

Technological Leverage and Financial Deepening Amongst Small Hold Enterprises in the Northern Kenya: A Review of Literature.

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Abstract: Central Bank of Kenya financial inclusion report 2022 indicates that financial access rate in Kenya increased from 26.7% in 2006 to 83.7% in 2021, as a result of use of mobile technology to break physical barriers in the financial system. However, other statistics show that the contribution of each of the 10 counties in the northern Kenya, to the country's GDP is less than 2%. This points towards slow pace of entrepreneurship activities in the region since young and innovative firms are curtailed in terms of growth and there are no new start-ups due to poor access to financing. Low levels of financial deepening in the Northern Kenya, is the major impediment to entrepreneurship and economic development in the region. It is important to understand whether and how the financial system can leverage on technological to improve financial deepening in the region in order to break up the small autarkic enterprises created due to lack of sufficient capital for expansion. In this regard, a desk top review of literature has been undertaken to assess the effect of technological leverage on financial deepening amongst small and medium enterprises in the 10 counties forming the northern Kenya. By synthesizing existing literature, it was found that technological leverage positively affects financial deepening and improves risk management practices by firms. The study concludes that through the use of technology, limiting barriers to financial accessibility by individuals and firms in Northern Kenya can be eliminated. The study recommends that counties in the northern Kenya should partner with the national government to provide the necessary technological infrastructure, such as the laying of the fiber optic cables, to facilitate use of technology in provision of financial services to firms and individual entrepreneurs in the region. There is also need to set up business incubation centers in the region where ideas can be nurtured into actionable plans which can be funded into fully developed enterprises providing employment opportunities to the locals. Finally, counties and national government need to develop policy eliminating regulatory hurdles for start-ups to gain access to a variety of sources of finance. This is in line with the conference theme and the sub-theme of use of technological innovations to improve efficiency, leading to sustainable economic development.

Keywords: Technological Leverage, Financial Deepening, Financial system, entrepreneurial financing, financial intermediation.

1 INTRODUCTION.

Northern Kenya encompassing counties including Turkana, Marsabit, Mandera, Wajir, Garissa, Isiolo, Lamu, Samburu, Tana River and West Pokot has been historically characterized by challenges such as arid and semi-arid climatic conditions, limited infrastructure, and security concerns. Statistics show that the contribution of each of the 10 counties in the region, to the country's GDP in the year 2022 (KNBS, 2023) was less than 2 %.

From Figure 1, Nairobi City accounts for more than a quarter of the country's GDP, a proportion which is way above the contribution made by 10 counties (5.2%) in the Northern Kenya. This points towards slow pace of entrepreneurship activities in the region since young and innovative firms are curtailed in terms of growth and there are no new start-ups due to poor access to financing. Agriculture

and livestock farming are central to the economy of Northern Kenya, with many communities relying on pastoralism for their livelihoods. According to the KNBS there has been a growing focus on promoting sustainable agribusiness ventures and value addition activities to enhance food security and increase incomes in the region (KNBS, 2023). There have been notable entrepreneurial activities aimed at addressing local needs, promoting economic development, and creating livelihood opportunities. However, behind the scenes of every startup's success story lies a complex landscape of financial challenges. From securing initial seed funding to sustaining growth and scaling operations, entrepreneurs face a myriad of hurdles in the realm of financing. These challenges can stem from a variety of factors, including risk aversion among investors, limited access to capital markets, and regulatory barriers that hinder entrepreneurial endeavours. Entrepreneurs often struggle to access the necessary capital to turn their ideas into reality.

Figure 1 shown below shows the contribution of each of the 47 counties to Kenya's GDP.

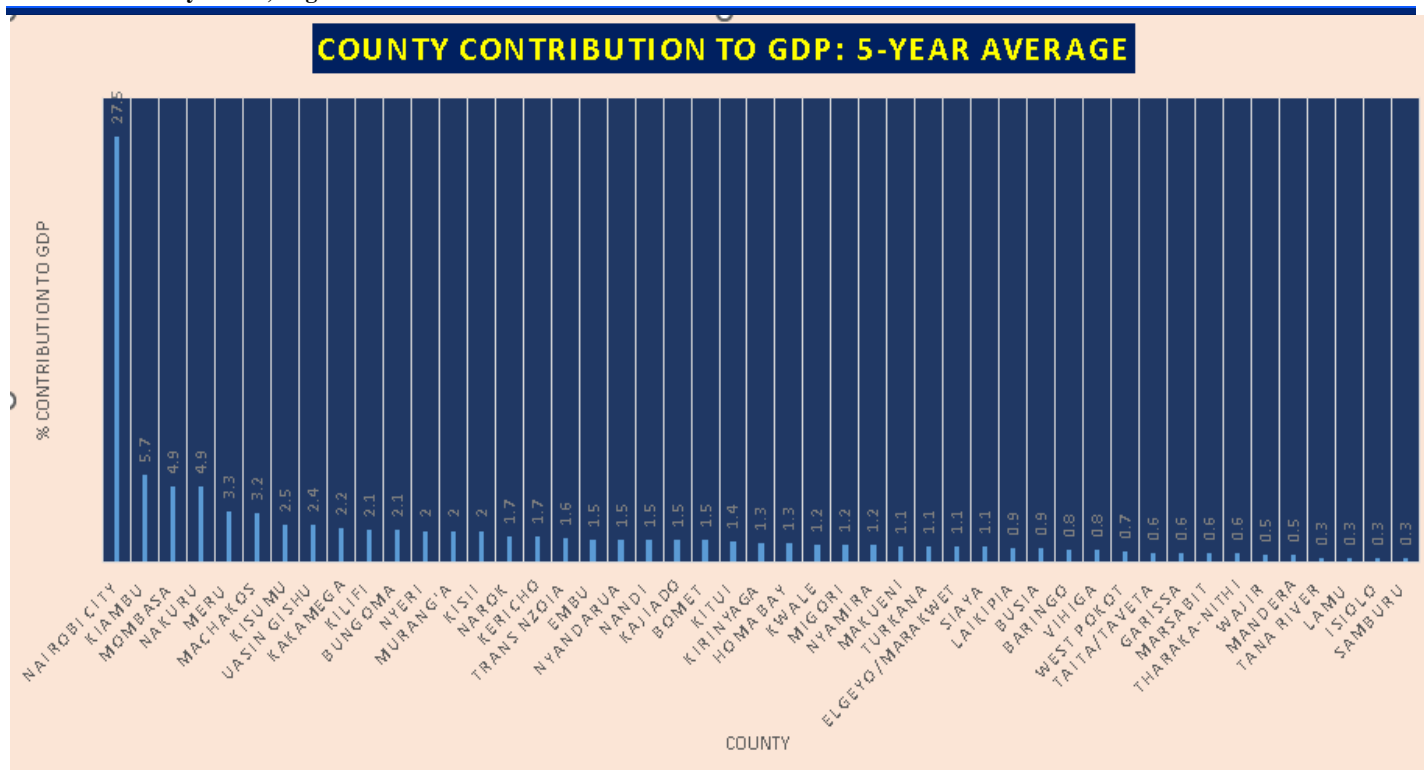


Figure 1: Counties' Contributions to Kenya's GDP.

Source: (KNBS, 2023).

Traditional sources of financing, such as bank loans, may be out of reach for early-stage startups due to stringent lending criteria and the lack of collateral. Moreover, venture capital and angel investors tend to concentrate their investments in later-stage companies with proven track records, leaving many startups in need of alternative funding sources. A study by Gupta, explores the challenges faced by startups in accessing venture capital funding in the wake of the COVID-19 pandemic (Gupta & Sharma, 2023). The research highlights the disproportionate impact of the crisis on early-stage ventures, with many investors shifting their focus towards established companies with stable revenue streams. The study underscores the need for innovative financing mechanisms to support the survival and growth of startups during times of economic uncertainty.

Regulatory constraints and compliance burdens can pose significant challenges for entrepreneurs seeking financing. Complex regulatory frameworks governing securities offerings, crowdfunding, and investor protections can increase the cost of capital and create barriers to entry for startups. Moreover, regulatory uncertainty can dampen investor confidence, leading to reduced investment activity and hampering entrepreneurial innovation. Research by Patel and Wang (2024) examines the regulatory hurdles faced by startups in accessing equity crowdfunding as a source of financing. The study analyses the impact of regulatory reforms on crowdfunding platforms and the implications for entrepreneurial financing. By providing insights into the

regulatory landscape, the research aims to inform policymakers and entrepreneurs alike on ways to foster a more conducive environment for startup funding.

It is important to note that while entrepreneurship holds the promise of innovation and economic prosperity in the northern Kenya, navigating through the challenges of financing remains a formidable task for many startups and SMEs. Addressing these challenges requires a multifaceted approach, involving collaboration between entrepreneurs, investors, policymakers, and regulatory authorities, within the counties and national governments, to create an ecosystem that supports entrepreneurial endeavours and fuels sustainable growth. This study seeks to evaluate how financial and capital markets can leverage on technology to enhance financial deepening for SMEs and start-ups in the northern Kenya.

2 LITERATURE REVIEW.

2.1 Theoretical Framework

The theoretical framework underpinning the relationship between technological gearing and financial deepening encompasses several key concepts. Firstly, technological advancements, such as automation, digitization, and artificial intelligence, play a crucial role in enhancing the efficiency and effectiveness of financial intermediation processes. These advancements facilitate faster transaction processing, improved risk management, and greater accessibility to financial services, thereby contributing to financial

deepening. Conversely, financial deepening can stimulate technological innovation by providing the necessary capital, infrastructure, and market incentives for research and development in technological gearing. This symbiotic relationship between technology and finance underscores the importance of understanding their interplay in driving economic growth and development by fueling the entrepreneurial activities. Theoretical literature on "technological leverage" and "financial deepening" often stems from various fields such as economics, finance, and management. Here's a breakdown of some theoretical perspectives on these concepts:

2.1.1 Schumpeterian Innovation Theory

Schumpeterian Innovation Theory, developed by the renowned Austrian economist Joseph Schumpeter, has profoundly influenced the understanding of economic growth and innovation dynamics. In his seminal work "Capitalism, Socialism and Democracy", Schumpeter articulated his theory, emphasizing the transformative role of entrepreneurship and innovation in shaping the capitalist economy (Schumpeter, 1942). Moreover, Schumpeter emphasized the critical role of technological change as a catalyst for innovation. He highlighted the transformative impact of technological advancements on economic evolution, noting that new technologies enable entrepreneurs to introduce groundbreaking innovations and disrupt established markets.

This Theory informs the researcher in conceptualizing his priori expectation that Technological leverage plays a crucial role in fostering innovation, which, in turn, stimulates economic progress. The theory posits that technological innovations are the primary drivers of economic growth and development. Entrepreneurs are agents of change in the economic system. Rather than being merely passive actors, the theory views them as dynamic individuals who disrupt existing markets through the introduction of novel products, processes, or business models. Schumpeterian Innovation theory highlighted in Rodgers E. M (1962); Rodgers E. M (2003) and Valente & Rodgers (1995) offers a comprehensive framework for understanding the dynamics of economic growth and development, emphasizing the central role of entrepreneurship, innovation, and technological change in the entire northern Kenya Region. Based on the theory, players in the financial system can deploy technology such as big data analytics, block chain technology and artificial intelligence among others, to enhance financial deepening amongst small holder firms in the Northern Kenya.

2.1.2 Innovation Diffusion Theory

Innovation diffusion theory, developed primarily by Everett Rogers (1962), explores how new ideas, technologies, products, or practices spread and are adopted by individuals or groups within a society or organization. It outlines the five-step process through which innovations are adopted by individuals and groups over time. The theory begins with the introduction of an innovation, which can be an idea, practice,

or object perceived as new by the target audience. Innovation is the core element of the theory. An innovation is then followed by the adoption process. Adoption refers to the process by which individuals make a decision to use an innovation. Rogers identifies five stages in this process: awareness, interest, evaluation, trial, and adoption. The next process after adoption is diffusion. Diffusion is the spread of an innovation through a population or social system. Rogers describes five adopter categories based on the time at which individuals adopt an innovation: innovators, early adopters, early majority, late majority, and laggards. The fourth step involves the Communication Channels. The theory emphasizes the role of communication channels in the diffusion process. Different channels such as mass media, interpersonal networks, and social media can influence the rate and pattern of adoption. Finally, the last process involves the Social System. The characteristics of the social system, including its norms, values, and structure, play a crucial role in shaping the diffusion of innovations. Rogers highlights the importance of social networks and opinion leaders in facilitating or hindering adoption (Rodgers E. M., 2003).

Theoretical frameworks like innovation diffusion theory could be applied to understand the factors influencing the adoption and diffusion of technology within Kenyan financial institutions. This could include examining the role of internal organizational factors, external market pressures, and regulatory environments in shaping technology adoption patterns. Understanding the nuances of each stage of the theory and the factors influencing the adoption and diffusion is crucial for effectively managing technological innovation processes and promoting the uptake of new ideas and technologies within the communities in the Northern Kenya Region.

2.1.3 Technological Leverage

Technological leverage refers to the strategic use of technology to enhance productivity, efficiency, and innovation within an organization or economy. In the context of finance, technological leverage encompasses a wide range of innovations, including artificial intelligence (AI), machine learning, blockchain technology, big data analytics, cloud computing, and the Internet of Things (IoT). AI and machine learning technologies have gained prominence in finance for their ability to analyse large data sets, identify patterns, and automate decision-making processes. These technologies are being deployed in areas such as risk management, fraud detection, trading strategies, customer service, and personalized financial advice. A recent study examining the application of machine learning algorithms in credit scoring, demonstrates how AI-based credit models outperform traditional scoring methods by leveraging alternative data sources and capturing non-linear relationships between variables (Tsholofelo & Museba, 2023). The study underscores the potential of machine learning to enhance credit assessment processes and expand access to credit for underserved populations.

Another technology, bringing a paradigm shift in the financial ecosystem, is the Blockchain technology. Its decentralized and immutable nature makes it well-suited for applications such as peer-to-peer transactions, smart contracts, supply chain finance, and identity verification. The study of Nitin, Saurabh and Jayesh (2023), explores the potential of blockchain-based digital identities to improve access to financial services for individuals without traditional forms of identification. The study discusses the benefits of self-sovereign identity solutions in reducing identity fraud and streamlining Know Your Customer (KYC) processes for financial institutions, thus, facilitating financial inclusion and deepening. The study concludes that the incorporation of AI in fraud detection and risk management heightens the proactive identification of potential threats safeguarding financial institutions and their clientele. This has the potential of bringing a revolution that is likely to safeguard against the existing challenges in the financial system as well as paving the way for new innovations to enhance financial inclusion and deepening (Nitin, Saurabh, & Jayesh, 2023).

Big data analytics technology can be used for collection, processing, and analysis of large volumes of data to extract actionable insights and inform decision-making in organisations. In finance, big data analytics is used for market research, customer segmentation, predictive modelling, and risk management. A study has been carried out examining the role of big data analytics in improving the efficiency of anti-money laundering (AML) compliance processes. The paper discusses how advanced analytics techniques, such as network analysis and anomaly detection, can help financial institutions detect suspicious activities more effectively and reduce false positives, thereby enhancing compliance and mitigating financial crime risks (Mingyuan, 2023). This technology can help improve security in the financial system and make it possible for financial products to be availed and accessed remotely. This breaks physical barriers and enhances financial inclusion and financial deepening in the far-flung areas of the Northern Kenya Region.

Cloud Computing and Infrastructure as a Service (IaaS) technology can also be deployed by players in the financial system. Cloud computing enables financial institutions to access computing resources, storage, and applications on-demand via the internet, without the need for significant upfront investment in hardware and infrastructure. This flexibility and scalability help reduce costs, improve agility, and support innovation in finance. A study by Ogundipe (2024) explores the adoption of cloud computing in financial services, highlighting its role in enabling digital transformation, accelerating time-to-market for new products and services, and enhancing operational resilience. The study discusses regulatory considerations, security best practices, and emerging trends in cloud adoption within the financial industry (Ogundipe, 2024). Through cloud computing technology, financial products can easily be availed to small holder businesses within the Northern Kenya region.

2.1.4 Financial Deepening

Financial deepening refers to the process of expanding and diversifying financial services within an economy, leading to increased access to financial products and greater efficiency in resource allocation (Sanga & Azikpono, 2022). This process typically involves the development of financial institutions, markets, and infrastructure to facilitate savings mobilization, investment, risk management, and capital allocation. Financial deepening plays a crucial role in promoting economic growth, reducing poverty, and fostering inclusive development. It allows individuals and businesses to access a broader range of financial services, including savings accounts, loans, insurance, and investment opportunities, thereby empowering them to manage risks, accumulate wealth, and pursue entrepreneurial ventures. A study by Shan and Liu (2023) provides empirical evidence on the positive impact of financial deepening on economic growth in emerging market economies. Using panel data analysis, the study finds that improvements in financial intermediation, such as increased credit provision and better access to financial markets, are associated with higher levels of GDP per capita growth over the long term (Shan & Liu, 2023).

Financial deepening is closely linked to financial inclusion, which aims to broaden access to financial services for underserved and marginalized populations. This includes efforts to expand banking networks, promote digital financial services, and enhance financial literacy and consumer protection measures. A study has been conducted to examine the progress and challenges of financial inclusion worldwide, highlighting disparities in access to financial services across regions and income levels. The study discusses policy interventions, such as mobile banking initiatives and regulatory reforms, aimed at promoting financial deepening and extending financial services to unbanked and underbanked populations (Demirguc & Huizinga, 2024). Considering the region that forms the Northern part of Kenya, similar policy interventions are required to enhance financial deepening.

Financial deepening also involves the development and diversification of financial markets, including money markets, capital markets, and derivatives markets. Deep and liquid financial markets facilitate efficient resource allocation, price discovery, and risk management, thereby promoting economic stability and growth. A report by the International Monetary Fund (IMF) (2023) assesses the state of financial market development in emerging and frontier economies, focusing on efforts to strengthen market infrastructure, enhance regulatory frameworks, and promote investor confidence. The report highlights the importance of deepening financial markets to attract investment, foster innovation, and support sustainable development goals.

2.2 Empirical Evidence

The study aimed at exploring the relationship between technological leverage, characterized by the integration of advanced mechanical systems with cutting-edge technology, and financial deepening, marked by the expansion and sophistication of financial services. Earlier scholars such as Sassi and Goaid (2013) and Shamim (2007) investigated the linkage of technological adoption financial development and economic growth based on the finance–growth nexus. These earlier studies did not endeavour to show the direct effect of technological integration on financial development but demonstrated that the interaction between technology adoption and financial development has a positive and significant impact on economic growth. Scholars in the recent past, such as Alshubiri, Jamil and Elheddad (2019); Chien, Cheng, and Kurniawati (2020); Edo, Okodua, and Odebiyi (2019) and Owusu-Agyei, Okafor, Chijoke-Mgbame, Ohalehi, and Hasan (2020) have made an attempt to fill this gap of direct effect of technology adoption on financial deepening in developing and emerging countries. Other recent scholars such as Asongu, le Roux, Nwachukwu, and Pyke (2019); Del Gaudio, Porzio, Sampagnaro, and Verdoliva (2021); Sheng (2021) and Wang, Xiuping, and Zhang (2021) extend their analysis to how technology integration can increase the banking sector's efficiency and debt financing by reducing intermediation and transaction costs, information asymmetry, collateral requirements and geographical limitations. Findings of these studies and many others are discussed below.

The study of Alshubiri, Jamil and Elheddad (2019) assessed the impact of technology diffusion on the financial development of six Gulf Cooperation Council countries. The study used internet users and fixed broadband as proxies for technology adoption and domestic credit/GDP and broad money supply/GDP as proxies for financial development. The findings of the study indicated that broadband has a more significant influence on the financial development index than the number of internet users.

The study of Edo, Okodua and Odebiyi (2019) analysed the impact of internet adoption on financial deepening in Kenya and Nigeria between 2000–2016. They used a sole explanatory variable—internet users—as a percentage of the population as proxy for technology adoption and private sector domestic credit to GDP as a proxy of financial development. The study established that internet adoption has a positive and significant impact on financial development. Owusu-Agyei, Okafor, Chijoke-Mgbame, Ohalehi, and Hasan (2020) extended the study by Edo et al. (2019) by covering 42 countries in sub-Saharan Africa for the same period and added more proxies for financial development, including bank assets as a percentage of GDP, bank assets as percentage of central bank assets and credit from financial institutions as a percentage of GDP. The findings of Owusu-Agyei et al.(2020) were similar to those of Edo et al. (2019).

Another empirical study by Chien, Cheng, and Kurniawati (2020) extended the earlier studies by covering a long period with more countries. Using the generalised method of moments and panel smooth transition regression on panel data for 81 countries from 1990 to 2015, Chien, Cheng, and Kurniawati (2020) examined the effects of ICT diffusion on financial development. The authors used internet users, mobile and telephony subscriptions as proxies for ICT diffusion. Their findings show that the adoption of the internet and telephone increases financial development in developed and developing countries, but mobile phone subscriptions enhance financial development only in the African countries.

The study of Misati, Osoro, Odongo, & Abdul (2022) examined the effect of digital financial innovation on financial depth and economic growth in Kenya. The study provided evidence of a positive relationship between digital financial innovation and financial inclusion with the strongest impact stemming from internet usage and mobile technology in disseminating financial services. The study also found a positive relationship between financial inclusion and economic growth. The study concluded that there is a strong need for stakeholders to invest substantively in technological infrastructure to enhance digital provision of financial services to increase financial deepening in Kenya, enhancing economic growth.

The study of Dário, S. and Paulo N.(2024) assessed whether Fintech innovation is beneficial or detrimental to financial inclusion and financial stability. Through a systematic review of literature, the researchers noted that although it is generally acknowledged as an essential driver of economic growth and thought to have a disruptive effect on the financial services industry, innovation has also been perceived as the main source of social exclusion and economic inequality in the emerging economies. The study concluded that Fintech has a great potential to promote access to financial products and provide unmatched opportunities to end financial exclusion and increase financial stability.

The invention of mobile money and Mobi-banking in Kenya has caused a tremendous economic development. The Kenyan mobile money system M-PESA led to an increase in per capita consumption levels and lifted 194,000 households out of poverty (Beck, Haki, Ravindra, & Burak, 2015). In ASEAN countries, AgriTech solution provided by InfoCorp technologies uses blockchain technology and IoT devices to uniquely identify livestock, making formal in a public ledger the hitherto informally-held property rights of farmers, making it easier to obtain insurance and trade credit in the form of collateralised loans (Fernandez & Rakatomalala, 2020)

The study of Del Gaudio, Porzio, Sampagnaro and Verdoliva (2021) analysed the effect of ICT on the performance of 28 organisations in the banking industry in Europe for 1995–2015. Del Gaudio et al. (2021) used the internet, broadband, mobile and the ratio of ATMs to branches as proxies of technology adoption. The findings indicated that

technology adoption has a positive effect on banking performance measures. Similar findings on the efficiency of banks were reported by Wang, Xiuping and Zhang (2021) from analysis of a panel of data of 113 banks in China over the period 2009–2018.

Technological innovation efficiency is an important factor in achieving high-quality and sustainable economic development. Using bank–firm and technological innovation efficiency data from 2008 firms in China from 2011 to 2020, it is revealed that firm-bank relationship promotes technological innovation efficiency which breaks the barriers in financing channels removing constrains and information asymmetry, which in turn increases financial access by individuals and entrepreneurs (Lei, Shanxing, & Chen, 2024). It has also been noted that China's high-tech industrial development zones (HIDZ) have achieved tremendous success in economic contribution, playing an important role in both national and local economic growth. The development and technological innovation within HIDZ make it easier for the firms to receive external financial support, thus increasing their financial depth (Junwei, 2024).

A study of Hasanul, Kabir, & Mamunur (2021) investigated whether a higher degree of fintech-based financial inclusion (FFI) intensifies banks' risk-taking by analyzing data from 534 banks from 24 OIC countries. The results indicated that higher degree of FFI controls bank's risk-taking behaviour (Hasanul, Kabir, & Mamunur, 2021). Financial globalization exerts a significant enhancing effect on technological innovation and this effect becomes stronger in countries with better institution quality (Mingbo, Gen-Fu, Quan-Jing, & Chun-Ping, 2023). This means that firms that target funding from international sources have to leverage on technology to improve the ease of access of such funds. The study of Schuetz and Venkatesh (2020) revealed that communities in rural India facing financial exclusion must be connected to regional and international financial supply chains to enjoy economic prosperity. Indians in the remote villages are unable to participate in these supply networks due to high rates of financial exclusion. Based on the findings of Schuetz and Venkatesh (2020), use of fintech in dissemination of financial services has the power of removing access barriers such as geographic access, high cost, inadequate banking products, and financial illiteracy. Through the development of internet infrastructure to facilitate the use of fintech in disseminating financial services, counties in the Norther Kenya have an opportunity to create an enabling environment for individuals and firms to unlimited access to financing, both locally and internationally.

Asongu, le Roux, Nwachukwu, and Pyke (2019) analysed panel data for 162 banks in 42 African countries for 2001–2011 using the generalised method of moments and quantile regressions. The authors show that technology diffusion reduces information asymmetry, lowers loan prices and increases the quantity of loans. Sheng (2021) assessed the

effects of FinTech on the provision of bank loans to SMEs in China for 2011–2018 using fixed effects and instrumental variable regressions and showed that FinTech effectively facilitates bank lending to SMEs and thus increases financial deepening amongst SMEs and start-ups.

These empirical studies provide valuable insights into the relationship between technological gearing and financial deepening across various sectors, regions, and contexts, highlighting the importance of technology in shaping financial systems and promoting economic development. The studies reviewed provide empirical evidence that technological adoption in the financial system improves functions and operational efficiency, borrower screening and loan monitoring processes, while better credit allocation and capital efficiency reduce operational costs, increase profitability and risk-taking, and standardise ways of collecting and managing information from clients. These benefits of technology adoption in the financial system have direct and indirect relationships with SMEs' and individuals' access to credit. Study findings have also indicated that countries with advanced technological infrastructure tend to exhibit higher levels of financial deepening, as evidenced by greater access to banking services, higher levels of financial inclusion, and increased use of digital payment systems. Conversely, financial deepening has been shown to spur investments in technology, particularly in sectors such as manufacturing, transportation, and telecommunications, where efficient mechanical systems are critical for operational efficiency and productivity gains.

3 RESEARCH METHODOLOGY

This study embraced a qualitative research paradigm which encompassed an analysis and a critique of relevant previous past literature. For this review, a total of 64 articles were taken into account. Wee and Banister (2016) claim that between fifty and one hundred papers are the optimum quantity of a thorough review article. A thorough analysis of the pertinent literature was conducted after reaching the point of saturation, which is the point at which there is no longer any new information on the subject being researched as a result of the continued examination of more articles. Conclusions were drawn based on the convergency of articles reviewed.

The criteria used to select the articles to be included in the analysis were, the time duration since the study was concluded and the suitability of the study's methodology concerning the research problem. Studies from earlier years were also considered, and they formed the basis for the current study. The publications that were largely focused on were those that had been published from the year 2015 up to the present.

4 STUDY FINDINGS, CONCLUSION AND RECOMMENDATION.

4.1 Study findings and conclusion

By synthesizing existing literature, the study came up with the following findings: That technological leverage positively affects financial deepening and improves risk management practices by firms, that technological adoption brings about major disruptions in the financial system and that the financial system can leverage on technology to reduce costs and frictions, increase efficiency, reduce competition and broaden access to financial services. The study concludes that counties in the northern Kenya should partner with the national government to provide the necessary technological infrastructure, such as the laying of the fiber optic cables, to facilitate use of technology in the provision of financial services to firms and individual entrepreneurs in the region. There is also a need to set up business incubation centers in the region where ideas can be nurtured into actionable plans which can be funded into fully developed enterprises providing employment opportunities to the locals. Finally, counties and national government need to develop policy eliminating regulatory hurdles for start-ups to gain access to a variety of sources of finance. Through increased entrepreneurship activities, the economic prospects of the region will improve. This is in line with the conference theme and the sub-theme of use of technological innovations to improve efficiency, leading to sustainable economic development.

4.2 Recommendation for further research.

While existing research provides valuable insights into the relationship between technological gearing and financial deepening, several avenues for future exploration remain. Firstly, further research is needed to explore the potential financial stability implications caused by the emerging technologies, such as blockchain, internet of things (IoT), and big data analytics, and the general impact on the country's financial system. Additionally, cross-country comparative studies could shed light on the factors driving variations in the relationship between technological gearing and financial deepening across different regions and economic contexts. Finally, interdisciplinary research that integrates insights from engineering, economics, finance, law and computer science will be essential for gaining a comprehensive understanding of this complex nexus and its implications for economic development, especially on issues of cyber security, systemic risks, data privacy and data governance.

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