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Factors Influencing Adoption of Service Robots in Nigerian Airports

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Abstract *The need to improve service delivery efficiency and enhance passenger satisfaction is driving most airport operators to increasingly adopt robotics as part of their service delivery infrastructure. This study examined the factors influencing the adoption of service robots in Nigerian airports. It specifically explored the effects of UTAUT dimensions on the adoption of service robots in selected Nigerian Airports. The study adopted cross-sectional survey design, and data were obtained from 241 airport staff using structured questionnaires. Hypothesized relationships were tested using multiple regression analysis. Results showed that performance expectancy, effort expectancy, social influence and facilitating conditions had significant positive effects on the adoption of service robots in Nigerian airports, although social influence and facilitating conditions respectively had greater influence in the adoption decision. It was, therefore, concluded that marketers of aviation service robots should consistently promote the unique benefits and performance expectations of their products in order to demonstrate the potential capabilities of these technologies in improving operational efficiencies.*

Keywords: *UTAUT, Service Robots, Air Travel, Performance Expectancy, Effort Expectancy*

INTRODUCTION

Presently, as a result of human ingenuity, the extent of human technological advancements witnessed across several sectors of society is growing. Development and advancements in modern technologies have resulted in a plethora of innovative systems and tools that have accelerated and facilitated the execution of human tasks in effective and efficient ways (Wirtz, 2020). These technologies have revolutionized operational procedures and standards in virtually every sector of human society, including the global civil aviation industry which is driven by robotic infrastructure and modern digital networks (Paluch et al., 2020). According to Ivanov et al. (2020), robotic systems are computerized infrastructure powered by electronic components and artificial intelligence to independently carry out tasks with little or no human assistance. They interact with their surroundings, including people, by using a variety of sensors, actuators, and human interfaces to deliver intelligent services and information. As a result of their efficiency, effectiveness and autonomous operability, robotic systems are fast being integrated into banking, transportation, military intelligence, and health systems around the world. In developed parts of the world, such as China, Japan, the United States of America, and a host of others, robotic systems are an integral part of aviation systems responsible for undertaking several roles such as security, safety, cleaning, check-in, baggage handling, among others (Wirtz et al., 2021). In South Korea and Japan, virtually all aspects of pre-flight, in-flight and post-flight services are fully supported by automated robotic technologies (Hwang et al., 2022). These services include welcoming of passengers, passengers' screening, baggage inspection, baggage handling, check-in and seat allotment service, on-board entertainment, baggage delivery and reservation services at destinations.

However, in developing African countries like Nigeria, despite recognizing the potential of robotic technology, the integration of service robots into airports is encumbered by several technical, administrative and policy challenges.

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Despite the large number of passengers passing through Nigerian civil aviation system, over 13 million as of 2021 (National Bureau of Statistics, 2021), there has been no successful effort to integrate service robots in Nigerian airports to provide seamless and comfortable aviation experience to passengers. As a consequence, majority of airport operations are handled by manually, and this is flawed by human errors, causing displeasure, dissatisfaction and poor experience among passengers. As a consequence, the Nigerian civil aviation sector ranked 3rd in overall complaints received by the Federal Competition, Consumer Protection Commission (FCCPC) in 2022. The report revealed that “most of the complaints received were on delays, cancellations, pilfered baggage, lost baggage, poor airport experience, and discourteous service among others” (Obogo, 2022, p. 36). The growing number of complaints could be attributed partly to the over-reliance on manual effort, which is naturally fallible. This has often undermined the quality perception of passengers towards Nigerian airports as compared to airports in developed parts of the world like Europe, and Asia, where robots play critical roles in airline service delivery. Given the near-absence of service robots in Nigerian airports, the aviation service delivery process is not as efficient as it should be. For instance, there is no advanced robotic technologies for enhanced baggage screening, which could detect miniaturized sophisticated explosive devices coming in or leaving the country, hence amplifying the risk of terrorist attacks in Nigeria. Also, the check-in process, which would have been easily accelerated by service robots, is slow and frustrating in some Nigerian airports. Passengers’ baggage is often poorly handled, damaged or misplaced during flight by airport personnel who do not have the caution and patience to properly handle them.

As a matter of fact, basic airport tasks such as passengers’ guidance, passengers’ safety checks, check-in process and seat allotment, are still handled by human personnel at Nigerian airports; these are subject to human errors which may lead to poor service experience for passengers. In light of the drawbacks of an over-reliance on human labour in Nigerian airports, one may be led to ask: what are the factors responsible for the slow adoption and utilization of service robots in Nigerian airports? In the Nigerian context, the fear of robots taking over human jobs at airports is compelling authorities and employees to resist the adoption of service robots in the Nigerian civil aviation system. The unavailability or inadequacy of supporting technological infrastructure such as power supply and internet connectivity is another major reason impeding the full-scale adoption of service robots in Nigerian airports. The lack of competent technical manpower for installation, operations and maintenance of the robots serves as another critical factor preventing the use of service robots in Nigeria. Similarly, a look at extant literature could provide broad strokes on the major factors preventing the adoption of new technologies, including robotics. Using the technology acceptance model as a basis, Kang et al. (2011) submits that perceived usefulness and perceived ease of use are key factors affecting adoption of new technologies. Also, theoretical models like the unified theory of acceptance and use of technology (UTAUT), task-technology fit (TTF) and information system success (ISS) were found to positive determinants of new technologies adoption (Alazab et al., 2021). Generally, these factors are presumed by scholars to affect the acceptance of new technologies, but do they actually affect the adoption of service robots in Nigerian airports? To solve this empirical puzzle, the study explored factors affecting the adoption of service robots in Nigerian airports using the framework of the unified theory of acceptance and use of technology (UTAUT) model.

LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

Theoretical Framework

This study was anchored in the Unified Theory of Acceptance and Use of Technology (UTAUT), propounded by Venkatesh et al. (2003). It was deemed relevant to this study because it outlines and explains probable factors influencing the acceptance and utilization of service robots in Nigerian civil aviation industry. The UTAUT model seeks to explain users’ initial intentions to use an information system and their subsequent usage behavior. The theory’s fundamental premise contends that behavioral intention determines how technology is actually used. The direct impact of four main constructs, including performance expectancy, effort expectancy, social influence, and facilitating factors, determines the anticipated likelihood of adopting the technology. Age, gender, experience, and willingness to utilize are factors that influence how predictors affect outcomes (Venkatesh et al., 2003). The elements of UTAUT include performance expectancy, effort expectancy, social influence and facilitating conditions. Through these basic dimensions, the UTAUT framework provides a logical foundation to understand the how users adopt and use new technologies and the major factors affecting their adoption decision.

Service Robots

Service robots are artificially-intelligent software and hardware systems used by service organizations to accelerate the pace, efficiency and effectiveness of service delivery to customers (Hornyak, 2020). They are electronic systems powered by artificial intelligence to carry on a variety of tasks faster, more reliably and more effectively than humans.

They are designed to help humans to execute complex or sophisticated tasks with superior efficiency. Service robots aid humans by carrying out work that is generally unclean, repetitive, far away, hazardous, or dirty. They often operate autonomously or are managed by internal systems with options for human override. The word "service robot" has no clear technical definition (Tuomi et al., 2021). The International Organization for Standardization defines a "service robot" as a robot "that performs useful tasks for humans or equipment excluding industrial automation applications" (Xu et al., 2020). This implies that the phrase "service robot" refers to machines that assist people or perform specific tasks aside from industrial production. They are situated in a variety of complex situations. Unlike industrial robots, they frequently participate in standardized manufacturing processes. Because they regularly have to interact with individuals in challenging environments, they must be more adaptive. A service robot needs to have some degree of autonomy in order to be able to reject rigid forms of instruction and behavior, respond to information received, and adjust to environmental changes. Furthermore, service robots can be utilized for both personal and professional objectives and come in a range of shapes, sizes, and settings, according to Hornyak (2020). By providing partially or completely automatic services, a mobile base, a robotic arm, and a controller device serve their unique purpose of improving the quality and comfort of human life. Around the world, service robots are being introduced into business environments to help with customer service and handling operations. In the global civil aviation industry, airlines are using service robots to serve passengers in more ways than could have been imagined decades ago. For context, consider that, according to a recent survey by Air Transport IT Insights, 32% of airports and more than half of all international airlines are presently searching for partners to increase their involvement with robotics over the course of the next three years (Airport Technology, 2021).

Use of Service Robots in Airports

Due to the effectiveness, efficiency, speed and reliability of service robots, they are fast being adopted by business organizations across several sectors. In the civil aviation industry, the application of service robots is wide ranging because they perform several critical tasks that are essential to the success of civil aviation operations (Wirtz et al., 2021). In developed countries with sophisticated technology and supporting infrastructure, the operations of civil aviation are greatly automated; and service robots are playing critical roles in facilitating the broad-based automation of operations at airports. According to Meidute-Kavaliauskiene et al. (2021), the efficiency of service robots in civil aviation is prompting practitioners to consider several areas to increase the integration of these technologies in aviation systems around the world. The desire to see more automation through robotization of civil aviation operations is rooted in the notion that fatal human errors resulting losses of passengers' lives could be greatly prevented through robotization of key processes like screening, security, flight scheduling, weather monitoring, among others (Huang et al., 2021). From the foregoing, it is observed that a key role of service robots in airports is passenger/baggage screening. In a world of new threats and challenges to civil aviation, this role could not be more important.

Given their accuracy, reliability, unique capability and intelligence, service robots are greatly relied upon to execute screening of passengers and their baggage to guarantee the elimination of potential threats to aircrafts, passengers and flight crews. Another key role of service robots in airports is baggage handling; and this includes baggage screening, loading, offloading and baggage delivery. This becomes particularly important when the contents of passengers' baggage are delicate and require cautious handling. And robots are becoming a popular alternative to human handling of passengers' baggage because humans have a history of mishandling and misplacing passengers' baggage (Ivanov et al., 2017). With service robots responsible for executing this role, incidents of baggage mishandling and misplacements are becoming rare in modern airports. In the view of Chen (2022), the purpose of service robots in airports could also be to ensure the provision of seamless experiences to passengers by accelerating the process of flight check-ins, luggage handling and guiding passengers before, during and after the flight. They also play the important role of effectively and efficiently coordinating the operations of airports to minimize fatal human errors and enhancing better performance.

Performance Expectancy and Adoption of Service Robots in Airports

Performance expectancy is "the degree to which an individual believes that using the system will help him or her to attain gains in job performance" (Venkatesh et al., 2003). It entails how an individual expects the adoption and use of new technology to facilitate the performance of intended tasks. In other words, it is the degree to which a potential user believes that the adoption of new technology would perform in terms of helping them carry out their tasks. In that case, if an individual believes that the adoption of new technology would greatly improve their work productivity, then performance expectancy is high and the propensity to adopt the actual technology will rise. In simple terms, performance expectancy is how users expect a potential new technology to perform, in terms of its ability to accurately carry out its basic functions when purchased and adopted (Mosweu et al., 2016). Prior to the purchase and adoption of new technologies, potential users often evaluate its perceived performance against the tasks it is considered to carry out when finally purchased (Wijaya et al., 2022). This is useful to users because it enables them to determine whether or not a new technology will be able to adequately perform the roles and duties it is acquired to perform. In that sense, a technology with high performance expectancy is one which is perceived to be well suited and fitted to effectively and efficiently carry out its intended purposes and functions on a consistent basis. In such a scenario (Putri, 2018) assert that users will have very little resistance to the technology and adopt it over technologies with low performance expectancy. The foregoing viewpoint suggests that performance expectancy could have the potential to impact the adoption of new technologies such as service robots. This viewpoint is in alignment with Gupta et al. (2019), who confirmed that performance expectancy had a significant influence on Indian customers' decision to adopt digital payment systems. The viewpoint is also reinforced by Hu et al. (2020), who confirmed that performance expectancy had a significant positive influence on academics' behavioural intention and use of mobile technologies in China. On this basis, the following hypothesis was stated:

H_1: Performance expectancy has a significant effect on the adoption of service robots in Nigerian airports.

Effort Expectancy and Adoption of Service Robots in Airports

Effort expectancy is the "degree of ease associated with the use of the new technological system" (Venkatesh et al., 2003). It is constructed from perceived ease of use obtained from the technology acceptance model. This entails how easy or not it is to adopt and use new technologies. In today's automated world, users typically expect new technologies to be more artificially-intelligent and carry out tasks independently with very minimal human intervention (Abbad, 2021). In response, technological manufacturers are introducing more autonomous technological systems in a variety of sectors to feed the huge consumer demand for artificially-intelligent products. In fact, an important consideration for most users of modern technologies is the degree of autonomy or artificial intelligence embedded in technological systems they intend to purchase before buying them (Rahi et al., 2019). Another key consideration of users, especially first-time users when evaluating new technologies to purchase is effort expectancy, that is, the level of effort required to install, operate, maintain, and service the technology (Alfansi & Daulay, 2021). In the civil aviation industry, effort expectancy entails how easy or difficult it would be for airport authorities and staff to adopt and operate new technologies like service robots. In this context, airport authorities would be more inclined to adopt service robots if the effort required to install, maintain and operate them is minimal. This viewpoint is reinforced by Gupta et al. (2019), who confirmed that effort expectancy had a significant influence on Indian customers' decision to adopt digital payment systems. It is also reinforced by Hoque and Sorwar (2017), who revealed that effort expectancy had a significant impact on the users' behavioral intention to adopt mHealth services in Bangladesh. On this basis, the following hypothesis was stated:

H_2: Effort expectancy has a significant effect on the adoption of service robots in Nigerian airports.

Social Influence and Adoption of Service Robots in Airports

Social influence is the "degree to which an individual perceives that important others believe he or she should use the new technological system" (Venkatesh et al., 2003). It has to do with what people think about an individual's decision to adopt and use new technologies. As such, if the potential user perceives that people around them are in favour of the new technology, then they will proceed to adopt it. Given that human beings are social creatures existing in a social world, it is impossible to discount or dismiss the impact of social influence on their decisions, including purchase-related decisions (Bozan et al., 2016). This entails that to a large extent, an individual's decision results from an accumulation of pressures and influences from people currently around them or those they aspire to associate with. In this sense, an individual is likely to confirm to the requirements of people that they closely interact with at the present time and those that they aspire to interact with in the future. The implication of this is that if the people that consumers hold as important are of the opinion that using a given technology is acceptable by them, then there is a high propensity for the consumer to adopt and use it in conformity to the requirements of the social group he belongs to or intend to join. Similarly, Abbad (2021) observed that social influence amounts from the persuasions and pressure that is mounted on consumers by people and groups considered important to them. These groups include family, friends, colleagues, co-workers, union members, peer group, reference group, opinion leaders, and so forth. Also, Bozan et al. (2016) asserted that given that man is a social animal, his purchase decisions are amenable to influences from social groups around him in the sense that most of his acquisitions reflect the requirements of his social groups. This viewpoint suggests that users' decision to adopt new technologies like service robots could be influenced substantially by social influence. It is corroborated by Hu et al. (2020), which confirmed that social influence had a significant positive influence on academics' behavioural intention and use of mobile technologies in China. The viewpoint is also reinforced by Kabra et al. (2023), who confirmed that social influence had a significant positive effect on the adoption of cloud computing services by Indian students. On this basis, the following hypothesis was stated:

H_3: Social influence has a significant effect on the adoption of service robots in Nigerian airports.

Facilitating Conditions and Adoption of Service Robots in Airports

Facilitating conditions entail "the degree to which an individual believes that adequate technical infrastructure exists to support the use of the new technological system" (Venkatesh et al., 2003). This has to do with the availability of requisite technological infrastructure such as power supply, technical know-how, internet access and other technological machinery needed for the intended new technology to be successful when adopted. In the event where there is adequate supporting technological infrastructure to facilitate the installation and operations of the new technology, then the propensity for users to adopt it will rise. This is why Lee (2017) cautioned that the overall performance of an adopted new technological system is contingent on the stability, capacity and reliability of the facilitating conditions available to back up the system. Similarly, Mahande and Malago (2019) asserted that facilitating conditions are critically essential to the successful adoption of new technologies for an individual and organizations. In fact, the durability, efficiency, stability and functionality of technological systems largely depend on the facilitating technical infrastructure available to prop up the system. As such, before the adoption, purchase and installation of new technological systems, organizations have to ensure that the essential technical infrastructure and manpower are in place to expedite successful adoption. Part of the problem hindering the adoption of innovative modern technologies like robotics in developing African countries like Nigeria is the acute shortage or unavailability of requisite technical infrastructure to support technological transition (Ebekozien & Aigbavboa, 2021). This is why important sectors of the Nigerian economy, such as the civil aviation industry are not fully robotized as is obtainable in developed countries. Apparently, facilitating infrastructure like technical manpower, power supply, and stable internet connectivity seemingly impede the adoption of service robots in Nigerian civil aviation industry. This implies that facilitating conditions could have the potential to affect the adoption of new technological systems by organizations. This viewpoint is supported by Odeyemi (2019), who confirmed that the adoption of robots in Nigerian academic libraries is significantly affected by facilitating conditions (unreliable power supply, inadequate technology infrastructure, and absence of technical skills). The viewpoint is also reinforced by Gupta et al. (2019), who confirmed that facilitating conditions had significant influences on Indian customers' decision to adopt digital payment systems. On this basis, the following hypothesis was stated:

H_4: Facilitating conditions have a significant effect on the adoption of service robots in Nigerian airports.

The hypothesized relationship between these UTAUT dimensions and adoption of service robots in the context of this study is portrayed in the adapted conceptual model displayed in Fig. 1.

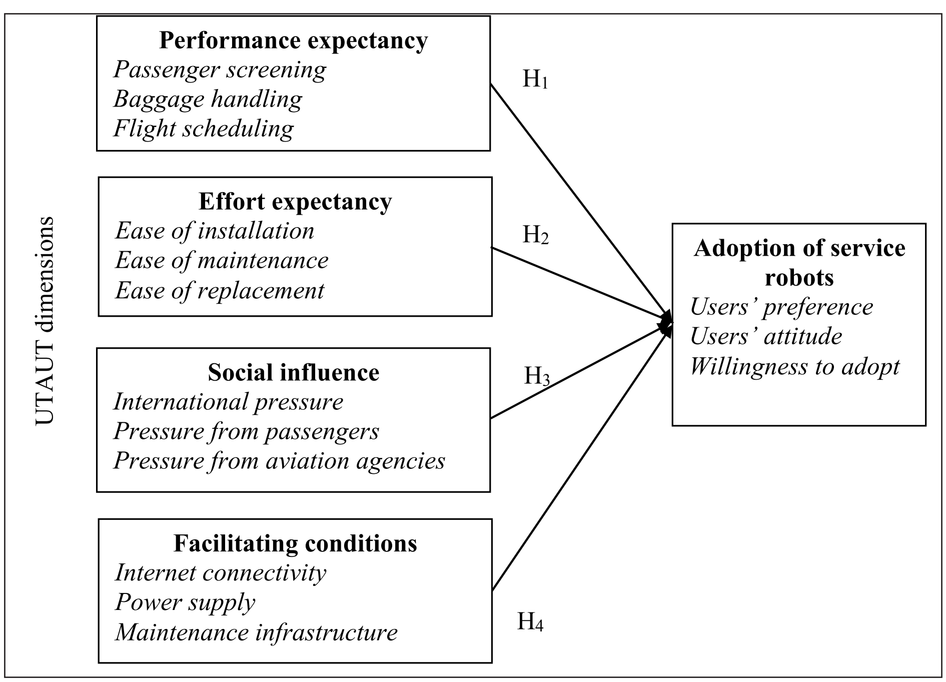

Fig. 1: Conceptual Model of the Study

METHODOLOGY

Sampling and Data Collection

This study adopted cross-sectional survey research design to collect data. First, a target population comprising 608 middle-level to senior management staff members of three (3) airports (Margaret Ekpo International Airport, Calabar, Victor Attah International Airport, Uyo, and Port Harcourt International Airport, Port Harcourt) were identified. This population included staff of the airport management authorities and service staff of the airlines operating in the airports, viz: air traffic controller, airport engineer, ramp staff, baggage handlers, flight attendants, reservation agents, airport managers, and pilots. Although no information is publicly available on the number of middle-level and senior staff in the target airports, the researchers arrived at this figure after pre-survey interactions with key informants in these airports. Given that the target population was manageable, it was adopted as the sample size for the study. The questionnaires were distributed to personnel in the target airports thus: Margaret Ekpo International Airport, Calabar (182); Victor Attah International Airport, Uyo (216); and Port Harcourt International Airport, Port Harcourt (210). These distribution ratios reflect the traffic flow in these airports.

A purposive sampling technique was adopted to identify the target respondent. The questionnaire distribution took one week. Three weeks after administering the questionnaire and after two reminder calls to the respondents, the researchers were able to retrieve 248 questionnaires (representing a response rate of 40.78 per cent). After checking for completeness of data 7 of the questionnaires were discarded, thus leaving the researchers with 241 useable questionnaires. The final sample size of 241 data points is suitable for the analytical method adopted for this study (Pallant, 2016).

Reliability and Validity of Instrument

The measurement items employed in this study were adapted from the UTAUT model (Venkatesh et al., 2003; Donmez-Turan, 2020; Rahi & Abd. Ghani, 2019). The instrument is made up of two sections, A and B. Section A comprise questions about respondents' demographic data such as age, gender, marital status, and educational qualifications, while Section B was composed of statements meant to measure the dependent and independent variables. The instrument measured the opinions of respondents using a 5-Point Likert Scale. Prior to field administration of the questionnaire, it was content-validated through authority-vetting method, while its reliability status was confirmed through Cronbach's alpha reliability approach. The Cronbach's alpha coefficient for each of the variables measure exceed the acceptable threshold of 0.7, thus indicating internal consistency of the instrument (Table 1).

Table 1: Questionnaire Reliability Coefficients

Variables	No. of Items	Cronbach's Alpha Coefficients
Performance expectancy	3	.771
Effort expectancy	3	.713
Social influence	3	.822
Facilitating conditions	3	.887
Adoption of service robots	3	.750
	15	

RESULTS

Demographic Characteristics

The data shows that out of the 241 respondents surveyed, majority of them (92 or 38.2 percent) were between the ages of 32-38 years. With respect to respondents' gender, the data shows that majority of the respondents surveyed (132 or 54.8 percent) were female. Regarding respondents' marital status, the data shows that majority of the respondents surveyed (119 or 49.4 percent) were married. And with regards to respondents' highest educational qualifications, the data shows that majority of the surveyed respondents (148 or 61.4 percent) were holdersof First University Degree.

Table 2: Summary of Respondents' Demographic Characteristics

Age	Frequency	Percent
18-24 years	33	13.7
25-31 years	35	14.5
32-38 years	92	38.2
39-45 years	30	12.4
46 years or above	51	21.2
Total	241	100.0
Gender		
Male	109	45.2
Female	132	54.8
Total	241	100.0
Marital status		
Single	105	43.6
Married	119	49.4

Age	Frequency	Percent
Divorced	17	7.1
Total	241	100.0
Highest Educational Qualifications		
FSLC	35	14.5
SSCE	32	13.3
First University Degree	148	61.4
Post-graduate Degree	26	10.8
Total	241	100.0

Source: Authors' analysis via SPSS 2023.

Hypotheses Testing

Multiple regression analysis technique was used to test the hypotheses formulated in this study.

The model summary for the regression run produced an R^2 value of 0.235, thus suggesting that only 23.5 percent of the variation in adoption can be explained by the independent variables examined in this study. However, the model-data fit indices ($F_{4,237}$ = 4.324, P< 0.001) suggest that the independent variables satisfactorily predict the dependent variable.

To determine the veracity or otherwise of the predicted relationships, the standardized values of the regression weight for each predictor variable was inspected (Table 3). The result shows that performance expectancy (β = 0.554, p = 0.001), effort expectancy (β = 0.434, p = 0.000), social influence (β = 0.272, p = 0.001), and facilitating conditions (β = 0.712, p = 0.000) had positive significant effects on adoption of service robots in Nigerian airports. Thus, all our hypothses were supported.

Table 3: Results of Multiple Regression Analysis

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	-.216	.127		11.701	.000		
	Performance expectancy	.230	.066	.554	3.486	.001	.354	2.827
	Effort expectancy	.259	.069	.434	3.734	.000	.537	1.864
	Social influence	1.105	.080	.272	8.778	.000	.173	2.787
	Facilitating conditions	.016	.061	.712	5.259	.006	.318	3.149

Discussion of Findings

From the test of hypothesis one, it was revealed that performance expectancy has a significant positive effect on the adoption of service robots in Nigerian airports. This finding is corroborated by the study of Gupta et al. (2019), which revealed that performance expectancy had a significant influence on Indian customers' decision to adopt digital payment systems. The finding is also reinforced by the study of Hu et al. (2020), which confirmed that performance expectancy had a significant positive influence on academics' behavioural intention and use of mobile technologies in China. In the context of this study, the implication of this finding is that the probability of adopting service robots in Nigerian airports is contingent on the perceived extent of effectiveness and efficiency of the system in terms of facilitating airport operations. This entails that service robots have a better chance of being accepted and adopted in Nigerian airports if they are perceived to possess the capacity to improve the performance of airport operations such as passenger screening, baggage handling, flight scheduling, among others.

The test of hypothesis two also revealed that effort expectancy has a significant positive effect on the adoption of service robots in Nigerian airports. This finding is reinforced by the study of Gupta et al. (2019), which revealed that effort expectancy had a significant influence on Indian customers' decision to adopt digital payment systems. It is also backed by the study of Hoque and Sorwar (2017), which revealed that effort expectancy had a significant impact on the users' behavioral intention to adopt mHealth services in Bangladesh. The implication of this finding, in the context of this study, is that the probability of adopting service robots in Nigerian airports is contingent on the perceived level of effort required to operate the technology for efficient airport operations. This entails that if airport officials perceive that minimum effort would be required to acquire, install and maintain service robots in Nigerian airports, then these technologies will be accepted and adopted as well.

From the test of hypothesis three, the findings revealed that social influence has a significant positive effect on the adoption of service robots in Nigerian airports. This finding closely aligns with the study of Hu et al. (2020), which confirmed that social influence had a significant positive influence on academics' behavioural intention and use of mobile technologies in China. The finding is also reinforced by the study of Kabra et al. (2023), which revealed that social influence had a significant positive effect on the adoption of cloud computing services by Indian students. In the context of this study, the implication of this finding is that the probability of adopting service robots in Nigerian airports is greatly contingent on social pressure from international regulatory organizations, airline passengers, airlines themselves and civil society groups. This entails that if sustained social pressure is mounted on Nigerian airport authorities to realize the immense potential of service robots, then overtime, there is a likelihood for these technologies to be introduced to Nigerian airports.

Finally, from the test of hypothesis four, the findings revealed that facilitating conditions have a significant positive effect on the adoption of service robots in Nigerian airports. This finding is reinforced by the study of Odeyemi (2019), which confirmed that the adoption of robots in Nigerian academic libraries is significantly affected by facilitating conditions (unreliable power supply, inadequate technology infrastructure, and absence of technical skills). The finding is also reinforced by the study of Gupta et al. (2019), which revealed that facilitating conditions had a significant influence on Indian customers' decision to adopt digital payment systems. In the context of this study, this finding implies that the probability of adopting service robots in Nigerian airports is greatly contingent on the level of facilitating conditions available. This entails that if there is adequate availability of facilitating conditions (such as internet connectivity, power supply and maintenance infrastructure), then the possibilities of service robots being adopted in Nigerian airports will be greatly accelerated. Hence, facilitating conditions can be considered to be critical foundations upon which the adoption of service robots in Nigerian airports is based.

CONCLUSION AND PRACTICAL IMPLICATIONS

As observed in the outset of the study, service robots are phenomenal innovative technologies redefining and reinforcing the effectiveness and efficiency of human operations in several sectors of the global society. From banking to transportation, medicine, telecommunications and manufacturing, robotic systems powered by artificial intelligence are playing substantial roles in bolstering productivity while minimizing possible human inefficiency. However, it was observed that unlike their counterparts in developed climes like Asia, Europe and the Americas, Nigerian airports were acutely deficient of service robots, which potentially undermines their operational efficiency. This is because the absence of sufficient modern service robots has compelled Nigerian airports to rely on human effort to carry out a series of airport operations, particularly related to customer service. This has often resulted in costly human errors that spawned incidents of customer dissatisfaction and displeasure. This study was therefore initiated to determine the major factors possibly preventing the adoption of service robots in Nigerian airports under the UTAUT theoretical framework. In that effort, the study explored how performance expectancy, effort expectancy, social influence and facilitating conditions influenced the adoption of service robots in three major airports in South-South Nigeria – Margaret Ekpo International Airport, Calabar; Victor Attah International Airport, Uyo and Port Harcourt International Airport, Port Harcourt. Through a structured questionnaire survey, primary data were obtained from staff of the aforementioned airports. With the aid of descriptive and inferential statistics, the data obtained along with the hypotheses developed were analyzed, tested and interpreted accordingly. Consequently, the findings of the study revealed that UTAUT dimensions (performance expectancy, effort expectancy, social influence and facilitating conditions) had significant positive effects on the adoption of service robots in Nigerian airports. This implies that the assumptions of the UTAUT framework hold sway in the context of Nigerian airports because its dimensions constitute the major factors affecting the adoption of service robots for airport operations. From the empirical evidence generated by the study findings, it has been concluded that UTAUT dimensions have significant positive effects on the adoption of service robots in Nigerian airports.

Guided by the findings of the study, the following recommendations are suggested for possible implementation:

- Marketers of aviation service robots should consistently promote the unique benefits and performance expectations of their products to Nigerian airport authorities in order to demonstrate the potential capacity of these technologies to improve airport operations and productivity. By deliberately promoting what service robots are capable of doing in airports, in terms of facilitating efficient operations, the likelihood for them to be adopted in Nigerian airports can be improved.
- Manufacturers of aviation service robots should ensure that their technological systems are user-friendly and require minimum technical expertise to install, maintain, use and replace in order to make them more desirable by airport authorities for adoption. Marketers should also demonstrate the ease of use of their technologies through exhibitions, trade fairs, personal or virtual demonstrations in order to assure potential users like Nigerian airport authorities that minimum human effort and costs will be required to adopt the systems for airport operations.

- There is need for sustained social pressure to be mounted on Nigerian airport authorities and other relevant organizations by passengers, employees, and regulatory bodies to encourage the full-scale adoption of service robots in airports in order to improve operational efficiency and improved passenger service.
- It is also critical for the Nigerian Government and airport authorities to ensure the adequate availability of relevant human and technological resources (such as internet connectivity, power supply and maintenance infrastructure) required to facilitate the full-scale adoption of service robots. This is because it is improbable for service robots to be integrated into Nigerian airports to function optimally without the corresponding supporting infrastructure available. Hence, the appropriate facilitating human and technological infrastructure should first of all be established before adopting service robots in Nigerian airports.

LIMITATIONS AND FUTURE STUDIES

This study was restricted to few airports in South-Southern Nigeria due to logistical and funding constraints. Its findings therefore may not be wholly representative of the realities in the Nigerian civil aviation industry as a whole. Similarly, the study was constrained to UTAUT factors, namely: performance expectancy, effort expectancy, social influence and facilitating conditions. Its findings are therefore limited to the UTAUT framework. There is therefore need for future studies to holistically capture the Nigerian civil aviation industry by expanding the scope of investigation to airports in the six geopolitical zones of the country. This will result in studies with larger samples, which are more likely to generate more representative and generalizable findings. Future researchers should also use other theoretical frameworks such as PESTLE, and TAM to explore the adoption of service robots in Nigerian airports to contribute to existing literature on the subject. It is also imperative for future research to demonstrate the potential influence of the adoption of service robots on operations efficiency in Nigerian airports in order to provide more compelling empirical evidence to encourage the adoption of the technology in Nigerian airports.

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