Exploring the Application of Artificial Intelligence (AI) in the Operations of Tourist Accommodation (Hotel) Outlets in Abuja, Nigeria in the Post-COVID-19 Era

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Abstract : Artificial Intelligence (AI) tools have improved the operations of multiple tourism sectors, including tourist accommodation outlets (e.g., hotels), attractions, transportation, travel agencies, food and beverages in the post-COVID-19 era. Nonetheless, it does not seem that there is evidence of any study investigating the application of AI in the hotel sector of the tourism industry in a developing destination like Nigeria in the post-COVID-19 era. This article employs a semi-structured/In-depth interview technique to explore the perspectives of tourist accommodation stakeholders including 12 hotel managers, 3 tourism industry sector consultants and 2 academics in selected wards (City Centre, Garki, Wuse, Gwarimpa) of the Abuja Municipal Area Council (AMAC) of Nigeria on the use of AI to improve their operations in the post-COVID 19 era. Data derived were descriptively analysed based on themes on the uses of AI to enhance hotel business efficiency. The research revealed the efficiency of AI tools in the selected AMAC hotels and the hindrances to their uses, including financial constraints in some of the facilities at the study sites. The article has implications for suggesting efficient measures for adopting AI technologies such as facial recognition, and mobile app/card entry in similar and other sectors of Nigeria's tourism industry.

Keywords: Artificial Intelligence, Tourism, Hotels, Innovation, Efficient service delivery, Post COVID-19 era.

1. Introduction

The tourism industry is multisectoral. It comprises transportation, accommodation, food and beverage, travel agencies, and attractions in tourist-generating and destination regions. Recent literature (Adekuajo et al. 2023; Ku and Chen, 2024) suggests that these sectors leverage technological innovation, including Artificial Intelligence (AI) tools in providing efficient complementary services to a wide range of stakeholders, chief among which are customers (tourists, visitors & locals) in the tourism value chain. The accommodation sector is undoubtedly the largest subsector in the tourism industry (Pappas and Glyptou, 2023). The accommodation sector managers, especially in developing destinations recovering from crises and similar threats including the post-COVID-19 economic crises, can adapt and deploy Artificial Intelligence (AI) to enhance efficient service delivery (Francis, 2023).

Technology innovations, including mobile booking, check-in, payment and in-room service are now common with diverse categories of customers, including tourists and other people who may require such services (Francis, 2023). Undoubtedly, these innovations are transforming the traditional front desk, including other services in the accommodation sectors (e.g., hotels, motels, bed & breakfast outlets) as customers/guests get services they usually request at the front desks through technological mediums. This transformation can be described as a service innovation, which refers to devising new or improved service concepts that satisfy customers' unmet needs (Francis, 2023; Tuomi, 2021; Pappas et al. 2021; Cheng et al. 2021), using technological innovations.

Artificial Intelligence has been deployed for facial recognition and temperature checks in developed and developing destinations, accommodation facilities and other public places without physical contact. These technological innovations were developed by hardware companies, occasioned by the COVID-

19 social restrictions (Sunnihitha and Priyanka, 2022; Khanam et al. 2021; Lynch et al. 2020). Artificial intelligence digital tools facilitate high efficiency in the check-in and check-out visitors' experiences and have aided accommodation guests' access to their rooms and other venues within the service facilities using facial recognition software. In addition to facilitating efficient service delivery, it can help to reduce the risk of crimes against guests and service providers at hotel accommodation facilities (Ambassador-Brikins et al. 2024).

AI can be regarded as a technological innovation tool. Technological innovation according to Tidd and Bessant (2020) can be described as the combination, integration and interaction of different technologies that make the product or service delivery efficient. This is evident in Lau's (2020) study which suggests that during the COVID-19 pandemic, many accommodation outlets (e.g. hotels) invested in technology to enable guests to access their rooms using digital key devices. This innovation does not require face-to-face interaction with front desk officers, except, perhaps, when there is a malfunction, and where there is no automated mechanism to guide guests.

Extant studies (Steyn and Hasnat, 2020; Mariani and Borghi, 2021; Lukanova and Ilieva, 2019) reveal that the automated device known as robot butler is popular among hotel guests and their service providers and helps to reduce face-to-face interactions with front desk officers. In addition, the device has facilitated revenue generation as it is used to deliver items including coffee within the lobby of a café for a fee (Francis, 2023). Also, Artificial Intelligence (AI) as a tool viable digital technology tool has been employed by some hotels to improve service quality during the pandemic (Yang et al. 2020; Jiang and Wen, 2020; Marković et al. 2020).

2. Technological Determinism Theory and CCTV Adoption in the Accommodation Sectors of Nigeria's Tourism Industry

German philosopher and economist, Karl Max is credited with the first major elaboration of a technological determinist view of socioeconomic development.

He contended that changes in technology are the primary influence on human social relations and organisational structure and that social relations and cultural practices ultimately revolve around a given society's technological and economic base (Croteau and Hoynes, 2003). The term ''technological determinism'' was coined by Thorstein Veblen and the theory was further refined by Marshal McLuhan in 1964 (Asemah et al. 2017; Communication Theory, 2016). The theory states that media technology shapes how members of society think, feel and act, and how society operates as it moves from one technological stage to another (Communications Capstone, 2001). Technology defines society's nature; it is its driving force, and it defines its history; technology can drive human interaction and create social change (Asemah et al. 2017; Communication Theory, 2016) in services industries such as tourism sectors (Majebi, 2018). Explaining the theory from the ontological assumptions, Communication Capstone (2001) shows that individuals have little or no free will as they have to deploy the media used by society to meet their own communication needs (Adelakun, 2018). Technological determinism manifests itself in various ways, starting with the introduction of newer technologies that introduce new ways of doing things (Communication Theory, 2016). The invention of language; discovery of various metals (e.g., iron, bronze, copper, etc.); introduction of double entry book-keeping; the internet, and the emergence of general Artificial Intelligence are some examples of the demonstration of technological determinism offered by Singh (2023). Asemah et al. (2017) note that the theory focuses on the effects of technology on society. The deployment of artificial intelligence for efficient operations is becoming common in tourism businesses, including hotels, as it enhances efficient service delivery and customer satisfaction (Ku and Chen, 2024; Francis, 2023; Tuomi, 2021; Cheng et al. 2021).

3. Study Context

Abuja, Nigeria

Nigeria is an example of a destination in sub-Saharan Africa with a diverse range of tourist accommodation, including luxury, mid and small accommodation outlets for a wide range of visitors and locals at its major cities, including Abuja, Lagos, Port Harcourt, Enugu, amongst several others. According to the PWC's (2024) Hospitality Outlook for 2019-2023, Nigeria's overall hotel room accommodation revenue among other African destinations rose 7.4% in 2018, up from the 1.9% increase in 2019, representing a 7.2 %-point improvement in the country. Also, the PWC's (2024) report shows that Nigeria has the fastest-growing market increase of 20% in 2018, compared with other African destinations such as Kenya (14.6%) and Mauritius (11.7%) with the same Year. Abuja, Nigeria's federal capital in the country's North Central Zone is undoubtedly a beneficiary of this growth. The city of Abuja has the potential to attract diverse domestic and international tourists and other visitors from across the country and the globe, despite its experience of decline in

tourism activities which affected the global tourism sectors during the COVID-19 era. This is due to the availability of basic social infrastructure, major tourist attractions, fewer incidents of crisis and associated threats and manageability, comparable high level of safety and security and the availability of high and medium-class hotel accommodation facilities (Majebi, 2020; Majebi, 2021; Majebi, 2023; Majebi & Agbebaku, 2024). Some of the major hotel chains in the Abuja metropolitan areas of Maitama, Wuse, and Garki among others include the Transcorp Hilton, Continental, Frasers Suites, Johnwood, Nicon Luxury, etc. An evaluation of the extent of the application of digital innovation/technology technologies including mobile booking, check-in, payment and in-room service, digital key, facial recognition and CCTV in the Abuja accommodation sector for efficient customer service and operations in the post-covid era would no doubt contribute to empirical literature and practice of hotel management in the study site context and similar developing destinations.

Abuja is the country's administrative and political capital. It has an estimated population of over 3,464,000 people. Because of its centrality, the city experiences two climatic conditions. The first is the dry season, which commences in November and ends in April, and the second is the rainy season, which starts in May and ends in October every year. The maximum temperature in the city is usually between 34.0°F-97.0°F (1.1°C-36.1°C), depending on the elevation. The mean annual rainfall ranges between 1,145.55mm (5.79 inches) and 1,631.7mm (4.24 inches) and the time zone is GMT +1. It is a city in the scenic valley of rolling grassland in an arid savannah region, with low hills, mountains, transverse shallow valleys, deep green vegetation, and pleasant weather (Britannica, 2021).

4. Theoretical Framework

The theoretical framework adopted for this study is the technological determinism theory (see the preceding section) (Croteau and Hoynes, 2003). It is appropriate for the character of this study's research problem, the set objectives, and the questions that guided the field study. This is, given that the entire investigation is based on deploying a modern technological product (AI) including mobile booking, check-in, payment and in-room service to enhance efficient service delivery in hotel accommodation and customer satisfaction in the post-covid 19 era. Although other studies (Azam et al. 2020; Dafoe, 2015; De la Cruz Paragas and Lin, 2016; Ambassador-Brikins, et al. 2023) adopted the theory for their research, this study seems to be the first to adopt the theory in the context of the deployment of AI in the accommodation sector of the Abuja tourism in Nigeria for efficient operations in the post-covid 19 era. Thus, this research sought to provide answers on the extent to which Abuja's accommodation sector (hotel) stakeholders employ AI tools such as mobile booking/app, unmanned check-in, payment and in-room service, and digital key to enhance efficient service delivery and customer services in the post Covid-19 era.

5. Research Methodology

This research sought to provide answers on the extent to which Abuja's accommodation sector (hotel) stakeholders employ AI tools such as mobile booking apps, unmanned check-in, payment and in-room service, and digital keys to enhance efficient service delivery and customer services in the post-Covid-19 era. This includes identifying any challenges being experienced in the deployment of AI technologies in hotel operations and possible recommendations for its deployment. The qualitative method was adopted to meet these research objectives and provide answers to the research questions. In line with Donnelly et al.'s (2013) study which suggests that sample selection for qualitative research is not calculated using mathematical stipulations and probability statistics, 20 hotel organisations, 2 academics, and 3 industry consultants were selected for the study using a snowballing technique.

Again, heeding the counsel of Donnelly et al. (2013) to qualitative researchers to describe their sample in terms of characteristics and relevance to the wider population, the selection of the organisations was based on their relevance to the research and the role they play in the society as agents of the law, tourism and hospitality industry regulators and operators of hotels, which form the subject of the study.

The selected hotel organisations were bifurcated into two categories, 10 medium and 10 large-scale hotels and the 2 academics, 3 industry consultants and 2 academics were recruited from the study destination. Letters of introduction were delivered to the representatives of the 20 key hotels in 4 major areas in Abuja (City centre, Garki, Wuse, and Gwarimpa) and the 2 academics and 3 industry stakeholders, and follow-up contacts were made through telephone calls and personal visits. Appointments were secured with the hotels that exhibited interest in and support for the study, and face-to-face in-depth interviews were conducted with their representatives. Even though 20 hotel organisations were selected for the study in the location, 12 hotel organisations, comprising 7 medium and 5 large-scale hotels, and the 2 academics and 3 industry consultants supported and participated in the study. Representatives of these hotel organisations, academics and industry consultants served as key informants and respondents to in-depth interviews. Two interview guides served as research instruments for the two categories of respondents (i.e., hotel operators and academics/industry consultants/regulatory authorities). Audio recording of the interviews was carried out for those who found such comfortable. However, some key informants were more comfortable with documentation.

To ensure validity, a member check was carried out as suggested by Donnelly et al. (2013) and Ningi (2022); recorded interviews were played to the hearing of the key informants who were recorded while the written responses were read out to those who declined to have their responses recorded on tape. As observed by Mihas (2023), there is no single strategy agreed upon for determining themes, but researchers might create clusters of seemingly related

codes and then name the conceptual glue that holds them together. Responses were thereupon transcribed and categorised into themes, based on the research objectives. Data are presented non-numerically, as narrations and direct quotations used to substantiate the thematic categories. Braun and Clarke's thematic analysis method formed the basis for the analysis and interpretation of data.

6. Results and Discussion of Findings

Data for this study is purely primary. Twenty hotel organisations were selected purposively for the research, but 12 willingly supported the study and took part in it. The selected hotels were placed in two categories: medium—and large-scale hotels. Other research participants included two academics and three industry consultants. Thus, there were 17 research participants for the interview sessions for the study (See Table 1). An interview guide designed based on the technology determinism theory (Croteau and Hoynes, 200) was adapted for the interview session.

Table 1. Profile of the study sites and research participants

Category	City Centre -Wuse		Garki		Gwarimpa	
	Code	Position	Code	Position	Code	Position
Small scale hotel	SCHC1	Facility Manager	SCHGA1	Human Resources Manager	SCHG1	Human Resources Manager
	SCHC2	Manager	SCHGA2	Facility Manager	SCHG2	Facility Manager
Large scale hotel	LCHC1	Facility Manager	LCHGA1	General Manager	LCHG1	General Manager
	LCHC2	General Manager	LCHGA2	General Manager	LCHG2	General Manager
Academics	A1					
	A2					
Industry Consultant	IC1					
	IC2					
	IC3					
Total Research Participants 17						

Note. A- Academics; C-City; G-Gwarimpa; GA-Garki; H- Hotel; I- Industry; LC-Large-Scale; SC-Small-Scale. Source: Authors' (Field interview, 2024).

Use of AI tools by the Abuja accommodation sector (hotel) managers for efficient operations and customer services.

All 12 key research participants who were the representatives of their hotels in the city centre, Gwarimpa, and Wuse affirmed the importance of the use of artificial intelligence technologies including mobile booking/app, check-in, payment and in-room service, and digital key to enhance efficient service delivery and customer services in hotels. However, only 5 representatives from large-scale hotels within the city centre and Wuse districts noted that they

employ all these technologies, including facial recognition devices, and mobile apps in the operations of their hotels. For example, the facility manager (LCHC1) of a large-scale hotel with 104 rooms in the city centre said;

> *"We try to deploy some AI tools to ease our operations in this hotel, including face recognition, mobile booking, unmanned check-in, payment and in-room service, and digital key, following our experience with the COVID-19 pandemic. (LCHC1, personal communication, August 2024).*

Similarly, the general manager (LCHGA1) in the hotel within the Wuse district in Abuja said;

> *"We are now beginning to introduce some AI technological tools such as full body scanners, mobile/e-booking app, answering machines, and room card keys to reduce physical interactions with our guests and for efficient service delivery" (LCHGA1, personal communication, August 2024).*

LCHC1 and LCHGA1's opinions on the use of AI were consistent with those of other large-scale hotels (LCHC2, LCHGA2, LCHG2) in the city-centre Wuse, Garki, and Gwarimpa areas of Abuja. They stated that they have adopted AI to enhance their operations and quality customer service delivery following their experience with the COVID-19 pandemic which affected the global tourism industry.

Challenges to deploying AI technologies to enhance efficient operations in accommodation outlets in Abuja.

Although the hotel managers in luxury hotels at Maitama and Wuse at the study destination confirmed the use of AI tools in enhancing their operations and customer satisfaction, interactions with the research participants from Garki and Gwarimpa reveal that although they know the importance of deploying AI tools for their daily operations, they cannot deploy such tools because of the current economic situation in the country. For example, the human resources manager of a 65-room hotel in Garki says:

> *"AI tools, including facial recognition and mobile apps for unmanned room entry/services, can aid efficient service delivery in our hotels, no doubt, but they are expensive to implement in the face of economic challenges occasioned by high exchange rates. Nonetheless, we shall deploy these tools as soon as our revenues improve (SCHC1, personal communication, August 2024).*

In the same vein, the human resources manager (SCHGA1) of a medium-scale hotel in Abuja said:

> *"The importance of AI tools including mobile apps to aid seamless entry of guests to their assigned rooms, facial recognition, and even crime prevention in hotels like ours' cannot be overemphasized. Nevertheless, we are still on the verge of full implementation of AI as patronage is very low in this current economic crisis".*

The statements of SCHC1 and SCHGA1 are similar to those of another research participant (SCHC2; SCHGA2; SCHG2 in the study areas who affirmed the importance of AI technologies such as facial recogni-tion scanners, and mobile app/keyless entry devices but cannot adapt the technologies to their operations due to financial constraints in the current post COVID-19 period.

Encouraging the deployment of AI tools to enhance efficiency in the midscale accommodation sector of the Abuja tourism industry

Interestingly, the findings of this study show that the tourist accommodation sector outlets (hotels) in the upper-class areas of the city centre and Wuse adopted some AI tools to enhance the operations of their services compared to some hotels in the Garki and Gwarimpa districts. Nonetheless, findings from these hotel representatives reveal that they would deploy AI tools to enhance the efficiency of their operations when their revenues improve. This shows the relevance of the technology determinism theory, which revolves around the notion that deploying technology (e.g., AI tools) can aid human social relations and organisational efficiency (Asemah et al., 2017; Communications Capstone, 2001; Communication Theory, 2016). Artificial intelligence in contemporary times facilitates the operations of tourist accommodation outlets (hotels), the largest subsector in the tourism industry. It can help deliver efficient customer service when incorporated into the lodging quality service index factors (Bello and Majebi, 2018) and facilitate competitive advantage (Majebi, 2013). It can also enhance revenue generation for the non-oil sector, including hospitality and tourism businesses of the destination(s) economy (Ajudua et al., 2021; Ajudua et al., 2022). Moreover, Academics (A1 & A2) and tourism/hospitality consultants (IC1, IC2, IC3) affirmed that Artificial Intelligence in contemporary times facilitates the operations of tourist accommodation outlets (ho-tels), the largest subsector in the tourism industry. It can help deliver efficient customer service when incorporated into the lodging quality service index factors (Bello and Majebi, 2018) and facilitate competi-tive advantage (Majebi, 2013). It can also enhance revenue generation for the non-oil sector, including hospitality and tourism businesses of the destination(s) economy (Ajudua et al., 2021; Ajudua et al., 2022).

7. Conclusion and Recommendations

The study revealed the significance of deploying artificial intelligence tools, including facial recognition scanners, mobile booking apps, and unmanned check-in, among other tools in enhancing the operations of the tourist

accommodation outlets (hotels) of the tourism industry in Abuja, Nigeria. The research revealed that while large-scale hotel operators in the city centre areas of the study sites adapted artificial intelligence tools for their operations, those within the medium-scale hotel categories cannot currently apply their uses due to inadequate revenue. Consequently, the findings of this research have implications for the use of artificial intelligence tools for efficient operations in tourist accommodation outlets where they are not being used to aid efficient service delivery. To facilitate this, tax rebates may be approved by relevant authorities of Abuja and similar destinations for medium-scale hotels to enable them to use some of their financial resources to introduce artificial intelligence tools in their operations. This can enhance efficient operations in the tourist accommodation outlets and other services-based sectors of the Abuja tourism industry and similar destinations.

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