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Digitalization of Micro Enterprises and Profitability: Evidence from Nigeria

Iorchir Doris Mary Ngurumun*
Department of Accounting, Federal Polytechnic Wannune, Benue State, Nigeria

***Abstract*: This study investigates the potential positive correlation between profitability and the digitization of business processes in Nigerian micro-enterprises. Based on theory, businesses can achieve their goals of increased profitability, improved performance, growth, and competitive advantage by investing in the appropriate business resources. According to the Resource-based theory (RBT), digitalization is a composite business resource that includes the use of a variety of digital tools accessible for business purposes, such as ordering and purchasing, cash payments and collections, sales, marketing, customer management and meetings, workshops or conferences, and business research. For this study, a structured questionnaire instrument was deployed for primary data gathering across 555 micro-business managers in 36 Nigerian states as well as the Federal Capital Territory (FCT). Descriptive statistics and regression analysis of the data produced results that were consistent with those of multiple earlier studies. Results show that even after controlling for factors that could complicate successful digitalization, the study finds a positive correlation between digitalization and profitability, which is in line with its per-testing predictions. Relying on the findings of the study, it is suggested that Nigerian micro business owners and managers must fully embrace digitalization for improved profitability and overall business performance. For the Nigerian government, it is suggested that digitalization of business operations should be incorporated in any package for entrepreneurship development. The study significantly contributes to literature and enriches users' understanding of business digitalization and its impact on profitability, especially in the Nigerian context.**

***Keywords*: Digitalization, Micro-enterprises, Obstacles, Profitability, Resource-based-view.**

1. Introduction

It is globally recognized that Micro, Small, and Medium Enterprises (MSMEs) serve as pivotal drivers of socioeconomic transformation, act as catalysts for national economic growth and prosperity, and are significant contributors to job creation in developing nations (Tuyon et al., 2011; European Investment Bank, 2019; Blancher, 2019; Ghassibe et al., 2019; Brixiová, Kangoye & Yogo, 2020). A World Bank report indicates that the MSMEs sector comprises around 90% of businesses and generates over 50% of global employment (World Bank, 2019). According to the Small and Medium Enterprise Development Agency of Nigeria (SMEDAN) reports, the MSMEs sector in Nigeria employs approximately 84.02% of the national labor force, including owners and the micro enterprises (MEs) sub sector contributes about 95.1% of the jobs (SMEDAN, 2017). The report further reveals that, as of December 2017, the MSMEs sector comprised 41,543,028 business units, with micro-enterprises accounting for the majority at 41,469,947 (99.8%). The reported data underscores the importance of micro-enterprises (MEs) for the socioeconomic well-being of Nigerians and the country's economic development, particularly considering the relatively high poverty level reported for Nigeria (World Bank, 2024). Over the years, the nation has battled poverty with various government-oriented poverty eradication policies and currently entrepreneurship development is being tested as a valuable panacea, given the expected impact of MSMEs on employment generation and poverty alleviation (Akanji, 2006; Akintoye & Oladejo, 2008; Akande, 2013). SMEDAN research on demographic features of MSMEs shows that the Nigerian MSMEs sub-sector, accounts for approximately eighty-five percent (85%) of total industrial employment and has contributed around 46% to the Gross Domestic Product (GDP) at various times (SMEDAN, 2010; 2017). Global reports also indicate that to enhance growth and alleviate poverty, the World Bank Group and other international aid agencies provide millions in dollars for MSMEs development to economies in need (Beck, Demirguc-Kunt & Levine, 2005). Consequently, considering the widely acknowledged significance of the sector to economic development and human well-being, stakeholders in international development aim to encourage policies perceived to potentially foster the prosperity and expansion of MSMEs.

Existing literature suggests that digitalization of MSMEs is a growth catalyst within the sub-sector (Bogner et al. 2016). Digitalization of business activities refers to the adoption of Internet-based technologies for conducting business operations (Zhu and Kraemer 2005) and is linked to business performance (Rai et al. 2006; Sambamurthy et al. 2003) such that the total cost of investment on digitalization of business operations may be considered to be a valuable business resource. Viewed from this perspective, business digitalization is deemed to serve as a potential technological strategy for transformation capable of significantly influencing performance of businesses in the MSMEs sub-sector (Olusola et al., 2013; Kilimis et al., 2019). Part of the literature on profitability drivers also indicates that businesses are likely to integrate digital solutions into their operations to improve transaction speed across value chain

*Corresponding author: dmiorchir@gmail.com

activities, facilitate real-time communication, reduce transaction costs, increase flexibility, profitability and uncover new markets for competitive advantage (Lee and Whang 2001; Oladejo and Yinus, 2013; Bi, Davison, & Smyrnios, 2017). Accounting literature highlights the importance of profitability in the business context including for payment of dividends or retained to finance expansion and growth (Thirumalaisamy, 2013; Gilchrist and Himmelberg, 1995; Altman, 1993; William Droms, 1990; Oscar, 1953) thus underscoring the importance of sustainable profitability to businesses (Alarussi & Alhaderi, 2018; Nanda & Panda, 2018).

In Nigeria, the development of entrepreneurship is crucial for economic development and eradication of extreme poverty such that investigating MSMEs' profit driving factors is a valuable research objective. Current literature across different jurisdictions, along with sparse research on Nigeria, suggests that digitalization of business operations functions as a resource which is perceivable as a theoretical catalyst for profitability and growth. In the Nigerian context however, there is limited empirical evidence supporting a conclusion that digitalization of business activities in the micro-enterprises (MEs') sub-sector is correlated with profitability or business growth and the research gap needs to be narrowed. Thus, the researcher views that it is imperative to utilize insights from existing literature, theory and empirical evidence using data on Nigerian MEs to investigate the impact of digitalization on profitability, to provide evidence specific to Nigeria. This research principally investigates whether digitalization of business activities in MEs positively affects business performance viewed through profitability and the findings are interesting as reported below. The remainder of this paper is broadly organized as follows: Section 2 documents the literature and hypotheses development; section 3 specifies the research design; section 4 describes the data; section 5 contains the result, test of hypothesis and analysis of findings while section 6 presents the summary and concluding remarks.

2. Literature Review and Hypotheses Development

A. Theoretical Review

This study is explained through two interconnected strategic management theories: profit-maximizing theory and competition-based theory, and the Resource-Based Theory (RBT). Strategic Management refers to the process of defining an organization's objectives, developing policies and plans to achieve them, and allocating resources for policy execution. It includes strategy formulation, implementation, and evaluation (David, 2005; Haim, 2005; Mohd, 2005; Zainal, 2005; Raduan et al. 2009; Killen et al. 2012). The primary aim of strategic management research is to determine the factors that lead to differences in organizational success across various dimensions and to understand the mechanisms utilized by specific organizations to achieve sustainable competitive advantage (Grant, 2010; Rumelt, Schendel & Teece, 1994). To sustain a competitive advantage, businesses must possess competencies that facilitate the creation of greater value relative to competitors and the achievement of lasting superior returns on investment (Barney and Hesterley, 2006; Barney and Clark, 2007; Kwak and Anbari, 2009). The identified theories clarify the importance of sustainable profitability and the incorporation of digitalization as a business resource for sustainable development within the micro-enterprises sub-sector.

B. The Profit-Maximizing and Competition-Based Theory

The Profit Maximization Theory, also known as Classical Profit Maximization Theory or Neo-Classical Economic Theory of the Firm, can be traced back to Adam Smith's early writings in 'The Wealth of Nations'[1] (Smith, 1937; Fama, 1980; Lynch, 2000; Jafar et al., 2010). Smith posits in the book that a 'invisible hand' guides individuals to utilize their capital involuntarily. Smith posits that the entrepreneur or investor typically does not aim to advance the public interest, nor is aware of the extent to which they may be doing so. Their primary intention is self-preservation; by directing investment to maximize value, their focus remains solely on personal profit[2]. The entrepreneur initially aims for personal gain through profitability from the investment; however, the pursuit of this personal interest inadvertently yields positive benefits for the broader economy.

The fundamental concept of profit-maximizing and competition-based theory in strategic management posits that business strategies are primarily motivated by the goal of long-term profitability and the establishment of a sustainable competitive advantage over rivals (Lynch, 2000; Raduan et al., 2009). Given the established significance of profit in business literature, companies aiming to transform their prospects and achieve sustainable growth seek methods to enhance profitability.

The profit-maximizing and competition-based theory faces criticism. For example, the stakeholder theory of the firm posits that a firm comprises stakeholders[3] who create a network of relationships within society. Consequently, the primary objective of firms should be the creation of value or wealth for all stakeholders (Freeman, 1984; Jones, 1995; Walsh, 2005; Parmar et al. 2010). Nonetheless, it is important to recognize that the absence of the business facilitating connections among the various stakeholders in the network results in a disjointed system. Consequently, as evidenced by profitability literature, entrepreneurs persist in prioritizing profit maximization to foster sustainable business growth, thereby ensuring the ongoing relevance and applicability of the theory.

1) The Resource- Based Theory (RBT)

The Resource-Based Theory (RBT) is a prominent strategic management framework introduced by Barney (1991), which investigates the correlation between firm resources and sustained competitive advantage. Resource-Based Theory posits that resources controlled by a firm generate capabilities that enable the firm to achieve a competitive advantage and superior performance (Ainuddin et al., 2007). This theory emphasizes the significance of a firm's resources and

capabilities, particularly in relation to how performance and sustained competitive advantage are influenced by these controlled resources (Barney, 1996). Business resources examined within the framework of Resource-Based Theory (RBT) encompass all assets, capabilities, firm attributes, organizational processes, information, and knowledge that the firm manages. These resources are enhanced to facilitate the implementation of strategies aimed at improving efficiency and effectiveness (Barney, 1991; Porter, 2008; Utami & Alamanos, 2022). Resource-Based Theory (RBT) is widely recognized in strategic management research as a framework for understanding a firm's competitive advantage and sustained performance, including profitability (Wernerfelt, 1984; Galbreath, 2005). Moreover, there appears to be a consensus among researchers that the factors contributing to firms' competitive advantage and superior performance are primarily linked to the characteristics of their resources and capabilities (Barney, 1986a, 1991, 2001a; Conner, 1991; Mills, Platts & Bourne, 2003; Peteraf & Bergen, 2003).

Technology as a business resource, is recognized as a key driver of competition and research findings show that businesses which effectively leverage technological change experience significant growth (Shehadeh et al. 2023; Porter, 2008). Research evidence also indicates that companies which regard technologies such as cloud computing, big data and social media technologies as integral components of their infrastructure tend to achieve higher profitability (Schwertner, 2017; Shehadeh et al. 2023). This study is consequently anchored on the Resource-Based Theory (RBT) to elucidate the relationship between profitability and digitalization as a resource, in Nigerian micro enterprises.

C. Conceptual Framework

1) Overview of Digitalization

Several scholars support the view that digitalization, or digital transformation, refers to frameworks driven by the use of digital technology in various areas to create and distribute value (Stolterman and Fors, 2004; Tilson et al., 2010; Rossato & Castellani 2020; Hervé, Schmitt & Baldegger,2021). Others describe the concept as an organizational metamorphosis that integrates digital technologies with business processes (Liu, Chen & Chou, 2011); changes that digital technologies can bring to a company's business model, products, processes, and organizational structure (Hess et al., 2016). In another context, digitalization has been defined as adjustments in operational methodologies, roles, and business offerings which result from the incorporation of digital technologies within an organization (Parviainen et al., 2017); or a process aimed at enhancing an entity, by initiating significant changes to its characteristics through the integration of information computing, communication, and connectivity technologies (Vial, 2019).

One viewpoint defines digitalization as an innovation in corporate operations, functioning as a strategy to augment and create value (Gassmann, Frankenberger & Csik, 2013; Kotarba, 2018; Kraus et al., 2022; Galindo-Martín, Castaño-Martínez & Méndez-Picazo, 2019; Zhai, Yang & Chan, 2022). A common perspective among the definitions or descriptions of digitalization is the application of electronic tools and technologies to deepen the effectiveness and efficiency of processes including in the conduct of business.

Digital technologies used in business are categorized into three main types based on their functionality namely: data collection, data integration, and data analysis technologies (Pagaropoulos et al. 2017), while on the other hand, technologies are categorized based on their digitalization capabilities of: intelligence, connectivity, and analytical capacities. The literature holds that technology capacity for intelligence involves the improvement of fundamental hardware via the integration of digital components that gather data (Lenka et al., 2017). Connective capabilities refer to the wireless connecting of devices with each other and the Internet, while analytical abilities enhance knowledge generation, by deriving insights from the vast data provided by sensors and systems (Ranta, Aarikka-Stenroos & Väisänen, 2021). Research indicates that adoption of digitalization in business is a global trend with gains relating to improved productivity due to streamlining of operations and diminishing communication barriers both internally and externally (Berg, Rubio & Laske, 2024). Furthermore, deployment of digital technology for business operation is associated with improved business process flows targeting; enhanced operational efficiency, cost savings, human error reduction, streamlined data analysis, improved revenues and value generating opportunities for the organization (Monton, 2022).

2) Digitalization in Micro and Small businesses

According to extant literature, digital resources or technologies utilized in digitalized businesses could include: all internet or network compatible services and devices, Payment and Accounting Systems, Customer Relationship Management Systems, Inventory Management Systems, Job Management Systems, Learning Management Systems, Hospital Practice Management Systems, Rostering Software, Time Management Software, Email Marketing Systems, Social Media Management Systems, cloud computing and websites (Alshboul, 2014; Adegbuyi, Akinyele, & Akinyele, 2015; Bayramusta & Nasir, 2016;Kwayu, Lal & Abubakre, 2017; Jurado, Moral, Viruel & Ucles, 2018; Yunis et al., 2018; Hizam, Khairuddin & Olowosuyi, 2020; Etim et al., 2021; Inyang & James, 2022; Etuk et al., 2022;Anyadighibe et al., 2023; Australia, 2024). Organizations use one or more of these technologies or digital tools to enhance communication, augment efficiency, elevate productivity, and secure a competitive advantage for a profitable and growing business (Apulu & Latham, 2011; James & Inyang, 2023; Etuk et al., 2022). An increasing volume of research indicates that information technology innovation and competencies promote business innovation, new product development, positively influence performance particularly profitability, growth, and productivity (Hollenstein, 2004; Kossai & Piget, 2014; Ainin, et. al., 2015; Shettima & Sharma, 2020; Hervé, Schmitt & Baldegger, 2021; Chen, Sun, & Chen, 2022; Davis and DeWitt, 2021; Peng and Tao, 2022 Peng and Tao, 2022; Zhai et al., 2022; Heredia et al., 2022; Agboola, Adelugba & Eze, 2023; Etim et al., 2023). This body of literature thus suggests that

digitalization is a driver of profitability, business growth, innovation, products development, value creation and enhanced competitive advantage. For Micro Enterprises in particular, social media can reduce marketing costs, improve customer relations and systematically create sustainable value (Ainin, et. Al., 2015; Matt et al., 2015; Bouncken et al., 2019). Extant studies suggest that Micro and small businesses may digitalize business relatively easier given their characteristics which include; size, accelerated innovation; flexibility and evolution' '(Fillis & Wagner, 2005; Shepherd and Haynie, 2009; Beliaeva, Ferasso, Kraus, & Damke, 2019; Bouncken and Barwinski, 2020; Eller et. al., 2020). It must be acknowledged that the literature generally suggests digital technology may be effectively integrated in operations for enhanced performance both in the private and' 'public sectors. Consequently, the Nigerian government, has recognized the importance of incorporating digitalization to optimize her public sector, drive growth and innovation, an influencing factor for the establishment of Nigeria's Federal Ministry of Communications, Innovation and Digital Economy.

3) Profitability of Micro Enterprises (MEs)

Profitability is established by taking the surplus of revenues over total business costs and is seen as a ratio that assesses business performance and an indicator of successful business operations (Koellinger, 2006; Margaretha & Supartika, 2016). Current research indicates that sufficient and sustainable profits are necessary for long-term business survival in a competitive business atmosphere to finance expansion (Foreman-Peck, Makepeace, & Morgan, 2006). Documented evidence further suggests that profitable organizations; exhibit greater productivity (Kossai & Piget, 2014) and acquire the capacity for further investment, corporate expansion, and improved competitive advantage in the marketplace (Stejskal et al., 2016; Kubicková & Procházková, 2014; Lesáková, 2014). This literature partially suggests that businesses operating at a loss lack capacity for investment, expansion and are likely to become bankrupt even in the short-run. The import of profit to business growth and survival portrays profitability from some perspective as an essential element for business longevity (Maynard, 2013). Although some Micro and Small businesses receive government grants sometimes through entrepreneurship promotion initiatives, a substantial body of literature promotes the perspective that sustainable business growth is achievable through profitable business operation (Lesáková, Gundová & Elexa, 2015; Higgins, 2003; Gibson, 2012; Yazdanfar, 2013; Cumming & Groh, 2018; Lesáková, Ondrušová & Vinczeová, 2019).

a. Drivers of profitability in MEs

Some factors have been identified in extant research as influencers of profitability in business. Bloom and Van Reenen (2007) posit that enhanced management practices have significant positive association with profitability. Yazdanfar (2013) found that firm size, previous-year profitability, growth, and productivity positively influence profitability. Similarly, Susilo, Wahyudi & Demi Pangestuti (2020) found significant positive association between profitability, firm size and growth. In their research, Chesini & Giaretta (2024) reported findings of positive association between digitalization and bank profitability, driven by a digitalization-enhanced sustainable competitive advantages anchored on market-learning, technical and industry digital capabilities.

D. Micro Enterprises (MEs) in Nigeria

In Nigeria, the National Policy on MSMEs has established a dual criterion for classifying enterprises thus micro enterprises are defined based on employment scale and asset value, excluding land and buildings. Micro enterprises (MEs) are defined as those with asset investments of less than N10 million and a workforce not exceeding nine persons (SMEDAN, 2017). Micro enterprises significantly contribute to enhancing the livelihood of residents in developing countries and have been recognized as an antidote for alarming poverty levels (Akoten, Sawada & Otsuka, 2006; Iorchir, 2006; AJAYI & Gomna, 2021).

Nigeria's MEs' report show that they significantly contribute to gross domestic product (GDP), employment generation, exports, local value addition, and technological advancement (SMEDAN, 2017; Gebreeyesus, 2007; Yahaya, Geidam & Usman, 2016). It is no gainsaying therefore, that the role of MEs in holistic national development is increasingly acknowledged in Nigerian entrepreneurship literature.

E. Empirical Review and Hypotheses Development

1) Digitalization of MEs and Profitability

Substantial research contributions discuss digital transformation or digitalization and business performance which is often evident in profitability. The literature suggests that given its perceived advantage, the industrial sector has swiftly evolved into a digital environment, especially following the COVID-19 pandemic invasion period when the shift was accelerated (Parviainen, Tihinen, Kääriäinen, & Teppola, 2017; Priyono, Moin, & Putri, 2020). According to the literature, this digital evolution attracts competitive advantage for adopters evident in cost efficiency, enhanced revenues, innovation, productivity, profitability and general performance (Lumpkin & Dess, 2004; Bloom & Van Reenen, 2007; Koski, 2010; Yoo et al., 2010; Tello, 2011; Piccinini et al., 2015; Nambisan, 2017; Graetz and Michaels, 2018; Paluch et al., 2019; Truant, Broca, and Dana, 2021; Llopis-Albert, Rubio & Valero, 2021; Hervé, Schmitt & Baldegger, 2021; Peng and Tao, 2022; Zhai et al., 2022; Heredia et al., 2022; Chesini and Giaretta, 2024; Sezal, Yalcin & Yenice, 2024). This study's objective is on the impact of digitalization on profitability of MEs and the empirical review is restricted accordingly.

Researchers have documented findings elucidating the relationship between digitalization and business profitability some of which are presented below:

Lal (1996) found that businesses in India employing ICT demonstrated increased profit margins, which suggests a positive relationship between ICT adoption in business and profitability. Machikita et al. (2010) identified a significant positive correlation between ICT and corporate performance which includes profitability, in four ASEAN nations of Indonesia, the Philippines, Thailand, and Vietnam. Similarly,

Tello (2011) reported a positive association between ICT implementation in business operations and profitability in Peru.

Kawira, Mukulu, and Odhiambo (2019) submit survey research findings on the' 'Kenyan business environment which reveals that most micro business owners and managers utilizing digital options for marketing, viewed their firms' performance (evident in profitability)' 'as substantially enhanced. Shettima and Sharma (2020) conducted a survey of 500 respondents and reported that digitalization substantially influenced job creation, economic opportunities, production quality and quantity which collectively increased profitability. Khairuddin & Olowosuyi (2020) submit that the implementation of digital technologies substantially enhances business performance, similar to Zahrah (2020) who studied a sample of 300 MSMEs' managers in Semarang and reported that, digitalization of accounting information had significant impact on profitability enhancement.

On the Italian business environment, Truant, Broca, and Dana (2021) reported research findings which suggested that many businesses recognized the benefits and positive performance effects of digitalization. Similarly, Omoyele et al., (2022) suggest in their report findings that adoption of digital technologies provide unique combinations of sustainable business model elements, that promote growth through profitability. Agboola, Adelugba, and Eze (2023) employed survey data from 303 participants to examine the relationship between Fintech and the sustainability of micro-enterprises.The study's report showed that in relation to Micro enterprises, Fintech lending substantially positively impacted revenue and important component of the profit ratio. Furthermore, Etim et al. (2023) analyzed data from 337 MSME operators in Nigeria and reported findings showing that the utilization of ICT resources, is likely to substantially improve business performance.

More recent research also produced results which indicate that adopting digitalization is positively associated with profitability. For example, Chesini and Giaretta (2024) analyzed 96 large publicly traded US banks from 2007 to 2017 and found that digitalization positively impacts bank profitability by enhancing sustainable competitive advantage, through market-learning, technical and industry digital capabilities. On the indonesian business environment, Pratama (2024) found that digital transformation increased profitability, and fostered innovation within SMEs, while Wulan, et al. (2024) engaged in a qualitative literature review of studies investigating the impact of digitalization in Indonesia. They found conclusions from previous findings suggesting that adoption of technologies such as e-commerce, cloud-based inventory management, and digital marketing can increase SME profitability by an average of 35%.

The studies documented above largely conclude that a significant positive association exists between business processes' digitalization and profitability. In contrast however, a study on 13 African nations reported findings which depict negative relation between digitalization and profitability (Esselaar et al., 2007), while another research found no association between ICT adoption and performance in Chilean businesses (Benavente, Lillo, and Turen (2011).

Given that a substantial number of studies suggest a positive association between digitalization and profitability, this study tests the following one-tailed hypothesis specified in its null form:

H_{01}: Digitalization has no significant positive relationship with profitability of Micro Enterprises in Nigeria.

2) Obstacles to digitalization

Research evidence also shows that change is often associated with challenges which pose as impediments to effectiveness (Dent, & Goldberg, 1999) suggesting that Micro enterprises undergoing digital transformation are subject to obstacles. Indeed, Hendrawan, et. al., (2024) identified various obstacles which Micro enterprises face in the digital era to include; limited financial and human resources, inadequate digital infrastructure, and lack of sufficient technology education. Other obstacles may include; resistance to change, lack of trust, and the high cost of technology (Vărzaru, 2022). Other researchers identify the challenges of: cybersecurity risks (Pantelei & Lazari, 2022), credibility of digital information handlers regarding preservation and transmission (Agostino et al., 2021). Other obstacles to harnessing the gains of digitalization noted in literature are human capacity constraints and imperfect legislative enforcement (Stefanovova et al.,2020; Kovalevska, et al. 2022).

These barriers may encumber the successful implementation of digitalization thus preventing the expected positive impact on profitability of Micro-enterprises. However, Hendrawan, et. Al (2024) reported recent research findings which indicate that despite noted challenges, digitalization offers significant opportunities for micro-enterprises' profitability through its components of; improved' 'operational.

Thus, this study follows theoretical proposition and recent research findings to propose the following null hypothesis:

H_{02}: There is no significant positive association between digitalization and profitability of Micro-enterprises in the presence of obstacles.

3. Research Design

A. Overview

This study employs a survey research methodology and utilizes a cross-sectional research design, which is the predominant approach in the social sciences (Nachmias & Nachmias, 1996). The cross-sectional survey design is adopted in this study due to its advantage of enabling large scale one-time sample data collection and facilitating credible inference on the population (Sileyew, 2019; Etim, et. al., 2023), efficiency of time and resources (Caruana, et al., 2015). The cross-sectional research design has also been utilized in numerous previous studies to effectively investigate the influence of independent variables on the dependent variables (Kossai & Piget, 2014; Caruana et al., 2015; Kawira, Mukulu & Odhiambo, 2019; Sileyew, 2019; Etim et al., 2023).

B. Measuring the Association between Digitalization and Profitability of Micro Enterprises

The general objective of this study is to investigate the nature

of the association between adoption of digitalization and profitability in micro-enterprises, including an examination of the intervening impact of Obstacles to digitalization in such a relationship. To test the formulated hypotheses and having the advantage of a large sample size, the study deploys the following linear regression models:

$$PROFITA = \beta_0 + \beta_1 DIGITA + \varepsilon \quad (1)$$
$$PROFITA = \beta_0 + \beta_1 DIGITA + \beta_2 OBSTA + \varepsilon \quad (2)$$

Where,
PROFITA= Proxy for Profitability
DIGITA =Proxy for Digitalization
OBSTA = Proxy for Obstacles to digitalization
$\beta_0, \beta_1, \beta_2$= Intercept and regression coefficients for *Digita* and *Obsta.*
ε = Disturbance term

In the model above, *Profita* (profitability), the dependent variable is measured as a composite variable of; increase in revenue, gross and net profit, cost reduction including achievement of targeted sales or profit. *Digita* (digitalization) the independent variable, is established with the extent of digital adoption in a micro-enterprise in relation to; marketing and sales, ordering and purchases, payments and collections, meetings, customer relations management, workshops and conferences including web presence of the enterprise. *Obsta* (Obstacles) the control variable is also a composite measure of various constraining factors which threaten the effective implementation of a digitalization policy in the micro enterprise.

In testing the first Hypothesis ($H_0 1$) and second Hypothesis ($H_0 2$), it is predicted following extant literature, that β_1 in equations (1) and (2) will be significantly greater than zero, while β_2 in equation (2) will be significantly less than zero. Items used as proxy to collectively measure profitability, digitalization and obstacles are consistent with indications in previous studies (Ehrahardt & Brigham, 2011; Lim, 2013; Okundaye et. al., 2019; Taskinsoy, 2019; Kaur, et.al, 2020; Mutoharoh, Winarsih & Buyong, 2020; Karim, et.al., 2022; Etim, James & Ekong, 2023).

4. Data

A. Nature of Population and Sample

The target population of this study is the entire micro-enterprises sub-sector across the 36 states and FCT of Nigeria, which is estimated to currently contain over 42 million micro business units. However, the exact population of micro enterprises in Nigeria as at the time of this study is unknown because a significant proportion of micro businesses in Nigeria is not registered with the Corporate Affairs Commission (CAC)[4] or the relevant state-level ministries designated to register such businesses (SMEDAN, 2017). Considering the infinite nature of the population of micro-enterprises in Nigeria and the researcher's aim to obtain a representative sample across all 36 states of Nigeria plus the Federal Capital Territory, a purposive original sample size of 740 micro-enterprises was established with 20 micro enterprises randomly selected from each state and the FCT. The judgemental sampling method was employed to yield a larger sample size that fits the purpose of this research.' 'Studies which apply the infinite population model to calculate, generate a sample size below 400 cases (Kossai & Piget, 2014; Lesakova, Ondrusova & Vinczeova, 2019; Etim et al., 2023).

The study generated primary quantitative data, collected via a structured survey questionnaire instrument of a 5-point Likert ordinal scale, from 5 designated as 'Strongly agree' to 1 being 'Strongly disagree' and administered by research assistants. The methodology involved briefly explaining the objective of the study to a selected manager respondent, before delivering the instrument to them for completion. Respondents were given space and time to complete the questionnaire and submit at an agreed later date. The questionnaire instrument contained items structured to obtain responses relating to the dependent and independent variables, respondent manager's' 'educational status in terms of whether they had higher education or not, age of business and location in Nigeria.

The hand-delivered questionnaire has been shown to reduce completion time for responses, facilitate clarification of doubts or misunderstandings, and contribute to a high response rate and honesty (Sekaran & Bougie, 2010; Aliyu & Rosali, 2014; Kawira, Mukulu & Odhiambo, 2019), in addition to attracting some cost savings.

B. Demographic Analysis

A total of 740 questionnaires were originally distributed to' 'micro-enterprises' manager respondents randomly selected from each Nigerian state and the FCT, through research assistants. However, 555 completed questionnaires were effectively retrieved after a reasonable period, generating a response rate of 75%. Consequently, the sample size (n) employed in the study was adjusted to 555 for data analysis. Demographic features (Appendix 1) show that majority of the respondents, 495 (89.2%) are located in 31 Nigerian states which the study considers to be "relatively less populated" while 60 (10.2%) of the respondents located in 5 densely populated Nigerian states and the Federal Capital Territory Abuja[5]. There are 239 (43.1%) enterprises aged from 1 to 4 years and 316 (56.9%) enterprises aged 5 years and above indicating that newer and relatively older businesses were included in the sample. Furthermore, gender distribution of the respondent managers across micro enterprises indicates that 284 (51.2%) were male and 271(48.8%) females suggesting that the sample covered a substantial number across each gender.

C. Instrument Reliability Analysis

Prior to administration of the questionnaire, a pilot study utilizing the developed questionnaire instrument was conducted on 30 managers of micro-enterprises close to the researcher's

Table 1
Reliability analysis

Variables	No. of cases in Questionnaire	Conbach's Alpha Coefficient
Profitability (Profita)	10	0.972
Digitalization (Digita)	5	0.906
Obstacles (Obsta)	3	0.839

Source: Author generated with SPSS (Version 23), 2025

location for effectiveness and cost efficiency. The completed questionnaires were analyzed using the SPSS statistical software and Cronbach Alpha reliability procedure executed, to ascertain the internal consistency of the instrument, understanding that the Cronbach's Alpha benchmark is 0.7 (Hizam, Khairuddin & Olowosuyi, 2020;

Agboola, Adelugba & Eze, 2023;' 'Etim, et al, 2023;). The Cronbach's Alpha coefficients generated for the main variables were; 0.97 (Profitability), 0.91 (digitalization) and 0.84(Obstacles) (see Table 1.). Following this reliability result, the questionnaire instrument was deemed sufficient and administered for data collection.

D. Descriptive Statistics

Likert scale of 5-point level coded with 1 (Strongly disagree); 2 (Disagree), 3 (Undecided), 4 (Agree) and 5 (Strongly Agree) was used in this study for data collection. Table 2 shows for the response variable *Profita*, that respondents collectively utilized all response options from the Minimum 1 (Strongly Disagree) to the maximum 5 (Strongly agree). Specifically, the Frequencies distribution indicate that 67 (12.1%) and 344 (62%) which collectively form the majority (74.1%) of the respondents, either 'Agree or 'Strongly Agree' with the indication of' 'an association between digitalization of MEs' operations and profitability as indicated (see Appendix 2). Table 2 also indicates that collectively, 144 (25.9%) of the respondents either strongly disagree (7.2%), Disagree (9.0%) or are undecided (9.7%) about the queried relationship between digitalization and profitability.' 'The mean value for *Profita* of 4.13 which lies between 'Agree (4)' and 'Strongly Agree (5)' is suggestive that on average, the popular view among respondents promotes the perception that adoption of digitalization is associated MEs' profitability or its growth components of increased revenue, reduced costs effective profit planning. The standard deviation of 1.3 indicates moderate variability from the popular opinions of respondents.

From the same Table 2 in relation to *Digita*, it is observed that a total of 361 (65%) either 'Agree" (25%) or 'Strongly Agree' (40%) that the processes of their Micro Enterprise (ME) are digitalized as captured in the questionnaire (see Appendix 2). Although the majority of MEs' managers 'Agree' that they digitalize business activities, a few other managers 'Strongly Disagree' (1.5%), ''Disagree'(8.1%) or are unsure/undecided (25.4%) about their level of digital technology adoption in the business. The mean (3.94) and standard deviation (1.05) for *Digita* collectively show that on the average, the majority of respondents hold consistent views (i.e. Agree) that they often adopt digital options in doing business.

In relation to *Obsta,* the same Table 2 indicates that a significant majority of respondents, 421(75.9%) either 'Strongly Disagree' (61.1%) or 'Disagree' (14.8%) with the indication that adoption of digitalization in business has no obstacles or that any associated obstacles prevent a visible association between digitalization and profitability (see Appendix 2). The mean (1.75) and standard deviation for Obsta indicate consistency among respondents in repudiation of the indications that obstacles to effective digitalization do not exist or that obstacles prevent a visible impact of digitalization on profitability of MEs.

Table 2
Descriptive statistics (Summary of responses and statistics)

Variables	Frequencies					Statistics				
	SD	D	UN	A	SA	Mean	Mode	Std. Dev.	Min.	Max.
PROFITA (Profitability)	40 (7.2%)	50 (9.0%)	54 (9.7%)	67 (12.1%)	344 (62%)	4.13	5	1.31	1	5
DIGITA (Digitalisation)	08 (1.5%)	45 (8.1%)	141 (25.4%)	139 (25.0%)	222 (40%)	3.94	5	1.05	1	5
OBSTA (Obstacles)	339 (61.1%)	82 (14.8%)	99 (17.8%)	04 (0.7%)	31 (5.6%)	1.75	1	1.12	1	5

Note: n = 555; 'PROFITA', 'DIGITA', 'OBSTA', 'SD', 'D', 'UN', 'A' and 'SA', represent Profitability, Digitalization, Obstacles, Strongly Disagree (1), Disagree (2), Undecided (3), Agree (4) and Strongly Agree (5).

Source: Author generated with IBM SPSS (Version 23), 2025

5. Result, Test of Hypotheses and Analysis of Findings

A. Result and Test of Hypotheses

Table 3 presents the result which analyses the association between Digita (Digitalization) and Profita (Profitability). The result reveals an adjusted-R^2 which suggests that adoption of digital options.

Table 3
Analyzing the impact of digitalization on profitability of nigerian MEs

Model	Prediction	Coefficient (β)	Std. Error	t-test
Constant		1.239	0.174	7.103
Digita	$\beta 1 > 0$	0.733**	0.043	17.132
R^2	0.347			
Adjusted-R^2	0.346			
F-test	293.493**			

** Indicates significant difference at the 1% level; and * shows significant difference at the 5% level.

Source: Author generated with SPSS (Version 23), 2025

(Digitalization) to conduct various business activities in Nigerian MEs, explains about 34.6% of the variation in Profitability as indicated by the adjusted-R^2. Also from the table, it can be noted that the coefficient (β_1) on digitalization is 0.733 (p. < 0.05) suggesting that increasing digitalization of business processes in MEs by a unit is perceived to increase profitability by up to 73.3%. The F-test (293.483, P-value <0.05) has a high and significant value suggesting that the simple regression model (Equation 1), has predictive power in relation to the dependent variable, profitability. Based on the findings visible from Table 3, the prediction made in section 3.2

that β_1 in equations (1) will be significantly greater than zero is upheld and the null hypothesis *(β_1 = 0),* is therefore rejected. Consequently, this study finds that increased adoption of digitalization in Nigerian micro-enterprises significantly influences their profitability.

B. Analysis of Findings

Findings of this study as presented in section 5.1 above provide strong evidence against the first and second null hypotheses. Null hypothesis one indicates' 'no positive association between digitalization and profitability while null hypothesis two indicates that obstacles prevent any positive association, between digitalization and profitability of MEs in Nigeria. However, results of equation (1) and (2) which model the relationships between profitability and digitalization including the moderating effect of obstacles presented in Tables' '3 and 4 indicate that digitalization as measured in this study, has significant positive association with Profitability. Furthermore, the empirical evidence shows that although the positive impact of digitalization and profitability is likely to weaken in the presence of obstacles, the impact on profitability remains consistently positive and significant. The implication of these findings is that adoption of digitalization, in other words embracing digital options for business operations in Nigerian MEs is a business practice and strategy for enhancement of profitability and its growth.

6. Summary and Concluding Remarks

The results of this study indicate that adoption of digital options to conduct business also regarded as digitalization of business activities is useful to enhance profitability in micro enterprises within Nigeria. A large sample of opinions was generated from micro enterprises operators in the managerial position across 36 Nigerian states and the Federal Capital Territory. The data were effectively analyzed where the impact of digitalization on profitability was observed in addition to a reassessment of the impact after accounting for the moderating effect of obstacles. In general, the study finds that adopting digitalization through investment in digital resources for business operations empowers the enterprise to achieve relatively higher profits irrespective of obstacles encountered in the process of digitalization. The result of this study provides evidence that a positive connection exists between business performance and useful resources employed for business operations consistent with the suppositions of the Resource-Based Theory. Thus, this study concludes that in the context of the Nigerian business environment, micro enterprises desiring to grow through profitability may need substantial investment on' 'business digitalization to exploit the gains which consistent with the literature include; efficiency, productivity, enhanced competitive advantage and profitability in general (Apulu & Latham, 2011; James & Inyang, 2023; Etuk et al., 2 022).

The findings of this study are consistent with previous studies where digitalization was found to be positively correlated with general business performance or profitability (Bertscheck et. al., 2013; Liu et. al., 2013; Haller & Lyons, 2015; Hagsten, 2016; Khairuddin & Olowosuyi, 2020; Igwe, et. Al, 2020; Okundaye, et. al. 2019; Shettima & Sharma, 2020; Mutoharoh, Winarsih & Buyon, 2020; Etim et al, 2023). However, some studies acknowledged in the literature reported findings of a negative association between adoption of digital options for business operations and profitability or performance in general (Esselaar et al., 2007; Benavente, Lillo & Turen, 2011). Thus, to the extent that these studies apply on the Nigerian business environment, this current study's findings of a positive relationship between digitalization and profitability provides contradictory empirical evidence which leaves the debate open for further research investigation.

The inferences drawn in this study are based only on the opinions of micro enterprises practitioners and managers some of whom have operated business for only a few years and the nature of the data was cross-sectional. A time series of real business figures relating to transactions generated from a sample of micro enterprises for a reasonable number of years, would have provided a more robust evidence of the relationship between the variables measured.However, a panel data set could not be employed in this study due to non-availability within the time frame needed to complete this research, leading to reliance on opinions of micro enterprises' managers, generated by a structured questionnaire. Thus, the researcher considers the nature of data applied in this study as a limitation and suggests that further research may extract real numbers and other information from the financial reports of micro enterprises to generate a more robust evidence regarding the impact of investment in digitalization on profitability of MEs.

In spite of the limitation acknowledged above, the findings of this research provide strong evidence of the perception of micro-enterprises' operators and given their professional business experiences, it is believed that the data and findings generated through the analysis are highly reliable for use by industry practitioners and policy makers in Nigeria. It is recommended on the basis of the findings of this study therefore, that to boost profitability and general business performance of micro enterprises in Nigeria, effective investment in digitalization is essential. This implies that micro enterprise owners should strive to adopt digital or electronic options for their business operations for optimal performance and outcomes. This study also recognizes that obstacles, some of which are criminal in nature and resolvable through government intervention only, are likely impediments to maximal benefits of digitalization. Thus, it is recommended that the Nigerian government should intensify regulatory measures aimed at preventing cybercrimes and strengthening cybersecurity, to enhance confidence in the use of digital options which are largely executed through internet connectivity.

This study is original, contributes substantially to the literature on the gains of adopting digitalization in executing the operations of micro-enterprises aimed at enhancing profitability as a performance indicator. The study provides empirical evidence which supports the perspective that digitalization is positively associated with profitability in micro-enterprises within the Nigerian context. The study also proffers efficacious

recommendations which have implication for micro enterprises' practitioners, investors and the government as a policy maker and law enforcement facilitator.

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[156] Stakeholders include; customers, suppliers, employees, financiers, the government, etc.

[157] *The CAC is a Nigerian government regulatory body established to register and monitor companies among other functions.* https://www.cac.gov.ng/about/

[158] *The six locations considered to be densely populated for the purpose of this research are: Kano, Lagos, Katsina, Kaduna, Bauchi and Federal Capital Territory.* https://www.nigerianstat.gov.ng/download/1241121