


Bridging the digital divide: Consumer engagement with transportation payment apps in emerging economies

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Abstract

The digital divide remains a formidable challenge in emerging economies, highlighting disparities in technology access and utilisation. This study explores consumer engagement with mobile payment applications for transportation in Lagos, Nigeria, a critical context where these disparities manifest. The research presents consumer perceptions and behaviours using a triangulated approach encompassing ethnographic observation, semi-structured interviews, and the ALARA model of information search. Anchored in the Engel–Kollat–Blackwell (EKB) theory of consumer behaviour, which depicts the five stages of consumer decision-making—problem recognition, information search, evaluation of alternatives, purchase decision, and post-purchase behaviour—this study identifies five key themes: awareness, information search, alternatives evaluation, engagement, and post-engagement evaluation. Insights from the study reveal that cultural preferences and trust in traditional payment methods significantly influence users' willingness to adopt mobile payment apps. These insights underscore the importance of addressing socio-cultural factors in technology adoption strategies. The findings highlight the need for an inclusive technological strategy to bridge the digital divide, emphasising the necessity of accessible information channels and user-friendly interfaces to enhance consumer engagement. Continuous app refinement based on user feedback is crucial for optimising usability. Additionally, a nuanced understanding of socio-cultural influences on technology adoption is essential for informing policy and business strategies. Overall, this study contributes to understanding technology adoption in emerging economies and provides actionable insights to foster inclusive digital transformations and mitigate the digital divide.

1 | INTRODUCTION

Technology has become inseparable from everyday life, revolutionising consumer behaviours through innovations like chatbots, digital assistants, augmented reality and the metaverse (Balakrishnan

et al., 2021; Beheshti et al., 2023; Del Vecchio et al., 2023; Jayawardena et al., 2023; Koohang et al., 2023; Ooi et al., 2023; Sattarapu et al., 2023). These advancements have reshaped how individuals interact with information and services and sparked global economic and social transformations. Despite the

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extensive literature exploring the adoption and implications of these technologies, a significant research gap persists concerning their utilisation by consumers in developing countries and emerging economies to improve their well-being (Abdulquadri et al., 2021; Sampat et al., 2023).

Existing research has predominantly focused on factors influencing technology adoption, such as usability, perceived usefulness and social influence (Ambika et al., 2023; Brüggemann & Lehmann-Zschunke, 2023; Chen & Aklikokou, 2020; Eastman et al., 2023; Rahi et al., 2023; Skare & Soriano, 2021). However, there is limited understanding of how consumers in emerging economies navigate and interact with these innovations, particularly in essential service sectors like transportation payments (Amankwah-Amoah et al., 2018; Mogaji et al., 2024; You et al., 2019). This study aims to address this gap by examining how consumers in these contexts engage with mobile applications for transportation payment, considering the unique socio-economic challenges they face (Mogaji et al., 2023; Nwaedozie et al., 2023; Xiao, 2022).

To explore these dynamics, the study adopts the Engel-Kollat-Blackwell (EKB) model of consumer behaviour as its theoretical framework (Engel et al., 2001). This model offers a robust foundation for analysing decision-making processes in consumer behaviour, encompassing stages from problem recognition to post-purchase evaluation. By grounding the study in this theoretical framework, the research integrates insights from previous studies (Kaur et al., 2023; Sattarapu et al., 2023) and employs a multi-stranded qualitative approach. The study further enhances its rigour through data triangulation, a methodological strategy that combines multiple data sources to corroborate findings and strengthen the reliability of conclusions (Patton, 2002; Farquhar et al., 2020). By triangulating data from different sources, including the ALARA model for information search, ethnographic observations and qualitative interviews, the research aims to comprehensively understand consumer behaviour towards mobile payment applications in transportation settings. This holistic approach enriches scholarly discourse on technology adoption in diverse socio-economic contexts. It offers practical insights for stakeholders—such as technology developers, policymakers and entrepreneurs—to enhance inclusive access and adoption of technological solutions.

The study contributes theoretical insights into consumer behaviour with technology, particularly within the contexts of developing countries and emerging economies (Amankwah-Amoah et al., 2018; Sampat et al., 2023; Soetan et al., 2021). The research informs stakeholders—including technology developers, policymakers and entrepreneurs—on enhancing inclusive access and adopting technological solutions by uncovering how consumers interact with transportation payment apps. Ultimately, this study seeks to advance scholarly understanding of consumer behaviour in the digital age and facilitate more equitable technological innovations. In subsequent sections, the paper will delve into the methodology, findings and implications, offering a comprehensive exploration of consumer technology engagement in diverse socioeconomic contexts.

In the subsequent sections, the paper provides a detailed exploration of the research methodology, findings and implications for theory

and practise, further elucidating the significance of understanding consumer engagement with technology in diverse socioeconomic contexts.

2 | LITERATURE REVIEW

2.1 | Mobile apps in emerging economies

The rise of mobile applications has profoundly impacted various sectors in developing economies, including transportation, financial services and personal safety. Chowdhury and Van Wee (2020) highlight the critical role of mobile apps in enhancing safety perceptions amongst women at public transport terminals and facilitating communication and access to emergency services to alleviate safety concerns. Mobile applications have revolutionised payment systems and financial services delivery in the financial sector. Liébana-Cabanillas, García-Maroto, et al. (2020) and Liébana-Cabanillas, Japutra, et al. (2020) identify perceived value, utility and risk as pivotal factors influencing users' adoption of digital payment solutions like Apple Pay. They emphasise the importance of these factors in shaping user attitudes towards technology adoption.

Moreover, Abdulquadri et al. (2021) explore the use of chatbots by Nigerian banks to improve customer service and promote financial inclusion, employing the Search-Access-Test (S-A-T) model to assess user capabilities influencing technology adoption. In Malaysia, Abdul-Halim et al. (2022) examined factors influencing the continued use of e-wallets, underscoring the impact of ease of use and user satisfaction on user attitudes and intentions, insights pertinent to technologies like the Cowry mobile app in Lagos, Nigeria.

Mobile applications also revolutionise urban transportation, enhancing mobility and user satisfaction. Adewumi et al. (2015) illustrates this with Nigeria's Red Cab mobile app case study, highlighting features such as registration, taxi booking, order tracking and driver communication that streamline user experiences. Nwabueze (2024) discusses the transformative impact of ride-sharing apps on urban mobility in Lagos, extending beyond transportation to influence broader societal dimensions. Frederico et al. (2021) propose an operational model for passenger-controlled fixed-route buses, emphasising user experience design's role in meeting evolving user demands.

Research by Liébana-Cabanillas, Japutra, et al. (2020) underscores the impact of ease of use, perceived usefulness, risk, trust and satisfaction on mobile app payment platform adoption in India. Similarly, Ma et al. (2018) found that perceived usefulness and trust significantly influence consumer intentions to use mobile e-payment apps in China. Mouakket (2019) survey amongst university students in the UAE identifies branding, social media engagement, customer reviews and app platform updates as practical strategies to enhance interest in mobile transportation payment apps.

Mobile apps prioritise safety and security through features like real-time tracking and driver verification while addressing traffic congestion and pollution by promoting shared rides and eco-friendly transportation options. These adaptations cater to diverse user needs

and preferences, facilitating access to essential services and significantly influencing urban mobility. Ultimately, mobile applications play a transformative role in reshaping urban landscapes, fostering economic growth and enhancing the overall quality of life in rapidly growing urban areas of emerging economies. These studies collectively highlight the multifaceted impacts of mobile applications across various sectors, underscoring their role in advancing technological adoption, enhancing user experiences and addressing societal challenges in emerging markets.

2.2 | Mobile apps adoption in different sectors

The rise of mobile applications has had a notable influence on various industries, particularly in developing economies. These industries encompass transportation, financial services and personal safety. Chowdhury and Van Wee (2020) examine the crucial role that mobile apps play in enhancing women's perception of safety at public transport terminals. These apps not only facilitate communication and access to emergency services but also instil a sense of security by addressing the safety concerns of female public transport users. This aspect has been neglected in past research.

Within the financial sector, mobile applications have brought about a revolution in traditional payment systems and the provision of financial services. Liébana-Cabanillas, García-Maroto, et al. (2020) explore the factors influencing users' inclination to adopt digital payment solutions, such as Apple Pay. They emphasise the significant impact of perceived value, utility and risk in shaping users' attitudes towards these technologies. Similarly, Abdulquadri et al. (2021) highlight Nigerian banks' innovative use of chatbots to enhance customer service and promote financial inclusion. They employed the S-A-T model to examine the influence of users' capabilities on adopting this technology. Building upon this, Abdul-Halim et al. (2022) investigated the factors that affect the continued use of e-wallets in Malaysia. They discovered that perceived ease of use and satisfaction significantly impact users' attitudes and intentions to continue using e-wallets, offering valuable insights for adopting similar technologies in other contexts, such as the Cowry mobile app for transport in Lagos, Nigeria.

Mobile applications have also played a pivotal role in enhancing mobility and user satisfaction in urban transportation. Adewumi et al. (2015) present a practical case study on developing and implementing the Red Cab mobile app for a taxi service in Nigeria. They emphasised the app's successful integration of essential features, including registration, taxi booking, order tracking and driver communication. Nwabueze (2024) reveals the profound impact of ride-sharing apps on urban mobility in Lagos, Nigeria, extending beyond transportation to encompass broader sociological dimensions. Frederico et al. (2021) propose an innovative operational model for fixed-route buses controlled by passengers, highlighting the significance of user experience design in meeting users' intentions and demands. This underscores the growing demand for user empowerment in urban transit systems.

Research conducted on mobile apps provides valuable insights while also identifying significant gaps. The literature acknowledges

the role of mobile apps in improving safety, specifically for women utilising public transportation (Chowdhury & Van Wee, 2020). However, further investigation is necessary to examine safety concerns and defence mechanisms across diverse demographics and cultures. Furthermore, it is essential to conduct comprehensive research to understand the impact of digital transformation in financial services on the adoption of mobile payment systems, particularly in public transportation contexts such as Lagos State (Abdulquadri et al., 2021; Liébana-Cabanillas, García-Maroto, et al., 2020; Liébana-Cabanillas, Japutra, et al., 2020).

2.3 | Mobile apps in transport

According to Porru et al. (2020), smart mobility solutions in public transportation offer extensive benefits to both urban and rural areas, with the potential to revolutionise transport systems, even in countries like Nigeria. Adopting technology in transportation goes beyond mere convenience; it also aims to address service gaps in developed and developing regions, reflecting a global trend towards more accessible and efficient transport systems. Integrating mobile apps in the transport sector has led to a significant transformation, particularly in smart mobility.

The usefulness of mobile apps in transportation is further supported by their impact on service quality and user experience. Schmitz et al. (2016) found that the convenience and speed of transactions provided by mobile apps significantly enhance the service quality of German public transport. Similarly, Preciado-Ortiz (2021) demonstrated that the quality of information, design and system functionality of mobile apps plays a crucial role in meeting the transportation needs of university students in Mexico. These findings highlight the importance of app features and functionalities in improving user experiences and satisfaction, emphasising the critical role of mobile apps in modernising transport services.

Moreover, mobile transport applications contribute to broader sustainability and inclusivity goals. Javid et al. (2021) and Alyavina et al. (2020) both underscore the significance of mobile apps in promoting sustainable travel behaviours and enhancing the appeal of demand-responsive transport (DRT) services, respectively. Frączek and Urbanek (2021) explore the macroeconomic aspects, revealing how digital payments facilitated by mobile apps encourage the use of mobile devices for internet access while on the move, further integrating digital solutions into daily commuting practises. Tijan et al. (2021) extend this narrative to the maritime sector, illustrating how digital transformation, driven by innovative technologies like blockchain and autonomous shipping, reshapes transport modalities beyond land transport.

Extensive research on mobile applications in transportation has revealed significant gaps in our understanding. Specifically, there needs to be more exploration regarding the adoption and impact of mobile apps in developing countries' transportation systems, such as Nigeria (Porru et al., 2020). The existing body of literature focuses on the immediate benefits of mobile apps in transportation while

neglecting the long-term effects on consumer behaviour (Javid et al., 2021; Schmitz et al., 2016). Furthermore, the importance of digital payments and application quality in enhancing user experiences is acknowledged (Frączek & Urbanek, 2021; Preciado-Ortiz, 2021), but their broader impact on public transport is not well understood. Additionally, integrating mobility as a service and digital transformation in transport with sustainable travel and sector-wide changes requires further investigation (Alyavina et al., 2020; Tijan et al., 2021).

2.4 | Consumer behaviour with mobile app

Integrating mobile apps into daily life has significantly impacted consumer behaviour in several areas, including app usage, food delivery, shopping and transportation. According to Zolkepli et al. (2021), mobile apps' functional, emotional and confoval values shape consumer behaviour. This study emphasises the importance of app ratings in influencing mobile app usage behaviour, highlighting the complex relationship between the various values offered by apps and consumer engagement levels.

Cognitive factors, especially in the food delivery sector, have significantly influenced consumer behaviour. Ahn (2022) revealed that perceived enjoyment and social presence in food mobile applications greatly enhance consumer attitudes towards these services. This underscores the role of cognitive factors in fostering customer engagement and loyalty. Similarly, Hamouda (2021) reported that mobile apps' affective and cognitive experiences influence purchase intentions. This suggests further exploring customer experiences in mobile app contexts, considering both cognitive and affective dimensions.

Consumer decision-making styles also play a crucial role in adopting and using mobile shopping applications. According to Sarkar et al. (2020), decision-making styles significantly impact mobile app adoption for shopping, with different consumers having varying perceptions of usefulness and risk. This research provides new insights into consumer behaviour in mobile commerce by linking decision-making styles with mobile shopping app usage. Furthermore, Dewan et al. (2022) examined how transportation mobile apps affect residents' life satisfaction. They found that while there is no substantial correlation between travel utility and travel satisfaction, the perception of ease of use is a key determinant of travel satisfaction. This highlights the influence of the technology acceptance model (TAM) on overall life satisfaction through travel contentment.

2.5 | Barriers and facilitators of mobile payment adoption in similar socioeconomic contexts

We examined several studies across various emerging markets to understand the barriers and facilitators of mobile payment adoption in similar socioeconomic contexts. Kumar and Chawla (2023) identified significant obstacles to mobile payment adoption in India, including usage difficulties, lack of facilitating conditions (such as network

coverage, device compatibility and user support) and value barriers. In Malaysia, Leong et al. (2022) found that usage, tradition, risk and value barriers significantly impact resistance to mobile money adoption, with perceived novelty, education level and income level playing crucial roles. Similarly, Yan et al. (2021) highlighted perceived risk, performance expectancy and effort expectancy as key influences on perceived value during the COVID-19 pandemic in Bangladesh, with social influence, perceived trust and perceived value facilitating adoption.

Further emphasising facilitators, Pal et al. (2021) argued that convenience, reflection and security have varying effects on mobile payment adoption in India. The role of government is underscored by Lashitew et al. (2019), who highlighted how the Kenyan government's financial inclusion policies significantly promoted mobile money usage. Pal et al. (2020) also identified contextual facilitators such as price benefits, network externalities, trust and habit, as well as barriers like risk and operational constraints, influencing mobile payment intentions. Lastly, Migliore et al. (2022) investigated factors driving adoption in China and Italy, noting that social influence is particularly significant in cultures with high uncertainty avoidance, like Italy, where tradition remains the primary barrier, enlightening us about the diverse factors affecting adoption.

The literature consolidates the research gaps by focusing on specific aspects, such as enhancing safety for women in public transportation (Chowdhury & Van Wee, 2020). While valuable, these studies underscore the critical necessity of broadening the scope to encompass broader demographic and cultural contexts. Understanding the comprehensive impact of mobile apps beyond safety concerns is crucial for developing inclusive and effective technological solutions (Chowdhury & Van Wee, 2020).

Additionally, the influence of digital transformation in financial services on the adoption of mobile payment systems in public transportation remains underexplored, particularly in regions like Lagos State (Abdulquadri et al., 2021; Liébana-Cabanillas, García-Maroto, et al., 2020; Liébana-Cabanillas, Japutra, et al., 2020). Extensive research is essential to elucidate how advancements in financial technology shape consumer behaviours and preferences towards digital payment solutions in transportation settings. This gap emphasises the need to contextualise financial service innovations within the specific socioeconomic dynamics of emerging markets.

Moreover, there is a dearth of understanding regarding the long-term effects of mobile app usage on consumer behaviour and satisfaction in developing countries. Our study aims to fill this gap by conducting a comprehensive analysis of long-term consumer satisfaction with mobile payment apps in the transportation sector in Lagos, Nigeria. By exploring the factors influencing user engagement and satisfaction over time, our research aims to provide valuable insights into the sustainable adoption and utilisation of mobile apps in emerging market contexts (Liébana-Cabanillas, García-Maroto, et al., 2020; Liébana-Cabanillas, Japutra, et al., 2020).

Additionally, further research should delve deeper into the role of mobile apps in promoting sustainable travel behaviours and enhancing the appeal of DRT services (Alyavina et al., 2020; Javid et al., 2021).

Understanding how mobile technologies can contribute to more efficient and environmentally friendly transportation solutions is crucial for advancing urban mobility agendas and achieving sustainable development goals (Javid et al., 2021).

Lastly, there is an urgent need to explore the integration of mobility as a service and digital transformation in transport with sustainable travel and sector-wide changes (Alyavina et al., 2020; Tijan et al., 2021). This includes examining how digital innovations can streamline transportation services, improve accessibility and foster inclusive urban mobility solutions that cater to diverse user needs and preferences (Tijan et al., 2021). Addressing these research gaps will enrich scholarly understanding and inform policy and industry practises aimed at leveraging digital technologies for sustainable urban development.

2.6 | Theoretical framework

To address the identified gaps in understanding technology adoption and consumer behaviour in the context of mobile payment apps for transportation in developing countries, we adopted the EKB model as our theoretical framework. The EKB model offers a structured approach to comprehending consumer decision-making processes, spanning from problem recognition through post-purchase evaluation (Osei & Abenyin, 2016). This choice was motivated by the need to explore broader demographic and cultural contexts, which existing research often overlooks in favour of narrower safety concerns, such as those addressed to women in public transportation (Chowdhury & Van Wee, 2020). By leveraging the EKB model, our study aims to delve into how socioeconomic factors and cultural influences shape consumer attitudes and behaviours towards mobile payment technologies, particularly in regions like Lagos, Nigeria, where digital transformation in financial services is rapidly unfolding (Abdulquadri et al., 2021; Liébana-Cabanillas, García-Maroto, et al., 2020; Liébana-Cabanillas, Japutra, et al., 2020).

The selection of the EKB theory for our study is motivated by several compelling reasons. Unlike theories such as the TAM and the Unified Theory of Acceptance and Use of Technology (UTAUT), which predominantly approach technology adoption from an information systems perspective (Beheshti et al., 2023; Mogaji et al., 2024), the EKB theory is rooted in consumer behaviour, aligning closely with our study's focus on understanding consumer behaviour in the adoption of mobile payment apps (Kaur et al., 2023). Moreover, the EKB model has a well-established history in consumer behaviour research, demonstrating its versatility in understanding decision-making processes across various contexts. For instance, Kaur et al. (2023) extended the EKB model to virtual environments within the metaverse, showcasing its adaptability in examining consumer adoption of emerging technologies.

Furthermore, the EKB model's comprehensive framework delineates the stages of the consumer decision-making process, which closely aligns with our qualitative research approach. Previous studies have successfully applied the EKB model to explore diverse consumer

behaviours, underscoring its practical utility in understanding complex decision-making dynamics. By integrating insights from marketing, psychology and information systems, the theory offers a holistic understanding of how individuals engage with and adopt new technologies within specific socioeconomic contexts. EKB facilitates the integration of existing literature on technology adoption, consumer behaviour and socioeconomic factors (Kaur et al., 2023; Linkiewicz & Bartosik-Purgat, 2022), allowing for a nuanced examination of the adoption process in diverse socioeconomic contexts. By recognising the stages of the consumer decision-making process—including problem recognition, information search, evaluation of alternatives, purchase decisions and post-purchase evaluation—EKB provides a structured framework for understanding how consumers engage with technology.

Employing the EKB model as our theoretical framework, our research directly addresses several critical gaps identified in the literature. Firstly, the EKB model's structured approach to understanding consumer decision-making—from problem recognition to post-purchase evaluation—aligns perfectly with our goal of exploring the long-term effects of mobile app usage on consumer behaviour and satisfaction in developing countries. Previous research has highlighted this gap, emphasising the need for deeper insights into how technological advancements, such as mobile payment systems, shape consumer preferences and behaviours over time (Abdulquadri et al., 2021; Liébana-Cabanillas, García-Maroto, et al., 2020; Liébana-Cabanillas, Japutra, et al., 2020).

Secondly, the EKB model's focus on socioeconomic influences and cultural contexts provides a robust framework for exploring broader demographic considerations in technology adoption. This addresses the existing literature's tendency to narrowly focus on specific aspects, such as safety for women in public transportation, without fully exploring how diverse demographic groups engage with mobile apps (Chowdhury & Van Wee, 2020).

Finally, by integrating insights from consumer behaviour, marketing and psychology, the EKB model facilitates a comprehensive understanding of the complex interactions between technological innovations, consumer perceptions and adoption dynamics in emerging markets. This theoretical alignment enhances our study's theoretical grounding. It ensures that our findings contribute substantively to academic discourse and practical strategies to foster inclusive and sustainable technology adoption in the transportation sector. In essence, the EKB model serves as a versatile and insightful framework that resonates deeply with our research objectives, guiding our exploration of how mobile payment apps influence consumer behaviour amidst unique socioeconomic challenges in developing countries like Nigeria.

3 | METHODOLOGY

3.1 | Research context

This study explores consumer attitudes towards Cowry, a mobile payment app for transportation in Lagos, Nigeria, akin to London's Oyster

card. Developed by Touch and Pay Technologies (TAP) in 2000, Cowry facilitates payments for public transport, managed exclusively by TAP, covering BRTs and ferries. Initially a physical contactless card, Cowry has expanded its services to include a mobile app for Lagos commuters (Mogaji & Nguyen, 2024). Lagos serves as an ideal research context for several reasons. Firstly, transportation is vital for economic activity and understanding consumer technology use in this sector is pivotal (Farinloye et al., 2024; Mogaji et al., 2023). Secondly, Lagos relies heavily on cash for transport payments, offering insights into adopting digital alternatives (Sampat et al., 2023). Finally, Lagos's tech-savvy population and dynamic urban environment necessitate the successful integration of such apps (Soetan et al., 2021).

Additionally, Lagos's commitment to improving transportation infrastructure, including new train services, underscores the city's progressive stance (Wahab, 2023). As a benchmark for similar regional and global initiatives, insights into consumer engagement with new technologies in Lagos are invaluable (Mogaji & Nguyen, 2022). Moreover, Nigeria's position as a tech hub in Africa emphasises the importance of understanding consumer behaviour in adopting transportation technologies (Balakrishnan et al., 2021). This understanding will drive Nigeria's technological advancement and shape the broader African and global tech landscape.

3.2 | Research design

This study employs a multifaceted qualitative research design to explore consumer behaviour in the vibrant and dynamic context of Lagos and their attitudes towards this new technology. This approach is considered appropriate for several reasons. Firstly, qualitative research allows for a deep exploration of the lived experiences of individuals, offering valuable insights into their struggles and challenges. Similar to Kaur et al. (2023) study on consumer behaviour in the meta-verse, this methodological choice aligns well with understanding consumer behaviour within the unique environment of Lagos and their interactions with the Cowry mobile app. Secondly, previous studies examining consumer attitudes towards technology in Nigeria and transportation services have successfully utilised qualitative approaches (Abdulquadri et al., 2021; Balakrishnan et al., 2021; Sampat et al., 2023). Leveraging similar methodologies enables the study to build upon existing research while tailoring it to the specific context of Cowry and transportation in Lagos. Thirdly, qualitative research facilitates flexibility and adaptability, allowing researchers to capture nuanced perspectives and uncover unexpected insights (Farinloye et al., 2019; Kaur et al., 2022). Given the dynamic nature of Lagos and the evolving landscape of technology adoption, qualitative methods provide the flexibility needed to explore complex phenomena in depth.

The data collection involves three interconnected stages to provide comprehensive insights into consumer experiences and engagement with the Cowry mobile app. The first stage involves engaging directly with the Cowry mobile app, analysing user comments on social media platforms, and reviewing feedback on app stores, a

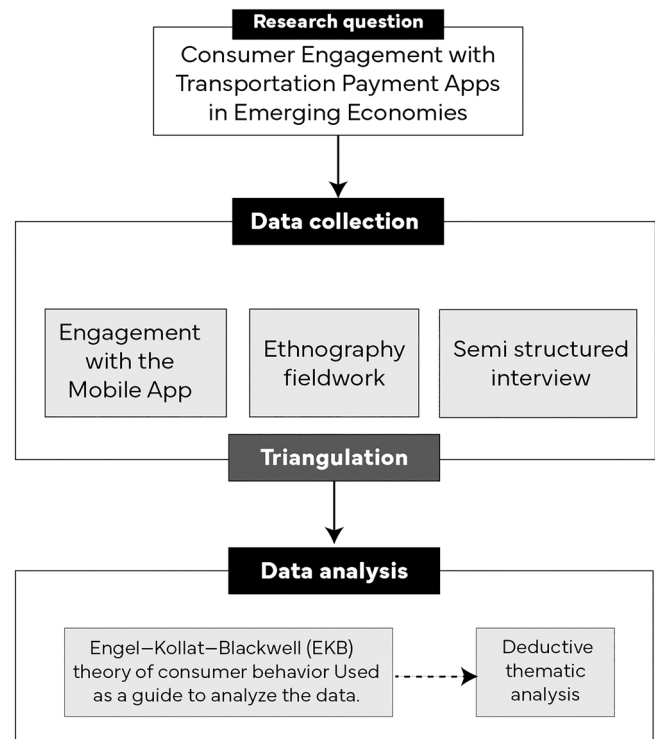


FIGURE 1 Visual representation of the interconnected research design, highlighting the iterative process of data collection and analysis.

similar approach adopted by Mogaji et al. (2021) in understanding consumer behaviour with a UK energy company. This initial step provides an overview of consumer experiences and perceptions of the technology. The second stage employs an ethnographic approach, allowing researchers to immerse themselves in the day-to-day experiences of consumers using the Cowry mobile app (Dumont, 2023). This hands-on approach provides rich contextual understanding and uncovers subtle nuances in consumer behaviour. The final stage involves conducting semi-structured interviews with selected participants (Kaur et al., 2023). These interviews offer an opportunity to probe deeper into consumer attitudes, motivations and challenges related to using the Cowry mobile app.

By triangulating data collected through these three strands (Farquhar et al., 2020), the study aims to ensure validity and reliability in its findings, providing a comprehensive understanding of consumer behaviour and attitudes towards the Cowry mobile app in Lagos. Figure 1 visually represents the interconnected nature of the research design, illustrating the iterative data collection and analysis process.

3.3 | Data collection

3.3.1 | Engagement with the mobile app

The ALARA model of information search (Mogaji et al., 2024) was adopted to explore the app design and understand consumer

engagement. ALARA is a methodology that emphasises not only users' information needs but also the responsibility of information custodians in providing readily accessible and actionable insights (Mogaji et al., 2024). ALARA, an acronym for availability, location, accessibility, reliability and actionability, introduces a fresh perspective to digital qualitative research, shifting the focus onto information custodians—the entities responsible for managing and disseminating information. In essence, the ALARA model offers a structured framework for dissecting and enhancing the information provision process on the Cowry App and by exploring the availability, location, accessibility, reliability and actionability of information being provided on the app, we can gain valuable insights into user behaviours and preferences.

Abdulquadri et al. (2021) previously utilised the ALARA model to investigate chatbot adoption by bank consumers and by Anyogu and Wayne (2020) to evaluate the quality of course information on African university websites. The ALARA model entails downloading the Cowry mobile app on both Android and Apple devices and engaging with it as researchers to gain first-hand insights into user experiences. Each research team member was tasked with using the app and sharing their observations and comments on shared visit notes, following the guidelines outlined by Mogaji et al. (2024). This process enabled us to offer critical reviews of the app, assessing factors such as user engagement and interface design, which can significantly impact consumer behaviour and willingness to adopt the technology.

Furthermore, we explore consumer engagement with the app by examining comments on social media platforms. This additional step provided insights into how consumers shared their experiences with the Cowry app, enriching our understanding of their perceptions and interactions. Additionally, we analysed comments and reviews from the app stores to gather further insights into consumer engagement with the technology. By exploring user feedback, we aimed to comprehensively understand consumer experiences and attitudes towards the Cowry mobile app. The qualitative data collected through these channels were subsequently exported to NVivo for thematic analysis. This analytical approach allowed us to identify recurring themes and patterns within the data, enabling more profound insights into consumer behaviour and attitudes regarding the Cowry app.

3.3.2 | Ethnography fieldwork

To deepen our understanding of consumers' engagement with the Cowry travel card app, we conducted an ethnographic study, enabling an in depth exploration of users' behaviours, attitudes and experiences within their natural environments (Dumont, 2023). Our study focused on individuals in Lagos, Nigeria, who utilised the Cowry travel card app for transportation needs. While participant selection criteria were not explicitly defined, efforts were made to ensure diversity across demographic groups encompassing various socioeconomic backgrounds.

The fieldwork spanned from November 2023 to January 2024, encompassing 3 months to capture seasonal variations and achieve data saturation, whereby further insights became redundant. Three

research assistants underwent training on research objectives, ethnographic concepts and safety measures while navigating Lagos. Calibration exercises were conducted to ensure consistency in data collection and interpretation. Observations were conducted at bus stops, emphasising app usage and frequency, and challenges were encountered (see Appendix 1 for the ethnographic fieldwork guide). Additionally, researchers accompanied participants on BRT buses, where the app validators were present, to gain real-time insights into usage patterns and behaviours during transit. Informal conversations were initiated with participants to gather nuanced insights, enriching observational data.

Photographic evidence was discreetly captured to supplement observations, ensuring privacy and ethical standards. Voice notes were recorded to document observations, reflections and key findings, facilitating real-time data sharing and collaborative analysis within a dedicated WhatsApp group. Detailed field notes were maintained to capture contextual information and researcher reflections throughout the fieldwork. All collected data were shared within the WhatsApp research group for accessibility in Nigeria and subsequently transferred to a shared Google Drive for the project. A stringent data management plan was implemented to regulate access, ensure data security and enhance research transparency and rigour.

3.3.3 | Semi-structured interview

Participants recruitment

We conducted semi-structured interviews with active app users to deepen our understanding of user engagement with the Cowry Travel mobile app and complement the ALARA model. This qualitative approach aimed to uncover rich, nuanced insights into users' experiences, perceptions and challenges related to the app. Recruitment efforts were diversified across social media platforms, WhatsApp groups, and research team personal contacts to ensure a broad pool of potential participants. Eligibility criteria were established to include individuals above 18 years old, residing in Lagos for at least 1 year, possessing the Cowry travel card, having downloaded the Cowry mobile app, and providing evidence of using the app for at least five journeys.

We did not aim for a specific number of participants or target a particular group. Instead, we invited individuals to fill out a form if they were interested in participating, promising to follow up with them. Some of the 62 people who responded and showed interest were excluded from the final sample. Exclusions were based on factors such as residential location (not living in Lagos), being below the stipulated age limit, inability to provide evidence of Cowry card usage, and unavailability for the interview. Managing the selection process and inquiries was challenging, especially as they came from various sources where we shared the call for participants. To streamline this, we created an online form to collect and collate the information of interested individuals, separate from the final list of participants. Additionally, verifying participant eligibility and managing inquiries to ensure every interested individual was noticed posed significant

TABLE 1 Demographic characteristic of semi-structured interview participants.

Demographic characteristic		Number of participants	Percentage
Gender	Male	25	53.2%
	Female	22	46.8%
Age Group	18–25 years old	15	31.9%
	26–35 years old	20	42.6%
	36–45 years old	10	21.3%
	46+ years old	2	4.3%
Residence in Lagos	Less than 1 year	3	6.4%
	1–5 years	10	21.3%
	6–10 years	12	25.5%
	11+ years	22	46.8%
Education Level	Secondary School	5	10.6%
	Bachelor's Degree	30	63.8%
	Master's Degree	10	21.3%
	Doctorate/Ph.D.	2	4.3%
Occupation	Student	8	17%
	Employed	30	63.8%
	Self-employed	5	10.6%
	Unemployed	4	8.5%
Number of Journeys with App (per week)	5–10	15	31.9%
	11–20	20	42.6%
	21–30	8	17.0%
	31+	4	8.5%

challenges. Ultimately, we successfully conducted interviews with 47 participants, resulting in a response rate of approximately 75.8%.

Data collection

A semi-structured interview guide was developed with the research team, drawing insights from literature review and ethnography studies. The guide included open-ended questions addressing various aspects of user experiences with the Cowry Travel app. The interview protocol underwent a rigorous piloting process with six participants not included in the final sample. This pilot phase refined the questions' length, comprehension and arrangement to ensure validity and reliability. Research assistants received training on techniques to foster rapport with participants and manage interview dynamics, addressing potential biases or power differentials during the process.

Interviews were conducted between January and February 2024. Trained research assistants who had previously engaged in the ethnography study conducted face-to-face interviews at mutually convenient locations agreed upon by participants and assistants. Before interviews, participants were presented with informed consent forms detailing the study's purpose, procedures and confidentiality measures, ensuring ethical considerations were strictly followed. A total of 47 participants were interviewed and selected based on the outlined eligibility criteria. Table 1 presents the demographic information of the participants. Data saturation was achieved when no new themes or insights emerged from the interviews, indicating a comprehensive

understanding of the topic. Interviews were audio recorded and transcribed, ready for analysis. The interview guide used during data collection is provided in Appendix 2 for transparency and reference. Participants were compensated for their time and contribution to the study with mobile phone credits, acknowledging their involvement and ensuring fairness in the research process.

3.4 | Data analysis

The data analysis process was conducted using NVivo12, employing Deductive qualitative analysis based on EKB and following Braun and Clarke's (2006, 2016, 2019) six phases of thematic analysis. The analysis began with consolidating visit notes, ethnography study data and interview transcripts into NVivo for thematic analysis. Following the five stages of the EKB theory, the approach prioritised interpretation over identification-focused coding methods, allowing dynamic themes to emerge. Initial codes were generated based on familiarisation with the data, and child nodes were formed through iterative review and collation. Themes were refined through constant comparison and triangulation, resulting in five main themes addressing the research objectives comprehensively. This deductive approach ensured rigour and validity, enhancing the coherence and focus of the analysis while uncovering key insights into users' attitudes towards the mobile app.

3.5 | Data credibility

Considerable effort was dedicated to ensuring the credibility and rigour of the research data. Firstly, ethical approval was obtained and stringent ethical measures were implemented to prioritise the safety and privacy of participants (Kaur et al., 2022). Ethical guidelines were strictly followed throughout the study, preserving participants' anonymity and privacy and securing informed consent prior to any data collection activities. Cultural norms and sensitivities were respected to ensure respectful engagement with participants and responsible use of photographic evidence. A robust data management plan was established to restrict access to authorised research team members, safeguarding the data's integrity and confidentiality (Mogaji et al., 2024).

Research assistants underwent comprehensive training sessions to enhance their contribution to the research and mitigate potential risks. Regular team meetings facilitated discussions on research progress, analysis and findings, ensuring alignment and collaboration amongst team members. Additionally, member checks were conducted with interview participants to validate the accuracy of transcripts and ensure they reflected participants' thoughts accurately. Reflexivity was maintained through critical reflection on personal biases, assumptions and preconceptions throughout the study, promoting transparency and enhancing the validity and reliability of the findings (Farinloye et al., 2019).

Triangulation of data sets from the ALARA model, ethnography and semi-structured interviews were employed further to enhance the validity and reliability of the findings, strengthening the credibility of the research outcomes (Farquhar et al., 2020). By integrating multiple data sources, the study offered a more comprehensive understanding of the research topic, minimising the potential for bias or misinterpretation. This approach ensured that the findings were robust and trustworthy, contributing to the overall credibility of the research.

3.6 | Findings

Thematic analysis of the qualitative data aligns with the five themes of the EKB theory, revealing insights into consumer behaviour towards a new transport mobile app technology in Lagos, Nigeria. Each theme is discussed with relevant participant quotes.

3.6.1 | Awareness of the technology

The mobile app is coming at the back of the existing physical contactless card; as observed during the ALARA information search, the mobile app shares the same brand identity design as the existing card, which allows for easy recognition and awareness of this mobile app. As of March 2024, the app has 100K+ downloads on the Google Play store, and on the App Store, the app has 3.8 ratings from 38 ratings. Evidence collected during the ethnography study and the interview

indicates that participants exhibited varying levels of awareness and familiarity with the Cowry mobile app, reflecting the diverse technological landscape of Lagos, Nigeria.

While some respondents embraced the novelty of the app and its potential to streamline transportation payments, especially the young participants and tech-savvy participants who are educated and conversant with technology and eager to explore this technology, others expressed scepticism and hesitancy towards adopting unfamiliar digital platforms, especially about the inwardness of paying with a mobile phone, downloading a QR code to scan and the idea that they are getting used to the new card. One participant said: *We are just moving away from cash, and we are going contactless with Cowry cards, and now we have to be using the mobile app.*

The awareness was further enhanced with social media, where the TAP, the organisation responsible for promoting this card, is also creating content on social media to raise awareness about the mobile app. As identified during our ethnographic study, the information about this mobile app is also available around the bus stops, where passengers are reminded about the new mobile app and asked to download it. The involvement of the government, particularly through its agency, Lagos Metropolitan Area Transport Authority (LAMATA), is lending credibility to this idea. Their support has not only helped to legitimize the initiative but has also increased public awareness of the mobile app, especially as it promotes the idea of using it as the only payment option. All our participants were aware of this app; 35 of them mentioned engagement on social media, 39 mentioned they had seen posters and marketing communications around the bus stops and 27 reported that the agent at the bus stop selling the physical card has mentioned the mobile app to them, telling them they can download it to monitor their journey and transactions.

3.6.2 | Information search about the mobile app

Upon encountering the Cowry mobile app, participants engaged in active information-seeking behaviours to understand its functionality and benefits. Evidence from our ALARA information search identified various comments and questions on social media, especially Facebook and X (formerly Twitter), where they are asking the company for some information about the app. People who had even downloaded it were leaving comments on the App Store to seek assistance and get information about the practicalities of this technology. One said—*Why am I unable to create an Account after filling up the passwords and all*, while another reviewer (King Lamarr, 09/07/2023) shared their frustration, saying:

The update you did today, 7/Sept/2023, wiped my user data. I had 5+ cards on the account with over 1k on it. I tried logging in this evening around 4 PM, and it could not recognise my account. I had to create another one using the same details. Had to buy a new card and load new funds This is theft and robbery, and I might sue you people.

The limited engagement from the company on these social media platforms presenting any issues and access to reliable information proved challenging; many participants shared their concerns about the limited access to information. One participant said: *I do not know the fuss about this mobile app because they need more time to answer when we ask them.* Another participant is in their defence: *They may be overwhelmed with many Lagosians who are not used to this technology and now ask questions regularly.*

We also found evidence of limited guidance available at kiosks and online platforms. While at the kiosk, available around the bus stop, assistance is often provided to those with a physical card. During our ethnography fieldwork, we heard one Kiosk assistant say to the customer: *I do not deal with the mobile app; you must go online and ask them questions.* This consumer appeared confused and needed help understanding the context of 'go online' to seek information about the mobile app. This experience was corroborated by one of the participants who said: *I ended up using my card because this technology [the mobile app] is not convenient.* Another participant seemed to come to their defence, saying: *You need to join the conversation online, tweet at them and leave a comment on Facebook, and they can follow up.*

This comment raises a significant concern about the expected level of customer service to expect from this company, or perhaps the Lagos commuters should just be grateful for the minimal services being offered. We found that this gap in support services led to frustration and uncertainty amongst users, highlighting the importance of accessible customer support channels and user-friendly instructional materials to facilitate seamless onboarding and usage. This app is an emerging technology, and consumers are trying to get used to the technology. They are shaping consumer behaviour about whether and how to further engage with the technology.

3.6.3 | Evaluating alternatives to the mobile app

As earlier iterated, the mobile payment app is a third-generation innovation for commuters in Lagos. They started using cash payments on public transport, then moved to using physical cards and then to this mobile app. Participants are navigating a range of alternative payment options as they deal with the presence of this technology. They are exploring traditional cash transactions, and even though that is not allowed, many participants shared their frustration. During our ethnographic study, we found people trying to offer the driver cash because their app was not working and they did not have their card; they felt further frustrated when the driver told them that BRT does not collect cash. One of the frustrated passengers shouted as she left the bus—'Which kind of Lagos is this!' highlighting how consumers are considering changing their behaviour to address the emerging technology being integrated into their transport system.

Some participants indicated that they use other transportation modes, allowing them to use cash as they need to move around. One participant justified her evaluation for alternative modes of transportation and payment, saying: *The BRT only accepts the card and the*

mobile payment, and they are not even within my area, so I often end up using my cash on Danfo. In addition, many commuters also said they explored shared mobility as they dealt with this emerging technology within the Lagos transport landscape, with participants saying they use Uber and Bolt. Even though it might be expensive, they feel it helped them overcome embarrassing situations. One passenger—male, educated, lived in Lagos for over 5 years and takes more than 15 trips in a week shared his experience:

I had a meeting on the Island, and I was going to use the BRT, but I couldn't get my QR code to work from the app. It was very frustrating and embarrassing. I was at the bus stop, and I had to use Uber, which is another technology. So, while I didn't want to use this mobile app, I ended up using another mobile app.

While some individuals preferred familiar payment methods, others embraced the convenience and potential cost savings the Cowry mobile app offers. Many participants were pleased and optimistic about their experiences using the card, saying they are enjoying it and the app has become a better alternative to their travel struggles; many believed this technology has a huge prospect and the possibility of integrating many other options. One participant—female, educated, lived in Lagos for more than 11 years said:

I am happy with the mobile app as it has enhanced my financial planning and expenses, better than using 'Danfo' (buses). I think it's here to stay. Like every technology, we struggle with it at first, but there is no alternative now, so we must make sure it works.

Notwithstanding these evaluations, our ALARA information search highlights the concerns about technological reliability and compatibility with existing infrastructure influenced users' decisions, underscoring the importance of addressing perceived barriers to adoption.

3.7 | Engagement with the mobile app

Building upon those who have benefited from the app and are very conversant with it, they demonstrate varying enthusiasm and commitment. For early adopters and tech enthusiasts, the app provided a seamless and intuitive platform for managing transportation payments, accessing additional services and monitoring transaction history. One participant shared his praise for the app: *This is the power of technology and innovation; who says we cannot get something right in Lagos? I can see my expenses for transportation; that is unprecedented.* A review on Apple app store said—*The Cowry app is so navigable. And I love how it facilitates seamless payment for transportation. Thumbs up to the team.*

There are fears about access to data and security on the platform, as one reviewer on the App Store said—*This app can be hacked easily,*

and your bank would read negative. Seven participants highlighted the prospects of data analytics on the platform; these consumers feel their engagement is offering a large dataset for the company and, therefore, highlight concerns about managing the process. One of these participants said:

These guys [TAP] are just keeping quiet and not saying anything about the amount of data that they are collecting about Lagosians. We, as Lagosians and commuters, are also just keeping quiet about how they use our data, but I think it's important for everyone to start monitoring the engagement, asking questions, and reflecting on what to do about the data.

Engagement with the mobile app is not always positive due to technical glitches and usability issues, underscoring the need for ongoing refinement and user feedback. A customer review on the Apple App Store criticised the need to visit a terminal—'I do not like the fact that I have to visit the terminal to transfer from wallet to card and the customer service for transactions above 10k'. These concerns highlight users' frustrations with the app's reliance on service kiosks, especially when the app should ideally function independently. Another customer echoed this sentiment, questioning why assistance is required for using a mobile app that operates autonomously from physical cards. She said—'If it is a mobile app, let it be; why should I still need assistance to use the app when I am not using a physical card?'

Eight consumers shared their concerns about the lack of consistency and the assurance that the technology will always work when needed. One passenger shared her experience, saying: *You fear this app will not work, and then it works. I have had issues with it, and it became embarrassing; thank God I have my card with me.* This vignette indicates how consumers are trying to manage the situation, especially benefiting from having both physical cards as a backup in case the mobile app does not work.

3.8 | Post-engagement evaluation of mobile app

Following initial interaction with the Cowry mobile app, participants reflected on their experiences and expressed cautious optimism about its potential to transform transportation payments in Lagos, Nigeria. Many participants believe that the card payment will be a long-lasting option and not mobile payments; one participant shared his prediction, saying: *Lagosians will not use the mobile app; they will only have it as a backup and use the card as the main thing*, he further went on to say: *from my experience and engagement with this app we will use the card and have the mobile app to get insight into our journey.* Another participant shared this sentiment upon post-engagement evaluation, saying:

The mobile app will only be a repository for data, which both the consumers and the company will use for data analytics to capture what the real physical card

is doing. I think this way, we can have both payment options and let them complement each other.

While acknowledging the app's innovative features and convenience, concerns about data security, technical support and compatibility with existing payment infrastructure persisted. Seventeen participants shared their fears about whether and how the government can track them based on how they use the app. One participant said: *Our mobile phones have got Bluetooth, and who knows, many of us have agreed to terms and conditions that we should be tracked, and who knows if the government will be tracking us with this mobile app.* Another person also corroborated this fear: *I do not think the government can track us with the card, but I am afraid of the mobile app. I have used it, and I know the amount of generated data.* However, one participant offered reassurance, saying that *Lagos is not that sophisticated; we cannot be tracked by using the mobile app.* Another person said: *The benefit of the card is that the government can track us and give us discounted transport, which we cannot get using Danfo, so it is another catch.*

Additionally, cultural preferences and trust in traditional payment methods influenced users' willingness to embrace the mobile app fully, indicating the importance of addressing socio-cultural factors in technology adoption strategies. Many consumers still need to be connected with their cash, saying it is important to know how things are going with their money. However, upon evaluation of this emerging technology, 16 consumers fear that technology will be the way forward. They may have to adjust and get used to the technology, especially the contactless card, not the mobile app.

Overall, the results align well with the EKB theory of consumer behaviour. Table 2 summarises the key themes, descriptions and sub themes, exploring how consumers engage with newer technology. These findings offer valuable insights into consumer behaviour towards a new transport mobile app technology in an emerging economy like Lagos, Nigeria. By understanding the nuanced preferences, challenges and opportunities shaping user perceptions, policymakers, businesses and technology developers can design more inclusive and user-centric solutions to drive widespread adoption and usage.

4 | DISCUSSION

In the dynamic landscape of an emerging economy like Lagos, Nigeria, understanding the varying levels of technology adoption amongst consumers is critical (Abdulquadri et al., 2021; Balakrishnan et al., 2021; Mogaji & Nguyen, 2024). While some readily embraced high-tech solutions, others exhibited hesitation or scepticism due to socioeconomic challenges (Sheth et al., 2024). Our study focuses on mobile payment app adoption within the transportation sector, aiming to profoundly understand the socioeconomic factors shaping technology adoption experiences.

Aligned with EKB, our findings advance theoretical understanding of consumer behaviour in the digital age, especially in emerging economies (Kaur et al., 2023; Ndemo & Weiss, 2017). Awareness of

TABLE 2 Summary of the key themes, description and the sub themes.

Key theme	Description	Sub themes
Awareness of the Technology	Awareness varies amongst participants, influenced by brand recognition, attitudes towards digital platforms, promotional efforts and governmental involvement, shaping adoption dynamics.	Brand Identity and Recognition Diverse Levels of Awareness Influence of Marketing Governmental Support
Information Search about the Mobile App	Participants actively sought information about the mobile app but faced challenges due to limited company engagement on social media and inadequate guidance at physical kiosks.	Active engagement in information seeking Limited engagement from the company on social media Inadequate guidance at physical kiosks Frustration with customer support services
Evaluating Alternatives to the Mobile App	Explores the diverse payment alternatives sought by users amidst challenges with mobile payment apps, emphasising their navigation through various options and concerns regarding technological reliability and compatibility.	Navigation of Alternative Payment Methods Use of Cash as a Preferred Option Adoption of Shared Mobility Services Mixed Attitudes Towards Mobile Payment Apps Addressing Technological Barriers
Engagement with the Mobile App	Varied user responses ranging from enthusiastic adoption and positive experiences to concerns about data privacy, technical glitches and reliance on backup payment methods.	Positive User Experience Enthusiastic Adoption Data Analytics Potential Negative User Experience Backup Reliance User Feedback Importance
Post-Engagement Evaluation of Mobile App	Expressing cautious optimism about its transformative potential, while harbouring concerns about data security, cultural preferences and the future of traditional payment methods.	Preference for Card Over Mobile App Concerns about Data Security Cultural Trust in Traditional Methods Benefits of Government Tracking Adjustment to Technological Shift

the mobile app is influenced by factors such as brand identity design, social media promotions and government involvement, emphasising the importance of marketing efforts and governmental support in promoting technology adoption (Kaur et al., 2023). The information search process reveals consumers' active engagement in seeking information about the app's functionality and benefits (Porru et al., 2020). However, challenges such as limited engagement from the company on social media platforms and inadequate guidance at physical kiosks hinder access to reliable information, highlighting the importance of accessible customer support channels and user-friendly instructional materials (Javid et al., 2021; Schmitz et al., 2016).

In discussing the challenges and opportunities in emerging markets, it becomes evident that infrastructure and connectivity play pivotal roles, as observed in Lagos. Emerging markets frequently encounter hurdles such as limited internet accessibility, varying degrees of smartphone penetration and unreliable power supply. Studies by Mogaji and Nguyen (2024) on the adoption of contactless digital payment technology in Nigeria, Albertus and Makoza (2023) on the COVID-19 contact tracing app in South Africa, and McCampbell et al. (2023) on Rwandan farmers' willingness to adopt mobile applications collectively highlight how these factors hinder the widespread

adoption and operational efficiency of mobile apps. Consequently, addressing these infrastructure deficiencies is crucial for enhancing the usability and reach of mobile apps across diverse regions. Moreover, user trust and security represent universal concerns across emerging markets, as Merhi et al. (2019) and Hinga et al. (2024) reiterated. Users prioritise apps that offer robust data protection measures and transparent privacy policies, regardless of the app's specific functionality (Chaw et al., 2024; Moharrak et al., 2024). Addressing these concerns is paramount for fostering consumer confidence and promoting sustained app engagement in emerging market contexts.

Comparatively, as this study focuses on transport apps, it is imperative to recognise that different types of mobile apps face distinct challenges and opportunities. For example, mobile banking apps encounter challenges related to financial literacy, trust in digital transactions, and compliance with regulatory frameworks, as Nair et al. (2023) noted in their studies on the determinants of mobile banking app adoption. Opportunities lie in leveraging these apps to expand financial inclusion, mirroring the potential of mobile payment apps within transportation sectors. Similarly, messaging and communications apps ensure usability across diverse devices and networks. Challenges include competition from global platforms and adherence to local regulations governing data security and encryption standards

(Mogaji, 2023), shaped by consumers' willingness to adopt and engage with these technologies.

In further contextualising our findings and providing generalizable insights into other types of apps for consumer engagement, it is imperative to recognise the cross-application engagement considerations, including synergies and interoperability. Integrating functionalities across different app categories, such as incorporating payment features into communications apps, enhances user convenience for peer-to-peer transactions and e-commerce activities. For example, in our study, consumers evaluate various payment options, including traditional cash transactions and alternative modes of transportation like Uber and Bolt, reflecting the literature's discussion on consumer decision-making processes and consideration of alternative options in adopting new technologies (Balakrishnan et al., 2021).

Engagement with the app demonstrates varying degrees of enthusiasm and commitment amongst users, with early adopters praising the app's innovative features while others expressed concerns about technical glitches and usability issues (Chowdhury & Van Wee, 2020; Liébana-Cabanillas, García-Maroto, et al., 2020; Liébana-Cabanillas, Japutra, et al., 2020). Post-engagement evaluation highlights consumers' cautious optimism about the app's potential to transform transportation payments, alongside concerns about data security, technical support and compatibility with existing payment infrastructure (Soetan et al., 2021). Beyond just transport, these concerns underscore the potential for apps to complement each other and broaden their utility.

Ensuring a seamless user experience remains critical across all app types (Wayne et al. 2020; Mogaji, 2023; Mogaji & Nguyen, 2024). Challenges related to app reliability, responsiveness of customer support services and intuitive interface design necessitate ongoing refinement to meet user expectations and sustain engagement. Addressing these common challenges through continuous improvement and user-centred design can enhance mobile apps' effectiveness and adoption in emerging markets.

4.1 | Theoretical implications

The study's application of the EKB theory of consumer behaviour underscores its relevance in understanding consumer behaviour towards emerging technology, particularly mobile payment apps, in the transportation sector of developing economies like Nigeria. By leveraging the EKB framework, the research offers a holistic perspective on the stages of the consumer decision-making process, ranging from awareness to post-engagement evaluation, within the socioeconomic context prevalent in such environments. This application enriches theoretical understanding and provides practical insights into technology adoption dynamics in culturally diverse and economically evolving settings.

Moreover, integrating socioeconomic factors into the analysis of technology adoption behaviours aligns with previous research highlighting their significant influence (Abdulquadri et al., 2021; Kaur et al., 2023). By acknowledging the impact of factors such as income

levels, access to technology, cultural norms and infrastructure development, the study provides a nuanced understanding of the interplay between socioeconomic contexts and technology adoption dynamics (Ahn, 2022; Hamouda, 2021; Zolkepli et al., 2021). This integration enhances existing theoretical frameworks by addressing the complex socioeconomic landscape in which technology adoption occurs, offering valuable insights for policymakers and industry stakeholders (Park & Le, 2023).

Furthermore, the study's exploration of consumer decision-making processes in the digital age, within the context of emerging technologies and unique socioeconomic challenges, extends beyond traditional models like the TAM and the UTAUT (Porru et al., 2020; Schmitz et al., 2016). By dissecting stages such as awareness, information search, evaluation of alternatives, engagement and post-engagement evaluation, the research provides a deeper understanding of consumer behaviour in rapidly evolving digital environments (Information 4). This exploration offers actionable insights for policymakers and industry practitioners seeking to promote technology adoption and inclusion.

In summary, the study's theoretical contributions advance scholarly understanding of technology adoption dynamics by applying the EKB framework, integrating socioeconomic factors, and exploring consumer decision-making processes in the digital age (Dewan et al., 2022; Sarkar et al., 2020; Sun et al., 2021). These contributions enrich theoretical discourse and offer practical implications for policymakers, industry practitioners and technology developers to foster inclusive access to opportunities in the digital era, particularly in emerging economies like Nigeria.

4.2 | Managerial implications

The study's managerial implications provide actionable insights for stakeholders across various sectors to enhance adoption, usability and consumer trust in mobile payment solutions globally. By focusing on user-centric design, robust data security, regulatory compliance and community empowerment, stakeholders can foster a conducive environment for digital payment innovation and adoption, driving sustainable growth and inclusion in the digital era.

Urban transportation authorities should develop targeted awareness campaigns that cater to both tech-savvy and less tech-savvy users to enhance awareness of transport mobile apps. Leveraging social media to engage younger users while conducting offline informational sessions for older or less technologically inclined users can bridge the awareness gap. Offering incentives such as free rides or discounts for first-time app users can encourage trial and adoption. Consistent branding across all marketing materials will strengthen recognition and trust in the app, making it a familiar and reliable choice for commuters.

Improving information search capabilities is crucial for user satisfaction. Establishing a 24/7 helpline and integrating robust in-app support features like FAQs and live chat can provide immediate assistance. Comprehensive instructional materials should be readily

available online and at physical kiosks, including user manuals and video tutorials. This will help users navigate the app more effectively and address common issues, reducing frustration and fostering a positive user experience.

Enhancing the app's reliability and providing backup options can address user concerns about technological reliability. Regular updates to fix bugs and improve performance, along with developing an offline mode for transactions without active internet connectivity, will boost confidence in the app. Promoting physical cards or alternative methods as backup options and exploring partnerships with other payment platforms to offer multiple payment methods within the app will ensure users have flexible and reliable payment options.

Engagement with transport mobile apps can be improved by prioritising user-centric design and robust data security measures. Regular user testing and feedback collection will refine the app's interface and features, making it more intuitive and personalised. Transparent communication of data handling practises and adherence to industry-standard security protocols will build trust and alleviate concerns about data privacy and security, encouraging more users to engage with the app.

Finally, addressing socio-cultural factors and fostering ongoing user education are essential for long-term adoption. Hosting regular workshops and webinars to educate users about the app's features and benefits and establishing a continuous feedback loop will keep users informed and engaged. Engaging with community leaders and organisations to address cultural concerns and promote the benefits of digital payments will build trust and drive adoption. Trust-building initiatives, such as showcasing success stories and providing guarantees for data privacy and security, will further enhance user confidence and commitment to using transport mobile apps.

5 | CONCLUSION

This research delves into consumer behaviours regarding emerging technology, specifically focusing on mobile payment app adoption in Lagos, Nigeria—an emerging economy. Applying EKB, the study explores various decision-making stages, integrating socioeconomic factors to understand technology adoption dynamics. Despite contributions, limitations exist: the study's context specificity may limit generalizability, qualitative methods may restrict quantitative measurement, and the timeframe might overlook long-term trends.

It is essential to acknowledge the limitations regarding the generalizability of our findings due to the study's focus on a specific mobile app within a defined socioeconomic context. The observations and conclusions drawn from this study are primarily based on the behaviours and perceptions of users interacting with the Cowry mobile payment application in Lagos, Nigeria. While efforts were made to ensure the sample's representativeness within this context, caution should be exercised in extending these findings to other mobile apps or geographical regions without considering their unique characteristics and user dynamics. The study emphasises a nuanced understanding of consumer behaviour within the specific parameters of the Cowry

app's functionalities and the socioeconomic conditions prevalent in Lagos.

Future research endeavours can strengthen the validity and applicability of findings by expanding the scope to include diverse mobile applications and contexts. Comparative studies across emerging economies facilitate a broader understanding of mobile payment adoption behaviours, considering varying socioeconomic, cultural and infrastructural factors. Integrating quantitative methods alongside qualitative approaches could provide deeper insights into the quantitative aspects of adoption rates, transaction volumes and user demographics, complementing qualitative findings on user behaviours and perceptions. Additionally, exploring the regulatory frameworks governing mobile payment systems in different regions could shed light on how policy environments influence adoption patterns and user trust.

Furthermore, future studies should extend beyond transportation sectors to examine the broader implications of mobile technology adoption, such as in healthcare, education and retail sectors. Investigating how different sectors adapt and utilise mobile payment technologies could reveal sector-specific challenges and opportunities, contributing to a more nuanced understanding of technology's impact across diverse domains. By addressing these avenues, future research can enhance scholarly knowledge and inform policymakers, industry stakeholders and technology developers on strategies to foster inclusive and sustainable adoption of emerging technologies in developing contexts.

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CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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APPENDIX 1: ETHNOGRAPHIC FIELDWORK GUIDE

Note

- *Observing consumers engagement with contactless digital payment technology on public road transportation.*
- *Please take fieldnotes (written), voice notes (audio) and photographic (visual) evidence of your observations.*
- *Data collection for three weeks on different journey at different time across the city.*

At the bus terminal

- Observe people buying their new card.
- Observe people using the service of the sales agents.
- Observe incidence of cash payment (through sales agent) for contactless digital payment.
- Observe The integral role of sales agents.
- Take note of artefacts for the contactless digital payment technology.
- Take note of the location/height of terminal.
- Look out for any possible struggles or challenges with the technology.
- Observe people not sure of how to use the card.
- Observe people with using the card with confidence.

On board

- Any struggle to tap and touch the card readers.
- Observe anyone checking the card reader, for possible deductions.
- Observe anyone scanning the QR code.
- Watch out for the role of driver in educating commuters.
- Any incidence of combination of cash and card payment on the journey?

Alighting

- Observe any consumers' struggle with how to touch out.
- Observed lack of awareness about the technology, consumers not sure of what to do.
- Take note of available support at the terminals.

APPENDIX 2: INTERVIEW GUIDE: EXPLORING CONSUMER ENGAGEMENT WITH THE COWRY MOBILE APP

Introduction

Thank you for participating in this interview. We're interested in understanding your experiences and perceptions regarding the Cowry mobile app for transportation payments in Lagos, Nigeria. Your

insights will help us gain valuable understanding of consumer behaviour towards this emerging technology.

Awareness of the technology

1. How did you first become aware of the Cowry mobile app?
2. What level of familiarity do you have with the app's features and functionality?
3. Have you encountered any challenges or concerns regarding the app's usability or adoption?
4. How do you think the app's design and branding contribute to its recognition and awareness among users?

Information search about the mobile app

1. When you first encountered the Cowry mobile app, what steps did you take to learn more about it?
2. Have you sought information about the app from social media platforms or online forums?
3. Can you share any experiences or difficulties you encountered while searching for information about the app?
4. How do you perceive the availability and accessibility of support services or instructional materials for using the app?

Evaluating alternatives to the mobile app

1. What other payment methods or transportation options have you considered or used alongside the Cowry mobile app?
2. Have you encountered any challenges or limitations with using the app compared to traditional payment methods?
3. How do you evaluate the convenience and reliability of the app in your daily transportation activities?
4. What factors influence your decision to continue using or exploring alternatives to the Cowry mobile app?

Engagement with the mobile app

1. Could you describe your overall experience and satisfaction level with using the Cowry mobile app?
2. How do you perceive the app's role in facilitating transportation payments and managing your expenses?
3. Have you encountered any technical issues or concerns while using the app?
4. Do you have any suggestions or feedback for improving the app's functionality or user experience?

Post-engagement evaluation of mobile app

1. Reflecting on your interactions with the Cowry mobile app, what are your thoughts on its potential impact on transportation payments in Lagos?

2. How do you perceive the app's security measures and data privacy practices?
3. What cultural or socio-economic factors influence your willingness to embrace or trust digital payment technologies like the Cowry mobile app?
4. Based on your experiences, what recommendations would you offer to enhance the adoption and usability of the Cowry mobile app?

Conclusion

Thank you for sharing your valuable insights with us. Your feedback will contribute to our understanding of consumer engagement with the Cowry mobile app and inform future developments in transportation payment technologies. If you have any additional comments or questions, please feel free to share them.