organization. Companies must ensure that the dangers of risk-taking and risk monitoring are independent (Attarwala & Balasubramaniam, 2014). Leading organizations have realized that risk management is fundamental to good organizational governance because managing risks effectively requires management to connect and align the organization's assets, people, activities, and goals (Patterson, 2015). These can only be achieved by focusing attention on the achievability of the organization's essential objectives. However, an effective risk programme

should provide management with an enhanced ability to continually capture, evaluate, analyze and respond to risks arising from changing internal operations, external markets, or regulations (Patterson, 2015). Hence, the business's success lies in understanding the external and internal risks concerning the industry and the techniques adopted to manage risk effectively (Rao & Pandey, 2013).

By the nature of the business of insurance companies, having to cover risks of the business and other social entities, insurance companies are exposed to financial and operational risks for themselves and that of their insured (Rao & Pandey, 2013). Every insurer faces a double task in identifying and managing its risk. (Sinkey, 2002 as cited in Akotey & Abor, 2011) The first task is identifying the risk that prospective policyholders possess. The proper identification and measurement of risk associated with policyholders determine insurance products' pricing (premium setting). The second task is to identify and manage risks inherent in the portfolio of assets in which insurance companies invest proceeds of premiums and equity capital. This double approach to risk management underpins the capacity of insurance companies to underwrite risks in the economy properly. Hence, the quality of risk management is a crucial issue for the survival and profitability of insurance companies (Akotey & Abor, 2011).

However, considering the wide range of technological options available today, it is encouraging to realize that continuing evolutions in information technology will provide risk managers with a wide range of opportunities to continue to add value to the discipline of risk management (Patterson, 2015). Information Technology and other related technologies continue to evolve. Organizations find it more purposeful to leverage technology to accurately and securely connect, communicate, and process business transactions with customers, suppliers, and other stakeholders (Ibid.). Therefore, the evolutions in computing and risk technology and related development in new technologies that exploit big data, mobile analytics applications, cloud computing, enterprise resource planning and governance, and risk and compliance systems are also crucial for risk management.

Hence, it is pertinent to investigate the effect of technological advancement on risk management in the insurance industry in Nigeria by examining the extent to which technological advancement relating to innovation in information technology affects the risk identification process of insurance companies.

Insurance companies take various risks; they write policies that deal with specific risks and sometimes exotic risks. Thus, as a direct result, insurance companies should be good at managing their own risk, but the reality is far from ideal. These companies are good at assessing insurance risks for their policyholders but not very good at setting up a program internally for managing their own operating and business risks (Attarwala & Balasubramaniam, 2014). Risk

programs are meant to do a better job of identifying, collecting, and analyzing risk data and preparing to respond to risk scenarios, as evidenced in root cause analyses done after an unexpected loss event. However, many risk management programs fall short when it comes to having skilled risk-aware resources, analytical processes and tools (Ibid.).

The insurance industry used to be a labour-intensive industry until recently, when the activities undertaken by humans were carried out by technology (Strategic Risk, 2014 cited in Attarwala & Balasubramaniam, 2014). However, insurance companies rely on actuarial analysis to decide the price, risk, and capital management. When there was no availability of computer technology, insurance companies used simplified methodology in calculating and analyzing risk, but doing precise and complex analytics was a difficult task. Technological advancement has brought visible improvement in analytics; it has improved human life and made living easier. These technical advancements have offered business managers an improved way of carrying out business activities (Beardall, 2015). Nevertheless, unfortunately, there is probably no empirical evidence regarding technical advancement improving risk management operations. Hence, the need for the study.

This study aims to examine the effects of technological advancement on risk management in the insurance industry in Nigeria. The specific objectives are;

    i.   To examine how technological innovations enhance the identification of policyholder risk by insurance companies.

    ii.   To evaluate how information technology has enhanced the identification of risks inherent in investments by insurance companies.

In order to achieve the objectives above, the following questions are formulated;

    i.   Does technological innovation enhance the identification of policyholder risk by insurance companies?

    ii.   Does information technology enhance the identification of risks inherent in investment by insurance companies?

To answer the research questions above, the following research hypotheses are formulated and tested;

H0$_1$: Technological innovation does not enhance the identification of policyholder's risk by insurance companies

H0$_2$: Information technology does not enhance the identification of risks inherent in investment by insurance companies.

2. LITERATURE REVIEW

2.1. Conceptual Review

Risk and uncertainty can negatively affect an organization, which leads to the motivation to manage risk (Odonkor et al., 2011). Hull (2007) believes that one of the basic functions of every organization, most importantly insurers, is to understand the portfolio of risk that it faces currently and the danger it plans to take in the future. Threats faced by the insurance industry are categorized into two, according to Rao and Pandey (2013). The first is **Financial Risk** (which includes capital structure risk, capital (in) adequacy risk, exchange rate risk, interest rate risk, investment risk, underwriting risk, catastrophic risk, pricing risk, claims management risk, reinsurance risk, policyholders and brokers risk claims, recovery risk and other debtors' risk). The second is **Non-Financial Risk** which arises from operations, failure of sophisticated financial technology, regulations, deregulation in the insurance industry and globalization.

The existence of these risks and the quest to handle them gave rise to Risk Management which, according to Rejda (2013), as cited in Attarwala and Balasubramaniam (2014), is defined as a systematic process for the identification and evaluation of pure loss exposure faced by an organization or an individual and the selection and implementation of the most appropriate techniques to treat such disclosure. Risk management is also described as the performance of activities designed to minimize the negative impact (cost) of uncertainty (risk) regarding possible losses (Schmit & Roth, 1990, cited in Akotey & Abor, 2011).

According to Fatemi and Glaum (2000), risk management objectives include minimizing foreign exchange losses, reducing the volatility of cash flows, protecting earnings fluctuations, increasing profitability, and ensuring the firm's survival. Risk management is intended to help an organization meet its objectives, which should maximize shareholder value in the case of proprietary insurers.

Managing risks in the insurance industry is imperative for achieving success in competitive markets. However, risk management processes are cyclic processes that start from identifying a chance, and it may result in the title of another new risk. Therefore, the company needs to have a process (or processes) in place for risk management to be effective. Sinkey (2002), cited in Akotey and Abor (2011), believes that five verbs can highlight modern risk management in the insurance industry: identity, measure, price, monitor, and control. However, according to Rao and Pandey (2013), the risk management process necessarily includes risk identification, risk assessment, risk avoidance and retention, risk improvement and mitigation using appropriate techniques, implementation of the recommendations, and periodic review of the risk management programs. Therefore, the risk identification process is the main focus of this study.

According to Rao and Pandey (2013), risk identification activity broadly involves a rigorous or

deep understanding of the industry, the areas and markets it serves, its activities, range of products, social, legal, and economic environment in which it operates, and other physical and natural hazard associated with the company's operations. The risk identification process involves identifying risk factors and evaluating the potential loss that might arise from the risk event. The risk identification procedure must consider the physical aspects of the risk under observation and maintenance procedures. Risk identification develops the foundation for the effective control of risks (Tchankova, 2002, cited in Akotey & Abor, 2011). However, in assessing how efficient and effective a company's risk management is, the first question is "what systems are designed to identify emerging risks?" (Cater, Kapel & McConnell, 2009 cited in Akotey & Abor, 2011). This reflects how salient risk identification is in the risk management process. The result of all other methods will be futile if the identification process is not well taken.

Risk management is one of the core aspects of business that is highly influenced by the evolution of information technology because it is mainly based on data. Over time, information technology facilitates the automation of the processes starting from risk identification and ending with monitoring. Therefore, new technologies, such as Big Data analytics, mobile applications, cloud computing, enterprise resource planning (ERP), and governance, risk, and compliance (GRC) systems, are essential for risk management (Fadlallah, 2018).

2.1.1. Technological Advancement

Technological advancement is the unprecedented development in all areas of science and technology due to the heavy investment in education, research, and action worldwide (Khan, 2019). New technologies are converging and making life easier and more efficient. Also, the modern era of the fourth industrial revolution with emerging and enabling technologies and systems, e.g. 5G, A.I., machine learning, big data, Internet of Things, block chain, cloud computing, virtual/augmented reality, and cyber security is bringing drastic positive impact on improving the quality of life and experience. Thus, this technological convergence is the cradle for many new products, processes, and services; and blurring the existence of old-school technologies due to innovation. The information and communication sector has also benefitted from the convergence of technologies; hence there is an improved information technology system. With the development in technology, there is an evolution in computing and new technologies that exploit Big Data, analytics, mobile applications, cloud computing, enterprise resource planning (ERP), and governance, risk, and compliance (GRC) systems (Patterson, 2015). Hence, the aspects of technological advancement that will be considered in this study are technological innovation and information technology.

2.1.2. Technological Innovation and Insurance

The main types of technological innovation implemented in the insurance industry include:

- Digital platforms (e.g. Internet, Smartphone),

- the Internet of Things (such as connected and smart devices that enable data collection),

- Telematics/Telemetry (sensors that allow to receive, transmit and process data through telecommunications without affecting control of the remote objects),

- Big Data and Data Analytics (used in modelling data to support decision making),

- Comparators and Robo-advisors- online services that provide automated algorithm-based product comparison and advice,

- Machine learning and Artificial Intelligence (modelling of prediction) (Klapkiv & Klapkiv, 2017).

However, almost every process in the insurance value chain is being revolutionized by technological innovations. Technological innovation has impacted the process of integrating, managing, and analyzing data from various sources, which has allowed insurers to capture more information on policyholders' behaviour and improve their understanding of individuals. Also, through client interaction and channels, insurance companies can expand their customer base by using new forms of marketing on the internet. In addition, some technological innovations have been focused on the efficiency of insurers' back-office operations to reduce costs. Artificial Intelligence also enables the forecast of important changes in weather or health monitoring to make insurance more effective. (Klapkiv & Klapkiv, 2017).

2.1.3. Conceptual Framework

As mentioned previously in this study, risk management in the insurance industry is focused on two tasks, namely, the identification and measurement of risk associated with policyholders (which, for the sake of this study, is limited to underwriting risk, catastrophic risk, claims recovery risk, pricing risk, fraud) and the identification and assessment of risks inherent in the portfolio of an asset in which insurance companies invest proceeds of premium and equity capital (which for this study the risks considered will be limited to investment risk, capital adequacy risk, exchange rate risk, interest rate risk and reinsurance risk).

On the other hand, technological advancement has brought about technological innovation and development in information technology; some applications and software have been developed to make life and business easier. Innovation has brought about new and more sophisticated ways of doing things, and information technology has made business communication and decision-making processes faster than in yesteryears.

Therefore, it is salient to examine the effect these technological advancements have on risk management in the insurance industry.
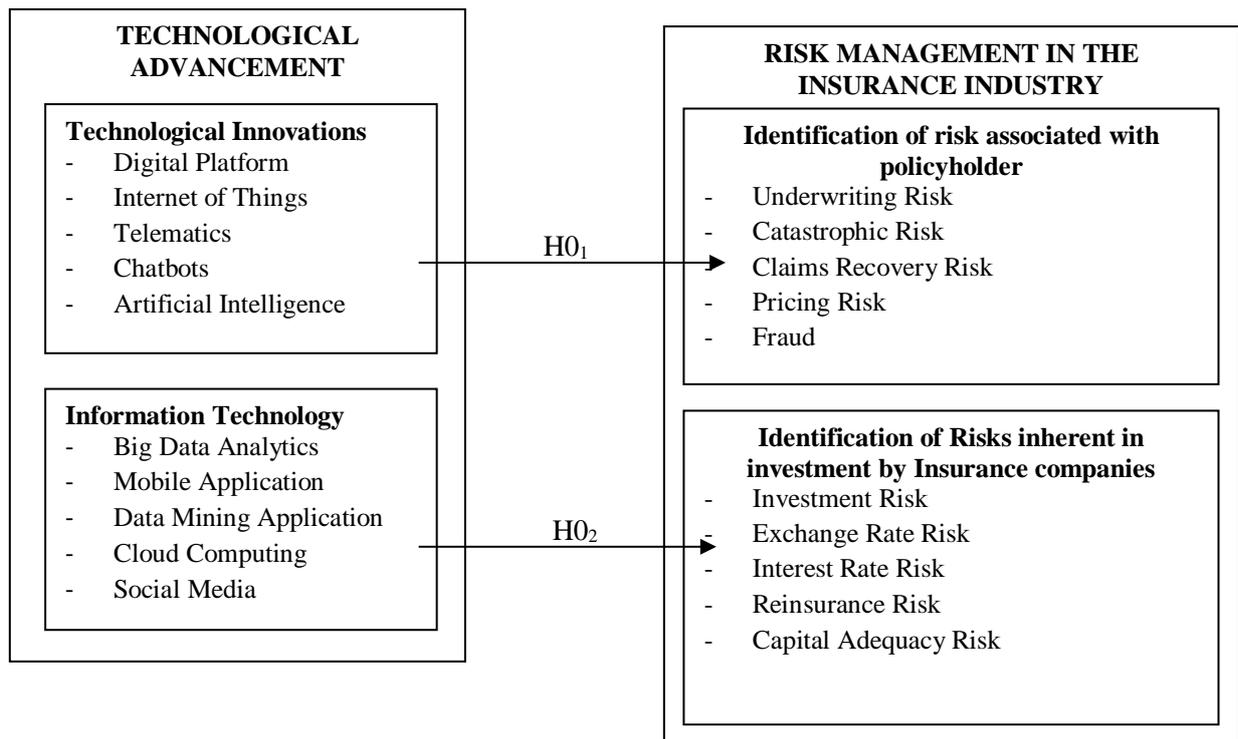
Fig1: Conceptual Framework of the study.

Source: Researcher (2021)

2.2. Theoretical Review

There are various theories propounded by different researchers in risk management and technologies, some of which align with this study. Some of the ideas in line with this study are reviewed as follows.

2.2.1. Diffusion of Innovation Theory

Diffusion of Innovation (DOI) theory was developed by Roger (1962); it is one of the oldest social science theories that originated in communication to explain how, over time, an idea or product gains momentum and spreads through a specific population or social system. The theory states that the result of diffusion is that people, as part of a social system, adopt a new idea, behaviour, or product. Adoption means that a person does something different than what they had previously. The key to adoption is that the person must perceive the idea, behaviour, or product as new or innovative. Hence, based on the theory, it can be concluded that individuals will ordinarily embrace innovation and adopt a new idea.

2.2.2. The Situation Theory

The situation theory was developed in the '80s by Barwise (1981) and Barwise and Perry (1983). Situation theory is an information model with complex relations between compound objects, partiality, under-specification, and restricted parameters. This theory states that

computerized information systems call for reliable, faithful representation of information. This theory has been used in the works of Lytras' (2012) Trends and Effects of Technology Advancement in the knowledge society and D'Addario's (2013) Influencing enterprise risk mitigation.

2.3. Empirical Review

Santomero and Babbel (1997) believe that deficiencies in risk management in insurance companies can lead to mispricing of insurance policies, non-compliance with insurance regulations, and financial misconduct on the part of officers and top management of insurance firms. These issues could lead to insolvencies in the insurance industry. Rao and Pandey (2013) argue that for effective risk management of insurance companies' financial and operational risks and insured, proper identification of structural functions, insurability, adequacy, and commercial viability holds the key to success.

Attarwala and Balasubramaniam (2014) suggested using risk management effectively. Insurance companies need to upgrade their credit assessment and risk management skills, retain staff, develop a cadre of specialists and introduce technology-driven management in an information system. Owen, Baxter, Maynard & Depledge (2009) also support that technological innovation drives economic growth, fosters sustainable development, and improves the well-being of individuals. Also, Williams et al. (2015) concluded that businesses today are adjusting to technological innovations as these innovations are progressing at a high rate, thereby influencing both decidedly and contrarily different areas of the economy. Ostagar (2018) believes that innovation, introduction, and implementation of new technology are critical drivers of change in the financial sector (of which the insurance industry is part). Implementing new technology will lead to efficiency gain even though these changes can initially have some uncertainty and doubt. Also, Ostagar (2018) concluded that the spread of technology, like the recent proliferation of internet connections, home computing, and mobile devices and the development of applications, had enriched the impact of technology on the insurance sector. New technology will lead to the possibility of new methods of service provision as well as greater opportunities for data collection. These new methods can be used for better risk identification and mitigation measures.

The studies of Santomero and Babbel (1997), Rao and Pandey (2013), and Attarwala and Balasubramaniam (2014) show that effective risk management in insurance companies is one of the keys to success in the industry. Furthermore, studies by Owen et al. (2009), Williams et al. (2015) and Ostagar (2018) also emphasized that technological advancement has a positive impact on the growth of insurance as an industry. Unfortunately, in the literature, the effect of technological progress as a means to enhance effective risk management in the insurance

industry has not been examined. Hence, this study seeks to fill this gap in the literature by examining how technological innovation and information technology will enhance the risk identification process in the insurance industry in Nigeria.

3. METHODOLOGY

3.1. Research Design

This study adopted a descriptive research approach. The research seeks to examine and report the state of affairs regarding technological advancement and risk management in the Nigerian insurance industry. Therefore, a survey research design was used for this study, being the best research design for a survey that provides answers to issues that border on who, what, where, and how questions. Also, the findings from the study can be generalized to the entire population (Oyeniyi, Abiodun, Obamiro, Moses & Osibanjo, 2016).

3.2. The population of the study

The study population consists of all staff of the 5 out of fourteen (14) composite insurance companies registered by NAICOM and quoted on the Nigeria Stock Exchange according to the NIA Report (2018). The five (5) composite companies are selected based on the performance of the companies using their cumulative gross premium, net premium income, and risk retention. Also, these companies assume 81.9% of the gross premium earned, according to the NIA Report (2018). Hence, the target population of the five (5) selected companies sums up to One Thousand, Five Hundred and Sixty-Nine (1569) (Annual Reports, 2018 & 2019). This is depicted in the table below.

Table **1: Number of employees of selected composite insurance companies.**

S/N	COMPANIES	No. of Employees
1.	Leadway Assurance Ltd	307
2.	AIICO Insurance Plc	559
3.	AXA Mansard Insurance Plc	317
4.	Cornerstone Insurance Plc	169
5.	LASACO Assurance Plc	155
	TOTAL	1,569

Source: Researcher's Compilation (2021).

3.3. Sampling Technique and Sample Size

For the population to be representative, a purposive sampling technique was adopted. The purposive sampling technique was used to determine the specific staff group with adequate knowledge of technological advancement in the selected companies. The Taro Yamane model (1967) was used to determine the sample size of the population. The model results give 181 members of the companies chosen as the sample size for the study. This is shown in the

calculation below.

$$n = \frac{N}{1+N(e)^2} \text{ (The Taro Yamane model)} \qquad (1)$$

Therefore,

$$n = \frac{1569}{1+1569(0.07)^2} = 180.59 \qquad (2)$$

Approximately 181 employees.

3.4. Method of Data Collection

Based on the nature of the study, a well-structured questionnaire was developed and employed to gather the required information for the analysis. The questionnaire was designed using a six-point Likert scale and was electronically administered using the Google forms.

3.5. Reliability and Validity of the Research Instrument

To determine the validity and reliability of the instrument, a pilot study was conducted to test and retest the capability of the data collection instrument to find out whether the device is capable of measuring what it was purposely designed for. The Cronbach's Alpha value of 0.789 proves that the tool is reliable.

3.6. Method of Data Analysis

Based on the aim of the study, one hundred and sixty-three copies of the questionnaires (data) collected from the respondents were analyzed using a statistical regression tool with the aid of the SPSS (IBM 23) package. In addition, regression analysis was employed.

3.7. Test of Hypotheses

The results of the analyses are shown in the tables below.

Table 2: Regression Result for hypothesis one

Model Summary

Model	R	R Square	Adjusted R Square	Std. The error of the Estimate
1	.860ᵃ	.740	.739	2.08237

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	4.121	.943		4.369	.000
	XVARIABLE	.801	.037	.860	21.421	.000

a. Dependent Variable: y variable, Predictors: (Constant), X VARIABLE

Where:

X variable means questions relating to the identification of policyholder's risk by insurance companies

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Y variable means questions relating to technological innovations.

Table 2 shows the output of the simple regression analysis; the model regression coefficient value of 0.801 indicates that a unit change in the adoption of technological innovation will result in an increase of 0.8 in the identification of policyholder risk by insurance companies.

The coefficient of determination value of 0.74 indicates that about 74% of changes in the identification of policyholders' risk by insurance companies can be explained by technological innovation. This implies that about 26% of insurance companies' changes in the title of policyholder's risk are due to other factors not included in this study. All these results are significant at a 5% level of significance. The significance value is .000, which is less than 0.05; this implies that the Null hypothesis will be rejected, and the alternate hypothesis will be accepted. Hence, "Technological innovation has enhanced the identification of policyholder's risk by insurance companies.

Table 3: Regression Result of Hypothesis Two

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.803ᵃ	.645	.642	2.54844

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.219	1.259		.968	.335
	YVARIABLE 2	.835	.049	.803	17.090	.000

a. Dependent Variable: XVARIABLE2, Predictors: (Constant), YVARIABLE2

X variable means questions relating to the identification of risks inherent in investments by insurance companies

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Y variable means questions relating to information technology.

Table 3 shows the output of the simple regression analysis. The model regression coefficient value of 0.835 indicates that a unit change in the adoption of information technology will result in an increase of 0.8 in the identification of risk inherent in investment by insurance companies.

The coefficient of determination value of 0.645 indicates that about 65% of changes in the identification of risk inherent in investment by insurance companies can be explained using

information technology. This implies that about 35% of changes in the identification of risk inherent in investment by insurance companies are due to other factors not included in this study.

All these results are significant at a 5% level of significance. Therefore, the significance value is 0.335, which is more than 0.05; this implies that the Null hypothesis will not be rejected. Hence, "Information technology has not enhanced the identification of risks inherent in investment by insurance companies".

4. DISCUSSION OF FINDINGS

Based on the data analysis, it was discovered that about 62.6% of the population was considered to have an advanced level of literacy in information technology and 18.4% had a professional level, with 19% having an introductory level of literacy in information technology. This indicates that the majority of the staff at these companies has a high level of literacy in technology that helps the organizations, meaning that the companies have to a large extent, the level of resources required to adopt technology to risk management.

The results from the test of Hypothesis One showed that technological innovation had enhanced the identification of policyholders' risk by insurance companies. Advanced technologies have helped insurance companies better identify the policyholder's risks, thereby enabling them to understand better the risks they cover. This will, in turn, be reflected in their total result. This implies that underwriting risks, claim recovery risks, catastrophe risks, pricing risks, and fraud will be managed effectively. These findings align with the findings of Toderascu and Stofor (2019) in their study on technological innovations and their challenges in the insurance industry. They believed that technological innovations would reduce damages and lower rates and premiums in some classes of insurance. The findings also support the position of Ostagar (2018), who posited that new technology would lead to the possibility of new methods of service provision as well as greater opportunity for data collection that can be used for better risk identification and mitigation measures. Also, the OECD (2017) believes that the internet and newly invented applications have expanded the opportunity for data collection. These freshly created devices can be used to accumulate data used by insurance companies as insurance has traditionally relied on quantitative data to make risk management decisions.

On the other hand, from the result of the test of Hypothesis Two, it is evident that information technology has not enhanced the identification of risk inherent in investment by insurance companies. This implies that information technology is not sufficient for insurance companies to identify the risk inherent in investment by insurance companies. This contrasts with the study of Patterson (2015), who posited that nowadays, data about economic conditions and markets are instantaneously available with the existence of modernized technologies. These data are

exploited and used in making nanoseconds business decisions, which can inform the manager's decision regarding the various market risks and fluctuations.

5. CONCLUSIONS

Technology has considerably impacted every aspect of human existence, evident in business. With the introduction and implementation of new technologies, there are noticeable changes in the insurance sector as well as other sectors of finance. The use of technology is also adding value to the insurance industry as technical innovations contribute enormously to the sector's overall growth. Technology has enabled the development of better predictive models as applications have been developed to enhance large data collection and analysis, which has made risk and capital management a more straightforward task. As a result, insurance companies can get information faster to make better business decisions as insurance companies rely on actuarial analysis to decide pricing, risk and capital management. With the integration of technologies such as Big Data analytics, cloud computing, Enterprise Risk Management applications, and Parallel-processing platforms, risk managers will be able to gain even greater advantages from capturing, extracting, transforming, and using legacy databases to perform risk assessments, stress tests, and risk scenarios analyses.

However, insurance companies in Nigeria have to invest more in modernizing their information technology to enjoy the expected nanosecond response that should help decision-making. Also, further study should be carried out to investigate the existence of advanced information technology and system in the insurance industry. This study discovered no effect between information technology and the identification of risk inherent in investments made by insurance companies.

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