Digital technologies and internationalization in emerging countries: The role of mobile money as a mediator of the institutional voids in Sub-Saharan Africa

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Abstract

This paper explores the relationship between institutional quality and the internationalization of emerging market firms (EMFs), focusing on the role of digital technologies, particularly mobile money, in Sub-Saharan Africa. Two divergent perspectives exist: one that argues stronger institutions facilitate internationalization, and another that contends institutional voids drive EMFs to international markets to escape domestic challenges. By analyzing a dataset from the World Bank Enterprise Survey covering 5,346 firms across 16 Sub-Saharan African countries from 2012 to 2020, we propose and find that institutional voids are positively associated with the adoption of mobile money. Moreover, mobile money significantly enhances the internationalization of these firms by reducing export costs, improving access to financial services, and facilitating cross-border trade. Our findings suggest that digital technologies mediate the relationship between institutional voids and internationalization, providing a potential resolution to the "institutions-internationalization conundrum." This study contributes to the international business and emerging markets literatures by highlighting the critical role of digital solutions in enabling EMFs to overcome institutional challenges and successfully enter foreign markets.

1 Introduction

There is scholarly debate as to whether weak institutions are hindering or supporting the internationalization of firms from developing economies. From institutional theory, two divergent perspectives have been developed on the role of institutions and the internationalization of so-called emerging market firms (EMFs). One perspective on company internationalization emphasizes the role that better institutions play in facilitating cross-border transactions (Gao et al., 2010). Research argues that the presence of stronger institutions may encourage and support the internationalization of firms (Li & Ding, 2017). In parallel, researchers highlight the barriers to internationalization of the bureaucratic business administration system in domestic markets in emerging markets. These challenges may limit EMFs' ability to manage their export cost structures, make informed decisions regarding internationalization, and efficiently oversee their export operations (Deng & Zhang, 2018; Krammer et al., 2018; Manolopoulos et al., 2018; Wu & Chen, 2014). Previous research indeed shows international entrepreneurship thriving in countries where there is institutional support, where the government allocates resources to building the business environment, recognizing the partnership opportunities that exist to improve the delivery of goods and services. According to this institutional support perspective, countries with more advanced institutions may support and enhance firms to export to foreign markets (Barnard & Luiz, 2018; Shirokova & Tsukanova, 2013).

A second perspective on company internationalization uses institutional arbitrage logic and emphasizes more the ways in which underdeveloped institutions facilitate EMFs' ability and willingness to increase their exploration of international markets (Luo & Tung, 2018). This element shows up in the ways that the institutional environment at home shapes the unique strategic actions of EMFs. First, this logic contends that EMFs use foreign markets to conduct business in order to escape their home

country's adverse economic climate due to inadequate institutions (Boisot & Meyer, 2008; Stoian & Mohr, 2016; Witt & Lewin, 2007). Second, it is sometimes argued that EMFs can use the expertise they gain in conquering institutional weaknesses at home, such as instability and uncertainty, to their advantage when expanding internationally, especially in similar institutional contexts (Cuervo-Cazurra, et al., 2018; Cuervo-Cazurra & Genc, 2008; Luo & Tung, 2007).

In an attempt to reconcile these opposing positions on the role of institutional support versus institutional void on internationalization, this paper will look into the mediating factors that might explain these contradicting standpoints. In particular, the paper will analyze the role of digital technologies – and of Mobile Money in particular - as a response to the institutional context and its impact on internationalization.

As regards the former, the literature highlights that, although reliant on institutional support and infrastructure, digital technologies are powerful tools to mitigate institutional liabilities, disrupting corruption and fostering the transparency of accountability (Adomako, et al., 2021; Santiso, 2021). Mobile money, in particular, allows to overcome the inefficiencies and information asymmetries of the traditional banking sectors, by reducing transactions costs, by providing access to microloans, and by enhancing the level of information, knowledge and trust across the operators and users even in rural areas (Liu and Dewitte, 2021; Ren and Gao, 2023). This explains why this digital technology has been particularly successful in emerging African countries (WBES, n.d.).

As regards the impact on internationalization, digital technologies typically offer competitive advantages by reducing entry barriers and reshaping traditional comparative advantages. Digital adoption enables companies to improve operational and managerial performances, facilitating international market success (Ledi et al., 2023). In general, internet-based technologies enhance information access, aiding in identifying and accessing international customers, monitoring trends, and making informed decisions (Liu, 2023; Ren & Gao, 2023; Zhao et al., 2023). Digitalization also reduces coordination costs within geographically dispersed networks and supports both local responsiveness and global integration (Nambisan, Zahra & Luo, 2019; Pan et al., 2022). It transforms resource-seeking and market-seeking strategies, offering affordances like decoupling activities, disintermediation, and generativity. In turn, businesses with digital strategies benefit from speedier internationalization due to light asset bases and cost-effective infrastructures (Mohamed, 2023).

Mobile money, in particular, can provide three main contributions to internationalization. First, it acts as an instrument of digital finance that reduces export costs and enhances the competitive advantages of the enterprises, thus contributing to foster the financial development of the entire country (Chaney, 2016; Nieminen, 2020; Rossi et al., 2021; Zhang, 2022). Second, being a digital platform it may encourage the implementation of cross-border e-commerce and, in turn, the development of new products for foreign markets, by also contributing to the growth of the overall industry and economy through network effects (Akinyemi & Mushunje, 2020; Chen et al., 2019; Jean & Kim, 2020; Nambisan, Zahra & Luo, 2019; Stallkamp & Schotter, 2021). Finally, Mobile money fosters the development and improvement of business activities, by enhancing data collection and analysis, communication skills, and risk-management capabilities, thus contributing to the resilience of the entire eco-system (Jean & Kim, 2020; Nan & Park, 2022).

Based on this perspective, given that digital technologies represents both a response to institutional voids and a boost to internationalization, we propose that firms in complex institutional settings such as Sub-Saharan African countries are more likely to embrace mobile money (being one of the most accessible digitalization options), potentially positively mediating the relationship between institutional voids and firms' internationalization tendencies.

We test our framework on a dataset based on the World Bank Enterprise Survey (WBES) composed of 17 datasets from 16 Sub-Saharan African countries. The sample period covers 5,346 observations each representing an individual firm during the period 2012 to 2020. Our analysis confirms that countries with high institutional voids are more likely to adopt mobile money, and that mobile money is positively associated with the internationalization of the African firms in terms of export propensity and intensity. In addition, the relationship between institutional voids and internationalization turns out to be mediated by the adoption of mobile money.

We believe that our paper provides at least three main contributions to the international business literature. First it offers a possible explanation to the "institutions - internationalization conundrum", which stems from the contrasting evidence concerning the relationship between these two phenomena. We claim - and provide evidence - that institutional voids, rather than directly fostering the internationalization of the firms, trigger the adoption of digital solutions – such as mobile money – that offset the inefficiencies and deficiencies of institutions while simultaneously increasing the probability that these companies enter new foreign markets through export activities. In other words, we propose that digital technologies – such as mobile money – mediate the relationship between the institutional voids of a country and the internationalization of its firms.

Second, we contribute to the emerging country literature by providing evidence on the role that digital technologies (and Mobile Money in particular) play as a response to the institutional voids of emerging countries and as a promoter of the internationalization of emerging markets firms (EMFs), which is a research area that deserves more attention (Buckley, Cavusgil, Elia and Munjal, 2023). We provide a further contribution by focusing on an emergent but still understudied geographic area such as SSA, which is increasingly deemed to be home to several future EMFs.

Finally, despite there being a significant body of IB research on the impacts of different digital technologies, there is a noticeable gap in the literature regarding the study of how mobile money technology affects firms' inclination toward internationalization. Moreover, literature focuses on advanced countries, while it is reasonable that digitalization, together with other variables, may have different effects on internationalization in different economic contexts (Cassetta et al., 2020).

2 Literature review

2.1 Institutions - Internationalization conundrum

Institutional theory suggests that institutional support aids in firms' internationalization. The support can be enlarged through different government promotional policies, which can provide firms with financial support, information services, business opportunities and help in dealing with risks in overseas markets (Li & Ding, 2017). Institutional voids characterize emerging markets, and encompass a range of challenges such as regulatory uncertainty, ambiguity in government frameworks, bureaucratic inefficiencies, weak enforcement of rules and laws, inadequate factor market functioning, excessive bureaucratic hurdles, and insufficient protection of property rights.

The institutional support standpoint would therefore put firms from emerging markets at a disadvantage. These barriers include intricate regulatory frameworks, limited financial market openness, insufficient property rights protection, and rampant corruption (Barnard & Luiz, 2018; Shirokova & Tsukanova, 2013). The lack of support in terms of access to resources, the complex regulatory arrangements, the inadequate protection of property rights, and the political instability make EMFs not only experience a different path, but even struggle with higher barriers when they try

to enter in or export to a foreign market (Deng & Zhang, 2018; Krammer et al., 2018; Manolopoulos et al., 2018; Wu & Chen, 2014). Those defects caused by governments and the state are often termed institutional voids or institutional gaps (Kolk & Lenfant, 2016).

In contrast to this position that considers liabilities as important expansion barriers, scholarly research has observed that disadvantaged contexts encourage firms to internationalize (Boisot & Meyer, 2008; Luo & Wang, 2012). These contrasting theories argue the role of institutional voids on exports, discussing whether it constrains business internationalization (Child & Rodrigues, 2005), or pushes them to look for foreign lands (Boisot & Meyer, 2008). According to institutional arbitrage, by conducting business in foreign markets, EMFs seek refuge from an unfavorable domestic environment (escapism) (Boisot & Meyer, 2008; Stoian & Mohr, 2016).

These last views are also supported by others research, which adopt the point of view that competitive advantage is not just about having valuable resources but also about a firm's capacity to sense, seize, and reconfigure resources in dynamic environments to justify the tested paradoxical relationships between institutional voids and level of internationalization. Dynamic firms' capabilities may influence both the inclination and ability of firms to escape from home country institutional constraints (Li & Ding, 2017). Organizations are prompted to leverage their resources more effectively to find strategic solutions to overcome obstacles that arise from external business environments. Therefore, EMFs have an additional advantage which is the capability and possibility to harness the expertise they gain in addressing domestic institutional shortcomings, such as instability and uncertainty, as an asset when expanding internationally (Cuervo-Cazurra et al., 2018; Cuervo-Cazurra & Genc, 2008). This competitive advantage is used to successfully internationalize into institutionally complementary host locations (Luiz et al., 2017).

Furthermore, researchers often commonly recognize some factors that help firms to overcome liabilities, among which the innovation capability and the digitalization of processes (Nambisan, Wright, et al., 2019; Su et al., 2022). Indeed, digitalization both enables firms to proactively meet the demands of various stakeholders in export markets, facilitating their ability to seize business opportunities beyond their domestic boundaries (Bresciani et al., 2021; Lee et al., 2019), and helps in managing the home-country complexities (Soluk et al., 2021).

2.2 Digitalization in emerging African countries

In order to catch the benefit evoked by the use of new digital technologies, since few years, companies have started a conversion process, called digitalization. Digitalization is the change of the existing socio-technological structure and the interactions between people and technology. It involves replacing non-digital elements or relationships with digitized counterparts, thereby opening to new digital capabilities. Therefore, digitalization not only transforms the way of working but also entails a shift in firms' business models by creating new revenue solutions and opportunities for value production (Gartner, 2023). Digitalization, as highlighted by recent literature (Bloomberg, 2018), defines a type of changing process which differs from digital transformation. Indeed, digitalization involves optimizing or enhancing processes through the adoption and utilization of digital technologies and digitized data, and forms the foundation for implementing digital transformation. The term digital transformation, thus, refers to a comprehensive business evolution enabled by digitalization and closely tied to a well-defined digital business strategy.

When businesses see new opportunities and want to digitally innovate, they inevitably need a surrounding digital ecosystem. In this sense, the role of the state is fundamental. In order to be supportive of digital businesses, it should provide the core foundation of digital economies, such as

the digital infrastructure and platforms (e.g. broadband internet, payment systems) and enhance people's digital skills. The expanding threats of the digital era, such as market concentration, data privacy, and cybersecurity issue will require even an additional state effort to realize a more controlled and regulated environment. At a global level, it should be granted a renewed commitment to cross-border integration of digital markets; it is essential in order to reach the great advantages of digitalization generated by the economies of scale, network effects and cooperation (World Bank, 2021).

This transformative process has already been underway for the past three decades, initially taking root in advanced countries across Europe and the US. More recently, we have witnessed similar endeavors in developing countries. Governments worldwide continue to spearhead new initiatives, consistently striving to enhance digitalization within their countries. And while developing countries have a lower level of digitalization as compared to industrialized countries, it has been argued that the digital lag has, in contrast, been more instrumental in digitally transforming economies and firms in developing countries.

Therefore, the African continent is a good sample to investigate how the digital scope varies across countries depending on the external context. Sub-Saharan Africa (SSA), beyond that to have started the process of digitalization later, at a different pace and level of intensity, followed a totally different and unusual path as compared to industrialized countries. Indeed, despite the low diffusion of computers, the lack of automation and the low advancements in ICT skills, firms and individuals started interacting through digital means (Myovella et al., 2020). While fixed broadband still does not reach a lot of people, the mobile connectivity is more largely spread around these countries. Ajakaiye et al. (2015) in their study of the Nigerian economy pointed out that the country has undergone a shift from an agrarian to a tertiary service-oriented structure, bypassing the intermediate stage of industrialization. The high mobile phone penetration contributed to enable Africans to skip the stages of development of the industrial sector, as well as those of the infrastructural sector, and to dive directly into the digital age. The noteworthy observation is that, although a large percentage of population does not have access to electricity yet, most of these people have a mobile phone, "never mind that many have to walk for miles to get a signal or recharge their phones' batteries" (Economist.com, 2017). According to the latest GSMA report, Sub-Saharan African unique mobile subscribers amounted to 515 million (46% of Sub-Saharan population) and it is forecasted to come to 613 million by 2025. Moreover, smartphones account from 49% of total connections on average and will account for 61% in 2025. The large use of mobiles, compared to traditional assets, is reflected, for example, even in the gaming sector, where 95% of gamers across the Sub-Saharan region play on a smartphone or tablet, as opposed to consoles and computers (GSMA, 2022).

Because of the continent's unique realities, homegrown firms have developed and implemented solutions that address this uniqueness. For example, mobiles are mostly used to reach the majority of consumers (Umeh, 2021). Mobile numbers are then considered as people's unique identifiers for digital services, as many users do not have an email address (Umeh, 2021). Many of transactions and information exchanges have been realized using USSD technology, which stands for Unstructured Supplementary Service Data, a mobile protocol which does not rely on internet. Right on this protocol, a digital service called "mobile money" was invented to overcome the local financial issues.

2.3 The benefits of adopting Mobile Money as digital technology

Mobile money is a digital service that allows users to store, send and receive money using a mobile device. This service is therefore used to make person-to-person transfers (P2PTs), receive credits, pay school fees, pay utility bills and save money (Kshetri, 2016). However, the term 'mobile money'

transcends the singular definition of a digital service, encompassing a spectrum of meanings and applications; it is defined as a pay-as-you-go digital medium of exchange and store of value (IMF, n.d.) emphasizing its role as a supporting technology. This could manifest as either a network infrastructure or a platform, as it brings together financial service providers and clients (Kendall et al., 2011).

This digital technology is easily accessible since its use requires only a basic phone paired with a mobile phone number linked to the associated account. The money is stored in a telco-led mobile money wallet, namely a digital wallet provided by a telecommunication company. The functionalities are very similar to those of a bank account: users can deposit their own money on mobile money account (cash-in), make transfers to others (both to registered or not) and whenever withdraw money from a cashier (cash-out) (Chiegboka, 2022). Having a mobile money account is free, but transactions can require a fee, which varies between registered and non-registered mobile money users (Murendo et al., 2018).

Furthermore, mobile money provides an alternative solution to the exchange of liquid money, and it allows to do it remotely (Aker et al., 2016). In relation to P2PTs, it is important to keep in mind that families in rural Africa used to travel a great distance to receive remittances. It implied adding considerable travel expenses and time to the already high transfer fees when mediated by institutions.

Mobile money as an instrument of digital finance

Mobile money can be defined as an instrument of digital finance because it leverages digital technology and infrastructure to provide financial services, transactions, and payments through mobile devices such as smartphones. Nonetheless, as emphasized by Ren and Gao (2023), notable distinctions exist between the financial development derived from digital finance and that from traditional finance. One primary distinction arises from the challenging cost dynamics, which make the penetration of traditional financial services difficult in less developed economies. Entrepreneurs from developing realities often encounter significant challenges in securing traditional financial support due to their limited scale and the absence of sufficient collateral (e.g. lack of business records) (Shen & Ren, 2023).

Secondly, traditional finance institutions distribute their main branches in highly populated areas, excluding the peripheral sides (Zhong & Jiang, 2021) and making geographical distance a severe issue. Digital finance allows overcoming these drawbacks, since the proliferation and utilization of digital technology via digital finance can expedite the sharing of knowledge and cross-company knowledge transfer, fostering the accumulation of corporate technological assets (Pan et al., 2022; Xu et al., 2023; Zhao et al.; 2023). In addition, due to market dynamics and the heightened availability of digital financial services, coupled with their close ties to traditional finance, competition within the financial market intensifies, thus leading traditional finance institutions to improve the efficiency and the quality of their services and simplify the constraints for enterprise financing (Ren & Gao, 2023).

Mobile money as a platform

Mobile money, on the other hand, acts as a platform (Kendall et al., 2011), and comes with multiple advantages as common online payment platforms do. The technology, indeed, falls in both the two conceptualizations of the platform term provided by Nambisan, Zahra, et al., (2019). According to the product development perspective, a platform constitutes a shared collection of components, technologies, and various assets, organized within modular architectures, designed to enable and facilitate innovation (Mohamed, 2023). However, from the industrial economic perspective, it also represents a set of rules and architecture designed to establish connections between two or more sets of entities, facilitating interactions and transactions among them.

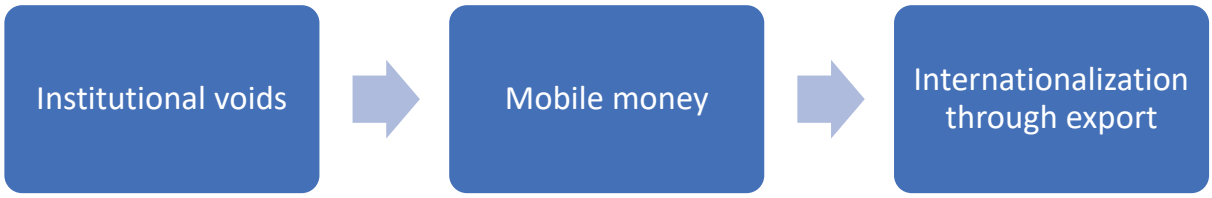
Improved management of business activities

Mobile money adoption has been inferred to contribute also to the improvement of business activities in different ways (Djossou & Novignon, 2022; Hassan, 2023; Ledi et al., 2023; Mohamed, 2023). For instance, Ledi et al. (2023) argue that the adoption of mobile money improves SME's performances; embracing digital solutions not only streamlines processes but also enhances the overall user experience, fostering heightened customer satisfaction and loyalty. Indeed, customers may find it more convenient to make payment for purchased items using their cell phones. Ultimately, this shift contributes to a marked improvement in firm performances, positioning SMEs at the forefront of efficiency and innovation, which in turn increases competitiveness. Moreover, it improves risk-sharing among buyers and customers (Patnam & Yao, 2020).

2.4 Combining institutions, mobile money and internationalization: Hypotheses building

We will bring these streams of research together and investigate the interplay among institutions, internationalization, and digitalization – with a focus on mobile money – in African emerging countries. In particular, considering the contrasting results of IB literature as regards the relationship between institutions and internationalization, we propose that mobile money acts as a mediator between the institutional context and internationalization, by claiming that institutional voids foster the adoption of mobile money, which in turns foster the internationalization of the African firms through export.

Figure 1. Conceptual model



2.4.1 Institutions -> Mobile Money

Literature suggests that, while digitalization often relies on institutional support and an adequate infrastructure (Myovella et al., 2020), at the same time, it serves as a powerful tool to mitigate institutional liabilities. Digitalization, indeed, has the potential to disrupt corruption by minimizing discretion, enhancing transparency, and fostering accountability through the dematerialization of services and reduced human interactions (Adomako, Amankwah-Amoah, Tarba, et al., 2021; Santiso, 2021).

The large diffusion of mobile money is due to the large benefits this digital service has; among them, the solution to the global challenge of financial inclusion. Before the advent of mobile money, or in general the advent of digital finance, people who did not have access to formal banking or those living in unbanked parts of Africa previously had no access to loans, investments, formal savings, or credit services (Friederici et al., 2020). Because of an inefficient banking system, they were forced to transact only in cash, they lacked a secure means to store and invest their money and used to rely on informal lenders and their personal networks for loans.

Having a mobile money account resulted in a more successful method compared to the traditional one, especially because the lower costs it requires. Traditional banking methods involve the

establishment of many physical branches to expand their coverage, necessitating substantial investments and the ongoing burden of additional labor costs. As a result, the cost of traditional financial services product inevitably increases, and it is even more unfavorable for individuals and enterprises in remote areas to obtain credit services (Ren and Gao, 2023). Liu and Dewitte (2021) expanded the research from studying credit card spending behavior to examining mobile money payments. Their findings revealed a decline in credit card usage, while mobile money payments offered a high level of payment convenience (Liu and Dewitte, 2021).

Thus, digital finance through mobile money fosters the inclusion of SMEs as well as customers in the financial ecosystem, making it more accessible and affordable. Furthermore, mostly for companies and entrepreneurs, the financial sector was not trustworthy. Insurance companies in SSA economies, for instance, suffer from a bad reputation. Some farmers and entrepreneurs that subscribed to an insurance have a bad experience; someone has been cheated because the insurance company and private banks went bankrupt, or in some cases, agents took money and then disappeared (Kshetri, 2016).

Another crucial factor contributing to the success of mobile money was the limited awareness of financial systems among rural residents. Many farmers who live in rural areas, where information and knowledge overall are quite scarce, have not ever heard about insurance and bank opportunities. Digital finance, through diffused devices as the mobiles phone, aims even to reach these customers target, pursuing the inclusivity value.

Mobile money has been started to be adopted by African firms from the beginning of 2010. Businesses may opt for mobile money accounts for various purposes, such as receiving customer payments, paying suppliers and employees, settling bills, making withdrawals, saving funds, or accessing microcredit. Looking at the sample used in this analysis (WBES database), entrepreneurs claimed to have started using mobile money mostly because, at first, it reduces the time spent in financial transactions (35.47%), secondly it satisfies the consumer request (24.86%) and thirdly it reduces costs of financial transactions (16.97%). Among the most frequently cited reasons for non-adoption are the perception that many transactions involve sums too large for mobile money and the fact that many suppliers do not yet embrace this technology.

Many practical solutions in digital finance emerged precisely where these financial system gaps were most pronounced, addressing significant challenges. Local inputs such as knowledge of local regulations, markets and people needs played a key role in the successful diffusion of this innovation. For instance, M-Pesa , was launched when there were no clear guidelines for m-payments, thus it started operating without a banking license (Kshetri & Acharya, 2012).

To conclude, given that mobile money has been adopted to compensate for the inefficiencies and information asymmetries of the traditional banking and financial system, and to overcome the lack of trust and knowledge across the operators, we claim that institutional voids – rather than strong institutions – have primarily contributed to the widespread of this specific digital technology in African emerging countries.

Hypothesis 1. Institutional voids in emerging markets are positively related to firms' adoption of mobile money.

2.4.2 Mobile money -> Internationalization

IB research that focus on the digital finance aspects of mobile money consider of “great theoretical and practical significance to study whether digital finance can promote the export behavior” (Ren & Gao, 2023). Some scholars argued that there is a positive relationship between the adoption of digital financial instruments within the firms and the likelihood of export decision, as well as the level or the quality of their exports (Liu, 2023; Pan et al., 2022; Ren & Gao, 2023; Y. Wu, 2022; Xu et al., 2023; Zhao et al., 2023). This link is arguably justified based on the fact that digital finance fosters the financial development of a country, which in turn has great impacts on export costs and the advantages of the enterprise (Chaney, 2016; Nieminen, 2020; Rossi et al., 2021; Zhang, 2022).

The most frequently cited mechanisms that elucidate how digital finance can facilitate the expansion of exporters pertain to the alleviation of constraints and the reduction of information asymmetry using information technology. This simplifies access to financial services for entrepreneurs while simultaneously reducing transaction costs (Liu, 2023; Ren & Gao, 2023; Zhao et al., 2023). As a result, a greater number of participants can avail themselves of financial services and in a more convenient way (J. Li et al., 2023). The gained savings and the loans derived from these services contribute significantly to covering the costs associated with exporting, solving the resource misallocation issue (J. Li et al., 2020; Liu, 2023; Xu et al., 2023). Based on the idea that digital finance makes it possible to match the financial demand side with the supply side, where the parties may be geographically disparate (Pierrakis & Collins, 2013), Pan et al. (2022) claim that it creates an expansion of the boundaries of cross-regional transactions and improves market accessibility as they show the positive relationship between digital inclusive finance and the city’s export upgrading through the market effect. Being a technology that fosters the development of digital finance, therefore, mobile money can increase the propensity to invest in export initiatives, while also enhancing the risk-resistance ability of existing exporters (Liu, 2023; Pan et al., 2022).

In addition, according to Zhao et al. (2023), Xu et al. (2023) and Pan et al. (2022), by accelerating the sharing of knowledge and cross-company knowledge transfer and by fostering the accumulation of corporate technological assets, the proliferation and utilization of digital technologies – such as mobile money - supporting the development of digital finance enhances enterprises' capacity for innovation. Empirical results then showed that technological innovation and industrial structure upgrading are important factors in promoting the improvement of export product quality. However, the positive impact registered by Zhao et al. (2023) is validated only under a certain threshold value of improvement of digital finance.

As regards the platform perspective, the literature suggests that it holds significant implications for international business (Jean & Kim, 2020; Nambisan, Zahra, et al., 2019). Although the adoption of mobile money to export does not imply the setting-up of digital exports, because it is the use of one or more e-commerce channels that defines them (Giuffrida & Mangiaracina, 2021), mobile money could indirectly encourage the set-up and growth of digital commerce, mostly in the B2B sector, given its capacity to facilitate remote connections between businesses and customers. The modular nature of mobile money technology makes the interaction, between firms’ internal actors and external ones, easy, convenient, and quick (Akinyemi & Mushunje, 2020). When platform interfaces are simple, indeed, it is more likely to engage with a larger and international audience, with different knowledges, capabilities and backgrounds (Gawer & Cusumano, 2002).

In addition, the industrial economic perspective suggests how, thanks to the digital nature, boundaries of distance are decreased, such that providers and worldwide customers can directly connect without their dependencies on other intermediaries (Nambisan, Zahra, et al., 2019). Therefore, Mobile Money

allows the reduction of coordination costs that usually arise because of geographical distance, time misalignment, or security issues. Transactions on mobile money are mostly real-time operations and the security measures inherent to mobile money technology, including encryption, effectively lower even the risk of fraud and theft in international trade.

Moreover, multi-side platforms are characterized by network effects (Rochet & Tirole, 2003), which, together with related externalities, make international expansion faster, wider, and deeper (Chen et al., 2019; Stallkamp & Schotter, 2021). Firms that adopt the mobile money technology could leverage both on cross-side and same-side effects. Firstly, the more widespread mobile money becomes among individuals, the greater the likelihood of acquiring digitalized customers. Secondly, when more companies adopt this technology, knowledge sharing is facilitated, and there is an increased chance of ecosystem enhancement and regulatory improvements. A large existing network could even foster firms to move to new markets (Eisenmann et al., 2011).

Finally, as regards the contribution of mobile money to business activities, if embedded in SMEs export marketing capabilities, it can effectively and efficiently enhance their export performance. Mobile money technology, indeed, generates transaction data, which can provide valuable insights for business (Jean & Kim, 2020). Firstly, this data can be used for financial analysis and decision-making to optimize export strategies through product development, pricing, and marketing communication capabilities. The platforms' recordings provide the opportunity to aggregate and match data to understand customers' needs and preferences, which can help to improve the product itself and the pricing tactics. Moreover, the adoption of the technology helps firms in communicating the value proposition to distant and foreign customers. In addition, transactions are whenever traceable and reliable. They provide a clear record of financial interactions, which can be essential for export documentation and compliance. Other research argues even that the speed and the possibility to transact with suppliers at a distance facilitates the production process and ensures the timely availability of raw materials, thereby enhancing the delivery of high-quality products to the market (Mohamed, 2023).

The integration of mobile money into SME operations plays even a pivotal role in supporting risk management and fraud prevention. It achieves this by facilitating the adoption of standardized accounting manuals and risk management frameworks. Nan and Park (2022) showed that mobile money improves SME resilience in catastrophic events, such as COVID-19. Their results proved that SMEs using mobile money seem less likely to face disastrous sales drops than non-users (Nan & Park, 2022). Additionally, it serves as a valuable tool for SMEs in mitigating liquidity risk, as it empowers business managers to swiftly raise capital from family and friends when needed (Koomson et al., 2021).

To sum up, mobile money contributes to enlarging the digital finance landscape, increasing connectivity and reducing internationalization-related risks, thus enabling the reduction of transaction costs, the investment in new resources, the increase of modularity and flexibility, the exploitation of network effects, and the augmentation of business capabilities. These benefits collectively diminish the significance of geographical distance and endow companies with a competitive advantage, enabling them to reach a wider international market share more effectively through export.

Hypothesis 2. The adoption of mobile money is positively related to firms' export internationalization.

2.4.3 Institutional voices -> Mobile money -> Internationalization

EMFs face the intricate challenge of managing ambiguous bureaucratic processes, particularly when it comes to getting the necessary operational permits. Moreover, they contend with issues surrounding the logistics and security of exported goods, presenting notable hurdles in their operational endeavors. For instance, World Bank surveys reveal the prevalent necessity of making gifts or informal payments to public officials by entrepreneurs to facilitate various processes such as customs, taxes, licenses, regulations, and services (WBES, n.d.). Entrepreneurs, heavily reliant on government permits, find themselves vulnerable to such practices without effective means of protection. Moreover, these surveys highlight instances where firms become victims of crimes, encompassing theft, robbery, vandalism, arson, or internet hacking (WBES, n.d.), issues that robust regulations and robust infrastructure could help mitigate.

Adding on, as argued by Adomako, Amankwah-Amoah, Tarba, et al. (2021), when entrepreneurs or managers perceive greater "economic adversity" because of institutional voids, they become risk-averse and try to protect their position (Dutton & Jackson, 1987), preventing them to embark on internationalization and instead seek for additional support.

In addition, overcoming institutional voids obstacles in emerging markets requires a certain degree of financial and human capital, which local firms generally do not possess in any abundance (Nachum et al., 2023). The adoption of digital technologies can certainly alleviate the weight of environment-related difficulties although it does not solve them.

In response, digitalization not only enhances the transparency of business operations in the presence of corruption but also amplifies the capability of firms to gather essential information required to navigate political and administrative obstacles. This, in turn, empowers firms to address challenges swiftly and effectively, utilizing the digitization of their business processes as a strategic means to mitigate corruption and other institutional gaps within their domestic market.

Based on this perspective, few papers have argued that firms in developing economies in a complex institutional settings are more likely to embrace digitalization, which in turn influences its degree of internationalization (Adomako, Amankwah-Amoah, Tarba, et al., 2021; Su et al., 2022), such that they identify digitalization as a positive mediator of the relation between institutional voids and firms' internationalization tendency.

Additionally, we would like to argue that digitalization serves as a mediator in trust-related issues by mitigating passive compliance and fostering a more accountable work environment. Technologies such as smart contracts, powered by blockchain, present innovative contractual alternatives challenging traditional informal agreements. Furthermore, decentralized software packages operate independently, free from proprietary servers, allowing autonomy within diverse legal, economic, and political contexts (Nikiforova et al., 2020). Alternatively, taking the example of mobile money and in general digital finance, it has been demonstrated that the new technology helped to mitigate the challenges of credit constraints (Lorenz & Pommet, 2021).

Hence, considering the previously discussed relation between institutional voids and the adoption of mobile money, on the one hand, and between the adoption of mobile money and the export of emerging African firms, on the other hand, we assert that mobile money acts as a mediator in the complex and widely debated relationship between institutions and internationalization.

Hypothesis 3 – Firms' mobile money adoption mediates the effect of institutional voids on firms' export internationalization.

3 Data and methodology

3.1 Data

To test the hypotheses, we built a dataset based on the World Bank Enterprise Survey (WBES) for 16 Sub-Saharan African countries. The WBES collects information on companies by surveying business owners or top managers from 155 countries all over the world since 2002. The manufacturing and service sectors are the primary business sectors of interest. The survey includes questions pertaining to the company as well as questions assessing the characteristics of a country's business environment. The most covered topics concern firms' characteristics, gender participation, access to finance, annual sales, costs of inputs/labor, workforce composition, bribery, licensing, infrastructure, trade, competition, capacity utilization, land and permits, taxation, informality, business-government relations, innovation and technology, and performance measures.

The targeted firms should normally have at least 5 employees. The sampling methodology for the Enterprise Surveys is stratified random sampling (by firm size, business sector and geographic region). The sample is representative of the non-agricultural, non-extractive formal private economy of a country. Excluded from consideration are public utilities, government services, healthcare, and financial services sectors. In more sizable economies, additional strata within the manufacturing sector are established based on factors such as employment, value-added, and the total number of establishments.

As the research question focuses on the use and impact of mobile money on internationalization, datasets that include questions and answers related to the use of mobile money in operational activities are included in the sample. Therefore, there are 17 datasets from 16 different countries included in the dataset, all from Sub-Saharan Africa. The sample period covers 2012 to 2020. The last data were collected in March 2020, therefore excluding COVID-19 effects from the analysis.

After consolidating data from 17 distinct datasets, the resulting pooled dataset comprises 7,011 observations. However, because of missing answers, the dataset used in the analyses has 5,346 observations.

3.2 Variables

In this study, we rely on a pooled dataset, where each observation represents an individual firm. It is important to note that each firm has been interviewed only once, ensuring that there are no repeated interviews for any given company. The dataset is organized into information pertaining to the specific year of the interview, reflecting the firm's current operations, and details from the last completed fiscal year, which corresponds to the previous year. The selected primary variables of interest consistently pertain to the concluded fiscal year immediately preceding the survey, or they capture idiosyncratic characteristics of the firm that do not change over time.

Dependent variable

The dependent variable – which is used to test both hypotheses 2 and 3 - is the execution of export activities. We rely on two different proxies to capture the export of African firms. The first one is *Export Propensity*, a dummy equal to 1 if in the last completed fiscal year the company has engaged in direct exports, and 0 otherwise. The World Bank Enterprise Survey defines "direct export," as a company that sells its products or services in a foreign market without utilizing a local agent or intermediary responsible for purchasing from the company and facilitating sales overseas. In the sample, 819 companies (i.e. 15.32 % of the sample) were assigned the value 1, while the remaining 4,527 (i.e. 84.68 % of the sample) were assigned the value 0.

The second proxy is *Export intensity*, corresponding to the percentage of total sales that is exported by the firm. As a percentage, it represents a continuous variable within the range of 0 to 100. Among the 819 exporting companies, 592 export less or equal to 50% of their sales, while only 227 export more than 50% of their total sales.

Mediating variable

The mediating variable – which is used as dependent variable to test, hypothesis 1, as explicative variable to test hypothesis 2, and as mediator to test hypothesis 3 - is *Mobile Money*, a dummy variable assuming value equal to 1 if a firm has used mobile money in any financial transaction, and zero otherwise. In order to circumvent endogeneity, we opted to assign a value of 1 to Mobile Money if the firm reported using the technology in the previous fiscal year. Within the sample, 1,715 firms (32.08%) utilized the technology, while 3,631 firms (67.92%) did not.

To explore the purpose of the use of mobile money by firms, comparing the relevance of its usage for suppliers as compared to customers, we introduced two additional binary variables, i.e. *Mobile Money for Customers* and *Mobile Money for Suppliers*. These variables discern whether the technology has been employed for a specific purpose; therefore, they take the value of 1 when a firm confirms its use of mobile money for receiving payments from customers or paying suppliers, respectively. It is important to note that these variables also assume a value of 0 when no mobile money usage is reported or when the particular function was not executed (see Islam et al., 2016). In the sample considered for the analysis, 26.52% of firms use mobile money to receive customers' transactions while 15.69%% to pay input materials.

Explicative variable

The main explanatory variable – which has been used to test hypothesis 1 and 3 - is Institutional Voids, which captures the level of obstacle perceived by entrepreneurs due their own country's institutional voids. It is a continuous variable, computed by combining different measures through a Principal Components Analysis prediction. The multi-item index contains measures that assess the formal institutional quality, which are commonly used in the literature (Brieger et al., 2022; Garrone et al., 2019; Su et al., 2022). For the computation, we collected information by selecting five questions regarding the regulatory quality, the political stability, the business and government relation and the control of corruption. These topics are similarly evaluated in the "World Bank Governance Indicator (WGI)", a firm-specific index is computed building on the WB (The World Bank, 2023).

The selected questions are: 1. "To what degree is tax administration an obstacle to the current operations of this establishment?" 2. "To what degree is obtaining business licenses and permits an obstacle to the current operations of this establishment?" 3. "To what degree is the political instability an obstacle to the current operations of this establishment?" 4. "To what degree is corruption an obstacle to the current operations of this establishment?" 5. "To what degree are courts an obstacle to the current operations of this establishment?" Respondents have the option to evaluate the extent of each obstacle using a scale that ranges from "no obstacles" (0) to "very severe obstacle" (4), with gradations such as "minor obstacle" (1), "moderate obstacle" (2), and "major obstacle" (3) in between.

As reported in Table 1, the column of eigenvalue of factor analysis shows that a single factor is enough to explain all the variables. Indeed, the first factor has the eigenvalue equal to 2.47, which is significantly higher the eigenvalues of the other components, and it accounts for 49,57% of the overall variance. In addition, the loadings (Table 2) associated to first factor variables are high (almost over 0.7). Therefore, we employ the first component as the institutional constraints index to effectively capture the multifaceted nature of institutional constructs as is customary in similar research.

Control variables

Drawing from the existing literature concerning the determinants of firms' export propensity and intensity, we accounted for several control variables at individual, firm, industry, sub-national, and country level, which should account for the factors influencing export-related activities.

At individual level, we employ the variable *Managers experience*, which is measured as the number of years spent by the managers in the sector. Greater experience is, indeed, expected to positively correlate with knowledge and the ability to accumulate resources necessary to support internationalization strategies (Tasheva & Nielsen, 2022; Wrede et al., 2020).

As regards the firm-level controls, we employed several variables. First, we control for *Firm Size*, which is represented as an ordered categorical variable, distinguishing firms as small, medium, or large based on the number of employees (Adomako, Amankwah-Amoah, Tarba, et al., 2021). A second firm-level control is *Firm Age*, which refers to the years of experience the company has accumulated in the sector and which is calculated as the difference between the year of the survey and the year of the firm's foundation. Research suggests that greater firm age and experience contribute to enhanced knowledge and the capacity to accumulate resources beneficial for internationalization (Elia et al., 2021). We also employed the dummy *Foreign Owner* - equal to 1 if foreign ownership exceeds 49% - to capture the effect of inward foreign investments on the internationalization of home country firms, considering that obtaining foreign venture capital can offer valuable resources such as foreign market expertise and an extended international network. In addition. A fourth firm-level control is *Indirect Export*, a binary variable equal to 1 if, in the last completed fiscal year, the firm is already involved in selling products to a local agent who subsequently sells them internationally; indirect exporting can, indeed, raise awareness of the attractiveness of foreign markets, thereby encouraging direct export commitments. A further firm-level variable is *Credit Loan Line*, which accounts for the ownership of a credit or loan during the fiscal year under consideration. In contexts where access to institutional finance is limited, having access to such financial resources can be instrumental in managing and acquiring resources for exporting (Nieminen, 2020). Finally, we employed the dummy variable *Website*, equal to 1 if the company claims to have its own website. While it may not directly measure digitalization, it can be indicative of a firm's level of technological orientation. Furthermore, having a website serves as a means of cross-border product advertising (Jean & Kim, 2020).

As regards the industry controls, we employed two dummies, namely *Manufacturing* and *Retail*, to capture the industry-specific fixed effects. In the final sample, 2,509 firms belong to the manufacturing sector (46.93%) and 1,011 to the retail sector (18.91%). This distinction was made because of the difference between service as compared to manufacturing services, especially given our focus on mobile money (Buckley, Pass & Prescott, 1992; Martineau & Pastoriza, 2016).

As regards the sub-national level control, we employed *Locality Size*, which is a categorical variable that measures the level of population density in the city where the business operates, ranging from ‘less than 50.000’ to cities ‘with population over 1 million’. Typically, in developing countries, urban areas with higher population densities tend to have more developed logistics services and network systems, aligning with the requirements of exporting. As the lowest value has been assigned to bigger cities, there is an expected negative correlation with exports.

Finally, we controlled for country related variable, namely *Country GDP* (constant PPP) expressed in dollar, and the *GDP Growth*. We also included *GDP per capita* in the mediation regression in order to control for home country economic context. These data come from the World Bank database.

To reduce the heteroskedasticity and the scale of the variable, the continuous integer variables are logarithmically transformed. More specifically, they are the Firms Age, manager Experience, GDP and GDP per capita.

3.3 Method

To investigate the conceptual mediation model, we run Structural Equation Models using Baron and Kenny's Sobel test (Baron & Kenny, 1986) as well as Zhao, Lynch and Chen's Monte Carlo test (Zhao, Lynch & Chen, 2010) to verify if full, partial or no mediation explains the relationship between institutional voids, mobile money usage and internationalization propensity and intensity. We will first run the models for export propensity, next the models for export intensity. The extent of mediation is then analyzed in an attempt to prove or disprove hypotheses 3.

4 Results

Descriptives

Descriptive statistics and correlations are reported in appendix 1. These summary statistics illustrate that about one firm in six export with an average export of six percent of turnover. However, the average export intensity for exporting firms is 40 percent of turnover. One firm in three have adopted mobile money, an average which increases to 40 percent for exporting firms. Almost ninety percent of firms are domestically owned firms, with about one firm in three sporting a website. There are no concerns of multicollinearity.

Findings

Table 1 shows the results of the structural equation modeling and confirms both hypotheses 1 and 2. On the one hand, models 2 and 5 demonstrate that institutional voids lead to increased use of mobile money from the companies, thereby confirming hypothesis 1. In Model 1, we have only included the impact of institutional voids on mobile money, while in Model 2 we have added GDP per capita in order to ensure robustness as the level of economic development has been shown to be of influence on the adoption of mobile money. On the basis of our dataset of emerging markets, it is shown that the level of economic development has a negative influence on the adoption of mobile money, again confirming that the more challenging the economic environment, the higher the adoption of mobile money.

On the other hand, models 3 and 4 in turn demonstrate that the adoption of mobile money by firms leads to an increased propensity and intensity of direct exporting, respectively, controlling for relevant export determinants.

Table 1. Structural equation model following Figure 1.

	Model (1)	Model (2)	Model (3)	Model (4)
	Hypo 1. Mobile Money <= Institutional void	Hypo 1. Mobile Money <= Institutional void	Hypo 2. X propensity <= Mobile Money	Hypo 2. X intensity <= Mobile Money
VARIABLES				
Constant	0.354***	1.513***	0.260**	36.79***
	(0.00649)	(0.109)	(0.128)	(7.121)
Institutional_voids	**0.0195*** **	**0.0208*** **	0.00412	-0.436*
	(0.00660)	**(0.00664)**	(0.00463)	(0.259)
logGDPpc		-0.165***		
		(0.0155)		
Mobile Money			**0.0501*** **	**2.564*** **
			(0.00979)	**(0.546)**
Firm_size			0.101***	4.865***
			(0.00702)	(0.392)
forown			0.0886***	2.784***
			(0.0141)	(0.787)
log_manager_exp			0.00427	0.114
			(0.00820)	(0.458)
log_age			0.0164**	-0.0463
			(0.00769)	(0.429)
indirect_export			0.177***	1.155*
			(0.0126)	(0.701)
credit_loan			0.0460***	1.610**
			(0.0113)	(0.630)
locality_size			-0.0122*	0.926***
			(0.00629)	(0.351)
website			0.124***	4.397***
			(0.0105)	(0.586)
manuf			0.0632***	2.412***
			(0.0103)	(0.574)
retail			0.0282**	1.725**
			(0.0130)	(0.724)
log_GDP			-0.0187***	-1.997***
			(0.00543)	(0.303)
GDPgrowth			0.00383**	0.458***
			(0.00186)	(0.104)
Observations	5,304		5,304	5,304

Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

As far as control variables are concerned, firm size is positively aligned with the likelihood to export as well as the extent of exports although the results for the age of a firm are weak. Manufacturing as well as retail companies are expectedly more likely to export than the remaining industry of local business services. The difference between manufacturing and retail companies is, however, small, indicating that mobile money assists retail firms to make up the disadvantage as services are typically more likely to be market- and customer-specific, whereas goods are likely to be more standardized, thus increasing firms' international involvement (Ekeledo & Sivakumar, 2004; Sanchez-Peinado, Pla-Barber, & Hébert, 2007). Foreign firm ownership is also significantly linked to exporting. The location of the firm shows some interesting results, with city size positively linked to export propensity but negatively to export

intensity, indicating that firms from small cities have a harder time to go international but depend on it more once they have. Managers' experience does not have any significance while a website has. Using "technology-mediated" transactions reduces the cost of internationalization (Knight & Liesch, 2016), and internet firms may be less subject to the liability of foreignness than traditional organizations (Kotha, Rindova, & Rothaermel, 2001). The internet also provides access to international market knowledge and facilitates interactions with customers and partners (Pergelova, Manolova, Simeonova-Ganeva, & Yordanova, 2019). Results for indirect exports are significant, indicating that when firms can rely on third-party collaboration for distribution, they are also significantly more likely to internationalize. Domestic market size has a negative impact on exporting while growth has a positive impact.

As far as the mediation is concerned, as argued in hypothesis 3, Table 2 shows the results of the mediation testing for export propensity, using the Sobel and Monte Carlo test (Baron & Kenny, 1986; Zhao, Lynch & Chen, 2010). While the Sobel test has been used more often in social sciences, the Monte Carlo test has been used extensively in exact sciences. Table 3 reports similar tests and results for export intensity, using the same methods. Both tables confirm that there is full mediation meaning that the impact of institutional voids on internationalization is fully explained by the adoption of mobile money, confirming hypothesis 3.

Table 2. Significance testing of indirect effect institutional voids -> mobile money -> international propensity

Baron and Kenny approach to testing mediation

STEP 1 - MM:Institutional_voids (X -> M) with B=0.021 and p=0.002
STEP 2 - exportdummy:MM (M -> Y) with B=0.050 and p=0.000
STEP 3 - exportdummy:Institutional_voids (X -> Y) with B=0.004 and p=0.374

As STEP 1, STEP 2 and the Sobel's test above are significant and STEP 3 is not significant the mediation is complete!

Zhao, Lynch & Chen's approach to testing mediation

STEP 1 - exportdummy:Institutional_voids (X -> Y) with B=0.004 and p=0.374
As the Monte Carlo test above is significant and STEP 1 is not significant you have indirect-only mediation (full mediation)!

Table 3. Significance testing of indirect effect institutional voids -> mobile money -> international intensity

Baron and Kenny approach to testing mediation

STEP 1 - MM:Institutional_voids (X -> M) with B=0.021 and p=0.002
STEP 2 - export:MM (M -> Y) with B=2.564 and p=0.000
STEP 3 - export:Institutional_voids (X -> Y) with B=-0.436 and p=0.092
As STEP 1, STEP 2 and the Sobel's test above are significant and STEP 3 is not significant the mediation is complete!

Zhao, Lynch & Chen's approach to testing mediation

STEP 1 - export:Institutional_voids (X -> Y) with B=-0.436 and p=0.092
As the Monte Carlo test above is significant and STEP 1 is not significant you have indirect-only mediation (full mediation)!

Robustness checks

The first robustness check we carried out was to split the adoption of mobile money according to usage. Therefore, we ran the structural equation models (see models 3) again but applying the adoption of mobile money on the downstream side as compared to adoption of mobile money on the upstream side. For instance, some studies have shown that firms start to internationalize by importing rather than exporting. However, our results confirm that the adoption of mobile money for both types of stakeholders has a positive effect on export propensity and intensity. However, if we add both at the same time, results show that mobile money adoption for suppliers has a more positive effect on export decisions as compared to mobile money adoption for customers.

Table 4. Structural equation models for mobile money adoption for customers as compared to suppliers.

	1	2	3	4	5	6
VARIABLES	Export propensity			Export intensity		
MM_customer	0.229***		-0.119***	15.837***		-12.033***
	(0.029)		(0.029)	(1.677)		(1.659)
MM_supplier		0.269***	0.397***		18.730***	31.721***
		(0.033)	(0.061)		(1.862)	(3.497)
SIZE	0.106***	0.109***	0.110***	5.352***	5.554***	5.655***
	(0.007)	(0.007)	(0.008)	(0.419)	(0.414)	(0.439)
FOR_OWN	0.113***	0.110***	0.108***	4.501***	4.339***	4.070***
	(0.015)	(0.015)	(0.015)	(0.864)	(0.840)	(0.881)
Log_MAN_EXP	0.010	0.004	0.001	0.398	-0.018	-0.340
	(0.008)	(0.008)	(0.009)	(0.484)	(0.472)	(0.500)
Log_AGE	0.022***	0.024***	0.024***	0.441	0.583	0.644
	(0.008)	(0.008)	(0.008)	(0.457)	(0.450)	(0.476)
IND_EXP	0.176***	0.165***	0.160***	1.198	0.427	-0.096
	(0.013)	(0.013)	(0.014)	(0.739)	(0.731)	(0.782)
CREDIT_LOAN	0.045***	0.043***	0.042***	1.299*	1.164*	1.092
	(0.012)	(0.012)	(0.012)	(0.664)	(0.652)	(0.690)
LOC_SIZE	-0.028***	-0.028***	-0.027***	-0.157	-0.177	-0.116
	(0.007)	(0.007)	(0.007)	(0.386)	(0.377)	(0.397)
WEB	0.096***	0.104***	0.109***	2.316***	2.850***	3.379***
	(0.012)	(0.011)	(0.011)	(0.665)	(0.630)	(0.654)
MAN	0.066***	0.067***	0.068***	2.644***	2.736***	2.775***
	(0.011)	(0.011)	(0.011)	(0.607)	(0.596)	(0.630)
RET	0.014	0.020	0.024*	0.828	1.272*	1.656**
	(0.014)	(0.013)	(0.014)	(0.771)	(0.750)	(0.791)
Log_GDP	-0.028***	-0.014**	-0.007	-2.793***	-1.825***	-1.092***
	(0.006)	(0.006)	(0.006)	(0.330)	(0.310)	(0.344)
GDP Growth	0.007***	0.003	0.001	0.702***	0.440***	0.238**
	(0.002)	(0.002)	(0.002)	(0.113)	(0.106)	(0.115)
Constant	0.438***	0.144	-0.007	51.877***	31.499***	16.298**
	(0.134)	(0.131)	(0.141)	(7.645)	(7.321)	(8.099)
Observations	5,229	5,229	5,229	5,229	5,229	5,229
R-squared	0.150	0.150	0.102		0.023	
Wald	1221	1225	1164	513.1	542	485.4

Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

The second robustness tests we ran was to split the sample rather than to add additional variables to verify whether there are significant differences in levels rather than just in degree in specific subsamples. We therefore split the sample between manufacturing, retail and other types of sectors. Results confirm that our results our important for all types of sectors, but that the adoption of mobile money is less important for manufacturing firms as compared to firms in retail and other sectors. The second split sample we analyzed was larger firms with multiple locations as compared to firms with a single location. Results indicate that mobile money adoption is more important for small firms as compared to larger firms.

Table 5. Split structural equation models for export propensity for type of industry and type of firm.

Models:	(1)	(2)	(3)	(4)	(5)
	Manufacturing	Retail	Other	Large	Single
SIZE	1.047***	0.393**	0.401***	0.679***	0.776***
	(0.085)	(0.183)	(0.114)	(0.120)	(0.073)
FOR_OWN	0.790***	0.560	0.477**	0.500***	0.693***
	(0.153)	(0.366)	(0.204)	(0.194)	(0.139)
Log_MAN_EXP	-0.095	0.168	0.420***	0.021	0.073
	(0.102)	(0.219)	(0.142)	(0.138)	(0.089)
Log_AGE	0.275***	0.052	-0.128	-0.065	0.186**
	(0.096)	(0.200)	(0.132)	(0.125)	(0.085)
IND_EXP	0.978***	1.415***	1.416***	1.032***	1.225***
	(0.132)	(0.263)	(0.175)	(0.177)	(0.116)
CREDIT_LOAN	0.679***	-0.226	-0.020	0.283	0.401***
	(0.127)	(0.308)	(0.187)	(0.181)	(0.113)
LOC_SIZE	-0.191**	0.068	-0.097	0.061	-0.159**
	(0.086)	(0.200)	(0.122)	(0.138)	(0.073)
WEB	0.830***	1.344***	1.009***	0.891***	1.042***
	(0.127)	(0.249)	(0.173)	(0.178)	(0.110)
MAN				0.553***	0.560***
				(0.182)	(0.122)
RET				0.232	0.200
				(0.248)	(0.170)
Log_GDP	-0.066	-0.545***	-0.157*	-0.122	-0.193***
	(0.081)	(0.127)	(0.085)	(0.090)	(0.064)
GDP Growth	0.018	0.019	0.032	0.060*	0.028
	(0.027)	(0.051)	(0.034)	(0.035)	(0.023)
MM	0.352***	0.560**	0.512***	0.403**	0.504***
	(0.131)	(0.258)	(0.171)	(0.181)	(0.109)
Constant	-3.045	8.328***	-0.694	-1.435	-0.417
	(1.877)	(3.076)	(2.059)	(2.116)	(1.489)
Observations	2,509	1,011	1,826	1,070	4,276
X^2	649.5	123.8	193	181.8	739.2

Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Next, we wanted to control for export selection bias by running Heckman selection models. These models first analyze the extensive margin of firms that have selected into the export market (export propensity) and subsequently checks whether the adoption of mobile money still plays a significant role in the intensive margin (export intensity). The Heckman two step selection procedure requires to have exclusion variables that are only present in the selection model and not in the intensity model.

As such, it is suggested to identify factors that affect the propensity to export and not the export intensity (Winship & Mare, 1992). Following extant literature, we excluded institutional voids (see before) as well as the dummy variable related to foreign ownership (LiPuma et al., 2013; Tuaño et al., 2014). As suggested by Daily et al. (2000), foreign assets help mitigate the uncertainties associated with entering foreign markets, ultimately streamlining the process of international market expansion (Daily et al., 2000). Nevertheless, research indicates that foreign ownership is not significantly associated with export intensity, especially when expressed as a percentage of total sales. For instance, Estrin & Meyer et al. (2008) used a Heckman model to analyze the relationship between export propensity and export intensity. In their second equation, they used majority or minority ownership as the exclusion variable (Estrin et al., 2008), similar to our variable construct of foreign ownership.

Table 6. Heckman selection model for extensive and intensive export margin.

VARIABLES	Export intensity model	Export propensity model	Selection criterion
SIZE	9.530**	0.426***	
	(3.715)	(0.034)	
Log_MAN_EXP	-1.175	0.040	
	(1.884)	(0.042)	
Log_AGE	-2.012	0.061	
	(1.790)	(0.039)	
IND_EXP	-12.121**	0.689***	
	(5.364)	(0.055)	
CREDIT_LOAN	0.696	0.209***	
	(2.744)	(0.054)	
LOC_SIZE	6.930***	-0.071**	
	(1.804)	(0.035)	
WEB	-0.320	0.559***	
	(4.923)	(0.051)	
MAN	0.797	0.283***	
	(3.393)	(0.054)	
RET	3.366	0.114	
	(3.769)	(0.074)	
Log_GDP	-6.165***	-0.106***	
	(1.608)	(0.028)	
GDP Growth	1.495***	0.021**	
	(0.528)	(0.010)	
MM	5.150*	0.268***	
	(2.764)	(0.051)	
Institutional Voids		0.013	
		(0.024)	
FOR_OWN		0.350***	
		(0.064)	
lambda			16.463*
			(9.934)
Constant	132.844***	-0.199	
	(31.868)	(0.654)	
Observations	5,346	5,346	5,346
Wald	136.6	136.6	136.6

Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

The Heckman procedure indicates that there is a small selection tendency, which is significant at 10 percent, indicating the usefulness of this model. It is also important to note that the foreign ownership is significant in the selection regression. However, more importantly, the results hold confirming our hypothesis 2 and indicating that the adoption of mobile money is important to select into the export market but also grow export sales with a large size effect.

Finally, we wanted to control for endogeneity between the adoption of mobile money and exporting. To test the robustness of the results, we employed an instrumental variable approach using a 2SLS estimator, following (Caldera, 2010; Ganotakis & Love, 2012; Lachenmaier & Wößmann, 2006; Su et al., 2022). The primary challenge associated with employing the instrumental variable approach lies in the identification and selection of suitable instruments. Therefore, we decided to use three instrumental variables that have been shown to assist firms in adopting mobile money but not exporting. As already indicated, there is ample research and statistics indicating that economic development might drive mobile money adoption but not exporting. Moreover, we also employed another country level variable which refers to the penetration of telecommunication services, namely the extent of fixed broadband subscriptions. While this might be a good proxy for mobile money adoption, it seems unrelated to exporting. Furthermore, Hassan (2023) argues that it can be assumed that the probability of a firm adopting mobile money increases with the average number of firms that have adopted this technology. Indeed, “peer effects” among entrepreneurs should exist and could contribute to the spread of mobile money (Hassan, 2023). Therefore, we employed an instrumental variable measured at the country level that refers to the number of mobile subscriptions existing in the country in the year of the interview. The variables are then logarithmically transformed to reduce the scale (Log_MOS and Log_FIX).

The results of the first stage of the 2SLS regressions show that the selected variables are highly significant in determining the adoption of mobile money. Second, post estimation Durbin and Wu-Hausman tests indicate that we can reject the null hypothesis that variables are exogenous, indicating the usefulness of employing this procedure. Third, the first stage post estimation test indicates that the F(4, 5212) of 232 is much higher than any critical values indicated that we can reject the null hypothesis that the instruments are weak. The final Sargan and Basmann test, however, indicate that our three instruments suffer from overidentifying restrictions. We therefore dropped them in a stepwise manner until this issue was resolved. As such, model 3 in Table 7 can be used to investigate the adoption of mobile money on exporting, yet again confirming our results. The effect of mobile money adoption on exporting, after controlling for endogeneity, holds and is again highly significant. Mobile money adoption leads to a 30% increase in export intensity.

Table 7. Instrumental Variable Regression

	(1)	(2)	(3)	(4)
First stage	Mobile Money	Mobile Money	Mobile Money	Mobile Money
Log_FIX	.070***	.093***	.082***	.082***
	(.006)	(.006)	(.006)	(.006)
Log_MOS	.237***	.517***		
	(.038)	(.030)		
Log_GDPpc	-.493***			
	(.026)			
H0: Variables are exogenous	No	No	No	No
H0: Instruments are weak	No	No	No	No
H0: Overidentifying restrictions	Yes	Yes	No	No
Second stage	Export propensity	Export propensity	Export propensity	Export intensity
Mobile Money	0.201***	0.200***	0.401***	29.156***
	(0.026)	(0.026)	(0.055)	(3.335)
SIZE	0.104***	0.104***	0.108***	5.576***
	(0.007)	(0.007)	(0.008)	(0.480)
FOR_OWN	0.115***	0.115***	0.150***	7.440***
	(0.015)	(0.015)	(0.018)	(1.107)
Log_MAN_EXP	0.009	0.009	0.014	0.777
	(0.008)	(0.008)	(0.009)	(0.556)
Log_AGE	0.022***	0.022***	0.030***	1.021*
	(0.008)	(0.008)	(0.009)	(0.529)
IND_EXP	0.177***	0.177***	0.172***	0.945
	(0.013)	(0.013)	(0.014)	(0.838)
CREDIT_LOAN	0.045***	0.045***	0.042***	1.087
	(0.012)	(0.012)	(0.013)	(0.754)
LOC_SIZE	-0.024***	-0.024***	-0.038***	-0.976**
	(0.007)	(0.007)	(0.008)	(0.472)
WEB	0.101***	0.102***	0.069***	0.276
	(0.011)	(0.011)	(0.014)	(0.850)
MAN	0.066***	0.066***	0.071***	3.028***
	(0.011)	(0.011)	(0.011)	(0.692)
RET	0.017	0.017	0.002	-0.097
	(0.013)	(0.013)	(0.015)	(0.890)
Log_GDP	-0.032***	-0.032***	-0.048***	-4.322***
	(0.006)	(0.006)	(0.008)	(0.458)
GDP Growth	0.008***	0.008***	0.014***	1.253***
	(0.002)	(0.002)	(0.003)	(0.158)
Constant	0.497***	0.495***	0.796***	79.317***
	(0.135)	(0.135)	(0.164)	(9.843)
Observations	5,229	5,229	5,346	5,346
R-squared	0.157	0.158	0.131	0,131
Wald	1229	1229	1026	393.4

Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

5 Discussion and conclusion

Our study aims at providing a contribution to the ongoing debate on the role of institutional quality in the internationalization of firms from developing economies, especially from SSA. By examining the specific role of digital technologies, with a focus on mobile money, we offer a nuanced understanding of how firms navigate institutional voids to enhance their international presence.

First, our analysis confirms that firms from countries with higher levels of institutional voids are more likely to adopt mobile money technologies. This finding supports the notion that firms in these environments turn to digital solutions to mitigate institutional liabilities (Adomako, et al., 2021; Santiso, 2021). In particular, our results focus on mobile money as a digital technology and highlight its crucial role in overcoming the inefficiencies of the traditional financial and banking system, which occurs by reducing information asymmetries, building trust, and sharing knowledge among operators.

Second, our findings show that the adoption of mobile money is positively associated with the internationalization of firms, as highlighted by increased export propensity and intensity. Results are robust also when controlling for selection bias and endogeneity issues. This suggests that mobile money can reduce international trade transaction costs, improve access to financial services for internationalization, act as a platform for cross-border e-commerce, mitigate international distances and risks, and enhance export efficiency and performance (Liu, 2023; Ren & Gao, 2023; Zhao et al., 2023; Jean & Kim, 2020; Nambisan, Zahra, et al., 2019, Mohamed, 2023; Nan & Park, 2022). This seems to hold especially for B2B – more than B2C - EMFs, as our robustness check shows that the relationship between export and mobile money is more positive when the latter refers to the upstream - rather than downstream - side. This is probably due to the larger international scope of the upstream activities of EMFs compared to the downstream target market, which is probably more local. In addition, our results show that the adoption of mobile money is more important for small firms and for firms in retail (and other sectors) than for manufacturing firms. This makes sense, as retailing seems particularly proficient to adopting mobile money. It also suggest that mobile money can really support the internationalization of SMEs.

Third, our study demonstrates that mobile money mediates the relationship between institutional voids and internationalization. Rather than institutional voids directly encouraging internationalization, they trigger the adoption of digital solutions, which in turn support firms' international activities. This result shows the twofold crucial role of digital technologies – and of mobile money in particular – which is capable of enhancing simultaneously the transparency of business operations when institutions are inefficient, and the propensity and intensity of EMFs internationalization through export.

Contributions to Theory

We believe that our paper provides at least three main contributions to the international business literature. First, it addresses the "institutions-internationalization" conundrum by adopting an intermediate position between scholars emphasizing a positive relationship between institutional quality and export to foreign markets (e.g. Barnard & Luiz, 2018; Shirokova & Tsukanova, 2013) and scholars supporting the institutional escape outward FDI perspective (e.g., Luo & Tung, 2018; Cuervo-Cazurra and Ramamurti, 2015). In an effort to bridge these conflicting viewpoints, we introduce the role of digital technologies – with a focus on mobile money – and show how they can mediate the impact of institutions on internationalization. In particular, institutional voids trigger the adoption of digital technologies, which, in turn, foster firms' internationalization through export. This highlights

the importance of considering technological adoption as a key factor in understanding the relationship between institutional contexts and firm behavior.

Second, our study enriches the literature on emerging markets by illustrating how digital technologies, specifically mobile money, serve as tools for firms to mitigate the negative impacts of institutional voids and to support their internationalization. This is particularly relevant for regions like SSA, which have traditionally been underrepresented in international business research. Therefore, our paper responds to recent calls for adopting a fresh perspective on studying EMFs by addressing critical yet relatively overlooked factors in the emerging markets literature, such as the role of digital technologies in the internationalization of EMFs and the idiosyncratic characteristics of Africa as a country of origin of these firms (Buckley et al., 2023).

Third, we extend the current understanding of digitalization's role in international business. Our findings suggest that digital financial technologies are crucial in facilitating the internationalization process, especially in contexts where traditional financial systems are lacking. Therefore, we contribute to understand how digitalization can provide opportunities for catching up through business creation and international expansion not only in technologically advanced but also in emerging economies (Meyer et al., 2023). Furthermore, by focusing on mobile money, we enhance the nuanced comprehension of how a specific technology contributes to firms' internationalization, instead of examining the broader and often too diverse category of digital technologies. Such an approach necessitates a detailed analysis to distinguish the specific impacts of various types of technologies.

Managerial and Policy Implications

Our findings suggest that managers in emerging markets should consider adopting digital technologies like mobile money to overcome institutional barriers and enhance their firms' international competitiveness. Firms should leverage digital finance platforms to improve operational efficiencies, reduce transaction costs and information asymmetries, and access new markets. This can be particularly effective in regions with significant institutional voids like emerging or, even more, “frontier” markets, i.e. economies that are more developed than least developed countries, but too small, risky, or illiquid to be generally classified as an emerging market economy, which is the typical status of several countries from SSA (Blanco, 2013).

At the same time, policymakers should support the development and adoption of digital financial solutions to foster an enabling environment for firms to internationalize. This includes investing in the necessary infrastructure and creating regulatory frameworks that promote digital innovation. Such investments are likely to foster also the development of the traditional financial and banking sector, which benefit from the expansion of digital finance.

Limitations and Future Developments

Our study is not exempt from limitations, which however, can represent the starting point for future developments. First, as regards the geographic scope, while our focus on SSA provides valuable insights, future studies could explore other emerging regions to see if similar patterns hold. Second, our results rely on the adoption of a specific digital technology such as mobile money: future research should investigate other digital technologies to understand their distinct impacts on internationalization. Third, our study considers the aggregated institutional context: future studies could investigate how different dimensions of the institutional context influence the adoption of digital technologies and its impact on internationalization. Fourth, our study relies on data from the World Bank Enterprise Survey, which may have limitations in terms of coverage and depth. Future research could use more granular data to validate our findings. A longitudinal approach could also offer deeper

insights into how the relationship between institutional voids, digital technology adoption, and internationalization evolves over time.

Despite these limitations, we believe that our study underscores the critical role of digital technologies in mitigating institutional voids and facilitating the internationalization of firms from emerging markets. By embracing digital solutions like mobile money, firms can navigate institutional challenges and achieve greater success in international markets.

Appendix 1. Correlation table of all dependent and independent variables.

		Mean	S.D.	Min	Max	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	EXP_DUMMY	0.153	0.36	0	1	1															
2	EXP_PERC	5.902	18.898	0	100	0.734	1														
3	MM	0.356	0.479	0	1	0.053	0.046	1													
4	Institutional Voids	-0.011	0.983	-1.637	2.769	0.019	-0.027	0.041	1												
5	SIZE	1.565	0.733	0	3	0.32	0.229	-0.026	0.029	1											
6	FOR_OWN	0.121	0.326	0	1	0.148	0.098	-0.134	-0.011	0.182	1										
7	Log_MAN_EXP	2.643	0.655	0.693	4.234	0.073	0.019	-0.08	0.094	0.161	0.018	1									
8	Log_AGE	2.674	0.716	0	4.89	0.139	0.052	-0.06	0.044	0.264	0.035	0.532	1								
9	IND_EXP	0.156	0.363	0	1	0.238	0.067	0.013	-0.026	0.125	0.059	0.019	0.11	1							
10	CREDIT_LOAN	0.209	0.407	0	1	0.131	0.085	0.013	0.081	0.19	0.02	0.096	0.108	0.045	1						
11	LOC_SIZE	2.522	0.728	2	5	-0.052	0.008	0.108	-0.113	-0.075	-0.03	-0.144	-0.047	0.05	0.002	1					
12	WEB	0.343	0.475	0	1	0.286	0.183	0.108	0.006	0.388	0.134	0.033	0.131	0.132	0.146	-0.097	1				
13	MAN	0.469	0.499	0	1	0.121	0.062	-0.068	0.034	0.151	0.032	0.15	0.192	0.088	0.052	-0.026	-0.002	1			
14	RET	0.189	0.392	0	1	-0.07	-0.031	0.075	-0.059	-0.182	-0.05	-0.083	-0.105	-0.053	-0.049	-0.004	-0.055	-0.454	1		
15	Log_GDP	24.066	0.87	21.879	25.107	0.027	-0.037	0.148	0.062	0.116	-0.081	0.112	0.174	0.028	0.061	0.032	0.128	0.08	0.007	1	
16	GDP Growth	5.112	2.444	-2.989	14.047	0.008	0.04	-0.121	-0.084	-0.045	0.031	-0.028	-0.04	-0.012	0.046	-0.005	0.029	-0.026	0.051	0.121	1

Appendix 2.

VARIABLE	SYMBOL	DESCRIPTION	SOURCE
Export propensity	*Exportdummy*	Direct Export is a dummy variable taking 1 if the firm claimed to sale a certain quantity through direct export, 0 otherwise.	World Bank Enterprise Survey (WBES)
Export intensity	*Export*	The percentage of sales that are sold through direct exports.	World Bank Enterprise Survey (WBES)
Mobile Money	*MM*	Dummy variable taking 1 if a mobile money service is used for the operational transactions, if not 0	World Bank Enterprise Survey (WBES)
Mobile money for revenues from customers	*MM_customer*	Dummy variable taking the value of 1 if mobile money service is used to receive payments from customers, 0 otherwise.	World Bank Enterprise Survey (WBES)
Mobile money for supplier payments	*MM_supplier*	Dummy variable taking the value of 1 if mobile money service is used to pay the cost of input materials provided by suppliers, 0 otherwise.	World Bank Enterprise Survey (WBES)
Size	*SIZE*	Size is a categorical variable (0-3) indicating if the firm is micro (<5 employees), small (5-19), medium (20-99) or large (>100).	World Bank Enterprise Survey (WBES)
Foreign Subsidiary	*FOR_OWN*	Dummy variable, taking 1 if the foreign owners have more than 49% of firms 'ownership, 0 otherwise	World Bank Enterprise Survey (WBES)
Managers' Experience	*Log_MAN_EXP*	Logarithm of the years of experience of top managers in the sector.	World Bank Enterprise Survey (WBES)
Firm's Age	*Log_AGE*	The logarithm of the number of years firms have been in operation.	World Bank Enterprise Survey (WBES)
Indirect Export	*IND_EXP*	Dummy variable, which takes the value of 1 if the company exports by selling through an intermediary, 0 otherwise.	World Bank Enterprise Survey (WBES)
Credit or Loan line	*CREDIT_LOAN*	Dummy variable taking 1 if the firm has already a line of credit or loan from a financial institution, 0 otherwise	World Bank Enterprise Survey (WBES)
Locality size	*LOC_SIZE*	Categorical variable (0-5) which denotes the population size in the city where the firm is located.	World Bank Enterprise Survey (WBES)
Website	*WEB*	Dummy variable taking 1 if the company has its own website, if not 0.	World Bank Enterprise Survey (WBES)
Manufacturing sector	*MAN*	Dummy variable taking 1 if the firm is a manufacturing company, 0 otherwise.	World Bank Enterprise Survey (WBES)

Retail sector	*RET*	Dummy variable taking 1 if the firm operates in the retail sector, 0 otherwise.	World Bank Enterprise Survey (WBES)
Country's GDP	*Log_GDP*	Logarithm of the GDP (PPP) of the home country, year of the survey.	World Bank Dataset (WB)
Country's GDP Growth	*GDP_Growth*	GDP growth (expressed in percentage) of the home country, year of the survey.	World Bank Dataset (WB)
Country's GDP per capita income	*GDPpc*	Logarithm of the GDP per capita of the home country, year of the survey.	World Bank Dataset (WB)

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