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# Financial technologies for the inclusion of informal workers: Solutions, barriers, and opportunities in the FinTech ecosystem

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***Abstract***

***Purpose:*** In recent decades, financial technologies (FinTech) have emerged as pivotal instruments for the transformation of global financial systems, particularly in contexts characterized by high levels of labor informality. This study analyzes the capacity of FinTech to promote the inclusion of informal workers in different regions of the world, especially in the developing economies of Latin America, Africa, and South Asia, where financial exclusion remains a structural problem. From a comparative and global perspective, the research explores how contextual factors influence the effectiveness of FinTech solutions in driving inclusive financial systems.

***Design/methodology/approach:*** The study evaluates the effectiveness of FinTech solutions, such as digital payments and microcredit, in developing regions characterized by poor infrastructure and regulatory barriers, particularly in Latin America, Africa, and South Asia. Following the PRISMA 2020 guidelines, a systematic review of studies indexed in Scopus and Web of Science was conducted to identify patterns, contextual determinants, and barriers that affect the inclusion of informal workers through financial technologies.

***Findings:*** Despite the advances witnessed in the provision of digital tools, many informal workers encounter obstacles due to a lack of financial and digital literacy, which hinders their full and sustainable integration into the financial system. The results indicate the necessity for public policies adapted to local realities and a more comprehensive approach to FinTech design that addresses the specificities of informal work. These findings provide relevant information for policymakers and financial regulators, highlighting the need to strengthen investment in infrastructure, regulatory frameworks, and inclusive financial governance.

***Originality/value:*** This study contributes to the literature by offering a PRISMA-based systematic and comparative synthesis of FinTech solutions targeting informal workers. Instead of proposing a new causal model, it develops an integrative conceptual framework that organizes existing research across technologies, dimensions of inclusion, contextual factors, and theoretical approaches. This framework enables a comparative understanding of how FinTech inclusion strategies vary across regions, identifying gaps, convergences, and persistent limitations in current academic production.

***Keywords:*** Financial technologies, Financial inclusion, Informal workers, FinTech, Regulatory barriers

***Jel Codes:*** O17, G23, O33

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## 1. Introduction

In recent decades, financial technologies (FinTech) have emerged as a transformative factor in global financial systems, encompassing digital innovations such as mobile payment platforms, microcredit services, digital insurance, and financial management applications. These technologies seek to enhance, automate, and broaden access to conventional financial services, particularly for historically marginalized populations. Financial inclusion refers to the capacity of individuals to effectively access and use these services, with special relevance for informal workers (Sherwani, Shaikh, Behal & Siddiqui, 2024).

Informality represents a substantial share of global employment, especially in developing economies, where it frequently exceeds 60 percent of total labor participation. In Latin America, informality constitutes a structural component of labor markets, leaving millions excluded from formal financial systems (Chacaltana, Bárcia-de-Mattos & García, 2024). Such exclusion constrains the capacity to save, invest, manage risk, and improve long-term economic conditions. In this context, FinTech solutions are frequently presented as mechanisms to overcome access barriers by expanding credit availability, encouraging digital savings, and offering insurance products adapted to volatile incomes (Menza, Jerene & Oumer, 2024). Complementary experiences with community-based financial services, including rotating savings and credit associations, further illustrate how informal financial structures can facilitate inclusion by adapting to local socioeconomic conditions (Kamran & Uusitalo, 2024).

The examination of the relationship between FinTech and the inclusion of informal workers is particularly relevant in contexts characterized by high labor informality. Although the FinTech sector has experienced sustained growth driven by digitalization, mobile penetration, and demand for inclusive solutions, this expansion has not translated into proportional inclusion outcomes for populations traditionally excluded from formal systems. Significant segments of informal workers remain marginalized from safe, convenient, and sustainable financial services, revealing a persistent disconnection between technological diffusion and its capacity to mitigate structural barriers to inclusion (Sackey, Ackah & Asabi, 2025).

Academic production on financial technologies and inclusion has expanded rapidly but remains fragmented. While numerous case studies and sector analyses have examined digital microfinance, alternative credit, and inclusive insurance, much of the literature exhibits limited conceptual integration and methodological cohesion. The absence of unified analytical frameworks restricts the identification of recurrent patterns and contextual determinants shaping inclusion outcomes in informal contexts (Altaytas, 2025). Moreover, research frequently operationalizes inclusion through access or usage indicators, overlooking the specificities of informal labor, including income volatility, weak legal formalization, and deficits in financial and digital literacy (Chibesa & Mwange, 2025).

Empirical evidence on the conditions under which FinTech generates inclusive effects remains uneven and incomplete. The documentation of successful and unsuccessful experiences is often superficial, constraining theoretical development and the design of effective public policies and technological interventions adapted to the realities of informal work. As a result, a persistent gap remains between the potential attributed to FinTech and its demonstrated effectiveness in promoting financial inclusion among informal workers (Magwedere & Marozva, 2025).

Existing studies provide heterogeneous evidence. Research from Kenya, India, and Brazil indicates that mobile money services and digital credit platforms have expanded access to savings and microcredit, fostering higher levels of financial participation and income stability (Afjal, 2023; Menza et al., 2024). In Latin America, digital wallets and microinsurance contribute to mitigating vulnerability among self-employed workers and informal entrepreneurs (Chacaltana et al., 2024; Kamran & Uusitalo, 2024). Conversely, other findings indicate that inadequate regulation and limited financial literacy substantially reduce the long-term impact of FinTech initiatives, particularly in rural and low-income contexts. This contradictory evidence highlights the need for context-sensitive approaches and integrated policy frameworks aligning technological innovation with inclusive development.

The theoretical foundations of this study draw on three main analytical traditions. The Technology Acceptance Model and the Unified Theory of Acceptance and Use of Technology examine behavioral determinants of FinTech adoption, including perceived usefulness and ease of use (Ajzen, 1991; Venkatesh, Morris, Davis & Davis, 2003). The Diffusion of Innovations framework explains heterogeneous adoption patterns across regions with varying levels of infrastructure and digital capabilities (Rogers, 2003). Inclusive Development and Financial Inclusion frameworks further guide the analysis of multidimensional inclusion processes.

However, the present study does not aim to adopt, test, or compare these theoretical models. Instead, they are referenced to illustrate the heterogeneity of analytical perspectives present in the literature reviewed. Consistent with its purpose as a PRISMA-based systematic review, this study follows an inductive synthesis strategy, organising and comparing empirical findings without privileging a single theoretical framework.

In this regard, the overall aim of this research is to analyze how financial technologies promote or limit the inclusion of informal workers through a critical, comparative, and systematic review of the existing literature. To achieve this purpose, the study establishes five specific aims: to identify the types of financial technologies implemented to promote inclusion among informal workers in different regions; to examine the main dimensions of financial inclusion addressed in the literature; analyze the social, economic, technological, and institutional factors that influence the effectiveness of FinTech in informal work contexts; explore how conceptual frameworks linking FinTech, informality, and financial inclusion have been integrated into academic production; and evaluate the evolution and emerging trends in knowledge related to the financial inclusion of informal workers.

Based on these objectives, the following research questions guide the analysis of the specialized literature:

1. Which financial technologies have been used to promote the inclusion of informal workers?
2. Which dimensions of financial inclusion are most addressed in existing studies?
3. What contextual factors—social, economic, technological, or institutional—influence the success of these technologies in informal labor contexts?
4. How do conceptual frameworks on FinTech, informality, and financial inclusion interact in academic production?
5. How has knowledge about the relationship between financial technologies and financial inclusion among informal workers evolved in recent years?

This study is designed as a systematic review with a comparative and integrative analytical focus. Its primary contribution lies in organising, synthesising, and comparatively analysing existing evidence on FinTech solutions for the inclusion of informal workers across developing regions. The proposed framework should therefore be understood as an analytical synthesis tool, aimed at identifying recurrent patterns, contextual determinants, and conceptual convergences in the literature, rather than establishing causal mechanisms.

## 2. Methodology

This study was conducted according to the PRISMA 2020 (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines, which offer a standardized framework for identifying, selecting, appraising, and synthesizing scientific literature (Page, McKenzie, Bossuyt, Boutron, Hoffmann, Mulrow et al., 2021). The PRISMA approach enhances the transparency, traceability, and reproducibility of systematic reviews, and it is widely used in multidisciplinary research that addresses complex phenomena, such as financial technologies and financial inclusion.

This systematic and exploratory study aims to synthesize empirical evidence, identify patterns and typologies of FinTech solutions, and determine contextual characteristics associated with the financial inclusion of informal workers. This study does not seek to test or integrate specific theoretical models, but rather to provide an inductive synthesis of the literature.

### 2.1. Eligibility Criteria

To ensure thematic and methodological relevance, explicit inclusion and exclusion criteria were established. Publications written in English or Spanish and published between 2010 and 2025 were considered eligible. This reflects the period during which FinTech solutions expanded and consolidated globally.

The review included empirical studies and systematic reviews that explicitly analyzed financial technologies, such as digital payments, mobile wallets, microcredit, and digital insurance, in contexts characterized by labor informality, financial exclusion, and/or limited access to formal financial services. The analytical focus was on informal workers and economically excluded populations, particularly in developing regions.

Studies examining FinTech ecosystems, financial inclusion mechanisms, or digital financial services in countries where informal employment is the predominant labor arrangement were also included, recognizing that informal workers are often statistically included in broader unbanked or financially excluded populations.

Studies were excluded if full-text access was unavailable, if they were poorly indexed, if they were purely conceptual without empirical evidence, or if they failed to establish a clear relationship between financial technologies and financial inclusion processes. Studies whose target population was not directly related to informal labor contexts were also excluded. Geographically, priority was given to studies conducted in Latin America, Africa, and South Asia, where informal employment and financial exclusion are highly prevalent. While this focus helps identify contextual patterns, it limits the generalizability of the findings to other regions.

### 2.2. Sources of Information

Two academic databases were selected as the primary sources: Scopus and Web of Science. These databases were chosen for their extensive multidisciplinary coverage and rigorous indexing standards, which ensure the quality and relevance of the included publications. Scopus provides access to peer-reviewed journals, conference proceedings, and books in social, economic, and technological disciplines. It also offers advanced search and citation filtering tools (Asubiaro, Onaolapo & Mills, 2024).

Web of Science complements this coverage with its selective indexing process and citation metrics, which facilitate the identification of influential research on financial technologies and financial inclusion (Asubiaro et al., 2024). Using both databases together strengthens the robustness and comprehensiveness of the reviewed corpus.

### 2.3. Search Strategy

For the search in Scopus and Web of Science, specific equations were defined based on the inclusion criteria. In Scopus, the equation used was:

TITLE (“fintech” OR “financial technology”) AND TITLE (“informal workers” OR “informal economy” OR “financial inclusion” OR “unbanked” OR “financial access”). This equation allowed us to identify relevant studies on financial technologies and their impact on the inclusion of informal workers.

In Web of Science, the equation was adapted to the database-specific format:

TS=(“fintech” OR “financial technology”) AND TS=(“informal workers” OR “informal economy” OR “financial inclusion” OR “unbanked” OR “financial access”). In addition, AK was used to refine key terms for authors and TS for titles and abstracts.

The emphasis on title-based searches was a deliberate methodological choice aimed at ensuring high thematic relevance and managing the volume of retrieved records. Although this approach may have excluded relevant studies that did not explicitly include key terms in their titles, it allowed for greater conceptual consistency within the reviewed corpus.

### 2.4. Selection Process

The selection process was conducted in two successive phases. First, automatic filters were applied according to the predefined inclusion and exclusion criteria. Second, abstracts and, when necessary, full texts were examined to confirm thematic relevance and methodological soundness. Only studies that met all eligibility criteria were included in the final analysis. The entire procedure was documented to ensure traceability and replicability. Figure 1 presents the PRISMA flowchart summarizing the stages of identification, screening, eligibility, and inclusion of the analyzed studies, in accordance with PRISMA 2020 guidelines.

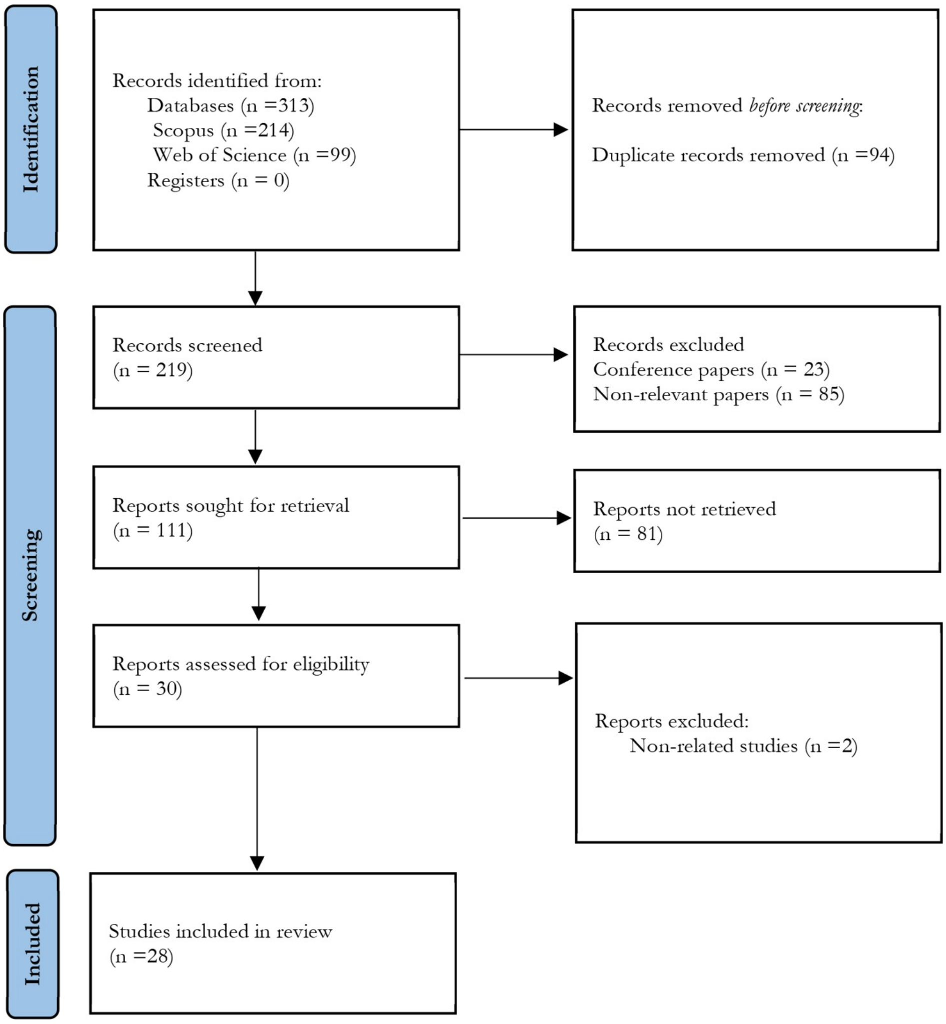


Figure 1. PRISMA flowchart. Prepared by the authors based on Scopus and Web of Science

### 2.5. Data Processing

Data extraction and processing were performed using Microsoft Excel. A structured extraction matrix was developed as a coding protocol to systematize information from each study, including author and year, geographical region, type of FinTech solution, target population, dimensions of financial inclusion addressed, methodological approach, and key findings.

These categories were applied consistently across all included studies, enabling the identification of recurrent patterns and cross-contextual differences. Descriptive analytical techniques, including filtering and pivot tables, were employed to synthesize the evidence without imposing predefined causal models or theoretical hierarchies.

## 3. Results

The results obtained are presented in accordance with the research questions that guided this study. The analysis was grounded in a systematic review of studies, which were examined to identify relevant approaches, patterns, and findings. Each subsection addresses a specific analytical focus derived from these questions and covers different dimensions related to the financial inclusion of informal workers. In this regard, the included studies were classified according to their level of relevance to informal labor dynamics, distinguishing between studies with direct relevance, those offering indirect contextual relevance in economies with high levels of informality, and those providing structural or conceptual insights into FinTech-enabled financial inclusion. Table 1 provides a synopsis of the studies incorporated into the detailed analysis along with their corresponding relevance classification.

| Title | Authors | Level of relevance | Explanation |
|---|---|---|---|
| Attaining Sustainable Development Goals through Financial Inclusion: Exploring Collaborative Approaches to Fintech Adoption in Developing Economies | Danladi, Prasad, Modibbo, Ahmadi & Ghasemi (2023) | Indirect contextual relevance | Examines FinTech-enabled financial inclusion in developing economies where informal employment constitutes a large share of the labor market. |
| Bridging the financial divide: a bibliometric analysis on the role of digital financial services within FinTech | Afjal (2023) | Structural or conceptual relevance | Provides a bibliometric overview of the FinTech and financial inclusion literature rather than focusing on specific worker populations. |
| Enhancing Financial Inclusion in ASEAN: Identifying the Best Growth Markets for Fintech | Loo (2019) | Indirect contextual relevance | Focuses on emerging ASEAN markets characterized by high levels of informal economic activity. |
| Exploring the dual relationship between fintech and financial inclusion in developing countries | Azmeh & Al-Raeei (2024) | Indirect contextual relevance | Analyzes developing countries where financial exclusion strongly overlaps with informal labor participation. |
| Fintech, financial inclusion and income inequality nexus in Africa | Chinoda & Mashamba (2021) | Indirect contextual relevance | Addresses African economies where informal employment is structurally prevalent. |
| Fintech, financial inclusion, and sustainable development in the African region | Tidjani & Madouri (2024) | Indirect contextual relevance | Regional analysis relevant to informal financial ecosystems in Africa. |
| Gender-Inclusive Development through Fintech | Tripathi & Rajeev (2023) | Direct relevance | Explicitly addresses financially excluded groups, including women engaged in informal employment. |
| Lessons from Remarkable FinTech Companies for the Financial Inclusion in Peru | Velazquez, Bobek, Vide & Horvat (2022) | Direct relevance | Case studies from Peru, a country with a high proportion of informal workers. |
| The effect of financial technology on financial inclusion in Ethiopia | Menza et al. (2024) | Indirect contextual relevance | Examines financial inclusion in a context where informal employment dominates the labor market. |
| The role of financial inclusion and FinTech in addressing climate-related challenges | Mhlanga (2022) | Structural or conceptual relevance | Provides a systemic perspective on FinTech-enabled inclusion rather than population-specific analysis. |
| Determinants of interest in eNaira and financial inclusion information in Nigeria | Ozili (2023) | Indirect contextual relevance | Nigeria's unbanked population substantially overlaps with informal workers. |
| Exploring the landscape of financial inclusion through the lens of financial technologies: A review | Carè, Boitan, Stoian & Fatima (2025) | Structural or conceptual relevance | Review article synthesizing conceptual approaches to financial inclusion through FinTech. |
| Financial inclusion and financial technology: finance for everyone? | Tian & Kling (2022) | Structural or conceptual relevance | Conceptual discussion of FinTech and inclusion mechanisms. |

| Title | Authors | Level of relevance | Explanation |
|---|---|---|---|
| Financial Technology as a Basis for Financial Inclusion and its Impact on Profitability | Alshehadeh & Al-Khawaja (2022) | Structural relevance | Focuses on formal banking institutions rather than informal workers. |
| Finclusion: The nexus of Fintech and financial inclusion against banks' market power | Aleemi, Javaid & Hafeez (2023) | Structural relevance | Market-level analysis without explicit reference to informal employment. |
| Fintech and Financial Inclusion in Saudi Arabia | Khan & Alhadi (2022) | Indirect contextual relevance | Addresses inclusion within a labor market with segmented formal and informal employment. |
| FinTech and Financial Inclusion: Exploring the Mediating Role of Digital Financial Literacy | Amnas, Selvam & Parayitam (2024) | Indirect contextual relevance | Digital literacy constraints are particularly salient among informal workers. |
| Fintech and financial inclusion: the mediating role of digital marketing | Al-Slehat (2023) | Structural relevance | Focuses on adoption mechanisms rather than labor status. |
| Improving MSME performance through financial literacy, financial technology, and financial inclusion | Gunawan, Jufrizen & Pulungan (2023) | Direct relevance | MSMEs significantly overlap with informal self-employment and micro-entrepreneurship. |
| Information Effect of Fintech and Digital Finance during the COVID-19 Pandemic | Ozili, Mhlanga, Ammar & Fersi (2024) | Indirect contextual relevance | Global crisis evidence with strong implications for informal workers. |
| Moderating effects of energy poverty on financial inclusion and FinTech lending | Rahman (2024) | Structural relevance | Macro-level analysis of moderating effects without explicit labor focus. |
| Monetary Policy Effectiveness and Financial Inclusion in Nigeria | Joseph, Chinyere, Pauline & Gbenga (2021) | Structural relevance | Policy-oriented study rather than worker-centered analysis. |
| Role of Government Policies to Fintech Adoption and Financial Inclusion in Pakistan | Noreen, Mia, Ghazali & Ahmed (2022) | Indirect contextual relevance | Pakistan displays high levels of informal labor market participation. |
| The Causal Relationship between FinTech, Financial Inclusion, and Income Inequality in African Economies | Girma & Huseynov (2023) | Indirect contextual relevance | Regional macro-level evidence applicable to informal economies. |
| The effect of financial inclusion and financial technology on effectiveness of the Indonesian monetary policy | Saraswati, Maski, Kaluge & Sakti (2020) | Structural relevance | Monetary policy focus rather than labor inclusion. |
| The impact of financial literacy, financial technology, and financial inclusion on SME performance | Rahadjeng, Pratikto, Mukhlis, Restuningdiah & Mala (2023) | Direct relevance | SMEs encompass a large share of informal employment. |
| The Impact of Fintech and Digital Financial Services on Financial Inclusion in India | Asif, Khan, Tiwari, Wani & Alam (2023) | Indirect contextual relevance | India hosts one of the world's largest informal workforces. |
| The impact of network coverage on the adoption of Fintech in sub-Saharan Africa | Mothobi & Kebotsamang (2024) | Indirect contextual relevance | Infrastructure access directly shapes FinTech adoption among informal workers. |

Table 1. Studies included in the research. Prepared by the authors based on Scopus and Web of Science

As illustrated in Figure 2, the frequency with which different types of financial technologies are reported in the analyzed studies varies considerably. The FinTech Solutions category is the most prevalent, with a total of 16 entries. The subsequent categories are Digital Payments (7), Digital Financial Services (5), and Mobile Money (4). In contrast, mobile banking (3), digital banking (2), e-wallet platforms (2), and peer-to-peer lending (1) have seen less development. The distribution is indicative of the diversity of technologies applied to the financial inclusion of informal workers, with a clear emphasis on FinTech solutions. This pattern is particularly evident in Latin America and sub-Saharan Africa, where digital payments and mobile money have been widely adopted as alternatives to traditional banking channels.

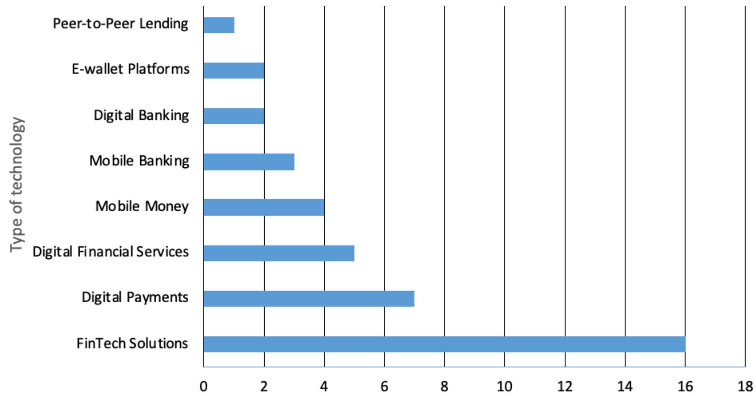


Figure 2. Frequency of financial technologies used. Prepared by the authors based on Scopus and Web of Science

As illustrated in Figure 3, the distribution of inclusion dimensions addressed in the reviewed studies is presented. The Financial Access category is the most frequently mentioned, with a total of five mentions. After this, the following four themes are addressed: Financial Inclusion, Gender Inclusion, Digital Inclusion, and Access and Usage, with each of these receiving four mentions. The Usage Dimension and Financial Literacy dimensions are identified in three studies, while Digital Financial Inclusion and Inclusion Awareness appear in two cases each. The range of approaches adopted reflects a comprehensive consideration of diverse aspects of inclusion within the financial context of informal workers. Studies from India, Indonesia, and Kenya show that improvements in financial and digital inclusion are closely associated with government-led digitization programs, while in Latin American countries, gender and social inclusion dimensions are increasingly addressed through microfinance-based FinTech initiatives.

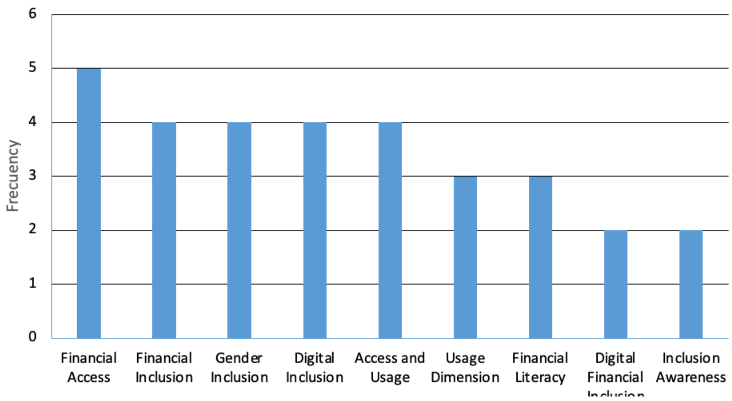


Figure 3. Dimensions of inclusion addressed. Prepared by the authors based on Scopus and Web of Science

As illustrated in Figure 4, the distribution of contextual factors documented in the reviewed studies is presented. The Geographic Factors category is the most frequently mentioned, with eight mentions in total. After this, the following elements are listed: Regulatory Environment, Infrastructure Gaps, and Macroeconomic Conditions, each of which is mentioned seven times. Other recurring categories include Socioeconomic Inequality (6), Access to Banking and Financial System Structure (5), and Youth and Employment (4). As indicated in the literature, the impact of the novel Coronavirus (SARS-CoV-2) on educational attainment, institutional support, and digital transformation has been documented on three occasions. In addition, the role of digital literacy in these contexts has been mentioned on two occasions. The distribution is indicative of a diversity of structural and contextual factors that influence the link between financial technology and inclusion. For example, African economies tend to emphasize infrastructure gaps and weak institutional frameworks, while Asian economies highlight macroeconomic conditions and digital literacy. In Latin America, inequality and informality remain the most influential contextual barriers.

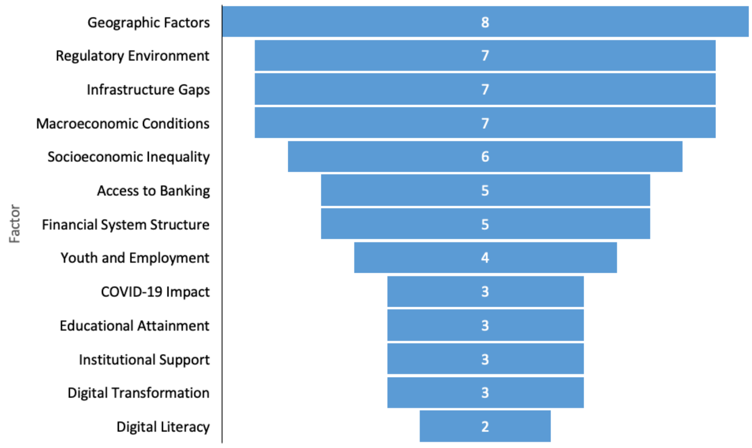


Figure 4. Identified contextual factors. Prepared by the authors based on Scopus and Web of Science

As illustrated in Figure 5, the distribution of the categories identified in the conceptual framework applied by the reviewed studies is presented. The predominant approach is statistical modelling, with 20 entries. Empirical Regression Methods are referred to on eight occasions. Other recurring categories include Systematic Literature Analysis (6), Global Financial Indices, and Data Analysis Techniques (5 each). The following theories are reported: Technology Acceptance Theories and Financial Technology Diffusion (4 each); and Financial Inclusion Models and Economic Resilience Models (3 each). The diversity of approaches reflects the variety of analytical frameworks utilized in addressing the financial inclusion of informal workers through technology. African and Asian studies tend to use econometric and regression-based models to explore macro-level relationships, while Latin American research often adopts hybrid or qualitative approaches, integrating social and institutional perspectives.

As illustrated in Figure 6, the predominant thematic trends observed in studies about financial technologies and the inclusion of informal workers are highlighted. The Regional Development Focus category is the most frequently mentioned, with 43 mentions. The publication is followed by Financial Inclusion Dynamics, with 11 mentions, and Sustainable Development Goals, with 8. Other topics identified include Cross-Country Comparisons, Technological Innovation Impact, and FinTech Adoption Trends, among others. The distribution of the chapters reflects a broad academic interest in the subject, encompassing geographical, technological, and social approaches to the analysis of financial inclusion. This trend reflects the growing academic and political relevance of FinTech inclusion in regions such as Latin America, Sub-Saharan Africa, and South Asia, where digital transformation and financial innovation are increasingly linked to the achievement of the Sustainable Development Goals (SDGs).

The results of the systematic review were organized according to the research questions. This structure enabled the characterization of the financial technologies applied, the dimensions of inclusion addressed, the contextual factors considered, the conceptual frameworks employed, and the main thematic trends. The organization has revealed patterns that facilitate comprehension of theoretical approaches and practical applications in different contexts. An evolution in the development of the topic was also identified, allowing the current emphases and persistent gaps in the study of financial inclusion of informal workers through technological solutions to be identified. Overall, the results show that, although regional trajectories differ, the adoption of FinTech in developing economies is consistently aligned with the broader goal of reducing informality and promoting inclusive economic growth.

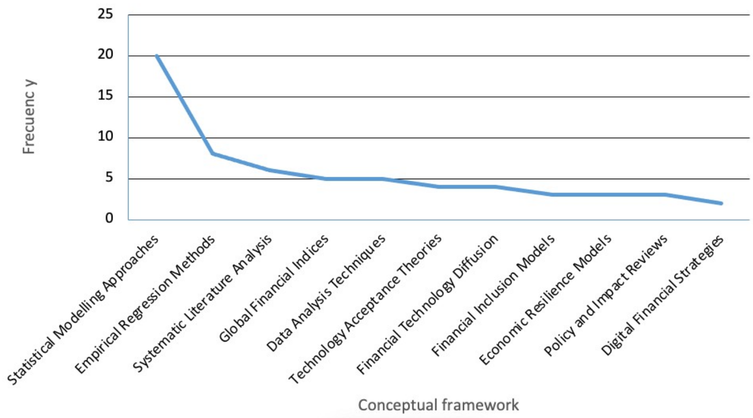


Figure 5. Distribution of categories in the conceptual framework.
Prepared by the authors based on Scopus and Web of Science

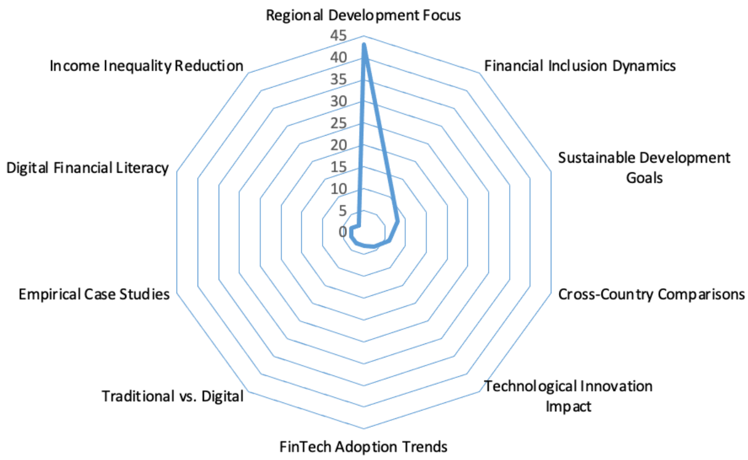


Figure 6. Thematic trends. Prepared by the authors based on Scopus and Web of Science

Beyond the distribution of frequencies by type of technology, inclusion dimension, and contextual factor, the comparative analysis of the reviewed studies reveals a set of analytical patterns that illuminate the mechanisms through which financial technologies shape the inclusion of informal workers in differentiated ways.

First, a recurrent mechanism of transactional inclusion is identified, particularly associated with digital payments and mobile money platforms in Sub-Saharan Africa and South Asia. In these contexts, the primary contribution of FinTech does not lie in the provision of complex financial products, but rather in the reduction of transaction costs and the expansion of income traceability, which facilitates access to basic payment systems and public transfer programs. This pattern suggests that, in environments characterized by structural underbaking, inclusion is mainly achieved through minimal operational functions rather than through full financial integration.

Second, in Latin America a mechanism of productive inclusion predominates, linked to the use of digital wallets, microcredit, and microfinance platforms oriented toward self-employed workers and informal micro-entrepreneurs. In this case, financial inclusion is articulated with processes of partial income formalization and participation in digital value chains. However, the reviewed studies indicate that these effects are highly dependent on regulatory stability and sustained access to connectivity, which limits their scalability in contexts of high territorial inequality.

Third, a mechanism of conditional inclusion emerges based on digital and financial capital. Across multiple regions, effective adoption of FinTech is mediated by minimum levels of digital literacy, device ownership, and algorithmic visibility. This pattern reveals an ambivalent dynamic: while technologies reduce institutional entry barriers, they simultaneously generate new forms of exclusion for workers with low digital footprints, limited connectivity, or highly volatile incomes.

Finally, the analysis shows that the inclusive effects of FinTech are neither linear nor cumulative. Several studies document processes of initial inclusion followed by stagnation or abandonment, particularly in contexts with weak regulation or products poorly adapted to irregular incomes. This finding suggests that technology-mediated financial inclusion constitutes a dynamic and fragile process rather than a stable outcome.

## 4. Discussion

The discussion has been organized to interpret the findings of the systematic review in relation to the central objective of the study, which is to understand the role of financial technologies in the inclusion of informal workers. Firstly, a critical analysis of the results is presented. A comparison with previous studies is then made to situate the contributions of this research in the current academic context. A conceptual framework is then proposed, based on the identified patterns. Finally, the theoretical, policy, and practical implications are addressed, the limitations of the study are acknowledged, and guidelines for future research are proposed.

### 4.1. Analysis of Results

The results of the systematic review indicate a shift from purely descriptive classifications toward an interpretive understanding of the dynamics through which financial technologies influence the inclusion of informal workers. Rather than producing homogeneous effects, the evidence reveals differentiated contextual configurations in which technology, institutional environments, and labor characteristics interact nonlinearly.

One central finding is that inclusion outcomes remain predominantly functional and partial. The expansion of access concentrates mainly on basic services, such as payments, transfers, and transactional savings, while sustained access to productive credit, insurance, and social protection mechanisms remains limited. The persistent gap between access and financial depth suggests that technological inclusion does not inherently translate into substantive economic inclusion, confirming that the mere presence of digital tools is insufficient to generate lasting improvements in the economic conditions of informal workers.

From a technological perspective, the predominance of generic FinTech solutions, digital payments, and digital financial services reflects a strategic focus on low-cost and scalable instruments designed to reduce transaction friction and facilitate entry into formal financial channels. However, comparative evidence indicates that similar technologies generate heterogeneous inclusion outcomes depending on regulatory environments, infrastructure quality, and levels of digital and financial literacy. Consequently, the effectiveness of FinTech instruments depends less on their intrinsic characteristics than on the institutional and social ecosystems in which they are embedded (Azmeh & Al-Raeei, 2024; Danladi et al., 2023).

A second dynamic concerns the uneven configuration of inclusion dimensions across contexts. Although financial access remains the dominant focus, other dimensions, including gender inclusion, digital inclusion, and effective usage, receive limited attention. This distribution reflects an implicit hierarchy that prioritizes initial access over deeper forms of empowerment, literacy, and sustained participation. The marginal presence of financial literacy and inclusion awareness suggests that many interventions privilege technological deployment over the development of user capabilities, potentially constraining long-term inclusion outcomes (Afjal, 2023; Mothobi & Kebotsamang, 2024).

Contextual factors operate as critical mediators shaping both adoption and impact. Geographic conditions, regulatory frameworks, infrastructure gaps, and macroeconomic volatility systematically influence the performance of FinTech initiatives. The prominence of socioeconomic inequality and banking system structure indicates that technological innovation operates within existing structural constraints rather than replacing them. In addition, the effects observed during the pandemic highlight the vulnerability of technology-mediated inclusion to external shocks, reinforcing the fragile and contingent nature of these processes in emerging economies (Loo, 2019; Tian & Kling, 2022).

A further analytical tension arises from the methodological orientation of the reviewed literature. The predominance of statistical modeling and regression-based approaches reflects a strong emphasis on macro-level relationships between FinTech adoption and aggregate inclusion indicators. Although this orientation facilitates cross-country comparisons and policy evaluation, it tends to obscure micro-level dynamics associated with income volatility, labor instability, and user heterogeneity. The coexistence of technology acceptance theories, diffusion models, and inclusion frameworks reveals a fragmented analytical landscape in which explanatory models coexist without full theoretical integration (Mhlanga, 2022; Tripathi & Rajeev, 2023).

Thematic trends further reveal an increasing alignment between FinTech inclusion and broader development agendas, particularly regional development strategies and the Sustainable Development Goals. However, this emphasis on regional growth narratives coexists with limited attention to distributional effects within the informal sector itself, suggesting that inclusion discourses may overstate aggregate progress while underestimating intra-group stratification and emerging forms of digital exclusion.

Empirical evidence confirms that FinTech solutions generate cross-cutting effects extending beyond financial access to influence gender inclusion, business development, and digital participation. In Latin America, digital wallets and mobile payment systems have contributed to partial income formalization and integration into value chains (Chacaltana et al., 2024; Kamran & Uusitalo, 2024; Velázquez et al., 2022). In sub-Saharan Africa, mobile money platforms strengthen transactional resilience and rural liquidity management (Mothobi & Kebotsamang, 2024; Loughlin & Priyadarshini, 2021). In Asia, the combination of microcredit and digital identification facilitates access to public transfers and social protection programs (Afjal, 2023; Menza et al., 2024). These differentiated trajectories confirm that FinTech operates as a contextualized inclusion technology rather than a universal solution, with outcomes shaped by institutional architecture, labor structures, and policy integration.

### 4.2. Comparison of Results with Other Studies

This systematic review situates its findings within the broader literature by identifying convergences and divergences in the conceptualization of financial technologies as instruments of inclusion for informal workers. One central convergence concerns the persistence of foundational barriers, including low digital and financial literacy, inadequate infrastructure, and regulatory frameworks poorly adapted to informal labor contexts (Hans, 2025; Loughlin & Priyadarshini, 2021). The present review confirms that these constraints systematically limit both the adoption and sustained use of FinTech solutions, particularly in rural and highly informal economies.

Beyond confirming these obstacles, the comparative synthesis highlights regulatory design and institutional integration as decisive mediating mechanisms. While prior studies emphasize flexible regulatory frameworks and hybrid institutional arrangements—such as village banking, public–private partnerships, and community-based platforms—as facilitators of access (Banda, Matafwali, & Mwange, 2025; Hans, 2025), the evidence reviewed here indicates that such arrangements frequently generate only partial and context-dependent inclusion. Hybrid models tend to expand transactional access without consolidating durable pathways toward credit deepening, insurance coverage, or social protection, reinforcing the functional and fragile character of technology-mediated inclusion.

A distinctive contribution of this review lies in its systematic focus on informal workers as a labor category rather than as a residual subgroup within broader unbanked or rural populations. Unlike previous reviews centered on women, youth, microcredit users, or geographically bounded communities, this analysis highlights the structural heterogeneity of informal labor. Income volatility, employment instability, and legal invisibility emerge not merely as contextual features but as core determinants shaping adoption trajectories and inclusion outcomes. Consequently, the review demonstrates that many inclusion strategies implicitly assume income regularity and institutional continuity, conditions rarely present in informal employment.

With respect to thematic evolution, the findings confirm a gradual shift from access-oriented paradigms toward more comprehensive frameworks incorporating sustainability, resilience, and regional development (Okello & Momanyi, 2024). However, a persistent tension remains between normative aspirations and empirical scalability. Although numerous studies emphasize training, incentives, and digital capability-building as transformative mechanisms, the synthesis reveals that most FinTech initiatives remain confined to pilot programs, localized experiments, or narrowly defined user segments, with limited evidence of structural inclusion in highly informal environments. This contradiction underscores the enduring gap between policy discourse and operational capacity under conditions of institutional weakness and socioeconomic inequality.

Methodologically, the review reveals both continuity and fragmentation. The predominance of quantitative approaches based on household surveys and global datasets has generated valuable cross-country evidence on macro-level associations between FinTech adoption and inclusion indicators (Priyadarshi & Prasad, 2024; Valera, Lei & Fong, 2025). However, this orientation tends to obscure micro-level dynamics related to labor instability, user heterogeneity, and abandonment behavior. The coexistence of diffusion models, technology acceptance frameworks, and financial inclusion paradigms reflects a fragmented analytical landscape in which explanatory models coexist without full theoretical integration.

The review's principal contribution lies in identifying thematic patterns linking FinTech inclusion to the Sustainable Development Goals and region-specific development trajectories. While previous studies have explored these connections in isolation, few have offered a systematic and comparative structure capable of capturing temporal evolution and cross-regional differentiation, as illustrated in Figure 6. This integrative perspective reveals persistent gaps regarding sustainability, depth of inclusion, and distributional effects within the informal sector, providing a structured basis for future theoretical refinement and empirical testing.

### 4.3. Proposed Conceptual Framework

The proposed conceptual framework is not conceived as a taxonomic classification of technologies and dimensions. Rather, it is designed as an analytical device to guide the interpretation of how financial technologies shape inclusion trajectories among informal workers. Instead of organizing elements into parallel categories, the framework illustrates the pathways through which technological instruments interact with institutional environments, labor profiles, and contextual constraints to produce different inclusion outcomes.

Figure 7 integrates the main findings of the review into a structured interpretive scheme composed of five interdependent components: technological instruments, functional dimensions of inclusion, contextual mediators, theoretical lenses, and thematic evolution over time. These components are not presented as independent layers, but rather as interacting domains that influence both adoption processes and inclusion outcomes. In this configuration, technologies operate as enabling or limiting instruments; inclusion dimensions operate as operational objectives; contextual factors operate as mediating mechanisms; and theoretical frameworks operate as interpretive filters that shape empirical expectations.

The analytical value of the framework lies in its capacity to identify intermediate transactional, productive, and conditional mechanisms through which similar technologies generate heterogeneous inclusion trajectories across regions and institutional settings. By explicitly incorporating mediating conditions and temporal evolution, the framework provides a heuristic structure for interpreting nonlinear processes, partial inclusion, and context-dependent outcomes observed in the Results and Discussion sections.

In this sense, the framework serves as an interpretive scaffold rather than a descriptive inventory. It allows for the systematic organization of empirical patterns, identification of structural tensions, and comparison of regional trajectories. Its primary contribution is explanatory, not classifying revealing how and under what conditions financial technologies contribute to or fail to achieve substantive, sustainable inclusion among informal workers.

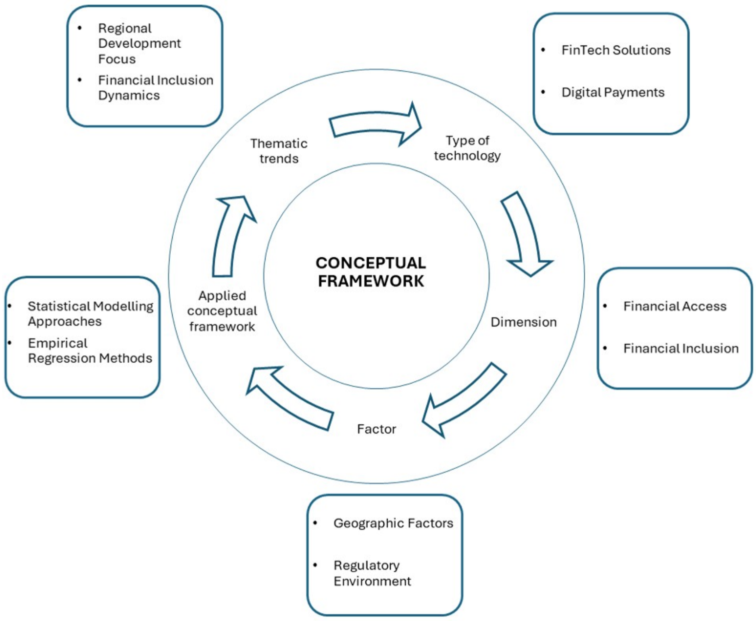


Figure 7. Conceptual framework for financial technologies and informal inclusion

### 4.4. Implications

The findings of this systematic review generate relevant theoretical, political, and practical implications for the advancement of knowledge, the design of public policies, and the implementation of effective solutions aimed at promoting the inclusion of informal workers through financial technologies.

From a theoretical perspective, the study contributes to the understanding of financial technologies as multicomponent instruments whose effectiveness depends on the interaction between technological means, inclusive objectives, contextual conditions, and explanatory frameworks. The integration of technology acceptance theory, diffusion of innovative models, and inclusive approaches supports the construction of hybrid analytical frameworks articulating individual, social, and structural dimensions. The proposed synthesis underscores the need to transcend access-oriented methodologies and adopt more comprehensive approaches encompassing effective use, solution adequacy, and the capacity to generate economic empowerment. The identified theoretical evolution from access-centered models toward frameworks incorporating sustainability, equity, and regional development opens new avenues for comparative analysis and empirical modeling.

From a public policy perspective, the results emphasize the need to adapt regulatory frameworks to the structural characteristics of the informal sector. Regulatory authorities and governments must address persistent obstacles, including limited digital and financial literacy, infrastructure deficits, and regulatory gaps. Flexible regulatory instruments such as regulatory sandboxes and policies linking financial digitalization with labor formalization and local development strategies are recommended. The promotion of interoperability among digital financial services is also essential to avoid fragmented systems and to foster integrated financial ecosystems. Governments may further enhance inclusion by incorporating FinTech services into social protection programs and conditional transfer schemes.

At the operational level, the findings highlight the importance of designing user-centered solutions through participatory approaches that ensure cultural relevance and functional adequacy. Digital microfinance platforms, mobile wallets, and artificial intelligence tools should be adapted to irregular income patterns and limited banking access. Public–private partnerships and hybrid models combining digital technologies with local institutions such as cooperatives and trade associations are critical for facilitating the social appropriation of financial tools. FinTech developers are encouraged to improve usability, linguistic accessibility, and affordability, while financial institutions should integrate behavioral data to refine credit scoring models reflecting informal income dynamics. Collaborative ecosystems involving governments, FinTech firms, and NGOs can promote sustainable inclusion by strengthening trust, resilience, and long-term empowerment.

Non-governmental organizations play a mediating role by promoting digital and financial literacy processes that enhance usability and economic autonomy. In parallel, FinTech firms are encouraged to incorporate inclusive impact indicators into their business models, assessing not only user acquisition but also effects on economic resilience and social capital formation.

Overall, the findings provide a robust foundation for interventions that combine technological innovation with structural inclusion in informal labor contexts. The proposed conceptual framework offers an integrated guide for academic research, policy design, and intervention strategies, supporting informed decision-making, strategic collaboration, and evaluation models that transcend traditional access-based approaches.

Nevertheless, the adoption of financial technologies also introduces risks requiring systematic attention. Kuladeep-Kumar, Katyayani, Venkatesh, Sunkara, Gowthami and Rani (2024) demonstrate that digital solutions generate mixed impacts on privacy and expose vulnerabilities related to sensitive data management, particularly in low-infrastructure contexts. Regulatory uncertainty further undermines transparency and may intensify digital and financial exclusion among populations with limited technological literacy. Singh, Dave and Joshi (2024) similarly warn that rapid digital expansion increases exposure to risk when regulation lags behind innovation and that automation may amplify structural weaknesses without adequate oversight.

Recent evidence also highlights cognitive and structural determinants shaping adoption trajectories. Wu and Peng (2024) show that perceived usefulness, ease of use, and financial awareness significantly influence adoption intentions, while technological limitations, restricted digital capabilities, and low financial literacy in rural areas exacerbate vulnerabilities and constrain the potential benefits of financial digitization. Together, these findings underscore the necessity of balancing innovation, security, and user protection to ensure that technological inclusion does not reproduce existing inequalities.

### 4.5. Limitations and Future Research Directions

The present study acknowledges several methodological, analytical, and contextual limitations that should be considered when interpreting its findings. First, the systematic review relied on only a few academic databases and digital repositories, primarily Scopus and Web of Science. This may have excluded relevant research published in local or non-indexed journals, as well as gray literature. Additionally, the inclusion criteria limited the scope to peer-reviewed publications in English and Spanish, which could introduce a language bias and underrepresent empirical evidence from regions where other languages predominate, such as French-speaking Africa or the Middle East. This restriction may have also contributed to the overrepresentation of studies from regions with a higher academic output in FinTech, such as Latin America and South Asia.

From an analytical perspective, the diversity of theoretical approaches, heterogeneity of methodological designs, and variability of indicators used across analyzed studies hinder direct comparison of results and limit broad generalizations. Consequently, the relationships identified between technology types, financial inclusion, and contextual factors should be interpreted as indicative patterns rather than definitive causal relationships. Furthermore, the findings reflect the available knowledge at the time of the review. Therefore, future updates may modify or expand the presented conclusions. The geographical focus on developing regions, mainly Latin America, Africa, and South Asia, further constrains generalization of the results to contexts with different institutional and economic structures.

The synthesis is based exclusively on secondary data and lacks field validation, limiting the empirical corroboration of the proposed conceptual framework. While applying the PRISMA 2020 protocol enhances methodological transparency, potential publication bias remains. The absence of primary data from informal populations restricts the robustness of the conclusions. Therefore, the patterns identified should be considered provisional and subject to empirical verification.

In this context, several priority areas for future research emerge. First, it is necessary to deepen the analysis of how financial technologies can be adapted more effectively to the specific contexts of informal workers by considering socioeconomic, cultural, and infrastructural conditions across regions. Further research should assess these technologies' inclusive potential in environments with limited connectivity and significant digital literacy gaps. It should also examine these technologies' long-term impact on economic resilience and empowerment among informal workers.

Empirical, comparative, and longitudinal studies should be developed to evaluate the effectiveness of FinTech solutions across diverse informal populations, identify common and divergent adoption factors, and analyze the sustained economic consequences of their implementation over time. Additionally, validating the conceptual framework through fieldwork using interviews, focus groups, and case studies with informal workers and key actors in the FinTech ecosystem is proposed to examine its practical applicability and identify additional relevant dimensions.

From a methodological standpoint, future reviews should broaden the range of consulted databases and sources, incorporating literature in additional languages, such as French or Arabic, to capture a wider range of regional perspectives. Subsequent research would benefit from mixed methods approaches that integrate quantitative analysis with in-depth qualitative inquiry. It would also benefit from the inclusion of case studies on public policy implementation and public-private collaborative models. These approaches would advance a more comprehensive and operational understanding of financial inclusion in informal contexts.

## 5. Conclusions

This study on financial technologies for the inclusion of informal workers highlights the need to address the complexity of the informal sector through more tailored and contextual solutions. The analysis focused on developing regions such as Latin America, sub-Saharan Africa, and South Asia, where informality remains a structural challenge and access to formal financial services is limited. While technologies with positive impacts were identified, such as FinTech solutions and digital payments, the analysis of contextual factors, including limited infrastructure and regulatory barriers, emphasizes the necessity for public policies that are more tailored to local realities. The findings also indicate that the dimensions of financial inclusion must extend beyond access, incorporating aspects such as financial and digital literacy, gender inclusion, and effective use of financial services.

Notwithstanding advances in technological implementation, impediments pertaining to inadequate infrastructure and suboptimal digital literacy persist, thereby curtailing the tangible impact on the economic resilience of informal workers. These barriers are particularly evident in rural and low-income areas of Latin America and Africa, where connectivity gaps and limited institutional capacity hinder the scalability of FinTech initiatives. The proposed conceptual framework must be validated and expanded by implementing mixed methodological approaches and case studies that offer a deeper understanding of local and regional dynamics.

This study establishes a comprehensive framework for future research, integrating technological innovation with structural inclusion. The objective is to facilitate a transition towards sustainable financial development models that acknowledge the particularities of informal work. In regions such as South Asia and Latin America, where informal economies account for a significant share of employment, this approach is essential to ensure that digital financial transformation effectively contributes to inclusive growth. The successful implementation of FinTech technologies necessitates a comprehensive approach that considers not only access to financial services but also their effectiveness and adaptation to the conditions of informal workers in various regions.

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## References

Afjal, M. (2023). Bridging the financial divide: a bibliometric analysis on the role of digital financial services within FinTech in enhancing financial inclusion and economic development. *Humanities and Social Sciences Communications,* 10(1), 645. https://doi.org/10.1057/s41599-023-02086-y

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes,* 50(2), 179-211. https://doi.org/10.1016/0749-5978(91)90020-T

Aleemi, A.R., Javaid, F., & Hafeez, S.S. (2023). Finclusion: The nexus of Fintech and financial inclusion against banks' market power. *Heliyon,* 9(12), e22551. https://doi.org/10.1016/j.heliyon.2023.e22551

Alshehadeh, A.R., & Al-Khawaja, H. (2022). Financial Technology as a Basis for Financial Inclusion and its Impact on Profitability: Evidence from Commercial Banks. *International Journal of Advances in Soft Computing and its Applications,* 14(2), 126-138. https://doi.org/10.15849/IJASCA.220720.09

Al-Slehat, Z.A.F. (2023). Fintech And Financial Inclusion: The Mediating Role Of Digital Marketing. Business: *Theory and Practice,* 24(1), 183-193. https://doi.org/10.3846/btp.2023.17624

Altaytas, K.M. (2025). From financial inclusion to indebtedness: How FinTech transforms credit access and household financial practices in Buenos Aires, Argentina. *Finance and Society,* 11(1), 103-122. https://doi.org/10.1017/fas.2024.22

Amnas, M.B., Selvam, M., & Parayitam, S. (2024). FinTech and Financial Inclusion: Exploring the Mediating Role of Digital Financial Literacy and the Moderating Influence of Perceived Regulatory Support. *Journal of Risk and Financial Management,* 17(3), 108. https://doi.org/10.3390/jrfm17030108

Asif, M., Khan, M.N., Tiwari, S., Wani, S.K., & Alam, F. (2023). The Impact of Fintech and Digital Financial Services on Financial Inclusion in India. *Journal of Risk and Financial Management,* 16(2), 122. https://doi.org/10.3390/jrfm16020122

Asubiaro, T., Onaolapo, S., & Mills, D. (2024). Regional disparities in Web of Science and Scopus journal coverage. *Scientometrics,* 129(3), 1469-1491. https://doi.org/10.1007/s11192-024-04948-x

Azmeh, C., & Al-Raeei, M. (2024). Exploring the dual relationship between fintech and financial inclusion in developing countries and their impact on economic growth: Supplement or substitute? *PLOS One,* 19(12), e0315174. https://doi.org/10.1371/journal.pone.0315174

Banda, N., Matafwali, B., & Mwange, A. (2025). Regulatory Frameworks for Village Banking and Financial Inclusion: Comparative Lessons from Africa, South Asia, and the Middle East. *East African Finance Journal,* 4(1), 76-97. https://doi.org/10.59413/eafj/v4.i1.5

Carè, R., Boitan, I.A., Stoian, A.M., & Fatima, R. (2025). Exploring the landscape of financial inclusion through the lens of financial technologies: A review. *Finance Research Letters,* 72, 106500. https://doi.org/10.1016/j.frl.2024.106500

Chacaltana, J., Bárcia-de-Mattos, F., & García, J.M. (2024). New technologies, e-government and informality, ILO *Working Paper,* 112. https://doi.org/10.54394/NEYY5523

Chibesa, K., & Mwange, A. (2025). The Role of Digital Financial Literacy in Enhancing Financial Inclusion Among Informal Entrepreneurs in Zambia. *East African Finance Journal,* 4(1), 141-146. https://doi.org/10.59413/eafj/v4.i1.8

Chinoda, T., & Mashamba, T. (2021). Fintech, financial inclusion and income inequality nexus in Africa. *Cogent Economics & Finance,* 9(1). https://doi.org/10.1080/23322039.2021.1986926

Danladi, S., Prasad, M.S.V., Modibbo, U.M., Ahmadi, S.A., & Ghasemi, P. (2023). Attaining Sustainable Development Goals through Financial Inclusion: Exploring Collaborative Approaches to Fintech Adoption in Developing Economies. *Sustainability,* 15(17), 13039. https://doi.org/10.3390/su151713039

Girma, A.G., & Huseynov, F. (2023). The Causal Relationship between FinTech, Financial Inclusion, and Income Inequality in African Economies. *Journal of Risk and Financial Management,* 17(1), 2. https://doi.org/10.3390/jrfm17010002

Gunawan, A., Jufrizen, & Pulungan, D.R. (2023). Improving MSME performance through financial literacy, financial technology, and financial inclusion. *International Journal of Applied Economics, Finance and Accounting,* 15(1), 39-52. https://doi.org/10.33094/ijaefa.v15i1.761

Hans, V.B. (2025). Fintech Innovations and Their Impact on Financial Inclusion in Developing Economies. *Journal of Economics and Business Management,* 3(1), 49-55.

Joseph, T., Chinyere, N., Pauline, O., & Gbenga, A. (2021). Monetary Policy Effectiveness and Financial Inclusion in Nigeria: FinTech, 'the Disrupter' or 'Enabler.' *International Journal of Applied Economics, Finance and Accounting,* 9(1), 19-27. https://doi.org/10.33094/8.2017.2021.91.19.27

Kamran, S., & Uusitalo, O. (2024). How informal financial service institutes facilitate the financial inclusion of low-income, unbanked consumers. *International Journal of Bank Marketing,* 42(6), 1232-1263. https://doi.org/10.1108/IJBM-03-2023-0148

Khan, S., & Alhadi, F. (2022). Fintech and Financial Inclusion in Saudi Arabia. *Review of Economics and Finance,* 20, 857-866. https://doi.org/10.55365/1923.x2022.20.97

Kuladeep-Kumar, L., Katyayani, J., Venkatesh, D., Sunkara, S., Gowthami, K., & Rani, C. (2024). Exploring the opportunities of FinTech services. *Communications on Applied Nonlinear Analysis,* 31(5s), 79-90. https://doi.org/10.52783/cana.v31.1001

Loo, M.K.L. (2019). Enhancing Financial Inclusion in ASEAN: Identifying the Best Growth Markets for Fintech. *Journal of Risk and Financial Management,* 12(4), 181. https://doi.org/10.3390/jrfm12040181

Loughlin, E.M., & Priyadarshini, A. (2021). Adaptability in the workplace: Investigating the adaptive performance job requirements for a project manager. *Project Leadership and Society,* 2, 100012. https://doi.org/10.1016/j.plas.2021.100012

Magwedere, M.R., & Marozva, G. (2025). Inequality and Informal Economy: The Moderating Role of Financial Technology. *Economics,* 13(1), 197-211. https://doi.org/10.2478/eoik-2025-0004

Menza, M., Jerene, W., & Oumer, M. (2024). The effect of financial technology on financial inclusion in Ethiopia during the digital economy era. *Cogent Social Sciences,* 10(1). https://doi.org/10.1080/23311886.2024.2309000

Mhlanga, D. (2022). The role of financial inclusion and FinTech in addressing climate-related challenges in the industry 4.0: Lessons for sustainable development goals. *Frontiers in Climate,* 4. https://doi.org/10.3389/fclim.2022.949178

Mothobi, O., & Kebotsamang, K. (2024). The impact of network coverage on adoption of Fintech and financial inclusion in sub-Saharan Africa. *Journal of Economic Structures,* 13(1), 5. https://doi.org/10.1186/s40008-023-00326-7

Noreen, M., Mia, M.S., Ghazali, Z., & Ahmed, F. (2022). Role of Government Policies to Fintech Adoption and Financial Inclusion: A Study in Pakistan. *Universal Journal of Accounting and Finance,* 10(1), 37-46. https://doi.org/10.13189/ujaf.2022.100105

Okello, D., & Momanyi, W. (2024). Revolutionizing Informal Labour Market through Fourth Industrial Revolution: A Case of Jua Kali Sector. *KIPPRA Discussion Paper*, 333.

Ozili, P.K. (2023). Determinants of interest in eNaira and financial inclusion information in Nigeria: role of FinTech, cryptocurrency and central bank digital currency. *Digital Transformation and Society,* 2(2), 202-214. https://doi.org/10.1108/DTS-08-2022-0040

Ozili, P.K., Mhlanga, D., Ammar, R., & Fersi, M. (2024). Information Effect of Fintech and Digital Finance on Financial Inclusion during the COVID-19 Pandemic: Global Evidence. *FinTech,* 3(1), 66-82. https://doi.org/10.3390/fintech3010005

Page, M.J., McKenzie, J.E., Bossuyt, P.M., Boutron, I., Hoffmann, T.C., Mulrow, C.D. et al. (2021). The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. *International Journal of Surgery,* 88, 105906. https://doi.org/10.1016/j.ijsu.2021.105906

Priyadarshi, A., & Prasad, D. (2024). An Analysis of Rural Consumers' Financial Behavior in the Context of Financial Inclusion through FinTech. *KIIT Journal of Management,* 20, 43-54. https://doi.org/10.54860/beyder.1672006

Rahadjeng, E.R., Pratikto, H., Mukhlis, I., Restuningdiah, N., & Mala, I.K. (2023). The impact of financial literacy, financial technology, and financial inclusion on SME business performance in Malang Raya, *Indonesia. Journal of Social Economics Research,* 10(4), 146-160. https://doi.org/10.18488/35.v10i4.3509

Rahman, M. (2024). Moderating effects of energy poverty on financial inclusion, FinTech lending, and economic growth: Evidence from fsQCA, NCA, and econometric models. *Environmental Challenges,* 15, 100867. https://doi.org/10.1016/j.envc.2024.100867

Rogers, E.M. (2003). *Diffusion of Innovations* (5th ed.). Free Press.

Sackey, F., Ackah, D., & Asabi, J. (2025). The Impact of Fintech and Digital Platforms on Financial Inclusion in the Informal Sector of Ghana. *Texila International Journal of Academic Research,* 12(01), 1-10. https://doi.org/10.21522/TIJAR.2014.12.01.Art007

Saraswati, B.D., Maski, G., Kaluge, D., & Sakti, R.K. (2020). Revolutionizing Informal Labour Market through Fourth Industrial Revolution: A Case of Jua Kali Sector. *Business: Theory and Practice,* 21(1), 230-243. https://doi.org/10.3846/btp.2020.10396

Sherwani, F.K., Shaikh, S.Z., Behal, S., & Siddiqui, M.S. (2024). Determinants of financial inclusion among women-owned enterprises: a case study of the informal sector. *Arab Gulf Journal of Scientific Research,* 42(4), 1340-1358. https://doi.org/10.1108/AGJSR-05-2023-0193

Singh, S., Dave, T., & Joshi, A.B. (2024). Moderating role of digital consumer protection in impacting the intention to use digital financial services. *International Review of Management and Marketing,* 14(5), 222–234. https://doi.org/10.32479/irmm.16842

Tian, L., & Kling, G. (2022). Financial inclusion and financial technology: finance for everyone? *The European Journal of Finance,* 28(1), 1-2. https://doi.org/10.1080/1351847X.2021.1981418

Tidjani, C., & Madouri, A. (2024). Fintech, financial inclusion, and sustainable development in the African region. *Frontiers in Applied Mathematics and Statistics,* 10. https://doi.org/10.3389/fams.2024.1276218

Tripathi, S., & Rajeev, M. (2023). Gender-Inclusive Development through Fintech: Studying Gender-Based Digital Financial Inclusion in a Cross-Country Setting. *Sustainability,* 15(13), 10253. https://doi.org/10.3390/su151310253

Valera, M.L.G., Lei, Z., & Fong, J.H. (2025). Determinants of financial inclusion in Southeast Asia. *Applied Economics,* 57(20), 2533-2550. https://doi.org/10.1080/00036846.2024.2326529

Velazquez, P.V., Bobek, V., Vide, R.K., & Horvat, T. (2022). Lessons from Remarkable FinTech Companies for the Financial Inclusion in Peru. *Journal of Risk and Financial Management,* 15(2), 62. https://doi.org/10.3390/jrfm15020062

Venkatesh, V., Morris, M.G., Davis, G.B., & Davis, F.D. (2003). User acceptance of information technology: Toward a unified view. *MIS Quarterly: Management Information Systems,* 27(3), 425-478. https://doi.org/10.2307/30036540

Wu, G., & Peng, Q. (2024). Bridging the digital divide: Unraveling the determinants of FinTech adoption in rural communities. *SAGE Open,* 14(1). https://doi.org/10.1177/21582440241227770