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Technological Factors and Internet of Things Adoption in Insurance Firms

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Abstract: ***Despite the perceived advantages of Internet of Things, Insurance Firm in Kenya, still have not widely adopted Internet of Things-enabled service or product delivery. The study sought to examine the effect of technological factors on the adoption of Internet of Things by Insurance firms in Kenya. The anchoring theory adopted was TOE supported by DOI and TAM theories. The positivism research philosophy was utilised. The study used explanatory research design, and the 56 registered insurance Firms in Kenya was the target population. The sample consisted of 15 Chief executive officers and 270 sectional heads. Interview guide and semi structured questionnaire were used to collect primary data from Chief executive officers and sectional heads respectively. Descriptive statistics used included standard deviation, skewness and kurtosis. Logit regression was used for inferential analysis. Qualitative data on the other hand was presented on narrative form. This research established that technological factors significantly influence internet of things adoption within insurance Firms in Kenya. The study recommends a deliberate development of a roadmap for adoption of internet of things by Insurance Firms. Further, the study recommends Government of Kenya to review ICT policy in order to enhance IOT adoption by Insurance Firms.***

Keywords: Internet of Things, Technological Factors, Internet of Things Adoption

1. Introduction

According to Qasem, Abdullah, Jusoh, Atan, and Asadi (2019) Internet of Things Adoption is the process by which a decision-making unit (adopter) evaluates and considers a new technology. The adoption process ends with a result or a decision to adopt or decline the technology based on the firm's/adopter's assessment of the new technology. International Telecommunication Union (2012b), defines Internet of Things adoption as deployment of technological solutions based on conceptual frameworks. Internet of things is made possible through internet technologies that connect devices that monitor, collect and share data while enabling a plethora of applications such as augmented reality, smart cities, smart homes among others.

According to Gartner (2021), by the year 2025, the opportunities from IT Services for IoT market will be close to 60 billion dollars, representing a 34% increment of compound annual growth rate from 2020. This increase has been related to the fact that everyday objects like refrigerators, GPS, vehicles, lighting, and operational technologies are becoming globally connected entities. This world of interconnectedness of things is now a reality. According to Statista (2020), Internet of things connected devices that were in use by the end of 2018 was approximately 22 billion. This trend when extrapolated, suggests that approximately 50 billion IoT devices will be in use around the globe by the end of 2030. This huge web of smart devices is predicted to grow global corporate profits by around 21% by the end of 2023 as corroborated by Bradley et al (2013). Internet of Things is rapidly evolving providing plethora of applications in business and individual everyday activities, some of which are beyond the reach of speculation. Thus, IoT solutions involve multiple technologies, such as analytics; cloud; and protocol management, to maximize benefits for stakeholders. Further, IoT-based solutions have been developing exponentially in all spheres of human life and the outcome has been positive as well as negative.

According to Ndubuaku and Okereafor (2015), IoT technology is already being used in several African nations, from utility firms utilizing connected meters to track the health of outpatients to healthcare practitioners monitoring the health of inpatients, verify consumption, identify issues, and anticipate demand spikes. The IoT has the potential to provide people throughout Africa with a plethora of cutting-edge solutions and services, and in doing so, alleviate some of the challenges the region is facing, such as those caused by high levels of poverty and the need to expand access to basic services to currently underserved populations.

In Kenya, the key IoT services implemented include traffic monitoring cameras, car tracking devices, speed limiting devices, surveillance cameras, wearables among others. Some of the data collected by Government and private institutions is relevant to insurance industry. However, there is no existing mechanism of real time sharing of the data with insurance Firms to help in informed decision making, prevention of fraud and prevention of loss. Top leadership for Insurance Firms are increasingly focusing on Internet of Things adoption to include analytics of big data generated by the smart sensors which subsequently will enhance quality decision-making processes and improved products. There are many expected benefits due to adoption of IoT,

however, these benefits might be difficult to realize if the Insurance Firms do not have insight on drivers of IoT adoption. Challenges of IoT adoption include cross-border traffic, reliability, connectivity, power, regulation, privacy, security and interoperability (Luqman & Belle, 2017).

Like any other Firm, Insurance Firms determine the kind and variety of internet of things solutions/services to adopt on the basis of the tangible expected benefits that can be accrued from these products such as efficiency in the core business, enhancing IoT capacity of employees, and improving financial resources available (Chou, 2019). Most firms are familiar with basic IoT products such as tracking devices, smart cameras, sensors, smart phones, fax, computers, cloud computing, data analytics systems and chatbots.However, despite the benefits of IoT, there is little evidence that insurance Firms systematically follow the stages identified in ICT adoption.

The Internet of Things is a disruptive and trending communication paradigm that leverages artificial intelligence to embed everyday objects, with a certain level of intelligence to create intelligent sensors and actuators that are linked together to interact, send messages, make choices, take proactive measures, and deliver convenient services (Khan, Alam, Ahmad, Salim, Khan, 2022). It is a fast-emerging shift in networking and communications. There are many merits accrued to the Internet of Things, such as facilitating wealth creation, creating new and responsive products and services, and improving efficiency and effectiveness, among others.

A study by Gatsis, Varoutas and Karapanos (2022) found that technological factors, including the availability of IoT infrastructure and data analytics tools, are the drivers of IoT adoption in the Greek insurance industry. In Africa, Gherib, Khemakhem and Jmaiel (2019) examined the IoT adoption in Tunisia's insurance industry and found that technological factors, including the availability of suitable IoT technologies and integration with legacy systems, are the main drivers of adoption. A study by Aigbavboa, Thwala and Ameyaw (2019) found that IoT adoption is crucial for insurers in managing risks associated with climate change and natural disasters in Africa.

According to Agyemang and Boadi (2020), IoT technologies are critical to insurers in Ghana in enhancing their operational efficiency and reducing costs associated with manual processes. In Kenya, Nyangosi, Mugambi and Adero (2019) examined the IoT adoption in insurance industry and found that technological factors, including the availability of IoT infrastructure and data security, are the main drivers of adoption. IoT devices such as health and fitness trackers could help insurers better understand their client's health status and develop more personalized health insurance products. Mukoya and Waweru (2020) investigated the potential of IoT technologies to improve motor insurance in Kenya. The study found that IoT devices such as telematics could help insurers better understand their clients' driving behaviors, leading to more accurate insurance premiums and improved customer experience. IoT devices such as weather sensors, health and fitness trackers, and telematics are being used to collect real-time data that helps insurers better understand their client's needs and develop more personalized insurance products.

2. Statement of the Problem

IoT deployments are important for enterprises, but they are still in the early stages of acceptance (Ahmetoglu, Cob and Ali, 2022). Despite the capabilities and opportunities provided by Internet of Things, Insurance Firms in Kenya have lagged behind in adopting Internet of Things technology. According to Kimani (2017), insurance businesses in Kenya continue to lag behind in taking important measures to acquire first-mover advantages through the intense use of technology, which allows for new sorts of client contacts and improves customer service delivery dramatically. Moreover, adoption of disruptive technologies such as Internet of Things by both the existing and new entrants in the insurance industry has been slow than expected (Deloitte, 2019).

Despite the expected advantages of IoT, insurance Firms in Kenya, still have not widely adopted IoT-enabled service/product delivery. Through the use of technology, the industry has an opportunity to embrace Internet of things and data analytics develop superior, customised and innovative services and products which meet user expectations and improve efficiencies that lower distribution costs hence making Insurance products accessible to all (AKI, 2019).

AKI (2016) have identified IoT and robotics as one of the major issues that will change the industry environment hence the need for Insurance firms in Kenya to adopt Internet of Things. The main IoT services implemented in Kenya include traffic monitoring cameras, car tracking devices, speed limiting devices, surveillance cameras, wearables among others. Some of the data collected by Government and private institutions is relevant to insurance industry.

This study was also inspired by conceptual, contextual, methodological and theoretical gaps in existing literature on IoT adoption. Contradicting findings by existing studies concerning the drivers of IoT adoption further intensify the need for the current study. Despite the significant theoretical and empirical attention paid to ICT adoption drivers, their impact on IoT adoption in the insurance industry remains unknown. As a result, this study attempted to fill this vacuum by addressing the question: What are the drivers for adoption of IoT within Insurance Firms in Kenya?

General Objective

The general objective of the study was to investigate the effect of Technological Factors on adoption of internet of things within Insurance Firms in Kenya.

Research Hypotheses

H_{01}: Technology factors have no significant effect on adoption of IoT within insurance Firms in Kenya.

3. Literature Review

3.1 Theoretical Literature

Technology Organization Environment (TOE) Framework

The TOE framework was developed in 1990 by Tornatzky and Fleischer. It identified three factors of a Firm's environmental that determine how a corporation embraces and utilizes technology breakthroughs. It is important to think about the technological, organizational, and environmental contexts. The technological context consists of present state of technology in the Firm as well as existing features of the technologies that the Firm can adopt (Tweneboah-Koduah, 2014). Significant technologies to a Firm, both internal and external, form part of the technological context and consist of, for example, procedures and equipment. It consists of a pool of external and internal technologies including what usefulness they are perceived to have, their organisational and technical compatibility, learning curve, complexity, experimentation or pilot study and imagination or visibility (Gangwar, Date & Raoot, 2014).

The main flaw of the TOE framework is in some of its adoption predictors elements that are more applicable to large firms whose clients expect consistency but have less complaints than clients in SME firms (Awa, Eze, Urieto, & Inyang, 2011). The majority of classic adoption theories (e.g., TAM, TRA, and TPB) assume that technology, not persons, influences the structure and behavior of organizations (Cascio and Montealegre, 2016). TOE is the only information systems theory that places a greater emphasis on both behavioural and social constructivism while also acknowledging the interplay between technological advancement and organizational settings impacted by environmental issues (Hossain & Quaddus, 2011). Analysts believe that ICT adoption determinants include the decision maker's excitement and growth ambitions, acknowledging that plans are formed by the eccentricities of the decision-maker (Awa, Ojiabo, and Orokor, 2017).

Despite the flaw of the TOE framework, it emerges as a popular theoretical paradigm in the field of information systems. Eze *et al*. (2013) and Awa *et al*., (2015) posit that the TOE framework is empirically valid through various Firm sizes and is used to support numerous ICT adoption enquiries. Further Oliveira and Martins (2011) and Eze *et al*. (2013) used the TOE framework and found that innovation characteristics, organization's technology, and external environment were all very effective in predicting and explaining adoption. TOE offers a more inclusive understanding of adoption elements, activities based on the value-chains, processes and implementation of adoption, post adoption as well as technological development capabilities (without regard to size or industry limits). As a result, the theoretical motives as well as their specific application to IoT adoption in the context of Insurance Firms influence the TOE framework. Theoretically, Technology is measured by Cost, Design, Security, Relative Advantage, Complexity, Compatibility, Standards, Return on Investment, Observability, and Trialability.

Diffusion of Innovation (DOI) Theory

The DoI Theory, developed by Rogers (1962), tries to explain how new ideas or innovations (such as the Internet of Things) are adopted, and it proposes that an innovation has five qualities that are considered to influence adoption: relative advantage, compatibility, complexity, trialability and observability.

According to LaMorte (2019), DOI has three significant aspects, that is, identifying the diffusion stages, characteristics of the invention that influence the rate of spread, and adopter categories. James and Jeffrey (2018) note that there are different adopter types, which are: Innovators, early adopters, early majority, late majority, and laggards. The number of adopters per unit of time producing a Svshaped adoption curve.

The relevance of the diffusion model to new technologies has been criticised by Vaugh and Schiavone (2014), who argue that organizational learning and know-how play an essential role in dissemination as well. Furthermore, according to Vaugh and Schiavone (2014), adopting complicated IT systems creates a knowledge integration challenge, as well as a problem of awareness. As a result, acquiring the technical expertise required to successfully employ a complicated innovation necessitates a significant investment on the part of potential consumers. Similarly, the diffusion of innovation theory assumes that all insurance companies are inventive, which is not necessarily the case. Majorly, data for this theory and of the adopter categories is found in other industries and not from the ICT industry, which does not particularly establish application of adopting innovative behaviours or technical inventions. Additionally, IoT deployment is not encouraged by DOI as a collaborative approach and is more effective for behaviour adoption rather with behaviour prevention or termination. An individual's social support and resources is not considered in DOI in adopting a new behaviour (or innovation). For this reason, therefore, DOI is found relevant to this study in support of IoT adoption.

Technology Acceptance Model (TAM)

Different theoretical models have been presented to help explain the drivers of information technology adoption, according to Davis (1989). The Technology Acceptance Model proposed by Fred Davis and Richard Bagozzi (1989) was created with the goal of predicting users' acceptance of IT and its use in a business setting. The model can be applied to a variety of ICT populations to describe user behaviour (Davis, 1989). Prior empirical studies, according to Liao et al. (2009), attempted to explain the causes and mechanisms of users' adoption decisions using the TAM, with the belief that the adoption process influences successful use of specific technology systems. The Technology Acceptance Model focuses on two specific attitudes about innovation: perceived usefulness (PU) and perceived ease of use (PEU), both of which are crucial in terms of innovation acceptance behaviour. Perceived usefulness refers to the subjective evaluation of a computer's capability at improving outputs of tasks. Perceived ease of use includes an individual's subjective outlook on the ease of computer system use, that impacts its usefulness and thus indirectly affects adoption of the technology by the user.

(Davis, 1989). TAM focuses on explaining attitudes on intent to use certain services and technologies (Bertrand & Bouchard, 2008). This study hypothesizes that technological factors influence adoption of IoT. According to TAM, there are determinants and mechanisms that influence end users' adoption decisions with the belief that the adoption process will impact effective distribution of specific technology systems.

3.2 Empirical Literature Review

Technological Factors and the Adoption of IoT

Through modelling IoT services adoption, Al-Momani, Mahmoud, and Ahmad (2016) focused on the technical components of the IoT services adoption and usage. The study created a conceptual model of IoT service uptake. The study discovered that IT expertise impact was strongly beneficial on the behavioural intention of IoT adoption. The study concentrated on the technical components of IoT services, with little attention paid to behavioural studies that clarified the intention to embrace and use IoT services. The model was built based on the theories that focus on industry adoption and not at Firm level. In contrast, the current study will focus on behavioural aspects of the Internet of Things services that clarify the intention to adopt IoT services at Firm level. Through TOE framework supported by DOI theory and TAM, the current study will seek to explain adoption at Firm level. Moreover, this study will investigate the factors, both internal and external, that influence an insurance Firm's decision to adopt IoT.

Similarly, Ziemba (2016) looked at the characteristics that influence successful ICT adoption and usage in Polish homes. Development of a framework of success determinants was grounded on previous scholarship and practical experience. The adoption of ICTs within households was primarily influenced by ICT cost, the perceived economic benefits of using the ICT, security and technological accessibility of ICT, as well as competencies and knowledge of ICTs, according to the report, which was based on 751 questionnaires. The study focused on households and not business organisations whereas the current research will focus on insurance Firms. Furthermore, the research only looked at the direct relationship amid the adoption of ICTs and factors influencing adoption. The current study will focus on organizational level and not individuals. Moreover, the study focused on adoption of ICTs in general and not IoT while contextually, the study was done in a developed country-Poland- possessing greater technological infrastructure.

Hsu and Lin (2018) explored the elements that influence internet of things service acceptance. The study investigated the effects of benefits such perceived usefulness, perceived privacy risk, perceived costs, and perceived enjoyment upon consumers' perceptions of the worth of IoT services and their intention to utilize them using the value-based adoption model. The study surveyed 489 users and used a structural equation modelling approach. Perceived utility and enjoyment have a considerable impact on behavioural intent over perceived privacy risk and perceived value has a major impact on IoT adoption, according to the findings. Unlike the current study which will focus on technological factors of cost, design, security, relative Advantage, complexity, compatibility, standards, observability and trialability of IoT adopted, the study applied the value-based adoption model to explain IoT adoption at an individual level.

In order to predict user intent to using wearable Internet of Things devices at work, Yildirim and Ali-Eldin (2019) created a conceptual model and surveyed 76 workers of an IT consulting Firm to test the suggested conceptual model. The authors used Adaptive Neuro-Fuzzy Inference modelling and partial least square path in validating and predicting the factors affecting user intent in using these devises. The study observed that perceived utility of an IoT device is the most powerful motivator for people to utilize it at work. Furthermore, the ANFIS strategy improves the predictability of user intention to utilize IoT devices, according to the findings. However, the study failed to incorporate other technological considerations such as cost, design, security, relative complexity Advantage, standards, compatibility, observability and trialability of the IoT adopted. Moreover, the study focused on individual adoption rather than firm level. The current study focused at organizational level and examined the influence of the aforementioned aspects of technology on IoT adotion.

In general, studies looking into the impact of technological elements on IoT adoption have found that IT expertise, ICT cost, perceived economic benefits, technological availability and security, as well as skills and awareness, have an influence upon behavioural intent in using IoT. Furthermore, through perceived value, perceived utility and perceived enjoyment holds a major impact on behavioural IoT adoption intent. However, the studies have not exhaustively examined behavioural aspects of the Internet of Things services that clarify the intention to adopt IoT services at firm level such as cost, design, security, relative complexity, standard, compatibility, Advantage and observability. Through TOE framework supported by DOI and TAM, this study sought to explain organisational level adoption. Contextually, the largest proportion of the studies were carried out in developed countries which possibly possess greater technological infrastructure than developing nations like Kenya.

4. Research Methodology

Positivism research philosophy was utilised. The study used explanatory research design, and the 56 registered insurance Firms in Kenya was the target population. The sample consisted of 15 Chief executive officers and 270 sectional heads. Interview guide and semi structured questionnaire were used to collect primary data from Chief executive officers and sectional heads respectively. Descriptive statistics used included standard deviation, skewness and kurtosis. Logit regression was used for inferential analysis. Qualitative data on the other hand was presented on narrative form. Diagnostic tests such as test for multicollinearity was conducted to ascertain conformance with the assumptions of Logit regression.

5. Findings and Discussions

Response Rate

Data was collected from the insurance sector, targeting CEOs, managers in product development, finance, marketing, underwriting and ICT departments of the insurance Firms. A total number of 270 questionnaires were administered out of which 209 responded, giving a response rate of 77.41%. Additionally, 10 out of 15 CEOs were interviewed, giving a response rate of 66.67 %. The response rate from all the units of observation in the current study was above 60%; hence appropriate for the study for the analysis and making of the inferences

Descriptive Statistics Results

Table 5.1: Descriptive Analysis for Technological Factors

Section	Statements	Mean	Std Dev
Cost	High Cost of Equipment related to internet of things such as Radio Frequency Identification (RFID) Tags and IoT system hardware	3.86	1.12
	Cost of hardware equipment shall increase with adoption of internet of things	3.62	1.20
	Adopting Internet of Things (IoT) technology will raise operational and maintenance costs.	3.32	1.21
	Increased spending on process reengineering and an increase in the number of IT workers will result from organizational changes.	4.08	1.01
	There is additional Cost of Hiring IoT Skilled Personnel	3.81	1.18
	There is high Cost of IoT Installation	3.73	1.22
	The advantages of IoT outweigh the expenses of implementation.	3.95	1.20
	Energy and environmental costs are reduced as a result of the Internet of Things.	3.67	1.23
	IoT maintenance expenses are minimal.	3.22	1.20
	Average	**3.70**	**1.17**
Design	Well-designed and easy to- use IoT	3.87	0.99
	My firm collaborates with other insurance firms and stakeholders in creating an interlinked web of physical objects and digital technology for ease of sharing information	3.79	1.18
	My Firm is not only selling products to buyers, but also providing digital platforms upon which users can add value upon.	4.06	1.09
	Average	**3.91**	**1.09**
Security	There is a lack of transaction secrecy.	2.19	1.13
	Information about web transactions is not kept private.	2.32	1.18
	There is a lack of trust in the online payment system.	2.48	1.47
	The Firm is concerned about the security of IoT data.	4.15	0.92
	Customers' IoT data security is an issue for the company.	3.47	1.24
	The Firm is concerned about the privacy of IoT devices.	4.00	1.10
	Average	**3.10**	**1.17**
Relative advantage	By adopting IoT my organization will have some relative advantage over the competitors	4.44	0.90
	Relative advantage influences an enterprise in adopting IoT	4.12	0.82
	Adoption of IoT can reduce costs associated with operational expansion	4.12	0.96
	IoT enables reduction of external costs of operations	4.17	1.02
	Use of IOT can enhance efficiency in service delivery in my Firm.	4.42	0.84
	IoT can lead to improved customer service and satisfaction	4.40	0.94
	IoT enhances reaching to new customers	4.48	0.89
	When it comes to designing and changing products, the Internet of Things provides speed, convenience, and flexibility.	4.33	0.82
	The Internet of Things (IoT) has the potential to lower labour costs.	4.17	0.90
	The Internet of Things enables you to run your organization more efficiently.	4.25	0.95
	You can boost your company's productivity by implementing IoT.	4.32	0.91
	Average	**4.29**	**0.90**
Complexity	The greater the likelihood of IoT technology adoption if the potential adopter believes it is simple to learn and use.	4.03	1.08
	The possibility of adoption will be reduced if companies believe IoT technology to be complex and challenging, requiring a lot of energy and effort.	3.85	1.12
	The greater the ease of use of IoT, the more likely it will be adopted.	4.33	0.93
	The operation of the Internet of Things technology is fairly complicated.	2.91	1.17
	The Internet of Things system is inconvenient to utilize.	2.35	1.23
	For commercial operations, the utilization of IoT is too complicated.	2.33	1.20
	For employees of the company, the skills required to adopt IoT are too difficult.	2.55	1.24
	It will be tough to integrate IoT into our work processes.	2.43	1.06
	Average	**3.10**	**1.13**
Compatibility	The Internet of Things (IoT) technology may easily integrate into company business processes.	4.09	0.80
	The Internet of Things system is compatible with the supply chain's work content.	3.76	1.06
	The company's work style is compatible with the utilization of IoT.	4.07	0.88
	IoT is completely compatible with conventional corporate processes.	3.86	1.02
	Average	**3.95**	**0.94**
Standards	\The lack of a data format standard (for product pedigree across the supply chain) is causing worry.	3.36	1.12

Section	Statements	Mean	Std Dev
	Achieving interoperability is challenging due to ambiguous interpretations of the IoT standardized protocol.	3.30	1.25
	Average	**3.33**	**1.19**
Trust	IoT systems are stable and reliable	3.91	0.78
	It is difficulty to operate IoT system	2.39	1.20
	Reading rate of RFID is fast	3.91	0.85
	Average	**3.40**	**0.94**
Observability	The greater the apparent observability of IoT, the more likely it will be used.	4.00	0.90
	Our firm may consider adopting IoT if there are positive results from other firms that have adopted IoT	4.26	0.88
	Average	**4.13**	**0.89**
Trialability	Firms would wish to be able to test and experiment with IoT before determining whether or not to adopt it.	4.12	0.77
	The greater the opportunity to test IoT, the more likely adoption will be.	4.29	0.83
	Average	**4.21**	**0.80**
	Overall Average	**3.70**	**1.04**

Source: Research data (2023)

Table 5.1 present the summary of the responses. Responses on a maximum of 5 scale, the assertions under cost had an overall mean of 3.70 and a standard deviation of 1.17, indicating that majority of the respondents were in agreement that cost is a driver for internet of things adoption within insurance Firms in Kenya. The statements on design had a mean of 3.91 and standard deviation of 1.09, meaning majority of the respondents agreed on design. Majority of the respondents were neutral with statements on security with a mean 3.10 and standard deviation of 1.17; and relative advantage with a mean 3.10 and standard deviation 0.90.

The respondents disagreed with statements on complexity with a mean of 3.95 and standard deviation of 0.94, disagreed with the statements on standards with a mean of 3.33 and standard deviation of 1.19. The respondents were neutral with the statements on trust with a mean of 3.40 and standard deviation of 0.94. Further, respondents agreed with the statements on observability with a mean of 4.13 and standard deviation of 0.89, and trialability with mean of 4.21 and standard deviation of 0.80 as a driver for internet of things adoption within insurance Firms in Kenya. The overall mean for the independent variable technological factors is 3.70 with a standard deviation of 1.04. This finding means most respondents agreed on the statements on technological factors as a driver for internet of things adoption within insurance Firms in Kenya.

From the open-ended questions, it was found that other technological factors limiting the use of IoT facilities include limited skilled technical labour, resistance to change, lack of awareness, high cost of installation, complexity, compatibility management, inadequate regulatory support, ineffective change management, lack of government support in terms of infrastructure and information sharing and security concerns. IoT technologies require significant investment in hardware, software, and network infrastructure, as well as ongoing maintenance and support costs. For smaller insurance firms with limited resources, these costs can be prohibitive and make it difficult to justify the adoption of IoT technologies. Many insurance firms in Kenya may need more technical expertise to leverage IoT technologies fully and may be hesitant to invest in the technology without the assurance of its successful implementation and its return on investment. The absence of a clear regulatory framework raises data privacy and security concerns, and insurance firms may be hesitant to adopt IoT technologies until clear guidelines are established.

Moreover, from the interview sessions, CEOs who participated in the study were also asked to explain the technological challenges they encountered in their firms. 80% highlighted that cost, security concerns and trust as the main challenges they encountered. This is in line with the responses from the top and middle level managers and reviewed literature. The study further sought information from the CEOs on the technological challenges they experience in their firms.

CEO 1 said;
"Most insurers have a large number of legacy systems which are not always easily integrated with newer technologies. The result is that most insurance firms operate on a patchwork of technology, creating inefficiencies and often leading to errors" (CEO 1, 2023).

CEO 7 stated;
"Insurers are under constant pressure to reduce costs and new technology can be expensive. The challenge is to identify technology that will deliver tangible value while keeping costs under control"(CEO 7, 2023).

CEO 4 said;
"Cyber security is a major concern for insurers, as they hold a great deal of sensitive data. The challenge is to ensure that systems are secure while also providing easy access to authorized users" (CEO 4, 2023)

CEO 10 argued;
"Insurance products can be complex and technology needs to be able to handle this complexity. This requires careful planning and design, as well as ongoing maintenance and updates" (CEO 10, 2023)

CEO 9 revealed;
"Technology play a key role in building trust with customers, but it can also erode trust if it fails. Insurance firms need to ensure that their technology is reliable and transparent, and that customers feel confident that their data is being handled appropriately " (CEO 9, 2023)

The study further found that the use of smart sensors and automation in insurance processes can bring a range of technological benefits that can help insurers to operate more efficiently, reduce costs, and provide better service to customers.

CEO 1 said;
"Smart sensors can be used to gather data on everything from property damage to driver behaviour, enabling insurers to make more accurate risk assessments and improve underwriting processes" (CEO 1, 2023).

CEO 4 said;
"By automating the claims process, insurers can reduce processing times and improve accuracy, which can lead to higher customer satisfaction and lower costs" (CEO 4, 2023)

CEO 3 stated;
"Smart sensors can be used to provide customers with real-time information on their insurance policies, such as how much they are paying and what coverage they have. This can help to improve engagement and build trust with customers" (CEO 3, 2023).

CEO 8 revealed;
"Automation can help insurers to streamline their processes and reduce the time and cost involved in manual tasks. This can free up staff to focus on higher-value tasks and improve overall efficiency" (CEO 8, 2023).

CEO 10 said;
"Smart sensors can be used to detect potential losses before they occur, such as water leaks or fire hazards. This can help insurers to prevent losses and reduce the cost of claims (CEO 10, 2023)

These arguments from the CEOs illustrate some of the key benefits of using smart sensors and automation in insurance processes, from improving underwriting to reducing processing times to preventing losses. By leveraging these technologies, insurers can improve their efficiency, reduce costs and provide better service to customers.

Logit Regression

Table 5.2 displays a P-value of.000 and a chi-square of 71.482; thus, the overall model is significant. The study found that -2 Log likelihood is 96.846 and this signifies that the model fits the research data. Further, it was found that Nagelkerke R Squared was 0.524. This implied that 52.4% of the variations in the adoption of IoT within insurance firms in Kenya can be determined by technological factors. The results indicate that prediction had an overall success rate (classification rate) of 88%. The classification rate is also known as the accuracy rate and is a measure of the proportion of cases that are correctly classified by a statistical model or test. The classification rate refers to the proportion of observations that are correctly classified as being in one category or another based on the results of the test.

Further, based on the results presented in Table 5.2, technology factors are positively and significantly related to the adoption of IoT within insurance firms in Kenya (odds ratio=1.711, P=0.000). This implied that insurance firms in Kenya with technological factors are 1.711 units more likely to adopt IoT than those without technological factors.

Table 5.2: Logit Regression

	B	t=B/S.E.	Wald	P-value
Technology Factors	1.711	0.272	39.601	.000*
Constant	-3.667	0.773	22.524	.000
Observation (n)		209		
Nagelkerke R Squared		0.524		
Model Chi-square	(1 df)	71.482		.000
Classification Rate		0.88		
-2 Log likelihood		96.846		
Hosmer and Lemeshow Test	(df 8)	6.339		.609
Note: * p <0.05				

Source : Research Data (2023)

Hypothesis testing of Technological Factors and Adoption of IoT

H_0: Technology factors have no significant effect on adoption of IoT within insurance Firms in Kenya.

The hypothesis testing was determined using the logit regression results in Table 5.2. When the P value is less than 0.05, the null hypothesis is rejected; otherwise, not. The results presented in Table 5.2 shows that the P value is less than 0.05 (P=0.000). Thus, the null hypothesis is rejected. Therefore, technology factors have a significant effect on the adoption of IoT within insurance Firms in Kenya. A positive coefficient implies that an increase in technological factors results in a significant improvement in the adoption of IoT within Insurance Firms. This agrees with the findings by Al-Momani, Mahmoud, and Ahmad (2016), which focused on IoT services' technical components and discovered that IT expertise impacts IoT adoption.

6. Conclusion

The objective of the study was to determine the effect of technological factors on the adoption of IoT within insurance firms in Kenya. The study found that most respondents agreed with statements of technological factors that were measured using organizational readiness, voluntariness, firm size, formalisation, specialization, top management support, organizational culture, work routineness and statements on openness. The regression results showed that technology factors are positively and significantly related to the adoption of IoT within insurance firms in Kenya. The null hypothesis was rejected. Hence, technology factors have a significant effect on the adoption of IoT within insurance Firms in Kenya.

Based on the findings, it is concluded that technology factors are positively and significantly related to the adoption of IoT within insurance firms in Kenya. This means that the technology factors such as the availability of IoT infrastructure, relative advantage, complexity, security, affordability of IoT devices, ease of use, and compatibility with existing systems have played a crucial role in driving the adoption of IoT within insurance firms in Kenya. The positive and significant relationship suggests that as technology factors improve, the adoption of IoT is likely to increase as well.

7. Recommendations for Policy and Practice

Based on the study's findings, it is recommended that insurance firms in Kenya prioritize integrating IoT technology into their operations. The firms need to prioritize the adoption of IoT technology, invest in technology infrastructure, data analytics and security systems to enable them to collect and analyze data, provide personalized premiums, prevent risks, and reduce losses. This will not only improve their customer experience but also enhance their competitiveness in the market. They should also adopt data analytics tools to help them make sense of the data collected and provide insights into their customers' behaviour and preferences.

Contributions to the body of Knowledge

The study examining the effect of technological drivers on the adoption of the Internet of Things within insurance firms in Kenya has made several significant contributions to the body of knowledge on this topic. The study has provided empirical evidence on the effect of various technological factors on the adoption of IoT technology within insurance firms in Kenya. This evidence can inform future research and decision-making in this area and contribute to a better understanding of the factors that drive the adoption of IoT technology.

In addition, the study has contextualized the adoption of IoT technology within insurance firms in Kenya by examining the unique drivers that influence this process. This contribution is particularly relevant for organizations operating in developing countries, where the adoption of IoT technology may be influenced by different factors than in developed countries. The study has practical implications for insurance firms in Kenya seeking to adopt IoT technology. By identifying the factors that are positively related to the adoption of IoT technology, the study provides guidance to insurance firms on the strategies they can employ to increase their chances of successful IoT adoption.

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