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# EMPIRICAL INVESTIGATION OF VIDEO SURVEILLANCE SYSTEM ADOPTION IN NIGERIA

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***Abstract*—The acceptance of video surveillance systems at homes, offices and business enterprises nowadays to reduce incidences of theft, burglaries, sexual offences and other forms of crimes is increasing. This study investigated the factors that influence adoption of video surveillance systems in Nigeria. Based on Rogers' diffusion of innovation model, the effect of relative advantage, compatibility, complexity, trialability and observability on adoption of video surveillance systems was examined. Structural equation model analysis of the collected data shows that relative advantage, compatibility, trialability and observability significantly influence adoption of video surveillance systems. However, the results indicate that adoption of video surveillance systems is not influenced significantly by complexity. Thus, complexity of video surveillance systems is perceived as a barrier to adoption of this technological innovation among Nigerians.**

*Keywords*— **Video surveillance systems, innovation, crime, security, Nigeria**

## I. INTRODUCTION

Crime and insecurity are strong inhibitors of economic development and growth of any nation. They deter local and foreign investors from committing their resources into a nation's economy. Therefore, governments at all levels are forced to use their resources that should have been utilized for developmental purposes to provide local, regional and national security for their people. Nigeria is a leading African country with a population of over 200 million people. Due to long decades of military regimes, the country is suffering from social-economic issues such as poverty, terrorism, banditry, unemployment, civil unrest, corruption, political conflicts and high rate of crime especially in areas where there are low level of formal education, housing, electricity, health care and job opportunities [1].

Crime and insecurity remain major concern to the Nigerian Government. Thus, the Country is searching for the best crime prevention and mitigation measures to reduce incidences of crime, violence and their adverse effects on the society. As a measure to prevent insecurity in Nigeria which are among the highest in the continent, it has been suggested that a systematic, integrated and coordinated approach by Government, households, civil society and individuals are needed using appropriate and cost effective technological innovations and alternative policing [1-3].

Video surveillance systems are technological innovations developed purposively to monitor movement of human, physical and capital assets either within or outside a public or private place. Video surveillance systems are useful to combat terrorists' threat, crime prevention and improve public protection by security and intelligence services. The technology helps business owners and managers to monitor the productivity of their employees, ensure accountability and reduce cases of shop lifting or theft. With the availability of inexpensive cameras, high speed and broad networks (wired or wireless), it has become economically and technically feasible to set up security surveillance in public places and private buildings [4]. Surveillance camera outputs are recorded or stored in video archives or recorders. The video surveillance system works by recording and capturing the video footages for a specified period of time in order to retrieve it for future uses or related events in the area being monitored. This necessitates the review of the video streams which may be time consuming and resource-demand assignments. Nowadays, video surveillance systems now incorporate 24-hour monitoring and analysis of video data to alert security personnel when crime is in progress or suspicious individuals or intruders enter premises without authorization. These are new security demands that are beyond the traditional or analog video surveillance systems. Video analytics thus include abilities of video surveillance systems to collect, analyse, record and transmit huge quantity of video data [3,4].

Prior studies on video surveillance systems have mainly emphasized human motion analysis and tracking, face detection and recognition, object detection and tracking, re-identification and knowledge extraction [2-5]. Considering the importance attached to video surveillance systems in securing human and physical assets, very little or no studies have been carried on the factors that drive adoption of video surveillance systems among its users. To address this knowledge gap, this

study will therefore focus at identifying the factors influencing adoption of video surveillance systems through study carried out in Kaduna, Nigeria. Datasets were collected using survey questionnaires administered to randomly selected respondents to express their perceptions on the video surveillance systems. In an attempt to reinforce the generalization and scientific value of the study, Rogers' diffusion of innovation theory was applied as the theoretical framework to analyze the factors that drive users' intention toward adopting video surveillance systems in order to meet their security needs. This study will thus provide decision and policy makers and implementers with the insight on the main determinants that influence intention to adopt video surveillance systems.

The rest of the paper is organized as follows. Video surveillance systems are explained in section II. Empirical results are presented in section III. Concluding remarks are given in section IV.

## II. MATERIALS AND METHODS

### *A.* **Video surveillance systems**

Video surveillance systems have evolved into three generations. The first generation of the systems is the analogue closed circuit television (CCTV) systems. They were developed as far back as 1960s. They are mostly used for indoor surveillance applications at homes, banks, supermarkets, offices, hotels etc. The second generation of surveillance systems evolved when digital imaging was developed. The second generation had two major improvements on the first generation of video surveillance systems. They have more efficient compression and distribution techniques, and computer vision algorithms integrated into the systems to support object tracking. Lastly, the third generation of video surveillance systems was introduced in the early 2000s. They are fully automated wide-area surveillance systems having newer features such as reasoning frameworks, behaviour analysis, multi-sensor platforms and data fusion techniques [5].

In reality, video surveillance systems are usually installed to track persons or detect intrusion but not designed to forecast crimes or undesirable events. However, research efforts are in progress to extend the capabilities of the current systems, and improve their efficiency. One of the key components of the video surveillance system is the camera, also known as video sensor. The analogue cameras and recorders are used to set up CCTV. Analogue cameras do not compress captured data during transmission. Thus, they require large amount of storage capacity when recording events. However, digital video camera or IP-camera performs digitization of the captured data and thus can take advantage of compressing algorithms and advanced video codec techniques. The digital video camera can directly interface or connect with network infrastructure and transmit their data over the network. The resolution and frame rate of digital video camera are adjustable. Examples of IP-cameras are high definition (HD), ultra high definition (UHD), and high dynamic range (HDR) [5].

Digital video recorders used video recording technology to store the camera footages captured by the video surveillance systems. Digital video recorders can be used in the CCTV systems. Analogue cameras can be connected directly to the digital video recorders using bayonet nipple connector (BNC) cables. To obtain clearer images, the cameras should be connected very close to the digital video recorder. However, IP-cameras work with network video recorders to store captured images or footages through the power-on-Ethernet switches. Video surveillance systems that are designed and installed with network video recorders could be easily scaled up with addition of new IP-cameras and do not suffer from proximity limitation associated with analogue and digital video recorders. The storage capacity of digital or network video recorders are very important to determine the size of the video surveillance systems. In addition to the video recorders, the cloud storage could also be deployed to store recorded video and facilitate their remote access at any time they are needed. The quality of captured video stream is very important factor in the design of a video surveillance system. The properties of video camera that determine the quality of the captured images are resolution, frame rate per second and contrast.

There are modules in the video surveillance systems that are meant to convert video data to specific structured information. These are modules includes: face detection; face recognition object detection and tracking; and re-identification. Face detection is meant to determine any face shown in a scene and further compute and generate the coordinates of the detected faces. It entails variations in scale, location, orientation, poses, facial expressions and lighting conditions. Face detection is an important process in video surveillance systems to facilitate or perform other related processes and applications. Face recognition is aimed at identifying a face from a specified database of object faces. Face recognition algorithms are coded to extract facial geometrical features such as lips, eyes, nose and mouth in order to recognize the face that match the face under examination [4,5]. Video surveillance system is commonly used for object detection and tracking. Object detection involves isolation of a specific region in a video stream based on the system's parameters. Object detection algorithms have been developed to separate objects, detect moving and stationary objects and differentiate colour textures. Object tracking deals with monitoring the motion of the specific region of interest. There are also algorithms that could be used to track objects taking into cognizance their shapes, appearance and positions [5].

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Re-identification occurs by identifying a particular object from video streams taken from more than one camera. Re-identification is able to identify objects tagged across or even within the same camera, when there is discontinuities and appearance of "blind" spots. This is due to vagueness and spatio-temporal uncertainty in the appearance of the object. Re-identification is applied in video surveillance system with multiple cameras where objects move around the view field of numerous cameras. Within such set-up, a video surveillance system develops this features identify objects across multiple cameras, analyzing crowd movement and activity detection. Contextual and other new approaches are been developed to solve person re-identification problem in video surveillance systems.

Another important component of video surveillance systems is the image and video enhancement algorithms. These algorithms are required to process highly noisy video streams produced by low quality cameras or harsh environmental conditions. Spatial-based and frequency-based domain processing techniques are used to improve the quality of image or video input. Real time response of video surveillance systems is an important and desirable feature as well. Automatic alerting when a specific event occurs is valuable especially when it is activated within a time frame immediately after the real event happened. Modern video surveillance systems have these requirements. These events require additional computational capabilities and large memory size. New video surveillance systems are now being incorporated into cloud infrastructures, fog and edge computing technologies to address the speed and storage limitations of existing video surveillance systems [5].

### *B. Diffussion of Innovation Model*

Diffusion of innovation model is an extensive social and psychological concept that explains and predicts how potential adopters make decision to accept a new innovation by examining their adoption patterns. It is one of the popular theories to study adoption of technological innovations and understand how they spread within and across communities [6]. According to [7], innovation is regarded as an "idea, process or a technology that is perceived as new or unfamiliar to individuals within a particular area or social system". Diffusion is the process by which information about innovation flow or spread within the social system over time from one person to another. The structure of a social system or set of interrelated units involved in solving problems to accomplish a common goal affects the attitude of individuals towards the innovation, and eventually, the rate of adoption of innovations [6].

The authors of [8], classified individuals in "a social system into five categories based on their attitudes toward an innovation: innovators; early adopters; earlier majority; later majority, and laggards". Innovators are the first group in a social system to adopt an innovation. They have the abilities to comprehend and used technological concept required to bring in innovation into the social system from the inventors. They are willing to use innovations and cope with the uncertainty about it. Early adopter is the next group, who are more integrated part of the social system than the innovators. They are well-to-do, well enlightened and well connected with the innovation. Early adopters are regarded as playing leadership roles in the social system. The uncertainty about the innovation in the diffusion process is decreased due to their leadership role in adopting innovation. The early and late majority adopters are the next two groups in the social system. The early majority accepts innovation just before the other half of their mates adopts it. The late majority group is however skeptical about innovation and its outcome but, peer pressure and necessities of life may spur them to adopt the innovation. The last group of individuals in the social system is referred to as laggards. They tend to become the non-adopters and resist adoption of innovation due to their limited resources and insufficient knowledge or awareness of the innovation. They want to be sure that an innovation works or succeeds before they adopt. In summary, the five categories of adopters are classified into two groups: earlier adopters and later adopters. The earlier adopters consist of the innovators, early adopters and early majority, while the late adopters and laggards constitute the later adopters [8,12].

In recent years, diffusion of innovation theory has been widely used to study individual's adoption of technological innovations [9,10]. The theory suggests five characteristics or attributes that precede adoption of any innovation. These are: relative advantage; complexity; compatibility; observability and trialability. It was suggested in [11] that perception of individuals on these attributes predict the rate of adoption of innovations. Therefore, this study will apply diffusion of innovation as the theoretical framework to investigate the influence of the characteristics of innovation on the adoption of video surveillance systems to support the decisions of individuals, security agencies and government to combat and prevent incidences of crime in their domains. Each of the diffusion of innovation characteristics is discussed and the respective hypotheses for the study are formulated as presented in Fig 1.

**Relative Advantage**

Relative advantage is referred to "the degree to which an innovation is perceived as being better than idea it supersedes" [6]. It is a factor that shows that an innovation is perceived as providing more benefits than its predecessors. Relative advantage leads to increase in efficiency, economic benefits and enhanced status. There is higher tendency for people to adopt an innovation when they are convinced that it will be more useful, increase their efficiency and effectiveness. The perceived advantage can be in terms of quality, ease of use,

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life span, price and also attributes that are far less concrete such as the enhanced status the innovation will likely give to the users. The components of relative advantage often include cost and social status. In order to increase the rate of adopting innovations and make it more effective, financial incentives (direct or indirect) may be used as motivational factors to support individuals in a social system to adopt an innovation [12].

Prior studies in the literature found that relative advantage influenced adoption of technological innovations. For instance, a study by [9] found that relative advantage has significant influence on adoption of Uber mobile application. It was noted in [10] that relative advantage is positively related to intention to adopt Internet banking. Similarly, the authors of [13] found that relative advantage has positive impact on adoption of mobile banking in Saudi Arabia. Relative advantage was found to have significant effect on innovation adoption among Malaysian manufacturing SMEs in [14]. In this study, relative advantage of video surveillance system is assumed to be an important factor for users to adopt the innovation. Based on the acclaimed benefits of using video surveillance systems, the following null hypothesis will be tested:
*H1: Relative advantage has no significant influence on adoption of video surveillance systems in Nigeria*

**Compatibility**
Compatibility is defined as "the degree to which an innovation is perceived as consistent with the existing values, past experiences, and needs of potential adopters" [11]. Compatibility is perceived to be a descriptor of how users' values, habits, and beliefs influence the adoption of similar technological innovations. Compatibility is an important attributes of innovation such that conformity with lifestyle of the users can stimulate a rapid rate of adoption. A lack of compatibility in technological innovation with individual needs may adversely influence the adoption of the innovation. When an individual need is compatible with innovation, uncertainty about the innovation will reduce, consequently innovation will increase. The more an innovation can coexist together with values, needs and experience of the potential adopters, the higher the rate of diffusion and adoption [6,12].

Previous studies found that compatibility has influence on intention to adopt technological innovation. The findings of [9] showed that compatibility has significant influence on adoption of Uber mobile application. In [10], it was found that compatibility is positively related to intention to adopt Internet banking. In [13], compatibility was found to have positive impact on adoption of mobile banking in Saudi Arabia. A study by [14] showed that compatibility has significant effect on innovation adoption among Malaysian manufacturing SMEs. Thus, in this study, this null hypothesis will be tested:
*H2: Compatibility has no significant influence on adoption of video surveillance systems in Nigeria*

**Complexity**
Complexity in [11] is defined as "the degree to which an innovation is perceived as relatively difficult to understand and use". It is regarded as the opposite of perceived ease of use. A simple or less complex innovation will experience more acceptability than complex innovation by existing or new users. Complexity discourages users and they usually think that it is difficult to understand and use.

Previous studies have shown that the effect of complexity on intention to adopt technological innovations. In [9], it was found that complexity has significant influence on adoption of Uber mobile application by users. A related study in [10] found that complexity is negatively related to intention to adopt Internet banking. In [14], complexity was found to have significant effect on innovation adoption among Malaysian manufacturing SMEs. Thus, this null hypothesis will be tested in this study:
*H3: Complexity has no significant influence on adoption of video surveillance systems in Nigeria*

**Trialability**
Trialability refers to the ability to experiment with or try new technological innovations before adoption [11]. It implies the ability of an innovation to be put on trial without total commitment and with minimal investment. An innovation with greater trialability is more likely to be accepted by potential adopters. The more an innovation is tried and tested, the faster it is adopted. This is true especially for innovations that have high visibility and low uncertainty. Innovation can be changed or modified when it is tried. This could lead to re-invention of the innovation and thus create faster adoption of the innovation by potential adopters. The authors of [10] found that trialability is positively related to adoption of Internet banking. In [15], it was suggested that trialability has significant influence on mobile money transfer technology in Ghana. Trialability in [14] showed significant effect on innovation adoption among Malaysian manufacturing SMEs. Thus, the following null hypothesis is proposed:
*H4: Trialability has no significant influence on adoption of video surveillance systems in Nigeria*

**Observability**
Observability is 'the degree to which the results of an innovation are visible to others" [11]. It shows the extent to which an innovation is visible to users and the benefits can be easily communicated and observed. Existing and potential customers are more likely to adopt new innovations when their advantages are visible. High visibility generally leads to fast adoption. Observability was found to significantly influence adoption of Uber mobile application in [9]. Observability is positively related to intention to adopt Internet banking by

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**Vol. 6, Issue 8, ISSN No. 2455-2143, Pages 12-19**
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customers in [10]. Observability was noted to have a positive impact on adoption of mobile banking in Saudi Arabia in a study by [13]. A study by [14], showed that observability has significant effect on innovation adoption among Malaysian manufacturing SMEs. In the context of this study, the effect of video surveillance systems is visible and desirable. Thus, the following null hypothesis will be tested:

*H5: Observability has no significant influence on adoption of video surveillance systems in Nigeria*

### *C. Design and pre-testing of survey instruments*

The survey instrument for this study was developed based on the review of relevant literature on diffusion of innovation model. The survey instrument was made up of two-part. The first part included the demographic characteristics of the respondents while the second part focused on the constructs of the diffusion of innovation model namely: relative advantage; compatibility; complexity; trialability and observability. Measurement items from the past studies on diffusion of innovation were adopted and further adapted to meet the objectives of this study [14,16]. All items were measured with a five-likert scale, ranging from strongly disagree (1) to strongly agree (5).

A pilot test was conducted among 50 randomly selected video surveillance system users in Kaduna. This was carried out to validate and improve the quality of the questions in the survey instrument. The feedback from the respondents after the pilot test was used to improve the clarity of some questions in the survey instruments.

**Sampling and data collection**

The target population of this study involved people that are using and/or know about video surveillance systems in Kaduna, Nigeria. Sampling technique was used to obtain responses from volunteers who administered the survey questionnaires. After the pilot study, questionnaires were distributed to 650 respondents while 410 usable responses were obtained. The remaining questionnaires were neither returned nor filled correctly. All completed questionnaires with illegible, inconsistent and ambiguous response were screened out. A code sheet was prepared from the data collected from the respondents.

## III. RESULTS AND DISCUSSIONS

### *A. Demographic characteristics of the respondents*

Table 1 shows the demographic characteristics of 410 respondents involved in this study. About 52.4% were male and 47.6% were female. The statistics showed that most of the video surveillance system users were in the age group of 35 years and above, that is more than 73%., were employed approximately 41.9%, had Higher National Diploma/Bachelor's degree that is 35.4% , and had between 1 and 3 years of experiences on the systems, that is 40.7% .

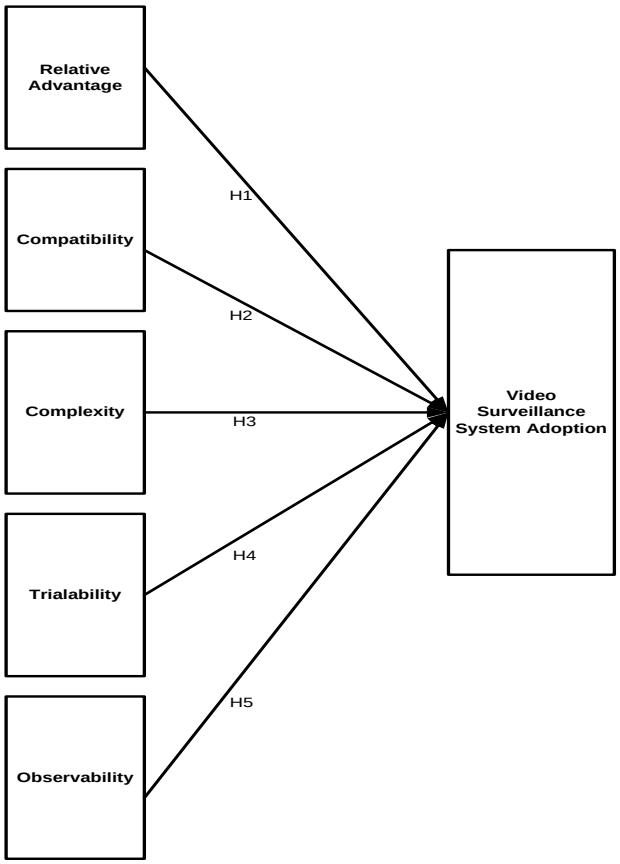


Fig 1 **Research conceptual framework and hypotheses**

Table -1 Demographic characteristic of the respondents

| Variable | Groups | Frequency (N) | Percentage (%) |
|---|---|---|---|
| Gender | Male | 215 | 52.4 |
| | Female | 195 | 47.6 |
| Age | 16 – 25 years | 25 | 6.1 |
| | 26 – 35 years | 85 | 20.7 |
| | 36 – 45 years | 148 | 36.1 |
| | 46 year - Above | 152 | 37.1 |
| Highest Education | Secondary School | 81 | 19.7 |
| | National Diploma | 104 | 25.4 |
| | Higher National Diploma/ Bachelor | 145 | 35.4 |
| | Post Graduate | 57 | 13.9 |
| | Others | 23 | 5.6 |
| Occupation | Students | 29 | 7.1 |
| | Employed | 172 | 41.9 |
| | Self-Employed | 156 | 38.1 |
| | Not-employed | 53 | 12.9 |
| Experience in using video surveillance systems | Less than 6 months | 44 | 10.7 |
| | 6 months to less than 1 year | 83 | 20.2 |
| | 1 to 3 years | 167 | 40.7 |

### *B. Diagnostic tests*

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In this study, factor analysis was performed to assess the construct validity. The measured items for the five constructs (i.e relative advantage (RA), compatibility (CP), complexity (CM), trialability (TB) and observability (OB)) were subjected to factor analysis in order to verify their uni-dimensionality. The exploratory factor analysis (EFA) was carried out on the constructs. The results of the factor analysis are summarized in Table 2.The factor loading of all remaining constructs to their own constructs are more than 0.59. The results showed that the cross loadings are not greater than 0.40. It thus found that the results supported construct validity of the questionnaire [17].

The confirmatory factor analysis (CFA) was used in this study to determine the convergence and discrimination among the measuring constructs. In Table 2, all composite reliabilities (CR) were found to be greater than cut-off point, 0.7. Furthermore, all values of average variance extracted (AVE) were higher than the critical value of 0.5. The reliability of each measured item in the study constructs was tested. In order to assess the reliability of each factor, Cronbach's alpha analysis was computed to determine internal consistency. The coefficient of each constructs shown in Table 2 was greater than the recommended value of 0.7. This showed that all items in the survey instruments were found reliable.

Table -2 Exploratory factor analysis

| Constructs | Loading factor (EFA) | Cronbach's alpha | Composite reliability (CR) | Average variance extracted (AVE) |
|---|---|---|---|---|
| RA | 0.8042 | 0.7720 | 0.75 | 0.74 |
| CP | 0.6236 | 0.8024 | 0.81 | 0.66 |
| CM | 0.8033 | 0.7558 | 0.78 | 0.80 |
| TB | 0.7049 | 0.7953 | 0.77 | 0.67 |
| OB | 0.8886 | 0.7477 | 0.82 | 0.83 |
| Average | | 0.8171 | 0.83 | 0.63 |

The results in Table 3 showed that the square root of AVE for each construct was greater than its correlation values with other constructs. This means that each construct relates more strongly to its own more than to other constructs. The implication of these tests is that the survey instrument designed to collect data in this study is found valid and reliable [17].

Table -3 Construct Discrimination

| | **RA** | **CP** | **CM** | **OB** | **TB** | **AV** |
|---|---|---|---|---|---|---|
| **RA** | 0.86 | | | | | |
| **CP** | 0.2725 | 0.812 | | | | |
| **CM** | 0.5329 | 0.5144 | 0.896 | | | |
| **TB** | 0.4815 | 0.2847 | 0.4041 | 0.915 | | |
| **OB** | 0.7255 | 0.4432 | 0.6147 | 0.5597 | 0.820 | |
| **AV** | 0.3166 | 0.3095 | 0.4114 | 0.2347 | 0.3784 | 0.794 |

*Note: The diagonals are the square roots of AVE*

The variance inflation factor (VIF) in this study indicated the degree to which the independent variables are correlated with each other. It was used to test the existence of multicollinearity in the dataset. From Table 4, all the VIF were less than 10 and also the tolerance values were greater than 0.1. This implied that multicollinearity was absent in the dataset.

Table -4 Variance inflation factor and Tolerance

| **Variable** | **Variance Inflation Factor (VIF)** | **Tolerance (1/VIF)** |
|---|---|---|
| **OB** | 2.87 | 0.3479 |
| **RA** | 2.25 | 0.4448 |
| **CM** | 1.90 | 0.5257 |
| **TB** | 1.49 | 0.6702 |
| **CP** | 1.44 | 0.6936 |

### *C. Structural Equation Model (SEM) Analysis*

SEM analysis was applied to analyse the relationship between the dependent and independent variables and to test the hypotheses formulated for this study. The regression results were significant at 0.05 and 0.01 levels. Table 5 shows the results of the SEM analysis of the model. The first hypothesis that assumed that relative advantage has no significant influence on adoption of video surveillance systems in Nigeria was rejected (0.551> 0.05). The second hypothesis that posited that compatibility has no significant influence on adoption of video surveillance systems in Nigeria was rejected (0.152 > 0.05). The third hypothesis that proposed that complexity has no significant influence on adoption of video surveillance systems in Nigeria was supported (0.006 < 0.01). The fourth hypothesis that assumed that trialability has no significant influence on adoption of video surveillance systems in Nigeria was rejected (0.993 > 0.05). The fifth hypothesis that suggested that observability has no significant influence on adoption of video surveillance systems in Nigeria was rejected (0.181 > 0.05).

The results of this analysis showed that four factors, namely, relative advantage, compatibility, observability and trialability have significant influence on video surveillance systems' adoption while complexity had no significant influence on adoption of video surveillance systems.

Table -5 SEM Analysis

| **Structural** | **Coef.** | **Std. Err.** | **z** | **P > \|z\|** |
|---|---|---|---|---|
| **RA** | .0679583 | .1140 | 0.60 | 0.551* |
| **CP** | .1156631 | .0808 | 1.43 | 0.152* |
| **CM** | .2543563 | .0932 | 2.73 | 0.006** |
| **TB** | .0007406 | .0860 | 0.01 | 0.993* |
| **OB** | .1870693 | .1397 | 1.34 | 0.181* |

*** p < 0.05, ** p < 0.01**

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### *D. Discussions and implications of the study*

The study investigated the effect of five constructs on video surveillance systems adoption in Nigeria based on Rogers' model of diffusion of innovation. There were significant evidences to support that relative advantage, compatibility, observability and trialability significantly affect adoption of video surveillance systems while complexity was not supported to have significant effect on adoption of video surveillance systems.

The results of the study showed that one of the main determinants of video surveillance systems' adoption is relative advantage perceived by the users. This means that users identified benefits of the video surveillance systems before they adopt the systems. A possible explanation for the significant influence of relative advantage on the adoption of video surveillance systems might be that the adopters found that the perceived benefits of the systems are direct, user-friendly and observable. In addition, the flexibility of video surveillance systems that could be customized to the needs of individuals or businesses is another driver for the adoption of this technology. Video surveillance systems could be adapted to cover single or several locations depending on the preferred solutions by the users. This finding is consistent with prior studies that found relative advantage is a significant determinant of adoption of technological innovation [9,10,13,14].

Compatibility was found to influence the decision to adopt video surveillance systems. The implication of this finding is that video surveillance systems are easily interfaced or integrated with existing IT systems, varieties of hardware technologies based on the societal needs and values. This attribute is an important motivator for the adoption of video surveillance systems. The system users acknowledged that effective monitoring and recording of activities taking place within and around their assets contributes significantly to prevent crime and provide useful information for security operatives and investigators. The result of this study is consistent with previous studies, which identified compatibility as an important factor influencing the adoption of innovation [9,10,13,14].

Trialability was found to have significant influence on adoption of video surveillance systems in Nigeria. The essence of the finding is that during the trial period, users obtained good technical support and awareness about the video surveillance systems from the sales or service personnel. In addition, prospective customers got adequate attention and consideration when the functionalities of the video surveillance systems were demonstrated during trial and testing sessions. The importance of trialability is that the potential adopters are more likely to identify the benefits and issues with video surveillance systems during trial before investing into them. In addition, the potential adopter would prefer to adopt video surveillance systems when they are convinced that they are useful, safe and less risky after trial. The result is in line with other research findings related to technological innovations [10,14,15].

Furthermore, the study found that observability had a significant effect on video surveillance systems adoption. Observability connotes the visibility of the applications and benefits of video surveillance systems. This implied that video surveillance systems were visible to the adopters being tangible products. The adoption of video surveillance systems based on observability has been supported since their uses and benefits can be easily observed and communicated to prospective customers. The finding of this study agreed with previous studies in the literature [9,10,13,14].

However, complexity was not a significant factor in the adoption of video surveillance systems in Nigeria. This finding is consistent with the findings in [16] but in contrast to the findings in other innovation adoption studies [13,14]. The finding could be attributed to the fact that video surveillance systems may be regarded as an innovation that requires complex procedures such as installation, regular back-up of the images, controlling and managing the systems. This might lead to difficulties for most users to understand and use the systems. The respondents perceived that the systems might require expertise to perform installation, maintenance and upgrade of the systems by the professionals. The users are thus much concerned by the complexity, running cost of using the systems and paid little attention to the huge benefits associated with the systems.

## IV. CONCLUSION

This study examined the drivers of adoption of video surveillance systems as part of measures to curb incidences of insecurity and crime in Nigeria. Relative advantage, compatibility, trialability and observability were found to have significant influence on the adoption of video surveillance systems while complexity had no significant influence on the video surveillance systems. Based on the findings of this study, it is suggested that the importance of the video surveillance systems in terms of simplified operations and ease of integration with Internet, smart phones and other existing technologies using electronic and using appropriate media to communicate the advantages or benefits of using video surveillance systems. There is a need for existing and future users to be enlightened on practical usage of video surveillance systems such as tracking and getting accurate account of crime scenes and prompt alerts to security agencies when there are cases of intrusion or unauthorized entries into secured premises. This will be very useful to adopters when comparing the advantages of the video surveillance systems with any traditional form of surveillance systems. Potential adopters should be given enough opportunities to try and

observe the possibilities of using video surveillance systems to improve personal and public securities.

Furthermore, the system designers should also consider developing easy-to-use, attractive and user-friendly systems. The operations and applications of video surveillance systems should not be difficult to comprehend. Video surveillance systems that are user-friendly and easier to operate might be widely accepted and adopted. This would reduce the perceived complexity of the systems and encourage prospective users to adopt them in order to prevent crime and provide evidences to prosecute suspects after criminal events. Thus, adopter may not find video surveillance systems difficult to adopt, operate and use.

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