Final report GHA-25349 March 2026

The use of digital tools among street hawkers: An explorative study

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Abstract

Despite near-universal mobile phone ownership, digital technology use for business purposes remains strikingly low among urban street hawkers. This paper examines the extent, determinants, and barriers to the adoption of digital tools among 83 street hawkers in Accra, Ghana, using original survey data. While 95.2 percent of respondents own a mobile phone and 80.7 percent hold a mobile money account, active use of digital tools for marketing, financial transactions, and record-keeping is far less common, particularly among female hawkers. Linear probability model estimates across three adoption margins (digital marketing, digital communication, and digital finance) reveal that the mechanisms driving non-adoption differ systematically by activity type. Sector composition and smartphone ownership are the primary predictors of digital marketing adoption; age-linked network accumulation drives digital communication; and education, network quality, and sector-specific transaction protocols govern mobile money use for business. A large raw gender gap in digital engagement is fully accounted for by observable structural characteristics, notably older age profiles, food-sector concentration, and lower secondary education rates among female hawkers, rather than by gender per se. Self-reported behavioural deterrents, such as fear of fraud and low digital confidence, carry little independent explanatory power once structural covariates are controlled for. The findings suggest that effective digital inclusion policy for this segment of the urban informal economy requires sector-targeted and capability-sensitive interventions, rather than generic digital literacy campaigns or infrastructure provision alone.

Keywords: digital technology adoption; mobile money; street hawkers; informal economy; Ghana; gender gap; linear probability model

1. Introduction

Why do potentially beneficial technologies fail to diffuse among the economic agents who stand to gain most from them? This question lies at the heart of a large body of literature in development economics, spanning agricultural technology adoption, microfinance, and management practices in small firms. Yet it remains unresolved for an important class of economic actors: the urban street hawker. In sub-Saharan Africa, millions of people rely on mobile street trading as their main livelihood, operating with little capital, no fixed storefront, and almost no access to support from formal institutions (Addi et al., 2024; Cummings, 2022; Uwamahoro & Khoo, 2025). At the same time, the rapid expansion of mobile phone networks and digital financial services has placed potentially transformative technologies within reach of even the most economically marginal workers. The puzzle, then, is not one of access alone. It is a deeper economic and behavioural question: given that digital tools such as mobile money, messaging applications, digital record-keeping, offer demonstrable reductions in transaction costs, information frictions, and financial exclusion, what explains the persistent gap between potential adoption and actual use among street hawkers?

This puzzle has an important structural dimension that distinguishes street hawkers from other segments of the informal sector studied in prior work. Standard models of technology adoption predict that agents adopt when expected benefits exceed costs (Bakhshi et al., 2024; Devi et al., 2025; Ligon et al., 2019; Nandru et al., 2023). For fixed-location micro-enterprises, even modest improvements in transaction efficiency or customer reach can generate measurable returns sufficient to justify adoption costs (Jolevski et al., 2025; Soman et al., 2024). However, street hawkers face a fundamentally different cost structure. Their hyper-mobile operating model means that the opportunity cost of engaging with digital tools, time spent learning interfaces, managing failed transactions, or navigating unreliable network coverage, is disproportionately high relative to the thin margins and rapid transaction cycles that define their trade. Moreover, hawkers operate in an environment characterized by layered uncertainty: uncertain income streams, uncertain regulatory enforcement, and uncertain reliability of digital infrastructure. Under these conditions, behavioural economics predicts that loss aversion and status quo bias may dominate even when expected net benefits are positive, producing persistent under-adoption that cannot be explained by structural constraints alone.

A second dimension of the puzzle concerns heterogeneity. If structural barriers such as device costs, data costs, poor network coverage were the primary obstacle to digital adoption, we would expect relatively uniform non-adoption among hawkers with similar income levels and operating contexts. However, existing evidence from micro-enterprise surveys consistently finds that adoption of productivity-enhancing technologies is highly heterogeneous even within narrowly defined groups of similarly constrained firms (McKenzie & Woodruff, 2016). This heterogeneity suggests that individual-level factors like the human capital, entrepreneurial capability, social learning, and trust, interact with structural constraints in ways that produce large variation in technology use. Understanding which of these factors dominates, and how they interact, is

essential for designing effective policy interventions. Yet, for street hawkers specifically, we lack even basic empirical evidence on the distribution of digital technology use, let alone its determinants (Danquah & Owusu, 2021; Ebrahim & Berg, 2024).

A third dimension concerns the implications of non-adoption for longer-run economic outcomes. The development economics literature on financial inclusion demonstrates robust links between access to digital financial services and improvements in household resilience, consumption smoothing, and small enterprise growth (Chaisiripaibool et al., 2025; Dey, 2025; Trotta et al., 2025) (Jack & Suri, 2014; Suri & Jack, 2016). If street hawkers remain systematically excluded from digital adoption—whether due to structural, behavioural, or capability constraints—they may face a compounding disadvantage as economic activity increasingly migrates to digital platforms. This concern is particularly acute in urban African economies, where rapid digitalization of payments, supply chains, and customer communication risks widening the gap between digitally integrated micro-enterprises and those left behind. Understanding the mechanisms driving this exclusion is therefore not only of academic interest but also carries direct implications for the design of inclusive digital transformation policies.

This paper addresses these questions by examining the extent and determinants of digital technology use among urban street hawkers in Accra, Ghana. We investigate three related questions: First, what types of digital tools do hawkers currently use in their business activities, and with what intensity? Second, what combination of structural, infrastructural, and behavioural constraints explains the gap between potential and realized adoption? Third, what observable characteristics—education, age, business scale, smartphone ownership—predict digital engagement, and through what mechanisms? By focusing on one of the most economically marginal and mobile segments of the urban informal economy, the study contributes new empirical evidence on a form of technology non-adoption that is quantitatively significant but poorly understood.

The findings contribute to three intersecting strands of development economics. First, the paper extends the literature on technology adoption among microenterprises by examining a population, highly mobile urban hawkers, whose operating conditions generate adoption constraints qualitatively distinct from those faced by fixed-location informal firms. Second, it contributes to the growing empirical literature on digital financial inclusion by providing evidence on the behavioural and structural mechanisms through which the most vulnerable informal workers remain excluded from digital systems. Third, it provides context-specific evidence from Ghana that speaks to a broader debate about whether digital transformation in developing economies complements or displaces the livelihoods of the urban poor. The remainder of the paper proceeds as follows: Section 2 reviews the relevant literature; Section 3 presents the theoretical framework; Section 4 describes the Methods; Sections 5 and 6 report results; and Section 7 presents the summary and conclusion.

2. Literature Review

2.1 The Economics of Technology Adoption: Persistent Non-Adoption as a Puzzle

The failure of economically beneficial technologies to diffuse rapidly among potential adopters has long been recognized as a central puzzle in development economics. In canonical models of technology adoption, firms or individuals adopt when the discounted expected return from adoption exceeds its cost (Foster & Rosenzweig, 2010; Uwamahoro & Khoo, 2025). If this model were sufficient, we would expect adoption to be near-universal for technologies that deliver clear net benefits at prices accessible to target users. Yet systematic non-adoption of profitable technologies is extensively documented across agricultural inputs, management practices, health products, and financial instruments in developing countries (Banerjee & Duflo, 2007; Bisheko & Rejikumar, 2023; Chowdhury et al., 2022; Giné & Yang, 2008; Kos et al., 2022; Mel et al., 2008). This literature has increasingly moved away from structural explanations, upfront cost, credit constraints, as complete accounts, and toward a more complex picture in which information frictions, behavioural biases, and heterogeneity in returns interact to produce patterns of adoption that are difficult to reconcile with simple expected-value calculations.

Two insights from this literature are particularly relevant to the present study. First, heterogeneity in returns is pervasive and often large. Even among apparently similar firms facing similar technologies, the distribution of returns to adoption is highly dispersed (Addi et al., 2024; McKenzie & Woodruff, 2016). This implies that aggregate adoption rates conceal significant within-group variation driven by differences in managerial capability, market access, and the ability to complement new technologies with existing resources. Second, behavioural constraints systematically depress adoption below the level predicted by structural factors alone. Loss aversion, status quo bias, and limited attention, particularly under conditions of scarcity and high cognitive load, can cause agents to forgo positive expected-value investments (Mullainathan & Shafir, 2013). For street hawkers operating under extreme resource constraints and high daily uncertainty, these behavioural mechanisms may be especially consequential.

Applying this framework to the adoption of digital technology among urban hawkers reveals a specific theoretical tension. On the one hand, the expected benefits of digital adoption are not trivial: mobile money reduces the costs and risks of cash handling; messaging and marketing applications lower the costs of customer communication and supplier coordination, and enable broader reach; digital record-keeping tools can improve financial management and support access to credit (Malek, 2024). On the other hand, the cost structure facing a street hawker is qualitatively different from that facing a small shop owner or agricultural household. The time cost of learning and maintaining digital tools (Aryeh-Adjei et al., 2025), the risk of transaction failures during a high-velocity trading day (Ozili, 2020), and the vulnerability to fraud in environments with limited institutional recourse (Dudu et al., 2024) all raise the effective cost of adoption in ways not captured by standard models. This divergence between the tools available and the specific

operational realities of mobile informal traders generates a theoretically meaningful adoption gap that warrants direct empirical investigation.

2.2 Digital Technologies and Informal Market Efficiency

The potential for digital technologies to reduce market frictions in informal and developing-country settings has been extensively studied. Early work by (Aker & Mbiti, 2010) demonstrates that the diffusion of mobile telephony in African markets improves price discovery, reduces trader search costs, and enhances market coordination. Subsequent research on mobile money platforms, particularly M-Pesa in Kenya, documents welfare-enhancing effects through improved household risk management, consumption smoothing, and business liquidity (Jack & Suri, 2014; Suri & Jack, 2016). These findings establish a strong prior that digital tools can improve the functioning of informal markets. The question for the present study is whether these benefits extend to street hawkers, whose market environment and operational constraints differ substantially from those of the agricultural households and small shop owners typically studied in this literature.

A key distinction concerns the nature of the market frictions at stake. For agricultural households, mobile money primarily resolves problems of geographic distance from financial services and seasonal income volatility (Bair, 2020; Baumüller, 2012). For small urban shops, digital payments and inventory management applications address cash-handling risks and record-keeping gaps (Klapper & Klapper, 2017; Senyo et al., 2022). For street hawkers, the relevant frictions are both financial and informational, but they operate on a much faster timescale and within a more spatially-constrained environment (Sherman & Weiss, 2014). Hawkers engage in high-frequency, low-value transactions with a largely anonymous customer base. Their supply chains are short and informal, typically involving direct purchases from wholesale markets rather than extended supplier relationships (Paché, 2026; Pasquier-Doumer et al., 2017). Their primary constraint is not access to distant markets but rather the ability to manage inventory, maintain customer loyalty, and absorb income shocks within a highly unpredictable daily trading environment (Caunan et al., 2025; Medina et al., 2021). Technologies that reduce friction in agricultural or fixed-enterprise settings may generate much smaller or qualitatively different returns in these contexts, which partially explains why adoption evidence from those settings does not straightforwardly predict behaviour among hawkers.

At the same time, emerging evidence suggests that digital communication tools are reshaping the commercial strategies of some informal urban traders. Studies from Asia document that messaging platforms and digital payment systems enable some vendors to build more stable customer relationships, receive pre-orders, and diversify their market channels (Zhang et al., 2022). During the COVID-19 pandemic, mobile phones and digital platforms enabled many informal entrepreneurs in Ghana and elsewhere to maintain customer contact and coordinate supply during periods of physical market disruption (Oteng et al., 2024). These findings suggest that digital tools are not simply irrelevant to hawkers' business models, but that their adoption is highly contingent

on trader capabilities, trust, and the specific operational fit between available tools and the demands of mobile trading.

2.3 Structural and Behavioural Constraints to Digital Adoption Among Informal Traders

The literature on technology adoption in informal settings identifies two broad classes of constraints that may explain persistent non-adoption (Ebrahim & Berg, 2024). Structural constraints include the upfront and recurring costs of digital tools (device acquisition, data plans, transaction fees), the quality of underlying infrastructure (network reliability, electricity access) (Aryeh-Adjei et al., 2025), and the regulatory environment (including identification requirements for mobile money registration) (Luhanga et al., 2023). Behavioural constraints include perceived risks and trust concerns(Aryeh-Adjei et al., 2025), low confidence in digital skills and limited digital literacy(Aryeh-Adjei et al., 2025).

For street vendors, structural constraints are well-documented. Systematic reviews of the literature highlight that affordability remains a primary barrier, with device and data costs consuming disproportionate shares of hawkers' thin operating margins(Rumanyika et al., 2019). Infrastructure gaps such as unreliable mobile networks, intermittent electricity supply, further raise the effective cost of digital tool use in ways that are difficult to anticipate ex ante and disruptive when they occur during commercial transactions(Rumanyika et al., 2019, 2021). Design-oriented studies in Tanzania demonstrate that many commercially available digital tools fail to match the operational requirements of street vendors because they are built for users with more stable, sedentary business models. These design mismatches mean that even nominally accessible digital services may be effectively inaccessible to highly mobile informal workers.

Behavioural constraints are less extensively studied but theoretically important. Vendors frequently report scepticism about whether digital technologies offer meaningful advantages over cash transactions(Chattopadhyay et al., 2013), a perception that may reflect rational calculation in thin-margin, high-velocity trading environments as much as it reflects a cognitive bias. Concerns about fraud are particularly salient: in markets with weak institutional recourse for digital transaction failures, the downside risk of a fraudulent transaction may loom disproportionately large relative to the efficiency gains from digital payments(Chattopadhyay et al., 2013). The framework of Mullainathan and Shafir (2013) on scarcity and cognitive bandwidth suggests an additional mechanism: traders operating under financial stress and attentional constraint may systematically underinvest in learning new tools, not because expected returns are negative but because the upfront cognitive cost of adoption—learning interfaces, troubleshooting failures, understanding fee structures—appears prohibitively high given competing demands on limited attention. This behavioural mechanism may generate persistent non-adoption even among traders who have adequate device access and could in principle benefit from digital tools.

Social learning and peer effects represent a further mechanism through which both adoption and non-adoption can be self-reinforcing(Currarini et al., 2013). In dense informal market environments, traders observe the behaviour and outcomes of nearby peers, and adoption decisions

are influenced by local diffusion patterns (Foster & Rosenzweig, 2010). Where digital adoption is limited and early adopters are few, the informational externality that drives technology diffusion in other settings may be weak or absent, producing a low-adoption equilibrium that is stable even when the technology itself is beneficial(Civel, 2019). Conversely, where adoption reaches a critical threshold, social learning can accelerate diffusion rapidly(Berger, 2001). Identifying whether Accra's hawker markets are above or below such a threshold, and what individual characteristics predict early adoption, is therefore an important empirical question for both academic understanding and policy design.

2.4 Gender, Vulnerability, and Digital Exclusion

Within the heterogeneous population of urban street hawkers, gender constitutes an important axis of differential digital access and adoption. In Ghana, women constitute a majority of street hawkers in many product categories, and their business operations are often further constrained by domestic responsibilities, limited mobility, and reduced access to financial resources and social networks(Achana & Tanle, 2021; Akuoko et al., 2013). Evidence from the broader literature on digital financial inclusion in sub-Saharan Africa indicates that women are systematically less likely to own smartphones, use mobile money services, or engage with digital platforms, even controlling for income and education (Suri & Jack, 2016). These gaps reflect both structural disadvantages like lower average incomes, reduced access to identity documentation required for digital service registration, and behavioural and social constraints including lower digital confidence and stronger risk aversion in financial decision-making(Ojo, 2023; Saluja et al., 2022).

Recent research on the digitalization of social protection in Africa underscores the risk that digital transformation initiatives may inadvertently deepen gender inequalities if the specific constraints facing women informal workers are not explicitly addressed(Becky et al., 2024). For street hawkers, this concern is compounded by the particular vulnerabilities of mobile trading: women hawkers often operate in higher-risk trading environments, have lower average inventory values, and face greater exposure to harassment and regulatory enforcement(Bhoola & Chetty, 2022; Pallangyo, 2021). These factors may further amplify risk aversion regarding digital adoption, particularly for tools involving financial transactions(Hbibi & Makhrout, 2025; Kaur & Batra, 2023). The present study pays explicit attention to gender as a determinant of digital adoption, recognizing that any policy intervention aimed at expanding digital inclusion among street hawkers must grapple with the specific structural and behavioural obstacles facing women traders.

2.5 Informal Sector Productivity and the Role of Digital Tools

A persistent finding in the literature on informal enterprises is that productivity gaps between formal and informal firms are large, stable, and not easily closed by standard interventions (Porta & Shleifer, 2014). Informal micro-enterprises typically operate with extremely low capital-to-labour ratios, limited access to formal finance, and minimal investment in productivity-enhancing management practices(Ohnsorge & Yu, 2021; Rajput & Sreeraman, 2022). Studies of small firm productivity in developing countries consistently find that relaxing individual constraints, credit

access, business training, technology adoption, generates only modest and often short-lived gains, suggesting that the barriers to productivity improvement are deeply structural and mutually reinforcing (de Mel, McKenzie & Woodruff, 2008).

Against this backdrop, digital technologies have attracted attention as a potential mechanism for breaking informal-sector productivity traps, precisely because they can in principle reduce multiple constraints simultaneously: lowering transaction costs, improving information access, expanding market reach, and facilitating integration into formal financial systems. However, the evidence that digital tools translate into meaningful productivity gains for highly mobile micro-enterprises remains limited(Alharthi & Islam, 2020; Galperín & Viecens, 2017). Most positive evidence comes from fixed-location enterprises or households with more stable income streams(Chen, 2023; Gál et al., 2019). For street hawkers, the causal pathway from digital adoption to productivity improvement is less clear, and the mediating role of operational constraints, capability gaps, and behavioural factors remains largely under-investigated. This paper contributes to filling that gap by providing empirical evidence on the distribution and determinants of digital tool use among hawkers, providing a foundation for future causal analysis of the productivity effects of digital adoption in this population.

2.6 Positioning and Contribution of This Study

The preceding review identifies a central gap in the existing literature: while the economics of technology adoption, digital financial inclusion, and informal sector productivity have each been extensively studied, the specific intersection of these literatures—digital technology adoption among highly mobile street hawkers in urban African economies—remains empirically underdeveloped. Existing work on digital adoption among informal traders focuses predominantly on fixed-location enterprises, missing the theoretically important ways in which mobile trading conditions alter the cost-benefit calculus of digital tool use. Furthermore, while behavioural constraints to adoption are increasingly recognized in the broader literature, their relative importance vis-à-vis structural constraints, and the mechanisms through which they operate, have not been systematically examined for this population.

This study addresses these gaps through a field survey of street hawkers operating across multiple commercial corridors in Accra, Ghana. By documenting the types of digital tools hawkers use, the barriers constraining adoption, and the individual and business characteristics predicting engagement, the paper provides a foundational empirical account of a form of technology non-adoption that is both quantitatively significant and theoretically underexplored. The findings speak directly to the theoretical puzzle motivating the paper: why does a demonstrably beneficial class of technologies fail to diffuse among one of the urban economy's largest and most economically vulnerable groups? Furthermore, they carry policy implications for the design of digital inclusion strategies that are sensitive to the specific operational realities and behavioural constraints of mobile informal workers.

3. Theoretical Framework

The adoption of digital technologies among informal traders can be conceptualized as an investment decision made under conditions of resource constraints, uncertainty, and imperfect information(Hall, 2004). In standard technology adoption models, adoption occurs when the expected net benefit from using a technology is positive:

$Di = 1 \text{ if } E(Bi) - Ci > 0$

where E(Bi) represents the expected benefits of adoption and Ci represents the full costs of adoption and use. This framework, while straightforward, obscures important heterogeneity in both terms for street hawkers specifically.

Expected benefits may arise through several mechanisms. First, digital financial services reduce the costs and security risks of cash-based transactions(Mpofu, 2024; Ozili, 2022). Second, communication platforms lower the cost of maintaining customer and supplier relationships(Maiga et al., 2015; Tomar, 2024). Third, digital record-keeping tools can improve financial discipline and generate transaction histories that facilitate future access to credit(Despard, 2023; Muralidhar et al., 2018). However, the magnitude of these benefits is highly context-dependent and may be substantially lower for hawkers than for fixed-location traders, given the shorter and more anonymous customer relationships that characterize high-frequency street trading.

On the cost side, several components are particularly salient for mobile informal workers. Direct financial costs such as device acquisition, mobile data expenditure, transaction fees, are non-trivial relative to hawkers' operating margins and constrain adoption in ways consistent with standard capital-constraint models(Choruma et al., 2024; Trotta et al., 2025). However, hawkers also face a set of indirect costs that standard frameworks underestimate. The opportunity cost of learning digital systems is high for traders who cannot pause commercial activity to troubleshoot failed transactions. Infrastructure risk like unexpected network failures, electricity outages, or digital fraud, creates a form of operational downside risk that may loom disproportionately large under loss aversion(Seethamraju & Diatha, 2019; Selemela et al., 2023). Moreover, the design mismatch between commercially available digital tools and the specific requirements of mobile trading generates usability costs that reduce the effective benefit of adoption even for otherwise capable users(Tchernavskij, 2019).

Behavioural constraints introduce a further wedge between expected and realized adoption. Under conditions of scarcity and cognitive load, traders may exhibit present bias, systematically discounting the long-run benefits of digital adoption relative to its immediate costs(Wang & Sloan, 2018). Status quo bias may reinforce reliance on cash-based practices even when digital alternatives offer better expected outcomes(Samuelson & Zeckhauser, 1988). And peer effects may generate path dependence in adoption rates(O'Shaughnessy et al., 2023): in low-adoption equilibria, the absence of local role models and the higher perceived risk of being an early adopter further discourage entry. Figure 1 below summarizes these mechanisms and their hypothesized relationships.

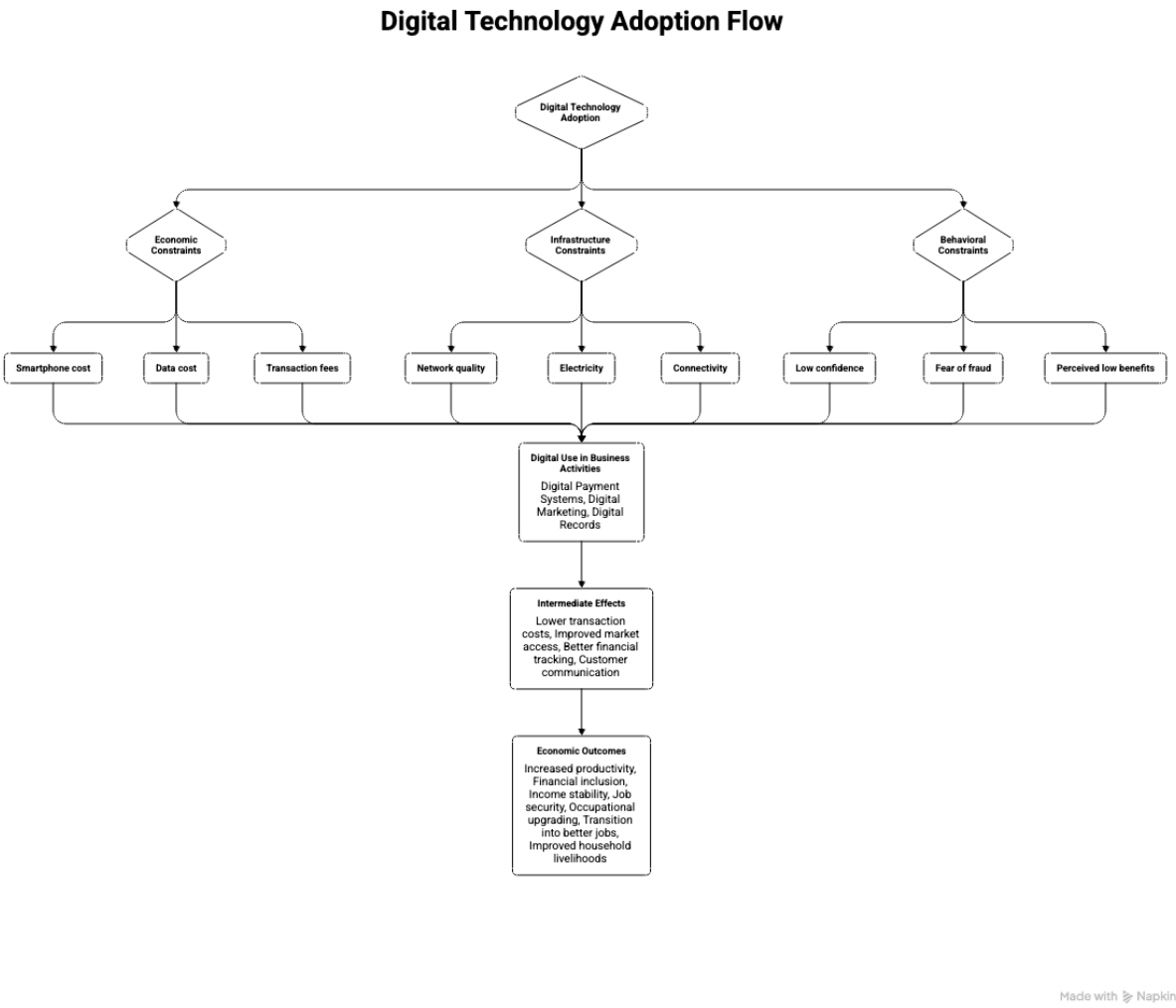

Figure 1Conceptual Framework of Digital Adoption Among Street Hawkers

The framework generates several empirically testable predictions. First, controlling for structural constraints, behavioural factors such as perceived risk, low digital confidence, trust concerns, should independently predict lower adoption probability. Second, human capital variables (education, experience) should positively predict adoption, both through direct capability effects and through their correlation with lower perceived complexity of digital tools. Third, peer effects and social learning should generate spatial clustering in adoption patterns across trading locations. Fourth, gender gaps in adoption should persist even after controlling for structural constraints, reflecting the additional behavioural and social barriers facing women traders. The empirical analysis examines these predictions in the context of Accra's street hawker population.

4. Methodology

4.1 Study Context

Urban informal employment dominates labour markets across sub-Saharan Africa, where formal job creation has not kept pace with rapid urbanization(Bolay, 2019). In Ghana, the informal sector accounts for the majority of employment and provides critical livelihood opportunities for individuals with limited access to formal wage employment(Adei et al., 2021; Anyidoho et al., 2024). Street hawking represents one of the most visible and precarious forms of informal economic activity in urban centres such as Accra(Poku et al., 2024; Sam et al., 2018). Hawkers typically operate without fixed business premises, selling goods along transport corridors, traffic intersections, and densely populated market areas(Amoah-Mensah, 2016; Rukmana & Purbadi, 2012). Unlike formal retail firms, hawkers rely on highly mobile trading strategies, minimal physical capital, and informal supply networks(Mahayati & Rahayu, 2022; Recio, 2019). Their business operations are shaped by intense competition, uncertain demand, and exposure to regulatory enforcement and environmental hazards(Amoah-Mensah, 2016; Armas et al., 2024).

Despite these constraints, street hawking plays a significant role in urban distribution systems by providing convenient access to goods for commuters and residents in high-traffic areas(Ndaba, 2025; Uwamahoro & Khoo, 2025). Hawkers often specialize in fast-moving consumer goods such as packaged food, beverages, mobile phone accessories, and household items (Bhoola & Chetty, 2022; Soneye, 2023). Their operating model differs from that of formal retailers in several key ways: transactions are predominantly cash-based, inventory management is informal, and customer relationships are largely based on repeated face-to-face interactions(Chandra, 2019). However, the rapid diffusion of mobile phones and digital financial services across Ghana has created new opportunities for informal traders to integrate digital tools into their business activities(Acquah et al., 2024; Aryeh-Adjei et al., 2025). Understanding whether and how hawkers engage with these digital tools is important for assessing the potential of digitalization to improve productivity, financial inclusion, and livelihood resilience within the informal sector.

4.2 Data and Sampling

This study relies on primary data collected through a mixed-methods field survey of urban street hawkers in the Greater Accra Region. Data collection combined structured quantitative questionnaires with qualitative in-depth interviews and observational notes to capture both measurable patterns of digital technology use and the contextual factors shaping adoption decisions. The survey was conducted across several commercial and transport hubs within Accra: Accra Central, Tema, Adenta, Lapaz, Madina, Dome, and Okponglo. These areas are major commercial corridors with high pedestrian and vehicular traffic, making them key sites for mobile street trading(Alimo et al., 2023; Dzisi & Appiah, 2026).

A total of 83 street hawkers participated in the survey. Respondents were identified through purposive sampling strategies commonly used in studies of informal economic actors who operate outside formal registries(Mabasa, 2023). Enumerators approached traders in street clusters, at market entrances, and at traffic intersections, where hawkers typically operate. While the sampling strategy does not yield a statistically representative sample of all hawkers in Accra, it is appropriate

for exploratory research aimed at documenting patterns of digital technology use among highly mobile informal traders. It intentionally captures heterogeneity across gender, age, educational attainment, product category, smartphone ownership, business scale, and years of trading experience. Data collection was conducted using mobile-based survey software (KoboCollect), and qualitative interviews were recorded on phone-based audio recorders with respondents' consent.

4.3 Variable Construction

The main outcome is digital technology use in business, such as mobile money, messaging apps, social media, or digital record-keeping for transactions or customer engagement. Key variables include smartphone ownership, perceptions of mobile data costs, network reliability, literacy, and fraud concerns. Additional factors cover business size, trading experience, product type, and perceived benefits of digital tools. These help analyse digital engagement and test the framework's predictions.

4.4 Empirical Strategy

The empirical analysis proceeds in two stages. First, descriptive statistics document patterns of digital technology access and usage across the sample. Second, regression analysis examines the determinants of digital adoption. The baseline specification models adoption probability as a function of smartphone ownership, perceptions of mobile data costs, network reliability, education, age, business size, and a set of controls including gender, trading experience, and product category:

$$DigitalUse_i = \beta_0 + \beta_1 X_i + \varepsilon_i$$

Additional specifications incorporate measures of behavioural constraints such as perceived fraud risk, digital confidence, and trust in digital platforms, to test whether these factors independently predict adoption after controlling for structural determinants. This empirical framework follows the approach of Slinger et al. (2024) and Thaha et al. (2024) in examining the determinants of management practices and technology adoption among microenterprises.

5. Descriptive Statistics

This section presents descriptive statistics characterizing the 83 street hawkers in the sample across four dimensions: sociodemographic characteristics, business profiles and income, digital infrastructure access, and digital tool use and barriers to adoption. Where patterns in the quantitative data are enriched or complicated by the qualitative interviews, cross-references are made to the thematic findings reported in Section 6. The sample includes 40 men (48.2%) and 43 women (51.8%). All statistics are reported for the full sample unless otherwise specified, with gender disaggregation provided where statistically meaningful differences exist.

5.1 Sociodemographic Characteristics of the Sample

5.1.1 Age and Gender

The sample shows notable gender differences in age distribution, with a mean age of about 34 years (SD = 13.2). Male hawkers have an average age of 28.9 years, while female hawkers average 38.6 years—a significant 9.7-year gap at the 1% level ($p < 0.01$). This age difference affects digital adoption, as younger people tend to have higher digital literacy, indicating gender gaps in digital engagement may partly reflect age differences rather than gender itself.

Table 1: Age Distribution by Gender

Age Group	Male (%)	Female (%)	Full Sample (%)
Under 25	32.5	23.3	27.7
25 – 34	37.5	18.6	27.7
35 – 44	20.0	23.3	21.7
45 and over	10.0	34.9	22.9
Mean age	28.9	38.6	34.0

Note: Mean age difference between males and females significant at $p < 0.01$.

Age is evenly spread across four groups: 27.7% under 25, 27.7% 25-34, 21.7% 35-44, and 22.9% 45 or older. Among males, 70% are under 35, showing a younger hawking population. Among females, 34.9% are 45 or older, nearly three and a half times the male percentage (10%), reflecting longer tenure and women's persistence in the trade.

The sample's age composition aligns with qualitative evidence: older female respondents have long hawking histories (e.g., ten or twenty-five years), while younger males see hawking as a recent or transitional activity. This age gap reflects a real structural difference, not a sampling artefact.

5.1.2 Marital Status and Household Structure

Most respondents (60.2%) are never married, but there is a gender divide: 77.5% of men, 44.2% of women. Women are more likely to be divorced or widowed (11.6% vs. 0%, $p < 0.05$; 9.3% vs. 0%, $p < 0.05$). Women urban informal workers often hold primary household responsibilities, affecting digital adoption, as household resource decisions involve childcare and family needs. The average dependents are 3.8 (range 1- 15), with women averaging 4.0 and men 3.6. The mean children count is 1.7 overall, but women report 2.5 children versus 0.8 for men ($p < 1$). This burden explains why female hawkers face greater digital resource demands: One uses her phone for her

child's schoolwork, and another cites childcare as a primary constraint on her work and digital activities.

5.1.3 Education

Educational attainment varies: 22.2% have no or only primary education, 40.7% completed Junior High School, and 37.0% reached Senior High School or higher. Males are more likely to have SHS or above (50.0% vs. 24.4%), while females are more in JHS (46.3% vs. 35.0%).

Table 2: Educational Attainment by Gender

Education Level	Male (%)	Female (%)	Full Sample (%)
No/Low Education	15.0	29.3	22.2
JHS / Middle School	35.0	46.3	40.7
SHS / Tech-Voc / Tertiary	50.0	24.4	37.0

Note: Gender difference in SHS/above significant at $p < 0.05$.

The education gradient in digital adoption predicted by the framework appears in the data. Respondent 12, the most educated (university graduate), shows the deepest digital integration—keeping records, marketing via WhatsApp, and studying entrepreneurship digitally. Respondent 14 (SHS graduate) also has significant digital engagement. Conversely, Respondent 15, with only primary education, cites her digital literacy gap as a barrier. Yet, Respondent 13, with no formal education but an active digital marketer, highlights that education isn't always necessary for digital adoption. Product logic and peer observation can encourage adoption regardless of formal schooling.

5.1.4 Migration Background

Migration characterizes the hawker population. About 50.6% are long-term residents (over five years), 26.5% are intermediate migrants (two to five years), and 22.9% are recent arrivals (under two years). Females are more likely to be long-term residents (60.5% vs. 40.0% for males, $p < 0.1$), indicating women tend to stay longer in hawking.

5.2 Business Profile and Income

5.2.1 Business Ownership, Sector, and Working Patterns

Most respondents (80.5%) run their own businesses, with males (87.2%) more likely than females (74.4%). Product sector composition shows pronounced gender segregation: women mainly sell food, fruit, and drinks (72.1%) while men dominate clothing, fashion (32.5%), electronics accessories (17.5%), and household goods (32.5%). No women sell phones or electronics. This

segregation is statistically significant and impacts digital adoption: visually appealing products like clothing and branded stands are ideal for photo-based marketing, whereas commodity food items are less suitable. The gender gap in digital marketing partly reflects product-sector segmentation rather than gender ability differences.

Table 3: Product Sector Distribution by Gender

Sector	Male (%)	Female (%)	Full Sample (%)
Food, Fruits, Drinks, Snacks	17.5	72.1	45.8
Clothing and Fashion	32.5	16.3	24.1
Phones and Electronics	17.5	0.0	8.4
Household and Personal Items	32.5	11.6	21.7

Note: All sector differences between males and females are significant at $p < 0.01$ or $p < 0.05$.

Male respondents work more days per week (6.1 vs. 5.6 for females, $p < 0.01$), as female hawkers often take days off for domestic and childcare. The average hawking days per week is 5.8 (range 3-7). Hawking is the main income source for 86.7%, especially women (95.3% vs. 77.5%, $p < 0.05$).

5.2.2 Daily Sales and Monthly Earnings

Daily sales are spread across four bands. The largest group (38.6%) reports GHS 400+ daily; 26.5% earn GHS 200–399; 19.3% earn GHS 100–199; and 9.6% earn less than GHS 100. Sales distribution is similar across genders, though men are more prevalent in the highest band (42.5% vs. 34.9% for women). Monthly earnings are modest: 18.1% earn under GHS 1,000; 21.7% earn GHS 1,000–1,999; 21.7% earn GHS 2,000–2,999; and 22.9% earn GHS 3,000+.

Table 4: Daily Sales Distribution — Full Sample and by Gender

Daily Sales Band	Full Sample	% Full	% Male	% Female
Less than GHS 100	8	9.6	10.0	9.3
GHS 100–199	16	19.3	20.0	18.6
GHS 200–399	22	26.5	25.0	27.9
GHS 400 or more	32	38.6	42.5	34.9

Note: Figures exclude respondents who preferred not to say or did not know.

The income distribution is key to understanding digital adoption. Many, especially female hawkers, operate at income levels where device costs, data, and digital investments are significant expenses. The most vulnerable, like Respondent 5 who spends GHS 9 daily on data (about 3-9% of her profit), show how income impacts digital use. Respondent 15, with weekly profits of GHS 150-200, cannot replace her stolen phone. These stories illustrate that income constraints deeply influence digital adoption, which cannot be considered separately from income.

5.3 Digital Infrastructure Access

5.3.1 Phone Ownership and Device Type

Phone ownership is nearly universal at 95.2%, with no significant gender difference (95.0% men, 95.3% women). However, a gender gap exists in smartphone ownership among owners—89.5% of men but only 65.9% of women ($p < 0.05$). This affects digital business tools like WhatsApp and social media, which are accessible only via smartphones. Female hawkers with basic phones are structurally excluded from these tools regardless of willingness or literacy.

The smartphone ownership gap highlights that device type, not ownership, often constrains digital business use. Respondent 9 has only a basic phone, limiting social media advertising. Respondent 8 has a damaged smartphone, and Respondent 1 owns a smartphone but doesn't use it for business. These patterns suggest that the 77.2% ownership rate overstates the number of hawkers with functional digital access, supporting the household-business technology divide discussed in the next section.

Table 5: Phone Ownership and Device Type by Gender

Variable	Male (%)	Female (%)	Full Sample (%)
Owns a phone	95.0	95.3	95.2
Owns a smartphone	89.5	65.9	77.2
MTN subscriber	78.9	95.1	87.3
Telecel subscriber	26.3	17.1	21.5
AirtelTigo subscriber	13.2	4.9	8.9

Note: Smartphone ownership difference significant at $p < 0.05$. MTN subscriber difference significant at $p < 0.05$. No phone: Respondent 10 (P10) represents the extreme case of complete device exclusion documented in the qualitative sample.

5.3.2 Mobile Data Access and Phone Usage for Business

Among respondents with data usage info, the average is 6.1 days/week, but there's notable variation. Males report more data days (6.6 vs. 5.4 for females, $p < 0.01$) and use their phones for

business more days (5.4 vs. 4.4, $p < 0.1$). About 74.3% are high users, with no gender difference at this level.

Table 6: Monthly Data Expenditure by Gender

Monthly Data Spend	Male (N)	Male (%)	Female (%)	Total (%)
Less than GHS 10	4	11.1	31.4	21.1
GHS 10 – 100	6	16.7	34.3	25.4
More than GHS 100	26	72.2	34.3	53.5

Note: Based on 71 respondents who provided data expenditure information.

Monthly data expenditure is skewed toward higher male spending. Of those providing info (n=71), 72.2% of males spend over GHS 100 monthly, compared to 34.3% of females. Females are more in the lowest band: 31.4% spend under GHS 10 versus 11.1% of males. This gap partly reflects constraints on smartphone ownership and income, leading to deliberate data rationing, as seen in female respondents' data management strategies (P1, P3, P5, P15) in the next section.

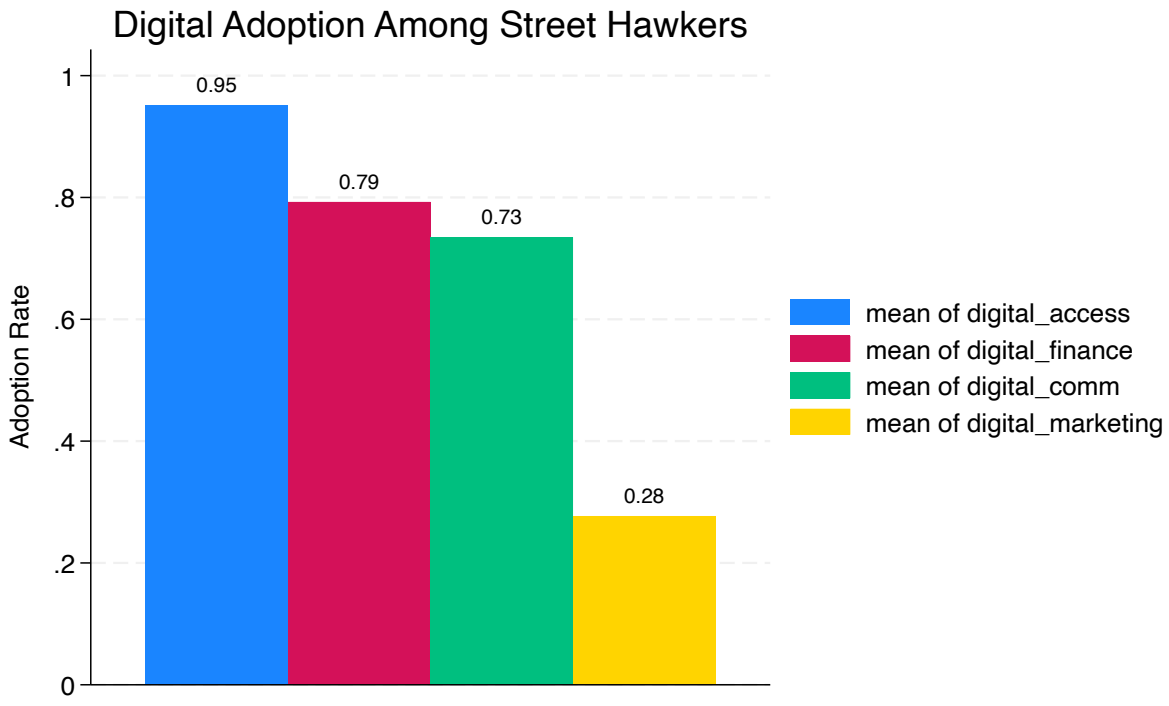

Figure 2 Digital Adoption Pyramid Among Street Hawkers in Ghana

5.3.3 Mobile Money Account Ownership and Use

Mobile money ownership is high overall (79.3 percent of respondents hold a MoMo account), but shows a gender reversal compared to smartphone ownership. Female respondents are more likely to own a MoMo account (90.5 percent vs. 67.5 percent for males, $p < 0.01$). This aligns with research indicating that women in sub-Saharan Africa adopt MoMo as a key financial tool due to limited access to formal financial services (Suri & Jack, 2016). However, qualitative findings reveal that account ownership does not imply deep financial engagement: MoMo is primarily used for payments rather than savings or management.

Among respondents with MoMo accounts, 69.5% received a MoMo payment from a customer in the past week, showing widespread transactional use. However, engagement varies by function. While 71.9% used MoMo for sales in the past month, only 34.1% for savings, 15.9% for bills, 20.7% for purchases, and 4.9% for insurance or pensions. Loan use via MoMo is at 11.0%.

Table 7: MoMo Usage by Function — Full Sample and Gender

MoMo Function (past 30 days)	Male (%)	Female (%)	Full Sample (%)
Own a MoMo account	67.5	90.5	79.3
Received MoMo from customers (7 days)	75.0	64.3	69.5
Sale transactions	75.0	69.0	71.9
Purchase/supplier transactions***	32.5	9.5	20.7
Sent to family/friends	50.0	57.1	53.7
Savings	35.0	33.3	34.1
Loan	17.5	4.8	11.0
Paid bills	22.5	9.5	15.9
Insurance / Pension	5.0	4.8	4.9

*Note: *** denotes $p < 0.01$ gender difference. MoMo account ownership gender difference significant at $p < 0.01$.*

The MoMo trust distribution illustrates widespread distrust, with 20.5% trusting 'not at all', 57.7% 'somewhat', and 21.8% 'completely'. Women are twice as likely as men to have zero trust (28.2% vs. 12.8%). This aligns with qualitative evidence that distrust is common, especially among women who experienced fraud or are more vulnerable financially. Only 34.1% use MoMo for savings, and 4.9% for insurance or pensions, confirming it's primarily a payment method rather than a financial account for most hawkers.

5.4 Digital Marketing, Record-Keeping, and Barriers to Adoption

5.4.1 Digital Communication and Marketing Activity

The most common digital communication activity for business is voice calling: 69.6 percent of respondents use voice calls with customers or suppliers. WhatsApp messaging is used by 35.4 percent of respondents, and WhatsApp status, which is the lowest-barrier digital marketing channel, is used by 25.3 percent. Formal social media platforms are used by only a small minority: TikTok by 11.4 percent, Facebook by 5.1 percent, and Instagram by 3.8 percent.

Digital marketing, defined as using any digital platform to promote products or attract customers, is reported by 27.7 percent of respondents overall.

Table 8: Digital Communication and Marketing Activity by Gender

Activity	Male (%)	Female (%)	Full Sample (%)
Voice calls (business)	79.5	60.0	69.6
WhatsApp messages*	59.0	12.5	35.4
WhatsApp status***	41.0	10.0	25.3
TikTok*	17.9	5.0	11.4
Facebook	7.7	2.5	5.1
Instagram	5.1	2.5	3.8
Any digital marketing***	45.0	11.6	27.7

*Note: * $p < 0.1$, *** $p < 0.01$. Text message differences also significant at $p < 0.1$. Gender differences in WhatsApp messages and status significant at $p < 0.01$.*

However, the gender gap here is among the most pronounced in the entire dataset: 45.0 percent of male respondents engage in digital marketing, compared with only 11.6 percent of female respondents — a difference of 33.4 percentage points, significant at the 1 percent level ($p < 0.01$). Digital marketing intensity (measured by the number of distinct marketing tools used) shows the same pattern: the mean for males is 0.73 versus 0.19 for females ($p < 0.01$).

These figures connect directly to the qualitative findings in several ways. First, the dominance of WhatsApp status over formal social media platforms in the quantitative data is consistent with the qualitative finding that WhatsApp status represents the lowest-cost, lowest-barrier digital marketing channel available to hawkers, requiring no audience-building, no algorithmic understanding, and minimal data consumption. Second, the large gender gap in digital marketing use is partially explained by evidence of product-sector segregation: female hawkers, concentrated

in undifferentiated food vending (72.1 percent of female respondents), have fewer incentives to engage in digital marketing than male hawkers selling visually differentiated products.

5.4.2 Record-Keeping Practices

Record-keeping among hawkers is limited: only 35.0% keep records. Most rely on handwritten books (26.5%), with digital records much less common (8.4%). There is a substantial gender gap: 59.0% of males keep records compared to 12.2% of females, a 46.8 percentage point difference, likely due to higher education levels and more complex business models among men.

The qualitative evidence helps explain why record-keeping remains low even among those who could, in principle, maintain records. Respondent 5 explained that she does not record sales because the income is immediately spent on restocking, food, and bills, leaving no residual figure to track. Respondent 7 stated he does not need records because he manages his inventory mentally. These accounts illustrate that low record-keeping is not simply a capability gap but reflects the hand-to-mouth financial cycle that characterizes the most precarious hawking operations, where recording a transaction that leaves no surplus offers limited practical value. The quantitative record-keeping gap between men and women (59 percent vs. 12 percent) is among the largest gender differentials in the entire dataset and merits further investigation.

5.4.3 Barriers to Digital Adoption

Among the 71 respondents who provided information on barriers to digital adoption, the most commonly cited were expensive data bundles (31.0 percent), poor network coverage (28.2 percent), fear of fraud or scam (25.4 percent), low confidence in using digital tools (18.3 percent), fear of phone loss or theft (16.9 percent), and perception of no benefit from digital tools (16.9 percent). Expensive smartphones are reported as a barrier by 15.5 percent, and electricity or charging access by 14.1 percent.

Several aspects of barrier distribution warrant interpretation based on qualitative findings. Data cost is the most reported barrier, mainly impacting males, who are more active digital users and face data costs as a constraint. Poor network coverage is also more reported by males (45.5% vs. 13.2%), reflecting their higher digital activity making network quality more relevant. Fear of fraud is reported similarly by both genders (24.2% vs. 26.3%), indicating a cross-gender distrust of digital platforms, supported by qualitative findings on trust issues stemming from experience and institutional factors (P1, P8, P14, P2). Lastly, female respondents report 'no benefit from digital tools' more often (21.1% vs. 12.1%), which qualitative evidence suggests stems from a realistic perception of limited value for their trading model, not bias.

About 32.5% of respondents lost money through digital fraud, evenly split between males and females, indicating fraud is a common experience rather than gender-specific. This widespread victimization explains the distrust in MoMo and the tendency to cash out quickly, with only 34% using MoMo for savings and most refusing to keep funds on the platform.

Additionally, 55.4% see digitalization as aiding work or business development, with men more optimistic (70.0% vs. 41.9%, $p < 0.01$). This gender gap in digital optimism reflects differences in digital engagement and capabilities, affecting how each group uses digital tools for their business needs.

Table 9: Barriers to Digital Adoption — Full Sample and by Gender

Barrier	Male (%)	Female (%)	Full Sample (%)
Data bundles expensive*	42.4	21.1	31.0
Poor network coverage***	45.5	13.2	28.2
Fear of fraud or scam	24.2	26.3	25.4
Low confidence in tools	15.2	21.1	18.3
Fear of phone loss/theft	18.2	15.8	16.9
No benefit from using it	12.1	21.1	16.9
Smartphone expensive	18.2	13.2	15.5
Electricity/charging access	15.2	13.2	14.1

*Note: * $p < 0.1$, *** $p < 0.01$. Figures represent share of respondents identifying each item as a barrier.*

5.5 Summary of Descriptive Findings

Analysis of 83 street hawkers in Greater Accra shows diverse demographics, business models, and digital use. While 95.2% own phones, fewer have meaningful digital business capabilities, especially women (65.9% vs. 89.5% men). 79.3% have MoMo accounts, mainly used for payments, not savings or insurance; only 21.8% trust MoMo fully, and 33% have experienced fraud. Digital marketing is limited (27.7%), with a significant gender gap linked more to product type than capability. Costs and rising prices hinder adoption. Data patterns vary with education, product, income, and fraud experience, making uniform policies ineffective. Regression analysis and qualitative findings further clarify these insights.

5.6 Regression Results: Determinants of Digital Tool Use

The patterns in Sections 5.1–5.4 lead to a structured analysis of how individual and business traits influence digital engagement. Tables 10–12 show linear probability models for digital tool use among Accra street hawkers: digital marketing (social media, WhatsApp Status, other platforms), digital communication (voice calls, WhatsApp), and digital finance (mobile money). Each outcome is modeled in three stages: a baseline with device, infrastructure, education, age, and

business size; an expanded model that adds gender, hawking experience, and product group; and a fully expanded model that includes fear of fraud and digital confidence issues. This stepwise approach highlights the impact of structural, sectoral, and behavioural factors.

5.6.1 Digital Marketing

The digital marketing regressions show a pattern consistent with the descriptive evidence while significantly refining the underlying mechanisms. In the baseline model (column 1), poor network connectivity appears as a strong and statistically significant positive predictor of digital marketing use, with an estimated marginal effect of 0.434 ($p < 0.01$). This counterintuitive result—that hawkers who report bad network as a challenge are more likely to use digital marketing—is best understood as a sorting effect rather than a causal link: hawkers already involved in digital marketing are the ones who have encountered and recognize network quality as a limiting factor for their digital activities. Those who have never tried digital marketing do not experience network failure as a barrier. Smartphone ownership has a positive marginal effect of 0.253 ($p < 0.10$) in the baseline, reflecting the device-as-gateway mechanism identified in the descriptive analysis: without a smartphone, access to WhatsApp Business, Facebook Marketplace, and social media advertising platforms is essentially unavailable.

The transition from column 1 to column 2 offers valuable insights. Once the product group is included, the poor network remains a positive predictor (0.347, $p < 0.05$), while the smartphone effect diminishes and becomes less precise—indicating that much of the initial device-use association is influenced by sector composition. Hawkers selling clothing and fashion items have a digital marketing premium of 0.432 percentage points compared to the food and drinks baseline ($p < 0.01$), which persists even after full controls in column 3 (0.405, $p < 0.05$). This impact is significant: controlling for other variables, operating in the clothing and fashion sector correlates with a 40-percentage-point higher likelihood of using digital marketing. This directly relates to the observable fact that male hawkers, predominantly in clothing, electronics, and household goods, have digital marketing rates nearly four times higher than those of female hawkers focused on food vending. The regression clearly shows that sectoral sorting, not gender alone, drives the marketing adoption gap: the female gender indicator in column 2 is minimal (0.030) and not statistically different from zero.

Age is a significantly and statistically important factor in the enhanced models. Compared to hawkers under 25 (the omitted category), those aged 35–44 display a digital marketing gap of 0.492 percentage points (column 2, $p < 0.05$), while those aged 45 and above have a gap of 0.431 ($p < 0.05$). These effects increase slightly in column 3. Since female hawkers in this sample are on average nearly 10 years older than their male counterparts—a highly significant difference noted in the balance table—the age gradient in digital marketing adoption forms a second pathway through which the gender gap in the descriptive statistics is mechanically created, operating alongside but independently of sector effects. Education, surprisingly, shows small, positive, and statistically insignificant coefficients across all three specifications for digital marketing,

Table 10. Determinants of Digital Marketing Use

	(1)	(2)	(3)
Infrastructure and device			
Smartphone	0.253*	0.198	0.178
	(0.145)	*(0.145)*	*(0.148)*
Bundle cost barrier	−0.268**	−0.172	−0.191
	(0.127)	*(0.129)*	*(0.131)*
Bad network barrier	0.434***	0.347**	0.296*
	(0.131)	*(0.145)*	*(0.155)*
Education (base: no/low education)			
JHS / Middle School	−0.043	−0.019	−0.024
	(0.152)	*(0.166)*	*(0.168)*
SHS / Tech-Voc / Tertiary	0.053	0.095	0.090
	(0.151)	*(0.157)*	*(0.158)*
Age group (base: under 25)			
25–34	0.010	−0.023	−0.057
	(0.146)	*(0.140)*	*(0.145)*
35–44	−0.235	−0.492**	−0.567**
	(0.167)	*(0.212)*	*(0.226)*
45 and above	−0.267	−0.431**	−0.505**
	(0.161)	*(0.192)*	*(0.205)*

Daily sales (base: less than GHS 100)			
GHS 100–199	−0.157	−0.086	−0.140
	(0.211)	*(0.217)*	*(0.227)*
GHS 200–399	−0.099	0.041	0.003
	(0.187)	*(0.191)*	*(0.197)*
GHS 400 or more	0.033	0.079	0.046
	(0.179)	*(0.192)*	*(0.196)*
Additional controls			
Female		0.030	0.009
		(0.147)	*(0.150)*
Years hawking		0.009	0.011
		(0.011)	*(0.011)*
Product group (base: food and drinks)			
Clothing and fashion		0.432***	0.405**
		(0.159)	*(0.162)*
Phone and electronics		0.167	0.164
		(0.226)	*(0.230)*
Household and personal items		0.295	0.265
		(0.182)	*(0.186)*
Behavioural barriers			
Lack of digital confidence			0.028

			(0.147)
Fear of fraud			0.152
			(0.155)
Constant	0.174	−0.080	0.012
	(0.226)	*(0.305)*	*(0.323)*
Observations	63	60	60
R-squared	0.358	0.488	0.504

*Notes: Linear probability model estimates. Dependent variable: Digital marketing (0/1). Standard errors in parentheses. *** p < 0.01, ** p < 0.05, * p < 0.1. Column (1): baseline specification. Column (2): adds gender, hawking experience, and product group. Column (3): adds behavioural barrier indicators. Base categories: education (no/low education), age group (under 25), daily sales (less than GHS 100), product group (food and drinks).*

indicating that within this sample, the education gradient in marketing adoption is fully explained by sector and age once controls are factored in. This aligns with the view that education influences sector choice and smartphone ownership beforehand, but once those factors are accounted for, it does not independently impact digital marketing decisions.

Neither fear of fraud nor lack of digital confidence is a statistically significant predictor of digital marketing in column 3. This is consistent with the nature of digital marketing as a lower-stakes digital activity, posting on WhatsApp or sharing contact details relative to financial transactions, where the material consequences of errors or fraud are more severe. Daily sales—the proxy for business scale—does not achieve statistical significance in any specification, suggesting that within the range of scale variation observed in this sample, revenue differences do not independently predict digital marketing adoption once sector and other covariates are held constant.

5.6.2 Digital Communication

Digital communication results differ markedly from marketing models. Smartphone ownership, bundle costs, and network quality—all key predictors in the marketing regressions—are insignificant in the digital communication baseline (column 1, R-squared = 0.246). Education also lacks significance. The main predictor across all communication specifications is age, with the sign reversed from marketing results. Hawkers aged 25–34 are 38.3 percentage points more likely

than those under 25 to use digital tools (column 1, $p < 0.05$); 35–44 show a 42.1-point premium ($p < 0.05$); and 45+ show a 54.2-point premium ($p < 0.01$), as shown in Table 11.

Table 11. Determinants of Digital Communication Use

	(1)	(2)	(3)
Infrastructure and device			
Smartphone	0.028	0.024	0.028
	(0.144)	*(0.156)*	*(0.161)*
Bundle cost barrier	0.034	0.073	0.077
	(0.126)	*(0.138)*	*(0.143)*
Bad network barrier	0.196	0.083	0.095
	(0.130)	*(0.156)*	*(0.169)*
Education (base: no/low education)			
JHS / Middle School	0.144	0.143	0.145
	(0.152)	*(0.178)*	*(0.183)*
SHS / Tech-Voc / Tertiary	0.123	0.132	0.133
	(0.150)	*(0.168)*	*(0.172)*
Age group (base: under 25)			
25–34	0.383**	0.386**	0.393**
	(0.145)	*(0.150)*	*(0.158)*
35–44	0.421**	0.371	0.388
	(0.167)	*(0.228)*	*(0.246)*
45 and above	0.542***	0.544**	0.561**

	(0.160)	*(0.206)*	*(0.223)*
Daily sales (base: less than GHS 100)			
GHS 100–199	0.171	0.248	0.260
	(0.210)	*(0.233)*	*(0.247)*
GHS 200–399	−0.059	0.037	0.045
	(0.186)	*(0.205)*	*(0.214)*
GHS 400 or more	−0.059	−0.027	−0.019
	(0.178)	*(0.206)*	*(0.213)*
Additional controls			
Female		−0.119	−0.114
		(0.158)	*(0.163)*
Years hawking		−0.002	−0.002
		(0.012)	*(0.012)*
Product group (base: food and drinks)			
Clothing and fashion		0.266	0.272
		(0.170)	*(0.177)*
Phone and electronics		−0.018	−0.018
		(0.242)	*(0.251)*
Household and personal items		0.145	0.152
		(0.195)	*(0.202)*
Behavioural barriers			

Lack of digital confidence			−0.003
			(0.161)
Fear of fraud			−0.035
			(0.169)
Constant	0.255	0.191	0.170
	(0.226)	*(0.327)*	*(0.351)*
Observations	63	60	60
R-squared	0.246	0.357	0.358

*Notes: Linear probability model estimates. Dependent variable: Digital communication (0/1). Standard errors in parentheses. *** p < 0.01, ** p < 0.05, * p < 0.1. Column (1): baseline specification. Column (2): adds gender, hawking experience, and product group. Column (3): adds behavioural barrier indicators. Base categories: education (no/low education), age group (under 25), daily sales (less than GHS 100), product group (food and drinks).*

This result requires careful interpretation. Digital communication, mainly involving receiving and making voice calls and WhatsApp messages on a phone, is a lower-skill, lower-barrier activity compared to digital marketing. In this sample, it is used by a large majority of hawkers across all age groups. The positive age gradient likely reflects a duration-of-business relationship effect: older hawkers have built more extensive supplier and customer networks, which require ongoing communication regardless of the digital platform used. Importantly, the near-zero coefficient on smartphone ownership indicates that digital communication in this context is not dependent on smartphones. Voice calls and basic WhatsApp messages are just as feasible on feature phones. This sharply contrasts with digital marketing, where the smartphone premium is strong, because that activity relies on access to richer-media platforms that are unavailable on feature phones.

Gender does not significantly predict digital communication in the augmented models (column 2: −0.119, not significant). Neither does sector, experience, nor the behavioural deterrents introduced in column 3. The R-squared of 0.357 in column 2 is driven almost entirely by the age gradient. These results suggest that digital communication, unlike digital marketing and digital finance, has achieved near-universal adoption among hawkers in the relevant age cohorts and is not meaningfully differentiated by the structural barriers, such as device type, education, sector, and cost, that stratify the other digital activities. The policy implication is that interventions targeting digital inclusion for hawkers should focus on upgrading communication activities toward more

productive forms (marketing, record-keeping, financial transactions) rather than promoting basic digital communication, which is already broadly normalised.

5.6.3 Digital Finance (Mobile Money)

The mobile money regressions show the most varied and economically detailed results across the three digital activity areas. In the baseline model, poor network connectivity has a negative and significant impact on mobile money use (−0.295, $p < 0.05$), unlike its positive link to digital marketing. The economic reasoning differs: for mobile money transactions, a failed or delayed payment during a commercial exchange creates an immediate, tangible cost—a failed sale, a customer refusing to wait, a dispute over payment confirmation—rather than just a qualitative decline in a posting. Network unreliability, therefore, truly reduces mobile money adoption, rather than simply being reported by existing users. This difference across digital activity types is important theoretically: it shows that the same infrastructure problem creates opposite selection pressures for different adoption levels, highlighting the need for detailed analysis across digital activity types.

Education achieves significance in the augmented models for mobile money in a way it does not for digital marketing. Hawkers with secondary school, technical/vocational, or tertiary education are 23.7 percentage points more likely than those with no or basic education to use mobile money for business (column 2, $p < 0.10$), and this effect is stable in column 3 (0.232, $p < 0.10$). This education premium for financial digital adoption, but not marketing adoption, is consistent with the interpretation that mobile money transactions, requiring PIN management, transaction verification, and navigating mobile money menus, impose a larger capability threshold than posting on WhatsApp, and that education reduces this threshold meaningfully. The finding also links back to the descriptive gender gap in mobile money use (supplier payments: 32.5 percent male vs. 9.5 percent female) and to the 25.6-percentage-point education advantage among male hawkers: a substantial share of the gender gap in mobile money use for business operates through the education channel.

The effects of product groups in digital finance models are particularly revealing. Phone and electronics accessory sellers are 67.1 percentage points less likely than food and drinks vendors to use mobile money for business transactions (column 2, $p < 0.01$), a result that remains significant after full controls (−0.654, $p < 0.01$). This is the largest and most precisely estimated sector effect in the entire analysis. The economic interpretation is that electronics and phone accessory sellers, who are disproportionately male in this sample, rely on cash-based, inspection-dependent transactions where the buyer examines the product before paying. This makes pre-payment via mobile money structurally incompatible with the transaction protocol. Food vendors, on the other hand, operate under a transaction model where the product is consumed immediately, and the key question is simply whether cash or mobile money is used for payment. This makes switching to digital finance more feasible. This finding challenges the naive expectation that male-dominated, higher-value sectors would lead in digital finance adoption. Instead, it shows that the compatibility

Table 12. Determinants of Digital Finance Use

	(1)	(2)	(3)
Infrastructure and device			
Smartphone	0.045	0.077	0.073
	(0.130)	*(0.124)*	*(0.128)*
Bundle cost barrier	−0.029	−0.014	−0.009
	(0.114)	*(0.111)*	*(0.114)*
Bad network barrier	−0.295**	−0.168	−0.171
	(0.118)	*(0.124)*	*(0.134)*
Education (base: no/low education)			
JHS / Middle School	0.134	0.211	0.204
	(0.137)	*(0.142)*	*(0.146)*
SHS / Tech-Voc / Tertiary	0.041	0.237*	0.232*
	(0.136)	*(0.134)*	*(0.137)*
Age group (base: under 25)			
25–34	0.104	0.215*	0.213
	(0.135)	*(0.125)*	*(0.132)*
35–44	0.100	0.257	0.254
	(0.151)	*(0.187)*	*(0.203)*
45 and above	0.117	0.190	0.190
	(0.145)	*(0.166)*	*(0.181)*

Daily sales (base: less than GHS 100)			
GHS 100–199	0.373*	0.396**	0.386*
	(0.196)	*(0.194)*	*(0.207)*
GHS 200–399	0.112	0.008	0.005
	(0.168)	*(0.164)*	*(0.171)*
GHS 400 or more	0.138	0.040	0.043
	(0.161)	*(0.164)*	*(0.170)*
Additional controls			
Female		0.119	0.120
		(0.125)	*(0.129)*
Years hawking		−0.003	−0.003
		(0.010)	*(0.010)*
Product group (base: food and drinks)			
Clothing and fashion		−0.138	−0.138
		(0.137)	*(0.141)*
Phone and electronics		−0.671***	−0.654***
		(0.197)	*(0.204)*
Household and personal items		−0.187	−0.187
		(0.158)	*(0.162)*
Behavioural barriers			
Lack of digital confidence			−0.070

			(0.127)
Fear of fraud			0.014
			(0.135)
Constant	0.612***	0.519*	0.531*
	(0.204)	*(0.261)*	*(0.278)*
Observations	62	59	59
R-squared	0.217	0.488	0.492

*Notes: Linear probability model estimates. Dependent variable: Mobile money use for business (0/1). Standard errors in parentheses. *** p < 0.01, ** p < 0.05, * p < 0.1. Column (1): baseline specification. Column (2): adds gender, hawking experience, and product group. Column (3): adds behavioural barrier indicators. Base categories: education (no/low education), age group (under 25), daily sales (less than GHS 100), product group (food and drinks).*

of the business model with digital payment protocols—including gender, scale, or education—is the main factor influencing mobile money adoption in these sectors.

Business scale significantly influences mobile money adoption only for the GHS 100–199 daily sales category: hawkers at this intermediate level are about 39.6 percentage points more likely to use mobile money than the lowest-sales reference group (column 2, $p < 0.05$). Higher sales tiers (GHS 200–399 and GHS 400 or more) show positive but statistically insignificant effects. This non-linear pattern aligns with a threshold model of mobile money adoption: hawkers with very low daily sales mainly operate in cash-only environments, but once their daily transactions reach an intermediate level, the benefits of mobile money such as reducing cash handling and enabling remote payments become important enough to encourage adoption. At the higher end of the sales spectrum, the additional benefits of mobile money over existing cash management may not be enough to overcome operational inertia or sector-specific barriers.

Fraud fear and lack of digital confidence, introduced in column 3, are neither individually nor jointly significant predictors of mobile money use, and their inclusion leaves R-squared essentially unchanged (0.488 to 0.492). This is an important negative result. It suggests that conditional on structural characteristics—smartphone ownership, network quality, education, sector, and scale—the incremental explanatory power of stated behavioural deterrents for mobile money adoption is minimal. This does not imply that these frictions are economically irrelevant; the descriptive evidence establishes that substantial shares of the sample, particularly women, report fraud fear

and lack of confidence. Rather, it implies that these stated barriers are strongly correlated with, and largely mediated by, the structural determinants already included in the model. Hawkers who lack digital confidence and fear fraud are predominantly those with lower education, feature phones, and food-sector concentration—characteristics that the regression already controls for. Once those structural factors are accounted for, the residual independent contribution of self-reported behavioural deterrents to mobile money non-adoption is small.

Cross-Outcome Synthesis

Considered together, the three sets of regression results clarify and significantly refine the descriptive patterns identified earlier. Four themes emerge. First, the factors influencing the adoption gap differ systematically across types of digital activities, and combined indices of digital engagement that merge these activities may hide important theoretical differences in what determines each one. Digital marketing adoption is mainly driven by sector composition and device type; digital communication by age and network effects; digital finance by education, network quality, and sector-specific transaction protocols. Second, although gender shows large raw gaps in the descriptive data, it has small, insignificant coefficients in all three models when included in the augmented regressions. This indicates that the gender gap in digital adoption is fully explained by observable variables: female hawkers' lower digital engagement results from their older age, greater concentration in the food sector, lower secondary education rates, and less smartphone ownership—not gender itself. Third, sector composition is one of the strongest and most consistent factors influencing digital adoption patterns across models, operating through multiple channels—such as business model compatibility, product type, and customer transaction norms—that cannot be reduced to individual skills or device constraints. Fourth, behavioural barriers like fear of fraud and lack of confidence are significant in descriptive terms but provide little additional explanation once structural variables are controlled. This suggests that the main policy approach to expanding digital adoption should focus on overcoming structural barriers rather than solely addressing perceptual obstacles.

6. Qualitative Findings

This section presents findings from interviews with fifteen street hawkers across seven Greater Accra locations: Accra Central, Tema, Adenta, Lapaz, Madina, Dome, and Okponglo. Organized thematically, each theme combines evidence and quotations. Respondent labels (P1–P15) show interview order. Eight themes identified are: hawking's demanding time and mobility; device access and use; mobile money trust; digital marketing goals and practices; data costs as barriers; occupational autonomy; digital training needs; and engagement levels.

6.1 Time, Mobility, and the Operating Conditions of Street Hawking

The main finding across interviews is the intense time and physical demands of street hawking, which form a background for digital adoption decisions. Most respondents work 12-18 hour days, every day, with no breaks and constant movement. These conditions limit digital use not just by

reducing available time but also by creating urgency and physical strain that make non-commercial activities, like digital skill-building, seem too costly.

Respondent 1, who wakes at 3:30 a.m. to reach Accra by 5:30 a.m. and trades until 6:00 p.m. six days a week, was unambiguous about how these conditions constrain her digital engagement:

"“This work involves a lot of walking, and you need to move fast for items to sell quickly so that you can buy another set. I cannot waste time and sit for training.” (P1)

Respondent 2 works from 7:00 a.m. to between 11:00 p.m. and 1:00 a.m. the following morning, every day of the week, with no structured rest:

"I don't go on break unless there are no customers. My leisure time is when I am sitting and waiting for a customer.” (P2)

Respondent 5 spends her idle moments — between customers and between restocking runs — simply recovering enough energy to continue, and described the physical hazards of trading in traffic with dry humour:

“Someone will ask, 'I want something,' the traffic light will be on. When you get there, it will stop. You will run from here to there, and when you get there, they will say, 'I want chewing gum, one cedi fifty pesewas.' It's not easy.” (P5)

These accounts are not complaints about working conditions in the abstract; they carry direct implications for the study's theoretical framework. Standard models of technology adoption assume that individuals weigh expected benefits against adoption costs, including the time cost of learning (Berger, 2001; Hall, 2004). For street hawkers, this time cost is not a minor friction, but a structural constraint imposed by the economics of a business model that requires physical presence across the longest possible selling window. Pausing to troubleshoot a failed MoMo transaction, learn a new application interface, or attend a training session has an immediate, concrete opportunity cost in lost sales. This cost structure is qualitatively different from that facing fixed-location traders or agricultural households, and it helps explain why technology adoption behaviours that appear irrational under standard models are often entirely rational responses to the specific demands of mobile street trading.

Beyond digital adoption, respondents noted the physical toll of hawking: back and waist pain (P7, P8, P11), headaches from the sun (P5, P7), and vehicle accidents (P5, P9). Respondent 8 paused her interview to rest due to back and neck pain. These health issues add to time constraints and show that hawkers value quick, easy-to-use tools over those that require long learning.

6.2 Device Access Does Not Equal Business Digital Use

A critical methodological finding that emerges from the qualitative data is a systematic gap between individual access to devices and productive digital use in business. Survey-based measures of digital adoption often consider device ownership as a key indicator, although

ownership alone may not fully reflect digital economic participation (Essel & Atagana, 2024; Hazari & Mohan, 2024). The interview evidence reveals that these proxies substantially overstate the share of hawkers who meaningfully deploy digital tools in their business operations.

The most direct illustration comes from Respondent 1, who owns a smartphone but deliberately leaves it at home each trading day, using a basic feature phone at the market. The smartphone serves her child's education, not her business:

"I have a smartphone that I leave at home and then I bring the simple phone to the market. My child is in JHS and studies with the smartphone, so I buy data every day." (P1)

She incurs daily data costs, marking her as actively connected in surveys, but this doesn't support her hawking. Respondent 6 owns a smartphone but doesn't use it for work, reserving it for personal use like YouTube and football. Respondent 8 has a smartphone with a damaged screen that allows TikTok viewing but not WhatsApp, making it limited to unidirectional media.

The household-business technology divide arises from several mechanisms illuminated by qualitative data. First, domestic resource decisions may divert shared devices from business to non-business uses, like children's schooling, reflecting household investment priorities under resource scarcity (Clemens & Tiongson, 2012; Hosany & Hamilton, 2022). Second, device degradation, such as a cracked screen, failing battery, or degraded SIM, can limit functionality; smartphones might be unsuitable for business tasks but remain useful for passive activities. Third, some individuals intentionally keep personal and business identities separate, carrying basic phones to markets to avoid distractions, theft, or blurred boundaries.

At the other extreme, Respondent 10 has no phone at all and borrows a friend's device for occasional calls. When customers ask to pay by MoMo, he must decline entirely. His case represents the hard floor of digital exclusion: below a minimum asset threshold of device ownership, participation in the digital economy is structurally impossible regardless of willingness, literacy, or awareness. Respondent 9 uses only a basic 'yam' handset and explicitly identified device type as the binding constraint on her digital ambitions:

"Advertising my goods and social media would have been good for me, but I can't since I don't use a smartphone. I will be very happy if someone buys a smartphone for me, but I can't afford to buy it myself." (P9)

These findings suggest that the policy goal of digital inclusion for hawkers requires distinguishing between at least three different populations: those with no device access (for whom basic device provision is the entry point); those with device access that is diverted away from business use (for whom business-use facilitation and household resource allocation support may be more relevant than access provision); and those with adequate device access but other barriers to business digital use (for whom training, trust-building, or tool design improvements are the appropriate intervention). Treating these groups uniformly under a single 'access' framework will generate misallocated interventions.

6.3 Mobile Money: Accepted Transactionally, Rarely Trusted as a Financial Account

The relationship between street hawkers and mobile money is one of the study's most consequential and nuanced findings. Across the sample, the dominant pattern is conditional transactional acceptance combined with near-universal rejection of the platform as a financial account. Most respondents accept MoMo payments from customers, at least sometimes, but almost none retain funds on the platform beyond the immediate transaction. Rapid cash-out is the norm, and the platform is used as a payment conduit rather than as a savings vehicle, investment tool, or credit-building instrument.

This behavioural convergence is produced by diverse and sometimes overlapping mechanisms of distrust. Understanding the specific mechanism operating for each sub-group of hawkers is analytically important because different mechanisms call for different policy responses.

6.3.1 Trust Collapse Following Direct Personal Loss

For several respondents, disengagement from MoMo as a savings vehicle followed a direct personal experience of financial loss. Respondent 1 stored GHS 1,500 on her mobile money account as an emergency fund and discovered GHS 300 had disappeared through unexplained deductions:

"I saved money on my phone so that when I am in trouble, it helps me. But I stopped because of the deductions. By the time I realised, it was only 1,200 cedis left when I wanted to take it out. My money has also been defrauded before, so I have stopped using MoMo." (P1)

Respondent 8 experienced a similar trust collapse after losing a SIM card that held significant mobile money funds:

"The last SIM card I had had lots of money on it, but when it went missing, I decided not to save on my phone again." (P8)

Respondent 14 reported a robbery through his mobile phone account. In each of these cases, the trust collapse was triggered by a specific, irreversible financial loss—a form of negative updating that the behavioural economics literature associates with disproportionate lasting effects relative to equivalent gains (Kahneman & Tversky, 1979). For a hawker operating on daily margins of GHS 100 to GHS 250, a loss of several hundred cedis amounts to multiple days of profit and is impossible to dismiss.

6.3.2 Institutional Reasoning: The Absence of Regulatory Protection

A distinct and more analytically sophisticated mechanism of distrust was articulated by Respondent 2, whose account reveals a coherent institutional theory of why mobile money is structurally less safe than formal banking:

"It's not for Bank of Ghana because if it were, if someone scams someone, they can refund it. But since they can't refund, it's a risk. I feel like the mobile networks give the numbers out to the fraudsters to defraud you." (P2)

This reasoning is economically sound. Mobile money platforms in Ghana operate outside the deposit-protection and dispute-resolution frameworks governing formal banking, making fraud losses practically irrecoverable(Akomea-Frimpong et al., 2019). Respondent 2 has not necessarily been a victim of fraud himself, but his institutional analysis leads to the same behavioural conclusion as that of those who have suffered direct losses: MoMo funds should not be stored. The behavioural consequence is vivid:

"3 days ago, a client sent me GHC 5,000. I did not even wait 30 seconds, and I cashed it out. I would rather keep it in the bank." (P2)

This near-instantaneous cash-out of a large MoMo receipt illustrates that distrust can be rational, systematic, and deeply embedded in institutional reasoning rather than simply the product of personal misfortune or low digital literacy.

6.3.3 Operational Barriers: Verification Risk in Traffic Contexts

For respondents who trade in moving traffic, MoMo acceptance introduces a specific operational hazard: the time needed to verify a transfer on a phone screen is often longer than the available window during a red traffic light, creating a risk of being deceived by unverified 'confirmations' while the light changes:

"I don't take MoMo because we work in traffic, and so if you decide to take MoMo, they will take the money. But sometimes, I take it if the traffic light is red." (P3)

Respondent 15 described a similar pattern of being told that money had been sent but, upon arriving home, discovering that the transfer had not completed or had been sent in the wrong amount. Her response was to restrict MoMo acceptance to customers she personally knows and trusts:

"If only I knew you is when I will accept momo. Someone can say that he will send momo but when you go, you will realise that he did not send the right amount or did not send at all." (P15)

This conditional, trust-based acceptance strategy — MoMo only for known customers — creates a de facto exclusion from digital payments for the majority of hawkers' anonymous customer base while maintaining access to it for a small, trusted subset.

6.3.4 The Consequence: MoMo as a Payment Rail, Not a Financial Account

Across all three mechanisms of distrust, the behavioural outcome is the same: mobile money functions in hawkers' financial lives as a payment rail — a channel through which funds can flow — rather than as a financial account with storage, saving, and credit functions. This distinction has profound implications for the financial inclusion literature. Account-opening rates, transaction

volumes, and even regular MoMo use among hawkers might suggest progress toward financial inclusion when in practice the platform's most valuable financial functions — savings mobilisation, credit access through transaction history, insurance premium payment — remain almost entirely unused. As Respondent 7 summarized: MoMo is safe for transactions but not for keeping money; this distinction neatly encapsulates the modal relationship between hawkers and the platform across the sample.

The notable exceptions in the sample, Respondents 12 and 14, who use MoMo more deeply including for bill payments and end-of-day deposits, share characteristics that help explain their divergence from the norm: both have higher educational attainment; both operate more differentiated and higher-value businesses; and both have not experienced significant fraud losses. Their profiles are consistent with the theoretical expectation that human capital and positive platform experience jointly predict deeper digital financial integration.

6.4 Digital Marketing: Aspirations, Practice, and the Business-Model Boundary

Digital marketing, broadly defined as using digital platforms to attract customers, showcase products, or build a business identity, is the area of digital adoption where the gap between aspiration and practice is most noticeable across the sample. Several respondents clearly express visions of what digital marketing could do for their business and show awareness of relevant platforms, yet their actual marketing efforts remain minimal or non-existent. Understanding the reasons for this aspiration-practice gap is a key focus of the study.

6.4.1 Business-Model Contingency: When Non-Adoption is Accurate

A key finding is that a substantial share of digital marketing non-adoption among hawkers reflects an accurate assessment of tool-business-model fit rather than a capability gap or attitudinal barrier. Respondent 1 articulated this most directly:

"For this hawking business, I do not think I can use digital marketing. It is not like I have a shop. I buy and sell quickly. Unless people see it before they patronize — as I am on the street, people just see me and buy." (P1)

This analysis is correct. Street hawking in high-traffic corridors is predicated on spatial proximity, physical visibility, and spontaneous encounter. Customers do not search for hawkers; they encounter them. The information-cost reduction that digital marketing platforms provide by connecting sellers and buyers who are geographically or temporally separated has limited utility in a business model where proximity and immediacy are the selling proposition. Respondent 3, who sells plantain chips in traffic, reached the same conclusion independently:

"I do not believe in using digital marketing. I do not think if I put my things on social media, it will impact my business." (P3)

Respondent 6 identified a further dimension of this business-model mismatch — social stigma:

"It is not everyone that would want others to know that this is the kind of work he is doing. Take shoe shine — he would not want to put it on social media because it is like a private thing he is doing, maybe he is doing it to get money to move into a better job." (P6)

This observation identifies an underexplored non-economic barrier to digital marketing adoption: social visibility conflicts with the desire for discretion among hawkers who view their current work as temporary or stigmatized. The gap between belief in digital marketing's general utility and adoption in one's own case may partly reflect this reputational cost rather than capability or access barriers.

6.4.2 Products That Are Naturally Suited to Digital Display

The contrast between low digital marketing adoption among most respondents and the active, effective use by others is substantially explained by product type. Respondents selling visually differentiated, searchable products, second-hand clothes (P13), branded stands (P14), homemade ice cream and popcorn with event-delivery capacity (P2), report meaningful returns from digital marketing activity. Respondent 13, who photographs garments and posts to WhatsApp status, described the results concretely:

"I take pictures of the trousers I sell and post on my status so I have customers that will watch and tell me to keep it for them. Posting on social media has helped me a lot." (P13)

Respondent 13 is notable for two additional reasons. First, he has no formal education, directly contradicting any assumption that digital marketing adoption requires educational attainment. Second, his adoption appears to have been driven by product logic and peer observation rather than training, he adopted because it worked for his product, not because he was taught to. By contrast, respondents selling commodities, eggs (P10), plantain chips (P3), yoghurt (P6), pure water (P8), have no meaningful digital marketing option because their products are undifferentiated and their customers make purchase decisions on sight rather than research.

6.4.3 Platform Ownership Without Platform Depth

A third sub-pattern is represented most clearly by Respondent 2, who holds accounts on TikTok, Facebook, and WhatsApp but markets only through WhatsApp status updates. His aspirations extend to Yango registration and a fully developed brand identity, but he explicitly defers this deeper platform engagement until his business is sufficiently developed to warrant it:

"I want to brand myself well and then I can now market myself well. I will even register on Yango and all to do the marketing. I have all these plans for my business." (P2)

Respondent 7 attempted to set up WhatsApp Business but was blocked by a SIM verification failure and abandoned the attempt. He has since heard, inaccurately, that posting on TikTok and social media requires payment, a misconception that functions as a real adoption barrier:

"I have heard that when you put your things to sell or post on TikTok or on social media, you have to pay something but I don't know how to do those things." (P7)

These cases illustrate that the aspiration-practice gap is not uniform in mechanism. For Respondent 2 it reflects rational sequencing, deferred adoption pending business development. For Respondent 7 it reflects both a specific technical failure and a misinformation barrier. Policy interventions designed to close the aspiration-practice gap need to diagnose the specific mechanism operating for each sub-population rather than applying a generic training or access solution.

6.5 Data Costs as a Persistent and Behaviourally Significant Barrier

High and rising mobile data costs were cited by twelve of fifteen respondents as a constraint on digital engagement, making this the most consistently reported structural barrier in the sample. The concern manifests not only as an affordability issue but as a behavioural and strategic one that shapes platform choice, usage patterns, and the willingness to experiment with new digital tools.

The most visceral expression of the data cost burden came from Respondent 5, who compared a data bundle directly to the cost of a meal:

"That 'just for you' bundle is too high, eeiii 20 cedis. Like I will use it to buy kenkey and eat and get strength to come and sell." (P5)

This comparison — a data package versus food — is not rhetorical. It makes explicit the trade-off facing hawkers at subsistence margins: digital engagement competes directly with caloric input, and for respondents spending GHS 9 daily on minimum data bundles (P5) or GHS 45 on three daily purchases (P11), data expenditure is a material line item in a constrained daily budget.

Two respondents described deliberate strategies for managing perceived algorithmic data pricing. Respondents 2 and 6 both reported purchasing cheaper data bundles to avoid triggering personalized premium-priced offers from their mobile network:

"I buy the cheapest options because if you buy the slightly expensive one, they think you have money and they will keep increasing it." (P2)

"I use the 'just for you' bundle but with that, the more you buy it, they think you have money so sometimes I just forget them." (P6)

Whether or not these respondents' theories about algorithmic pricing are accurate, their behaviour reflects a rational adaptation to a perceived pricing dynamic. They are not passive data consumers but active strategists within a market they experience as adversarial. This behavioural dimension of data cost management has not, to the authors' knowledge, been documented in prior literature on digital adoption among informal traders.

Respondent 11, a Nigerian national, provided a cross-country benchmark that frames Ghana's data pricing not as a reflection of global market conditions but rather as a structural national disadvantage:

"Data is too expensive in Ghana than Nigeria. In Nigeria I can get 200mb for GHS 0.50 and about 1GB for GHS 5 on MTN." (P11)

The behavioural implications of high data costs extend beyond reduced usage volume. They shape which platforms hawkers engage with — WhatsApp status rather than TikTok, which consumes more data per session; how frequently they check business messages, and how willing they are to experiment with unfamiliar tools whose data consumption is uncertain. For hawkers with aspirations toward deeper digital marketing engagement, data costs represent a compounding barrier: the more digital activity they attempt, the higher the expenditure, while the returns from digital marketing accumulate slowly and uncertainly. This asymmetry between immediate, certain costs and deferred, uncertain benefits is precisely the condition under which behavioural economics predicts adoption will be systematically underprovided relative to the socially optimal level(Yue et al., 2023).

6.6 Occupational Autonomy as a Non-Monetary Value of Hawking

A theme that emerges consistently and unprompted across multiple interviews is the value hawkers place on the autonomy, flexibility, and independence of informal self-employment. This non-monetary dimension of hawking is not a secondary finding; it is central to understanding both why individuals enter and remain in hawking despite its hardships and how digital adoption interventions are likely to be received.

Respondent 2, despite working eighteen-hour days seven days a week, was emphatic about the value of self-determination:

"I like this job because I am my own boss. I don't have to answer to anyone. Even if I become a billionaire, I will still do this business. But I will set up a factory and do in bulk." (P2)

Respondent 5 expressed pride in her economic independence despite physical hardship, road accidents, and chronic illness:

"I am proud of the fact that I have my own something that I am doing. I am not working for anybody. The money that I make is my own and I don't answer to anyone." (P5)

For Respondent 8, a young mother of two, the decisive advantage of hawking over formal employment is temporal flexibility around her children's needs:

"This one, I can close whenever I want and go and see them. Even if I bring them here, I will get someone to watch them. But I can't send them to someone's work — the person might be angry one day and ok the next day." (P8)

Respondent 12, the most educationally qualified respondent in the sample, rated his business ten out of ten and described his life in Accra as 'very very good because of this work.' Respondent 6 framed hawking as a form of exercise as well as income. These accounts are not rationalizations

of constrained choices — they reflect genuine and substantive preferences for the specific features of informal self-employment that formal alternatives would not provide.

This finding has direct implications for digital adoption policy. Interventions that are perceived as imposing external structure, accountability, reporting requirements, or formalization on hawkers' businesses may encounter resistance that is not about digital capability but about the preservation of occupational autonomy. Digital tools that require hawkers to register with platforms, commit to fixed delivery schedules, maintain publicly visible transaction records, or comply with algorithmic performance metrics may be experienced as constraining the flexibility that makes hawking valuable in the first place, and may be rejected on those grounds even when they offer genuine productivity benefits. Effective digital inclusion strategies must be designed around hawkers' existing autonomy preferences, offering tools that enhance rather than constrain their operational independence.

6.7 Demand for Digital Training: Conditional, Temporally Specific, and Format-Sensitive

Nine of fifteen respondents expressed some interest in digital training when asked, but the conditions attached to this interest are so specific and varied across the sample that aggregate interest figures would be misleading as a guide to program design. The qualitative data reveal a set of cross-cutting preferences that collectively point toward a portfolio of delivery formats rather than a single standardized training model.

6.7.1 Temporal Availability

Training timing preferences are directly structured by the temporal demands of each respondent's business. Respondent 2, whose market builds from the afternoon, prefers morning sessions:

"I will love to do it for like 2 to 4 hours in the mornings because my market starts mostly around 2 or 3pm." (P2)

Respondents 14 and 15 prefer Saturdays, when their trading activity is different or lower in intensity. Respondent 7 can only participate on Sunday evenings, by phone call, at home. Respondent 5 is open to Saturday mornings or afternoons and prefers online delivery. Respondent 1 — one of the highest-demand cases for digital skills — concluded that no available time window would work for her given her 3:30 a.m. to 6:00 p.m. six-day schedule:

"I know that this will help me but it will be difficult to meet up to do the training because this work you walk a lot and you need to move fast." (P1)

This heterogeneity means that a single fixed training schedule will exclude large portions of the potential participant population. Effective delivery requires either multiple time-slot options or asynchronous formats that respondents can access when their individual trading schedules permit.

6.7.2 Format Preferences

Group-format training is preferred by several respondents who emphasize the value of peer learning alongside formal instruction:

"I will like a group training because I get to listen to people's ideas too." (P2)

One-on-one formats are preferred by respondents with lower confidence or more specific individual capability gaps — Respondent 15 explicitly requested one-on-one training at home. Respondent 11, an 18-year-old Nigerian who is already the most financially organized respondent in the sample, specifies online delivery and a maximum of one hour per session. Respondent 12 would travel to a training venue at Legon if invited. These format preferences are not arbitrary; they reflect individual learning-style assessments, confidence levels, and logistical constraints that a single delivery format cannot simultaneously accommodate.

6.7.3 What Respondents Want to Learn

Where respondents articulated specific learning interests, the content preferences were concrete and practical. Respondent 14 identified social media marketing and fraud prevention as priorities. Respondent 7 wants to understand whether social media posting costs money, a basic misinformation correction that a short session could address. Respondent 12 expressed interest in expanding his link-sharing and platform engagement strategies. Respondent 9 would benefit from smartphone-based training but needs access to a device before she can use what she learns.

These preferences collectively suggest that the content of digital training for hawkers should be organized around immediate, business-relevant use cases, how to photograph and post a product, how to verify a MoMo transaction safely, and how to use WhatsApp Business, rather than generic digital literacy curricula. The training should address specific misinformation barriers (e.g., platform posting costs) and fraud-prevention knowledge gaps, alongside skill-building. And in the most resource-constrained cases, it should be preceded by device access provision.

6.8 The Spectrum of Digital Engagement: From Exclusion to Integration

Taken together, the fifteen interviews reveal that digital engagement among street hawkers in Accra does not follow a simple binary of adoption versus non-adoption but is distributed along a spectrum with at least five identifiable positions. Understanding where different hawkers sit on this spectrum — and what combination of factors places them there — is essential both for interpreting the quantitative findings and for designing targeted interventions.

At one end of the spectrum sits complete digital exclusion. Respondent 10 has no phone, no MoMo account, and no digital marketing capability. His exclusion is not attitudinal — he acknowledges the potential utility of digital tools — but structural: device non-ownership makes participation in the digital economy impossible regardless of awareness or willingness. Respondent 15 occupies an adjacent position: she owns a basic phone, makes occasional calls, and recognizes her own digital literacy gap, but has no data, no smartphone, and no capacity to experiment or learn without external support.

A second position is minimal transactional use. This is the modal position in the sample and is characterized by conditional MoMo acceptance, basic phone-based customer contact (stored numbers, occasional calls), and no digital marketing activity. Respondents 1, 3, 4, 8, and 9 broadly occupy this position. Their digital engagement is real but shallow: the phone is a communication device and an occasional payment channel, not a business management or marketing platform.

A third position is aspirational partial adoption — respondents who are aware of digital tools' potential, hold platform accounts, and have articulated plans for deeper engagement, but whose actual practice remains limited. Respondents 2 and 7 represent this position clearly. Respondent 2 has TikTok and Facebook accounts but only posts on WhatsApp status; Respondent 7 attempted WhatsApp Business but was blocked by a technical barrier. Their digital engagement is more than passive but falls substantially short of their stated intentions, with the gap attributable to a mix of rational deferral, technical friction, and misinformation.

A fourth position is active but selective digital use. Respondents 5, 6, 11, 12, and 13 occupy this position, characterized by regular use of one or two specific digital tools for specific business purposes, alongside non-use of other potentially relevant tools. Respondent 13 actively photographs and posts clothing items to WhatsApp status and reports meaningful customer responses, but does not use MoMo as a financial account. Respondent 12 keeps digital records, uses WhatsApp status for product display, and studies entrepreneurship via TikTok, but data is only purchased weekly. Their digital engagement is purposeful and business-relevant but concentrated in the areas where their specific business model rewards it.

At the far end of the spectrum is deep digital integration. Respondent 14 is the clearest example: he prefers MoMo over cash, deposits daily revenues digitally, maintains approximately 1,000 customer contacts who call for price inquiries, uses a calculator daily, and keeps financial records. His digital engagement is not simply high in volume but deep in functional diversity — spanning payments, communications, financial management, and customer relationship management. His profile illustrates what full-spectrum digital integration looks like in practice for a hawker, along with the business conditions that accompany it: a high-value, differentiated product, a relationship-driven customer base, the highest income in the sample, and no history of digital financial losses.

This spectrum is not randomly distributed across the sample. It is structured by the intersection of at least five factors identified through the thematic analysis: business-model type and product category; device access type and quality; data affordability relative to income; trust in digital platforms shaped by prior experience and institutional reasoning; and human capital, particularly education and the financial management capabilities it enables. These factors do not operate independently — a hawker with high education but a basic phone, low income, and a history of fraud will occupy a different position on the spectrum than one with the same education, a good smartphone, adequate income, and no negative platform experience. The policy implication is that digital inclusion interventions for hawkers need to be multi-dimensional, addressing the binding

constraint for each position on the spectrum rather than applying a uniform access-or-training solution across the full population.

6.9 Summary of Qualitative Findings

The analysis of 15 interviews with Accra Street hawkers reveals eight key findings. First, hawking's time and mobility demands create a structural barrier, raising the opportunity cost of digital engagement and explaining seemingly irrational behaviours. Second, household device access overstates business digital use because domestic resource decisions, device degradation, and separation of personal and business devices divert digital assets from commerce. Third, mobile money is often accepted for transactions but rarely used as a financial account due to loss experiences, regulatory concerns, and verification risks, leading to immediate cash-out. Fourth, digital marketing non-adoption often reflects poor tool-business fit rather than capability gaps; some aspirational adopters face technical, informational, or rational barriers. Fifth, data costs are a persistent barrier influencing platform choice and usage beyond affordability. Sixth, occupational autonomy is a key non-monetary value, and digital solutions must respect it to prevent resistance. Seventh, demand for digital training exists but is highly specific in time and format, limiting participant inclusion. Eighth, digital engagement varies widely from exclusion to deep integration, shaped by business model, device access, data costs, trust, and human capital, necessitating targeted, multi-dimensional policies.

7. Conclusion

This study aims to address a critical question for digital inclusion policy in sub-Saharan Africa: why do potentially transformative digital tools fail to reach street hawkers, even when physical access to devices and networks is generally available? Data from 83 hawkers working in Accra's urban trading environment reveal four significant findings for theory and policy.

First is an Access-Use Gap Driven by Structural Sorting. The main pattern observed is not low access but low usage. Phone ownership is nearly universal, and many have registered for mobile money accounts, yet only a small portion actively use digital tools for tasks like business marketing, supplier payments, and record-keeping. This gap is not caused by a single constraint. Instead, the data shows that what influences digital engagement varies depending on the activity. Adoption of digital marketing is mainly affected by sector type, e.g., clothing and fashion hawkers have a 40-percentage-point advantage over food vendors, and by smartphone ownership. Digital communication use is mostly influenced by age, reflecting the growth of networks over time. Mobile money use for business is impacted by education, network reliability, and transaction protocols: phone and electronics sellers, despite operating in more profitable sectors, are 67 percentage points less likely than food vendors to use mobile money because their transaction norms like inspection-before-payment, clash with pre-payment platforms.

Secondly, Gender Gaps Are Structural, Not Behavioural. Early data shows a stark gender divide: male hawkers use digital tools for marketing four times more often than females, and male hawkers' use of mobile money for supplier payments is three times higher. However, once

controlling for variables like sector, age, education, and smartphone ownership, the gender coefficient becomes small and statistically insignificant across all adoption types. This indicates the gender gap is driven by observable structural sorting: women typically work in food vending, a sector less suited for digital marketing, are generally a decade older, and have lower secondary education rates. Policies aimed at improving gender-based digital adoption should thus focus on these structural factors rather than assume behavioural causes.

Furthermore, Behavioural Barriers Are Shaped by Structural Factors. Reported obstacles such as fear of fraud and lack of digital confidence are common, especially among women, and are often cited as primary barriers to adoption. But the data offers a different perspective: these concerns have minor, statistically insignificant effects in comprehensive models, and adding them doesn't improve explanations. This does not mean these issues are unimportant as they reflect real experiences. But it shows that people worried about fraud or lacking confidence are mostly those with lower education, basic phones, and food-sector businesses, traits already captured by structural variables. This suggests behavioural barriers have limited independent impact when structural factors are considered. Therefore, policies that solely focus on trust and confidence without addressing structural challenges may fall short.

Also, the Informal Sector Shows Great Diversity. A key conclusion is that even among street hawkers in a single city, the informal sector varies widely in digital adoption based on sector, education, device type, and age. Overall statistics can obscure important differences, leading to misallocation of resources if policies are uniform. Instead, targeted, segment-specific approaches are necessary: subsidizing smartphones or providing financing for hawkers in sectors conducive to digital marketing; supporting secondary education to increase mobile money use; and designing mobile money products that align with the norms of sectors like electronics and durable goods trading.

Study Limitations and Future Research

The sample of 83 hawkers in Accra limits the precision of the estimate and causal inference due to size and cross-sectional design. Future longitudinal or experimental studies could clarify causality, such as the impact of mobile money rollouts. The study does not assess digital tools' financial or productivity benefits, which could reveal if the adoption gap causes welfare losses, as seen in other countries. Despite these limitations, this constitutes a well-conducted systematic quantitative study of digital adoption among Ghanaian street hawkers, laying a foundation for future research. It emphasizes the importance of policy focus on structural factors—such as sector, education, and device costs—to bridge the digital divide prior to the success of behavioural interventions.

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