

Article

Artificial Intelligence and Robots in the Nigerian Hospitality Sector: Factors to Consider Before Adoption

Chiedozie Cyprain Nweke¹, Ali Dhakir Abbas², Chigozie Jude Odum³

¹⁻² Lincoln University College, Malaysia; ³ Department of Tourism Studies, University of Nigeria, Nsukka

Correspondence: **Chigozie Jude Odum**, jude.odum@unn.edu.ng; ORCID: 0000-0001-6018-7063

Abstract

The adoption of artificial intelligence (AI) and robots in the hospitality industry has improved efficiency, personalisation, and 24/7 service in developed economies, yet scholarship on their applicability in emerging African economies remains limited. This preliminary study identifies factors that Nigerian hospitality stakeholders should consider before adopting AI and robots. A documentary, narrative literature review of peer-reviewed journal articles, government reports, and credible industry publications published between 2017 and 2024 was conducted using Google Search and Google Scholar, accessed through Google Chrome and Mozilla Firefox browsers in May 2024. Relevant studies from Nigeria, Ghana, India, and developed economies were thematically synthesised. Five interrelated factors emerged: (a) economic viability and total cost of ownership; (b) labour implications, staff support, and retraining needs; (c) operational resilience and infrastructural readiness; (d) customer and cultural acceptance of high-tech versus high-touch service; and (e) marketing and service personalisation potential. High acquisition, installation, maintenance, and training costs, exchange-rate pressures, fear of job loss, and uneven digital literacy are major constraints, while seasonal hiring and complementary deployment offer pragmatic pathways. Phased, complementary adoption supported by government, the Nigerian Tourism Development Corporation, and the National Institute for Hospitality and Tourism, alongside empirical guest and staff studies, is recommended before large-scale deployment.

Keywords: Artificial Intelligence, Service robots, Hospitality industry, Labour, Nigeria

Introduction

The Fourth Industrial Revolution seeks to shift service production from human labour to intelligent machines, including AI-enabled systems and robots. In hospitality, this shift is changing service delivery from human-to-human interaction to human-to-AI-mediated interaction, a pattern already common in developed economies (Hodibert et al., 2024). Large hospitality groups favour AI and robots for reduced labour costs, speed, service automation, rapid analysis of guest enquiries (Belanche et al., 2019; Sousa et al., 2024), and personalised, memorable guest experiences (Li et al., 2019).

Robots, AI, and service automation (RAISA) are increasingly described as the new operational reality rather than science fiction (Ferreira et al., 2017). AI and robots are now applied in education, engineering, transportation, and poverty-reduction initiatives (Hodibert et al., 2024; Ogunleye, 2021), with growing relevance for hospitality in emerging economies such as India and Ghana (Hodibert et al., 2024; Mithichar & Gunajit, 2024).

Technological benefits and risks are unevenly distributed across countries (UNESCO, 2021). AI and robotics advances in developed economies shape the technological imaginaries of emerging economies, where the knowledge divide remains wide (Hodibert et al., 2024). In Nigeria, AI adoption is still at an infancy stage despite growing business interest in AI solutions (Ogunleye, 2021), and Nigeria ranks low on AI readiness. Since hotels sell

experiences and technology is not static, experts anticipate that interaction with AI and robots will become standard by 2030 (Ojoye & Ihua-Maduenyi, 2019), as already seen in the United States and Japan, including Japan's Henn-na Hotel staffed largely by robots (Samala et al., 2022).

There is therefore a need to understand the potential roles, benefits, and risks of AI and robots for hospitality in Nigeria. Literature on the topic in Nigeria is scarce, partly reflecting the newness of AI in tourism scholarship (Sousa et al., 2024). This study asks: What factors should Nigerian hospitality stakeholders consider before adopting AI and robots?

The Hospitality Industry in Nigeria

The Nigerian hospitality industry is a major employer of skilled and unskilled labour across hotel management, housekeeping, food and beverage service, front-office operations, and event planning, contributing meaningfully to economic development (Adeyinka, 2024). Historical estimates recorded contributions of N680.1 million in 1980, N492.4 million in 1984, N477.9 million in 1990, N591.9 million in 2000, N1,950.0 million in 2004, and N2,390.0 million in 2006 (Central Bank of Nigeria, 2013, 2016, as cited in Onyeonoro et al., 2023). More recently, hospitality contributed about 4.8% to national output and employed about 1.6% of Nigerians in 2016 (Kushal, 2017, as cited in Omodero, 2019), and it remains among the largest job creators, employing women and youth in particular.

If AI and robots are widely adopted, many hotel workers could be displaced, increasing unemployment (Smith & Anderson, 2014, as cited in Li et al., 2019). This risk is acute for Nigeria, where the unemployment rate rose to 5.0% in the third quarter of 2023 from 4.2% in the previous quarter (National Bureau of Statistics, 2023; Aina & Olufemi, 2024). The sector was also severely affected by COVID-19 lockdowns, after which digital technologies expanded rapidly in hotel operations and management (Odum, 2022). Understanding the preconditions for responsible adoption is therefore urgent.

Method

This study adopted a documentary approach with a narrative literature review. This design was appropriate for three reasons. First, AI and robot applications in Nigeria are nascent and dedicated empirical literature is limited, so lessons must initially be drawn from related contexts, especially other emerging economies. Documentary sources can indicate where and how to pose questions for future inquiry (Glenn, 2009). Second, secondary data collection is rapid and feasible where time and primary-access constraints exist (Ajayi, 2023; Kalu et al., 2018), and where practitioner familiarity with AI is low. Similar documentary approaches have been used to examine virtual reality in Nigeria's tourism industry (Odum & Ukekwe, 2020). Third, narrative review allows broad thematic synthesis and interpretation across a dispersed literature (Cheung, 2025).

Searches were conducted in May 2024 using Google Search and Google Scholar, accessed through the Google Chrome and Mozilla Firefox browsers. Search terms included "artificial intelligence and robots in Nigeria hospitality sector" and variants with "PDF" to retrieve full-text credible sources. Searches returned limited Nigeria-specific records, consistent with prior observations of scarce scholarship on AI and robot adoption in hospitality (Hodibert et al., 2024; Ivanov & Webster, 2017). Records were screened for relevance to hospitality, AI/robots, and emerging economies, prioritising peer-reviewed articles, government

publications on AI in Africa and Nigeria, and credible industry reports. Included sources, including studies from Ghana and India and foundational RAISA studies, were coded thematically around costs, labour, operations, customers, and marketing. This is a preliminary, non-systematic review; no meta-analysis was performed, and findings should be validated empirically.

Literature Review

Artificial Intelligence

AI refers to technologies that emulate human intelligence in problem solving (Lai & Hung, 2018, as cited in Bulchand-Gidumal, 2020) and to machine-based systems that, given human-defined objectives, generate predictions, recommendations, or decisions influencing real or virtual environments (Ogunleye, 2021). In this sense, AI involves understanding human intelligence and creating artefacts capable of performing tasks otherwise performed by humans (Mithichar & Gunajit, 2024, p. 111).

In hospitality, AI supports efficiency and competitiveness through computation and analysis of large datasets, enhancing guest experience and personalisation (Kşeoğlu et al., 2019; Yadav et al., 2021). Applications include customer-service delivery robots, technology-assisted check-in and check-out, chatbots for direct guest communication and mobile room service, virtual and augmented reality for hotel presentation, virtual tours and booking interfaces, and large-database analytics for guest-preference profiling (Mithichar & Gunajit, 2024). AI can activate and coordinate robots to initiate and complete tasks. AI chatbots and smart concierge robots have been developed to support guests and improve hotel experiences (Ivanov & Webster, 2017, as cited in Li et al., 2019).

Robots and Service Automation

Although “robot” is widely used, there is no single precise definition (Ben-Ari & Mondada, 2018). The term is credited to Czech playwright Karel Čapek’s *Rossum’s Universal Robots*, deriving from the Czech *robota*, meaning forced labour. A robot resembles a machine with human-like features in some forms (Delbridge, 1991), while the Robot Institute of America defines it as “a reprogrammable multifunctional manipulator designed to move material, parts, tools, or specialized devices, through variable programmed motions for the performance of a variety of tasks” (Gibbons, 1982). Robots perform specified assignments across settings and include industrial, service, medical, humanoid, educational, and entertainment types (Yasar & Hanna, 2024), often exceeding human capacity for difficult, repetitive tasks (Nikolova et al., 2022).

In hospitality, service robots provide information, suggestions, delivery, and entertainment for adults and children (Ivanov et al., 2017). Examples include robotic receptionists, suitcase handlers, room assistants, vacuum-cleaning robots, and delivery robots. Robots may incorporate AI and speech recognition, offering speed, cost-effectiveness, and accuracy (Martijn, 2024). Chatbots can respond continuously, 24 hours per day, seven days per week, supporting staff during peak demand, breaks, or staff shortages, and enabling personalised stays (Social Tables, 2024). For example, media coverage in 2023 of a Nigerian guest excited to receive food from a robot (Basit, 2023) suggests openness among some Nigerians, even as employment concerns persist.

Demonstration cases include Japan’s Henn-na Hotel in Nagasaki, the first hotel to use robots extensively for information, front-desk, storage, check-in, check-out, voice, and facial-recognition services, and IBM’s robot Connie, which interacts with visitors through speech recognition and improves with use (Martijn, 2024). Japan has invested heavily in robotics, controlling a large share of robot production, with projections that millions of jobs could be affected by 2025 (Alli, 2017). Globally, the robot market is expected to grow substantially, with estimates of USD 341.91 million growth between 2022 and 2027 at a compound annual growth rate of 12.13% (Young, 2024). Robots offer continuous availability, personalisation, and enhanced guest experience (Young, 2024), but evidence also links automation to job loss (Lee, 2017; Smith & Anderson, 2014). Table 1 summarises common hospitality applications.

Table 1
AI-Enabled Robots and Related Technologies in the Hospitality Industry

Type of technology	Hospitality function
Robot-staffed hotel operations	Automated guest services for efficiency
Robotic concierges	Guest interaction and information provision
Autonomous suitcases / luggage robots	Luggage handling and storage
Robotic bartenders and chef robots	Drink service and meal-preparation automation
Cleaning robots	Housekeeping efficiency
AI chatbots and receptionist robots	24/7 customer assistance, check-in and queries
Delivery robots	Room-service streamlining

Note. Compiled from Martijn (2024).

With falling costs, greater speed, and low error rates, AI and robots are likely to become more attractive to hospitality firms seeking to reduce labour costs (Li et al., 2019). Yet AI and robotics have permeated health, education, engineering, transport, finance, tourism, and hospitality in both developed and emerging economies (Hodibert et al., 2024, p. 2471), and Nigeria ranks low in AI readiness despite high potential benefit (Ogunleye, 2021). The question is not whether the technology will advance, but under what conditions Nigerian hotels should adopt it.

Results: Factors to Consider Before Adoption in Nigeria

Five interrelated factors were synthesised. They should be evaluated jointly rather than in isolation, as cost, labour, infrastructure, customer, and marketing considerations interact.

1. Economic Viability and Total Cost of Ownership

AI and robots can save costs and support employees during peak demand or fatigue by reducing human error and increasing speed (Belanche et al., 2019, as cited in Hodibert et al., 2024). For example, a delivery robot need not replace room-service staff; by relieving physical delivery, it allows staff to take and fulfil more orders promptly, generating auxiliary revenue (Ivanov & Webster, 2017, p. 3). Large hotels with hundreds or thousands of rooms achieve greater savings from RAISA and are more inclined to adopt it (Ivanov & Webster, 2017, p. 5). AI also analyses large guest datasets efficiently, saving managerial time and energy compared with shift-based human respondents (Sousa et al., 2024).

However, acquisition is only one component. Investment includes gadgets, installation, hiring and training operators, maintenance, software updates, and specialists (Hodibert et al., 2024, p. 2473; Ivanov & Webster, 2017). Indicative 2024 online estimates illustrate the scale: AI software USD 30,000–45,000; technical labour USD 25–49 per hour; training and maintenance USD 8,999–14,999 (RisingMax, 2024); chatbot development USD 6,000–15,000 (WebFX, 2024); and small service-delivery robots USD 5,000–20,000 initially, or USD 10,000–50,000 including features and maintenance depending on size and functions (Technavio, 2024). At an illustrative exchange rate of N1,500 to USD 1 (rates reached N1,800 during the review period), USD 5,000–20,000 equals approximately N7.5 million–N30 million before import duty, installation, and after-sales support. Implication for Nigeria: full purchase is viable mainly for large, high-occupancy urban hotels; smaller properties should consider seasonal hire, leasing, or shared services during peak periods such as New Year, Valentine's Day, Sallah, Durbar festivals, New Yam festivals, and Christmas.

2. Labour Implications, Staff Support, and Retraining

Hospitality managers may view RAISA as cost-effective, but technology is a workplace stressor associated with job insecurity, unclear career paths, and strained employment relations (Brougham & Haar, 2017, as cited in Li et al., 2019). Without clear internal communication, introduction of AI can trigger unproductive competition for recognition, bonuses, and promotion, increasing stress and turnover intentions (Gim et al., 2015; Schrock et al., 2016; Li et al., 2019). Ivanov and Webster (2017) therefore recommend proactive communication with managers and employees to reduce fear and perceived threat.

Implication for Nigeria: adoption plans must include funded retraining for AI supervision, basic programming, and robot maintenance; redeployment pathways for low-skilled staff, women, and youth who dominate routine roles; and consultation with unions and community stakeholders where land was leased for tourism projects. Framed as augmentation – robots handling repetitive delivery and information tasks while staff focus on relational service – adoption is more socially sustainable than outright substitution.

3. Operational Resilience and Infrastructural Readiness

Service robots, chatbots, and self-service kiosks can operate beyond the standard 40-hour human work week, serve many customers simultaneously, and repeat tedious tasks without complaint or omission (Ivanov & Webster, 2017, p. 2). This resilience is a primary managerial motive (Hodibert et al., 2024). For large Nigerian chains seeking technological competitiveness, 24/7 capability is attractive.

Yet resilience assumes reliable electricity, internet connectivity, technical support, and spare parts – conditions that vary across Nigeria. Hotels must audit power backup, bandwidth, data privacy, and vendor service-level agreements before deployment. Implication for Nigeria: pilot in properties with stable infrastructure and measure downtime, energy costs, and failure modes; do not assume developed-economy uptime.

4. Customer and Cultural Acceptance

Resistance may come from customers who prefer high-touch human service, feel uncomfortable or intimidated, lack skills to use the technology, perceive RAISA service as inferior, or are unwilling to pay equally for it (Ivanov & Webster, 2017, p. 4). Technological

diffusion differs between the Global North and South; foreign guests familiar with robots may accept them more readily than domestic guests with limited exposure.

Implication for Nigeria: empirically assess willingness to use and pay for robot-delivered services among domestic and international segments before investment. Preserve human alternatives for guests who value conviviality, and design robot interactions to reflect Nigerian languages, etiquette, and hospitality norms. Personalisation should enhance, not replace, human warmth.

5. Marketing and Service Personalisation

Competition makes AI-enabled marketing valuable. Virtual reality (VR) and augmented reality (AR) allow prospective guests to preview properties through 3D environments from their phones (Mithichar & Gunajit, 2024), a capacity previously recommended for Nigerian tourism marketing (Odum & Ukekwe, 2020). AI also processes large volumes of guest data for individualised offers, improving campaign performance and return on investment (Limna, 2022, p. 7).

Implication for Nigeria: even without physical robots, hotels can adopt lower-cost AI tools – VR previews, chatbots for enquiries, and data-driven personalisation – to improve visibility and conversion while building digital capabilities for later automation.

Elaboration: From Purchase Price to Sustainable Use

For Nigerian decision makers, total cost of ownership should be modelled over three to five years, including import duty, clearing, installation, staff time for supervision, energy consumption, insurance, software licences, and vendor maintenance. Leasing, hire for peak seasons, or multi-property sharing of expensive units can lower entry barriers. For example, a delivery-robot fleet hired for December, Easter, and festival peaks allows managers to observe utilisation, guest response, and maintenance burden before committing capital. Hotels should request vendor pilots with explicit performance indicators: deliveries per hour, failure rate, guest satisfaction, and staff time saved, rather than relying on brochure claims.

Training should go beyond brief equipment demonstrations. International experience suggests three tiers: (a) awareness and change communication for all staff addressing fears, roles, and guest messaging; (b) operational competence for front-line users in safe operation, handover, hygiene, and escalation; and (c) technical competence for selected staff in troubleshooting, basic programming, and preventive maintenance. Partnering with NIHOTOUR and polytechnics to certify these tiers would create portable skills and reduce dependence on foreign technicians. Critically, hotels should co-design new job descriptions so that time saved by robots is visibly reinvested in relational service, upselling, and quality control, demonstrating complementarity in practice.

Cultural acceptance also involves language, religion, age, and expectations of hospitality as care. A robot delivering efficient service but unable to greet appropriately, respect privacy norms, or handle complaints with empathy may be judged inferior regardless of speed. Hotels should therefore test robot scripts, voices, and appearance with Nigerian guests, offer explicit opt-in and human alternatives, and avoid deploying humanoid designs that provoke discomfort. Collecting willingness-to-use, perceived usefulness, and willingness-

to-pay data by segment will provide the empirical basis currently missing and prevent costly missteps.

Comparative Lessons and Ethical Considerations

Placing Nigeria alongside Ghana and India is instructive. Hodibert et al. (2024) show Ghanaian stakeholders balancing enthusiasm for technological modernity with concerns about job loss, authenticity, and infrastructure, a tension equally present in Nigeria. Mithichar and Gunajit (2024) document Indian hotels using AI for analytics, chatbots, and virtual presentation even where full robot deployment remains limited, suggesting a ladder of adoption: start with software and marketing AI, then add single-function robots, then consider integrated systems. Nigeria can follow a similar ladder, prioritising low-capital, high-visibility tools such as chatbots, VR previews, and revenue-management analytics while building the power, connectivity, and skills base for physical automation.

Ethically, hospitality leaders must consider community obligations. Where communities leased land for hotel development expecting employment, large-scale substitution without consultation risks social licence. Transparent impact assessment, local hiring commitments, and reinvestment of efficiency gains in staff development and community benefits can preserve legitimacy. From a humanities perspective, hospitality is not only efficiency but welcome, recognition, and care. Automation that frees staff for genuine human attention aligns with this ethic; automation that hollows out human presence does not. The guiding test should be whether technology deepens the guest's experience of being cared for, not merely served quickly.

Discussion

Hospitality remains among the largest employers globally, creating millions of jobs annually (Hodibert et al., 2024), and contributed substantially to Nigerian output and employment before COVID-19. The pandemic accelerated digitalisation (Odum, 2022), yet AI and robot adoption remains uneven: advanced in the United States and Japan, emerging in India and Ghana, and nascent in Nigeria (Hodibert et al., 2024; Mithichar & Gunajit, 2024; Ogunleye, 2021). Prior Nigerian hospitality technology studies focused on internet and information and communication technology adoption as functions of room size, location, services, market size, and competition (Ebiendele & Ebiendele, 2020; Gbandi & Ilavbare, 2023; Nwakanma et al., 2014), leaving RAISA preconditions unexamined. This review fills that gap preliminarily.

Viewed through a cost-benefit and diffusion lens (Ivanov & Webster, 2017), adoption in Nigeria is not a simple buy decision but a system decision. Large properties benefit most from scale, but face the highest labour-displacement scrutiny. Smaller properties face prohibitive total costs but could access benefits through seasonal hire or leasing. Across all properties, infrastructure reliability and customer acceptance moderate the realised value of 24/7 capability. Collaboration among the Nigerian Tourism Development Corporation, the National Institute for Hospitality and Tourism, and hotel associations is needed to coordinate training, standards, and pilot evaluation, ensuring that efficiency gains do not erode the employment and community benefits that justify tourism development (Diminyi et al, 2025).

Implications and Conclusion

AI and robots hold real value for Nigerian hospitality – continuous service, speed, data-driven personalisation, and marketing reach – but room capacity, star rating, finances, and local labour responsibility mean most hotels cannot adopt them immediately or uniformly. Government interest and targeted subsidies could help, yet policymakers must weigh disengagement risks, especially for low-skilled workers, women, and youth. International evidence links robot exposure to heightened fear of replacement, reduced job satisfaction, and insecurity (Abeliansky & Beulmann, 2021; Schwabe & Castellacci, 2020, as cited in Nikolova et al., 2024, p. 21). Emerging economies should therefore reappraise wholesale transfer of developed-economy models. With phased, complementary deployment, proper training, and customer-choice safeguards, Nigerian hotels can remain competitive without undermining their social mandate. As a preliminary review, these findings require empirical validation.

Theoretical Perspective

To interpret these factors coherently, this study draws on cost-benefit analysis of RAISA adoption (Ivanov and Webster, 2017) combined with insights from diffusion of innovation and job insecurity perspectives. Cost-benefit reasoning explains why large, high-occupancy properties are early candidates: fixed automation costs are spread over many service encounters, while variable human-labour costs rise with demand. Diffusion reasoning explains the lag in Nigeria: relative advantage, compatibility with existing infrastructure and hospitality norms, complexity, trialability, and observability all moderate uptake. Where electricity and connectivity are unstable, where guests value high-touch conviviality, and where robots cannot be readily trialled or observed, perceived relative advantage declines even if global narratives celebrate automation.

Job insecurity theory further explains staff responses. Awareness of AI and robotics heightens turnover intention when employees perceive low organisational support and a competitive psychological climate (Li et al., 2019). In Nigerian hotels, where many routine roles are held by low-skilled staff, women, and youth, visible robots without accompanying communication and retraining can signal replacement rather than support. Perceived organisational support, clear redeployment pathways, and involvement in pilot design therefore become preconditions, not afterthoughts. This lens reframes adoption from a procurement decision to an organisational-change and humanities question about the meaning of work, hospitality, and human presence.

Infrastructure and Readiness in the Nigerian Context

Understanding infrastructure is essential because operational resilience claimed for robots presumes conditions often taken for granted in developed-economy hotels. Nigerian properties face intermittent power supply, variable broadband quality outside major cities, maintenance supply-chain delays, and data-protection uncertainties. A robot that can theoretically operate 24 hours requires charging infrastructure, backup power, secure Wi-Fi, regular software updates, and vendor response within hours, not weeks. Without these, downtime costs and guest dissatisfaction can outweigh labour savings.

Similarly, digital literacy among staff and guests is uneven. While urban, younger, and international travellers may navigate chatbots, kiosks, and app-based room controls with ease, other guests may require human mediation. Hotels must therefore assess not only

purchase price but readiness: power audit, connectivity audit, maintenance contract terms, spare-parts availability, staff digital skills baseline, and guest-segment analysis. Pilot testing in Lagos and Abuja properties with relatively stable infrastructure, followed by staged rollout, is more defensible than simultaneous nationwide deployment.

Recommendations, Limitations, and Future Research

We recommend that (a) government constitutes a committee to assess AI and robot implications for tourism employment; (b) hotels pilot complementary deployment with retraining and redeployment plans; (c) seasonal hire or lease models are evaluated for peak periods; (d) guest willingness-to-use and willingness-to-pay are surveyed across regions and segments; (e) existing AI and robot policies relevant to hospitality in sub-Saharan Africa are documented; and (f) future reviews use systematic databases such as Scopus with PRISMA reporting.

Limitations include reliance on secondary, largely non-Nigerian sources, non-systematic search, and absence of primary guest or staff data. Future empirical studies should examine adoption challenges and prospects with hospitality stakeholders across West Africa using surveys, interviews, and pilot evaluations.

A Practical Decision Guide for Nigerian Hotels

The synthesis above can be translated into a staged decision process. First, hotels should segment use cases by guest contact and risk. Low-risk, high-volume, back-of-house tasks such as linen delivery, vacuuming of public areas, and handling of luggage are better pilots than high-risk, high-empathy tasks such as complaint resolution or personalised concierge advice. Second, hotels should quantify the service volume required to justify automation. A 300-room hotel at 70% occupancy generates far more delivery trips than a 30-room boutique, shortening payback time. Smaller hotels can aggregate demand through outsourcing or joint hire, for example by contracting a robotics service provider during festivals when city-wide occupancy peaks.

Third, readiness should be scored before procurement. A simple checklist covering power backup hours, internet redundancy, staff digital-skills coverage, availability of a local maintenance partner, data-privacy compliance, and guest-segment openness can prevent premature purchase. Properties scoring low should first invest in foundational capabilities and in software-only AI such as chatbots and VR previews, which require less capital and maintenance while building organisational learning. Fourth, impact should be monitored against both efficiency and human outcomes: staff hours redeployed to relational service, guest satisfaction by segment, downtime incidents, energy costs, and staff turnover intentions. Publishing pilot results, including failures, would build the Nigerian evidence base that this preliminary review finds missing.

Policy coordination matters because individual hotels cannot resolve training and standards gaps alone. A joint working group involving the Nigerian Tourism Development Corporation, the National Institute for Hospitality and Tourism, hotel associations, and technology vendors could define minimum service and safety standards for robots in guest areas, certify the three-tier training outlined above, and negotiate framework maintenance agreements to reduce vendor lock-in. Targeted incentives, such as duty relief for training-linked pilots rather than blanket equipment subsidies, would tie public support to

employment safeguards. This aligns efficiency with the sector's social mandate to employ youth, women, and low-skilled workers while remaining competitive as guest expectations evolve.

Seasonality, Star Grading, and Phased Pathways

Nigerian demand is strongly seasonal and segmented by star grading, location, and purpose of travel. Business hotels in Lagos and Abuja with year-round corporate occupancy face different automation economics from leisure, religious-pilgrimage, or festival-driven properties with sharp peaks. A phased pathway respects this heterogeneity. Phase one, applicable to all grades, involves software AI: cloud chatbots for enquiries and check-in support, review analytics, and VR or rich-media previews that improve conversion without major capital outlay. These tools also generate the guest-preference data on which later personalisation depends, while exposing staff to AI supervision in a low-risk setting.

Phase two involves single-function physical robots in carefully bounded roles, such as delivery robots for room service in large properties or cleaning robots for banquet halls and corridors during night shifts. Success criteria should be defined in advance, including staff time saved per shift, guest opt-in rates, hygiene compliance, noise and safety incidents, and maintenance response times. Only properties that demonstrate stable power, connectivity, and positive guest and staff feedback should progress to phase three, which integrates systems such as receptionist robots linked to property-management systems with facial or voice recognition. Each phase should retain a human alternative, both to accommodate guest preference and to ensure business continuity during outages. This ladder avoids the costly error of purchasing integrated humanoid systems before foundational reliability and acceptance are proven.

Such phasing also addresses the common concern that hospitality scholarship in Nigeria has focused on general information and communication technology without addressing RAISA-specific risks. Room size, location, service mix, market size, and competitor behaviour, previously shown to shape ICT adoption (Ebiendele and Ebiendele, 2020; Gbandi and Ilavbare, 2023; Nwakanma et al., 2014), remain relevant but insufficient. For AI and robots, additional variables matter: floor layout and lift compatibility for delivery robots, food-safety workflows for chef robots, nighttime staffing models for cleaning robots, and brand positioning around luxury as human attention versus luxury as technological novelty. Future empirical work should therefore stratify samples by star rating, size, and location rather than treating Nigerian hospitality as uniform.

A Research Agenda to Move Beyond Preliminary Insights

To move from preliminary synthesis to actionable knowledge, four empirical strands are needed. First, nationally stratified surveys of hotel managers should quantify total cost perceptions, infrastructure readiness, and adoption intentions by star rating, size, and city, testing whether scale and occupancy predict willingness to pilot. Second, staff studies using validated job-insecurity, perceived organisational support, and turnover-intention scales (Li et al., 2019) should examine how awareness of AI shapes morale and which communication and retraining interventions mitigate fear. Qualitative interviews should capture how front-line staff redefine hospitality work when robots handle delivery or information tasks. Third, guest studies should use experimental or vignette designs comparing human-only, robot-assisted, and robot-led service encounters on satisfaction, perceived warmth and

competence, and willingness to pay, segmented by domestic versus international, age, and prior technology exposure. Fourth, pilot evaluations with before-and-after measurement of labour hours, service speed, error rates, energy use, downtime, and satisfaction would provide the cost-benefit evidence that documentary work cannot supply. Documenting AI and robotics policies affecting hospitality in sub-Saharan Africa and depositing anonymised search records, instruments, and pilot data as supplementary material would further strengthen transparency and reuse. Priority should be given to studies that compare pilot hotels with matched controls so that Nigerian stakeholders can judge value under local power, connectivity, and labour conditions.

Statements and Declarations

Funding: No specific grant was received for this preliminary review. Conflict of interest: The authors declare no competing interests. Data availability: This is a literature-based review; all sources are listed in the references and search procedures are described in the Method section. Author contributions: All authors contributed to conceptualisation and synthesis; Odum led writing and correspondence. Ethics: No human participants were involved; permission notes for adapted Table 1 are provided. Acknowledgements: The authors thank hotel practitioners whose informal discussions motivated attention to seasonality, retraining, and community employment concerns. All views expressed are those of the authors.

References

- Adeyinka, T. (2024). *Understanding the hospitality industry in Nigeria: A, B, Cs of the industry*. LinkedIn. <https://www.linkedin.com/pulse/understanding-hospitality-industry-nigeria-b-cs-tayo-adeyinka-a57yf>
- Aina, D., & Olufemi, D. (2024, February 2). Nigeria's unemployment rate rises to 5% — NBS. *Punch Nigeria*. <https://punchng.com/nigerias-unemployment-rate-hits-0-8-in-2023-q3-nbs-report>
- Ajayi, V. O. (2023). A review of primary sources of data and secondary sources of data. *European Journal of Education and Pedagogy*, 2(3), 1–7.
- Alli, F. (2017, January). Robots taking over jobs from factory workers. *Vanguard Nigeria*. <https://www.vanguardngr.com/2017/01/robots-taking-jobs-factory-workers>
- Basit, J. (2023). *Nigerian man delighted to receive food from robot at restaurant shares video*. Legit.ng.
- Belanche, D., Casaló, L. V., Flavián, C., & Schepers, J. (2019). Service robot implementation: A theoretical framework and research agenda. *The Service Industries Journal*, 40(3–4), 203–225. <https://doi.org/10.1080/02642069.2019.1672666>
- Ben-Ari, M., & Mondada, F. (2018). Robots and their applications. In *Elements of robotics* (pp. 1–20). Springer. https://doi.org/10.1007/978-3-319-62533-1_1
- Bulchand-Gidumal, J. (2020). Impact of artificial intelligence in travel, tourism, and hospitality. In Z. Xiang et al. (Eds.), *Handbook of e-tourism* (pp. 1943–1962). Springer.

- Cheung, C. (2025). *Understanding the different types of literature reviews*. Jenni AI.
<https://jenni.ai/blog/types-of-literature-review>
- Delbridge, A. (Ed.). (1991). *The Macquarie dictionary* (2nd ed.). Macquarie University Press.
- Diminyi, C. A., Okim, D. O., Etta, J. N., Laguo, G. L., Oloda, F. O., Inameti, E. E., Ewanlen, D. O. (2025). Exploring opportunities for regenerative tourism in the Nigerian tourism compass. *Nsukka Journal of the Humanities*, 33 (3), 226-248.
<https://doi.org/10.62250/nsuk.2025.33.3.226-248>
- Ebiendele, H., & Ebiendele, P. (2020). Information and communication technology (ICT): A panacea for hotel service delivery in Osun State, Nigeria. *Journal of Travel, Tourism and Recreation*, 2(2), 25-33.
- Ferreira, M. I. A., Sequeira, J. S., Tokhi, M. O., Kadar, E., & Virk, G. S. (Eds.). (2017). *A world with robots: International Conference on Robot Ethics: ICRE 2015* (Vol. 84). Springer.
- Gbandi, E. C., & Ilavbare, B. E. (2023). Information and communication technology (ICT) and customer satisfaction with hotel services in Benin City, Nigeria. *Ife Social Sciences Review*, 31(2), 51-62.
- Gibbons, J. H. (1982). *Exploratory workshop on the social impacts of robotics: Summary and issues*. U.S. Government Printing Office.
- Gim, G. C., Desa, N. M., & Ramayah, T. (2015). Competitive psychological climate and turnover intention with the mediating role of affective commitment. *Procedia – Social and Behavioral Sciences*, 172, 658-665.
<https://doi.org/10.1016/j.sbspro.2015.01.416>
- Glenn, B. (2009). Document analysis as a qualitative research method. *Qualitative Research Journal*, 9(2), 27-40. <https://doi.org/10.3316/QRJ0902027>
- Hodibert, V. A., Anderson, A. N., & Neequaye, K. (2024). AI/robotics in the tourism and hospitality sector: Technological realities and imaginaries in the Ghana context. *International Journal of Research and Innovation in Social Science*, 8(1), 2454-2471.
- Hudson, N., & Runge, J. (2020). *Recruitment of workers into low-paid occupations and industries: An evidence review*. National Institute of Economic and Social Research.
- Ivanov, S., & Webster, C. (2017). Adoption of robots, artificial intelligence and service automation by travel, tourism and hospitality companies: A cost-benefit analysis. In *Contemporary tourism: Traditions and innovations*, 19-21 October 2017, Sofia University.
- Ivanov, S., Webster, C., & Berezina, K. (2017). Adoption of robots and service automation by tourism and hospitality companies. *Revista Turismo & Desenvolvimento*, 27-28, 1501-1517.
- Kalu, A. O. U., Unachukwu, L. C., & Ibiam, O. (2018). Accessing secondary data: A literature review. *Singaporean Journal of Business Economics, and Management Studies*, 6(6), 53-63.
- Kşeoğlu, M. A., Morvillo, A., Altin, M., De Martino, M., & Okumus, F. (2019). Competitive intelligence in hospitality and tourism: A perspective article. *Tourism Review*, 75(1), 239-242. <https://doi.org/10.1108/TR-06-2019-0258>

- Lee, K. F. (2017). Automation, computerization and future employment in Singapore. *Journal of Southeast Asian Economies*, 34(2), 388–399.
- Li, J. J., Bonn, M. A., & Ye, B. H. (2019). Hotel employee's artificial intelligence and robotics awareness and its impact on turnover intention: The moderating roles of perceived organizational support and competitive psychological climate. *Tourism Management*, 73, 172–181. <https://doi.org/10.1016/j.tourman.2019.02.006>
- Limna, P. (2022). Artificial intelligence (AI) in the hospitality industry: A review article. *International Journal of Computing Sciences Research*, 7, 1306–1317. <https://doi.org/10.25147/ijcsr.2017.001.1.103>
- Martijn, B. (2024). *Robots in the hospitality industry*. Revfine. <https://www.revfine.com/robots-hospitality-industry>
- Mithichar, B., & Gunajit, S. (2024). The use of artificial intelligence in tourism industry of India: A critical insight. *Migration Letters*, 27(S7), 111–119.
- National Bureau of Statistics. (2023). *Nigeria labour force survey Q3 2023*. <https://nigerianstat.gov.ng>
- Nikolova, M., Cnossen, F., & Nikolaev, B. (2022). *Robots, meaning, and self-determination* (GLO Discussion Paper No. 1191). Global Labor Organization.
- Nikolova, M., Cnossen, F., & Nikolaev, B. (2024). Robots, meaning, and self-determination. *Research Policy*, 53, 104875. <https://doi.org/10.1016/j.respol.2024.104875>
- Nwakanma, I. C., Ubani, E. C., Asiegbu, B. C., & Nwokonkwo, O. C. (2014). Factors affecting the adoption of ICT in the hospitality industry in Imo State. *International Journal of Computer Science Issues*, 11(4), 170–181.
- Odum, C. J. (2022, October). *Innovation in tourism industry: Insight from Nigeria*. Paper presented at the Ahi Evran International Conference on Scientific Research, Türkiye.
- Odum, C. J., & Ukekwe, C. (2020). Tourism and virtual reality (VR) in developing nations. *African Journal of Hospitality, Tourism & Leisure*, 9(2), 1–16.
- Ojoye, T., & Ihua-Maduenyi, M. (2019). AI, automation to boost hotel revenues by 10% – Report. *Punch Nigeria*. <https://punchng.com/ai-automation-to-boost-hotel-revenues-by-10-report>
- Ogunleye, I. (2021). *Artificial intelligence for economic development in Nigeria*. Citris Policy Lab. https://citrispolicylab.org/wp-content/uploads/2021/12/Artificial-Intelligence-for-Economic-Development-in-Nigeria_Ifejesu-Ogunleye.pdf
- Omodero, C. O. (2019). Nigeria's economic diversification with an emphasis on hospitality and tourism sector as a necessity. *Management Dynamics in the Knowledge Economy*, 7(2), 147–164.
- Onyeonoro, C. O., Okpaleke, V. C., Ononuju, V. I., & Onyeonoro, F. N. (2023). Economic recession and hotel performance in Abia State, Nigeria. *European Journal of Hospitality and Tourism Research*, 11(2), 1–21.

- RisingMax. (2024). *How much does AI cost in 2024*. <https://risingmax.com/blog/how-much-does-artificial-intelligence-cost>
- Samala, N., Katkam, B. S., Bellamkonda, R. S., & Rodriguez, R. V. (2022). Impact of AI and robotics in the tourism sector: A critical insight. *Journal of Tourism Futures*, 8(1), 73–87. <https://doi.org/10.1108/JTF-07-2019-0065>
- Schrock, W. A., Hughes, D. E., Fu, F. Q., Richards, K. A., & Jones, E. (2016). Better together: Trait competitiveness and competitive psychological climate as antecedents of salesperson organizational commitment and sales performance. *Marketing Letters*, 27, 351–360. <https://doi.org/10.1007/s11002-014-9329-7>
- Smith, A., & Anderson, J. (2014). *AI, robotics, and the future of jobs*. Pew Research Center.
- Social Tables. (2024). *Robots in hotels: 6 hotel brands leading the way*. <https://www.socialtables.com/blog/hospitality-technology/hotel-brands-robot>
- Sousa, A. E., Pais, S., & Viana, A. S. (2024). Applications of artificial intelligence in tourism and hospitality: A systematic literature review. In *Management, tourism, and smart technologies* (Lecture Notes in Networks and Systems, pp. 291–302). Springer. https://doi.org/10.1007/978-3-031-44131-8_29
- Technavio. (2024). *Hospitality robots market analysis: Size and forecast 2024–2028*. <https://www.technavio.com/report/hospitality-robots-market-industry-analysis>
- UNESCO. (2021). *Artificial intelligence needs assessment survey in Africa*. UNESCO.
- WebFX. (2024). *AI pricing: How much does artificial intelligence cost?* <https://www.webfx.com/martech/pricing/ai>
- Yadav, J. K., Verma, D. C., Jangirala, S., & Srivastava, S. K. (2021). An IAD type framework for blockchain enabled smart tourism ecosystem. *Journal of High Technology Management Research*, 32, 100404. <https://doi.org/10.1016/j.hitech.2021.100404>
- Yasar, K., & Hanna, K. T. (2024). *Definition: Robotics*. TechTarget. <https://www.techtarget.com/whatis/definition/robotics>
- Young, C. S. (2024). *LG Electronics to develop hotel exclusive robots*. KED Global. <https://www.kedglobal.com/robotics/newsView/ked202402210014>