The Digital Microfinance Model: Modern Way of Alleviating Poverty.

Introduction:

Alleviating poverty has been an effort of the world for a long time. In 1789, Benjamin Franklin bequeathed £2,000 sterling to Boston and Philadelphia in his *Last Will and Testament*, envisioning a philanthropic initiative lasting 200 years. He aimed to promote civic virtue, particularly industry and frugality, through microfinance trusts to assist married artisans in starting businesses (Yenawine, 2015). As Donovan (2012) says, it is not a lack of money, but a lack of access to financial instruments that makes a person poor. Following what Franklin did to Boston and Philadelphia, in the 1970s, Muhammad Yunus, an economics professor at a university in Bangladesh, began providing small loans to poor villagers of Bangladesh (Morduch & Armendariz, 2005).

Mohamad Yunus is now the Father of Modern Microfinance (Duflo & Banerjee, 2011). He has become that because his model of lending to the poor became useful in many countries in the world (Morduch & Armendariz, 2005). Yunus, who established Grameen Bank, the model was group lending. The group lending model, emphasizing community ties, incentivized prompt repayment and fostered peer support *ibid*. Grameen's success led to Yunus receiving the Nobel Peace Prize in 2006. While microfinance was hailed as a solution for poverty, criticism arose regarding its effectiveness in poverty reduction. Grameen Bank shifted from subsidized to profitable models due to repayment challenges, challenging the notion of microfinance as a poverty eradication tool (Milana & Ashta, 2020; Sherratt, 2016; Sinclair, 2012).

Duflo and Banerjee (2011) put it well, to describe microfinance as akin to a figure from Greek mythology—a creature with dual attributes, serving both a profit-driven purpose and a social

cause. From their study, it is still debatable to know what attribute defines the microfinance of now. On one hand, poor people go back to microfinance institutions to borrow and on the other hand some people, especially farmers commit suicide because of allegedly being put under unbearable pressure by the loan officers' coercive recovery practices *ibid.*

Modern microfinance which uses a group lending model made some of the country governments enter the business. Duflo and Banerjee (2011) ascertain that from the 1960s to the late 1980s, numerous developing nations implemented government-backed credit schemes which aimed specifically at rural populations living in poverty. They put that government credit schemes faced default rates at an astonishing 40 per cent throughout the 1980s. Lending frequently succumbed to political agendas rather than economic imperatives. The funds often found their way into the coffers of local elites. Regardless of the challenges, still the government practice the scheme (Adhikary et al., 2021; Massele et al., 2015; Obamuyi, 2009; Tambe et al., 2017). This aligns with Milton's (1993) assertion that the government can commence an activity that appears beneficial initially. He contends that stakeholders from both public and private sectors develop a vested interest in its continuation, regardless of its actual desirability. If the original rationale for the activity diminishes, there emerges a compelling motivation to search for alternative justifications to maintain its existence. This is what is happening in Microfinance, where the arguments are on whether microfinance benefits the poor or not (Duflo & Banerjee, 2011).

This article argues not against the government schemes or the private ones, rather the study wants to offer alternative thinking that can improve the recent challenges. There is still a light to send poverty in museums as Mohamed Yunus dreamed. However, poverty in museums may not be in 2030 as Yunus theorized. Recently, poverty is still the problem. United Nations (UN) has a 2030 agenda for sustainable development. The first goal of the Sustainable Development Goals

(SDGs) is No Poverty, which explains ending poverty in all its forms everywhere. The UN's updates of 2023 have shown that since 2015, global poverty reduction has slowed and it worsened by COVID-19. Recovery remains slow and uneven amid various risks. Approximately 575 million people, or 7% of the global population, are expected to live in extreme poverty by 2030 (United Nations, n.d.). This means the dream of Mohamed Yunus is far from reality, poverty will not be in the museums in 2030.

Different from the UN, Africa has the 2063 agenda of the African Continental Free Trade Arrangement (AfCFTA). AfCFTA has the potential to lift people out of extreme poverty (Nurudeen & Adekola, 2023). While the potential is in the free trade area, it is known that poverty is multifaceted, it is not only free trade that will alleviate it. The holistic approach will speed up the process. That is, on top of the current efforts of alleviating poverty this study redefines microfinance to add to the efforts in alleviating poverty.

Microfinance, as Sherratt (2016) said, was judged to be "the vaccine for the pandemic of poverty." I still find to be microfinance to be the vaccine to this time. Considering the technological change, the world, or developing countries to be specific, may not need the group model and trust within the group as collateral. Alternatively, technology can be employed and make the most of it by lifting people out of poverty within a short time.

The challenge of the group model

Microfinance typically entails providing financial services to individuals, particularly those excluded from mainstream banking. Traditionally, it focused on offering small loans, averaging around USD 500, to impoverished individuals unable to access commercial bank loans (Hermes

& Lensink, 2020). The microfinance model operates through group lending systems where borrowers self-select into groups to discuss borrowing, saving, and repayment. The Grameen Bank strategy combines group lending with joint liability, making the entire group responsible for individual defaults. This theoretically reduces adverse selection and moral hazard *ibid*. The group is assumed to have people who know each other and trust one another. Trust plays a fundamental role in the functioning and success of microfinance operations (Epstein & Yuthas, 2011).

Microfinance institution needs to know the group, and the group need to know one another. That is, knowing your customer in microfinance is going down to the group and becoming ‘know your colleague’. Thus, trust becomes an essential part of the group. Being in a group is a must and sometimes the group is not a voluntary union. Group members are mutually accountable, and individuals who prefer not to pry into others' affairs are hesitant to participate. Group members may be hesitant to include unfamiliar individuals in their groups, which disadvantages newcomers. Collective responsibility discourages risk-taking; as a member, you naturally prefer all others to adopt the safest approach possible (Duflo & Banerjee, 2011).

The group lending model has not considered the trust crisis. Trust among people has fallen if it has ever existed (Sapienza & Zingales, 2012; Tonkiss, 2009). This may be the reason why people borrow more from other sources than from the ubiquitous microfinance institutions. Duflo and Banerjee (2011) showed that the introduction of microfinance institutions that provide credit in Hyderabad's slums did not affect most of the poor people there. Only a quarter of families borrowed from Microfinance institutions. Over half borrowed from moneylenders at significantly higher rates, with this fraction remaining unaffected by the introduction of microcredit. While there may be several explanations for this, I find that people do not want

collective accountability. Study by Ojong and Simba (2020) suggests that trust is built on informal relationships. Their study is on building relationships, that is, there is a problem with trust in the microlending groups thus they made a study on building it. However, the informal relationship they have found makes people have informal financial groups like rotating savings and credit associations (ROSCAs) which are more common in Africa (Duflo & Banerjee, 2011).

Building trust in micro-lending groups is evidence that scholars do not see the options to change the way microfinancing works. The group lending is good but from the trust crisis, the micro-lending should go beyond that. Quoting the words of Armen Alchian a friend of Milton Friedman *"There is one thing that you can trust everybody to do and that is to put his interest above yours"* (Milton, 1993). It is normal for people to put forward their interests before anyone else. Milton (1993) argues that actions benefiting self-interest vary between the private and public spheres. In this argument, the efforts of keeping microlending groups by building up trust is more like to reduce the self-interest nature of the group members. Going against this very nature of a human is tiresome work which may affect many who are willing to act altruistically. If one member defaults the burden is carried by the group, knowing this, Protter and Quintos (2022) studied the optimal size of the group. They put more emphasis on the game theory. I define game theory, as a theory that defines how to balance self-interest in an exchange to avoid a big loss. The optimal size of the group reduces the risk as they have argued, however, it does not remove the self-interest.

When writing about ending poverty, Sachs (2005) saw that trust should not be a requirement. He says, "*The end of poverty will require a global network of cooperation among people who have never met and who do not necessarily trust each other*". This is different from what Ojong and Simba (2020) suggested, they insist on trust, that is just keeping the group. Building a model that

needs no trust as the primary requirement will help the poor. And it is the model that is going to be suggested in this article. The group lending model could act as a good nudge to keep the poor people together. A global network of cooperation is now possible with the current digital innovations. Trust can now be replaced with knowing your customer. Even group member won't need to trust their colleagues but to know them.

The group lending model does not remove the moral hazard problem. Using the funds for an issue that is not economically beneficial is normal for poor people. Values, Attitudes, and Institutions have a vital role in development (Todaro & Smith, 2010). Values are principles, criteria, or attributes deemed valuable or favourable by society or its constituent groups. In developing countries, harmful activities are more valued than beneficial activities. Duflo and Banerjee (2011) have shown that if the average impoverished household in Udaipur eliminated expenses on alcohol, tobacco, and festivals, it could potentially allocate up to 30 per cent more of its budget towards food. They have seen that 14% of the personal budget in Udaipur is used for festivals. What they have observed has made many people remain in debt as has been observed by (Sachin et al., 2018). Their study proved that Festivals and ceremonial expenses are among the major causes of indebtedness. Poor had their own way of operating microfinance such as ROSCAs, sanduq in Sudan and other group lending (El-Gack, 2013; Randhawa & Gallardo, 2003). (Mossang & Yomso, 2022) inform that the primary aim of establishing a group corpus is to offer financial support to members for essential needs like education, healthcare, and cultural expenses. Modern Microfinance has moved some people from their informal ways of getting funds, but that does not guarantee a change in cultural values.

The group is likely to choose a group member they trust, but they will not care if the group member is going to use the money for a festival or ceremony. This is because values are for society, that is some group members will value that as well. Depending only on the trust of the people that are in a group does not remove the moral hazard problem which is the problem caused by asymmetric information. Bicchieri (2016) has explained well why people follow a certain behavioural pattern be it a norm or custom. She argues that norms and values are driven by social expectations, and a person feels isolated if fails to adhere to the norms or values. The failure to reduce the moral hazard problem makes poor people fall into the poverty trap. Then it is said that it is the problem of microfinance which may not be true. In my undergraduate research project, I faced this problem when I wanted to interview some of the people. They never wanted to listen to me, as once I mentioned microfinance they thought I was a marketing officer of a certain microfinance. They have seen their neighbours who misused the money and they became poorer than they were.

To sum up, the problem with the group lending model is that it relies on trust between the group members. Trust is compromised as the individuals it is based on are self-interested in the context of this discussion: the group lenders. Hence, people have decided to borrow from moneylenders who do not require a group and charge an unnecessarily high-interest rate. Even though the group lending model saves on transaction costs, it does not alleviate the moral hazard problem, implying the need to re-innovate the model. When it comes to re-innovating the microfinance model, digital has to be the approach, and it should be no-trust, but my model will be a nudge to reduce the moral hazard problem. The digital solution that I am proposing depends on the self-interest nature of people. Protter and Quintos (2022) suggested that the optimal group size to be finite, greater than one, and unique. This article argues a group to be finite but greater than zero,

that is, there should be room for microfinance to lend to an individual. If people choose to be in a group of more than one, that will be a voluntary union.

The Emergency of Digital Innovations.

Technology has impacted many areas including the financial world. Thus, there are terms like Financial Technology or FinTech which refers to the utilization of emerging technologies within the realm of financial services (Abad-Segura et al., 2020). Financial technology includes all the technologies that are aimed at enhancing and streamlining the provision and utilization of financial services. Financial technology changed the way the financial market functions, for example, the introduction of Peer-to-peer lending (Bhasin, 2018). Peer-to-peer lending utilizes interconnected computer systems for fundraising. Borrowers can access loans from multiple lenders at interest rates typically lower than those offered by traditional banks. It is a technology that has made the automation possible. Automation started in the 1950s when the world experienced the appearance of active bank cards. In the 1960s Automatic Tellers Machines (ATMs) became actively in use, and other improvements up to the utilizing smart contracts within the financial sector, employing blockchain technologies (Sydorovych et al., 2021). The ecosystem of a financial sphere as Sydorovych et al. (2021) put it includes among others, technology companies, financial institutions, and infrastructure players. Automation and electronification are the key terms in Digital Finance, that is where electronic payments, business, and money transfers get in.

While financial technology has brought changes in financial services, information on the other hand has not been left behind. Interacting with various actors in the market needs identification. In contemporary society, having a formal identification is essential for progress and growth (Gelb

& Clark, 2013). Various countries have employed technology to streamline identification processes and enhance security within the country. Formal identity comprises the characteristics, both fixed and changeable, that people utilize to establish their identity when engaging with official establishments such as governments, employers, and financial institutions. Previously countries used to paper-based systems which could not offer uniqueness and were prone to fraud (Gelb & Clark, 2013). Digital has changed the issue as now access to one's identification is biometrically documented and unique (de Luis-García et al., 2003; Gelb & Clark, 2013; Jain et al., 2000). This identification is crucial for people to interact with financial institutions.

In sub-Saharan Africa, as mobile money which increased financial inclusion, made the need for proper identification. To accurately identify users, nations have implemented measures like SIM registration with official identification, known as "Know-Your-Customer" (KYC) protocols (Luhanga et al., 2023). Mobile money, offered by mobile network operators (MNOs). Users register their SIM cards to activate their accounts. The mobile phone number serves as the account number, and the SIM card's registered name serves as the account name. That is, the trust that was once needed in the group lending model is becoming redundant as the customer is well-known from digital finance.

Tanzania, for example, has the National Identification Authority (NIDA). NIDA is an agency responsible for the issuance of national identification cards to Tanzanian citizens. These identification cards serve as official proof of identity and are often required for various official transactions and services, such as opening bank accounts, registering for government services, and voting. Recently a person with NIDA does not need paper documentation to access some of the services including opening a bank account.

The revolution in innovation affects the countries differently. Developing countries have less digital technologies compared to developed countries (Pakhnenko et al., 2021; Sydorovych et al., 2021). Regardless of this fact, there is still room for developing countries to use the existing digital technology in reframing the microfinance model. Developing countries in Africa use the technology that fits their environment to increase financial inclusion. In East Africa, mobile money technology is extensively utilized in Sub-Saharan Africa, according to Demirgüç-Kunt and Klapper (2012). They note that it has emerged as a prevalent substitute for traditional banking, enabling millions of individuals lacking formal financial accounts to conduct transactions conveniently, affordably, and securely via their mobile devices.

Mobile money technology refers to a financial service enabling customers to perform transactions using mobile phone networks. Customers access their funds stored by mobile network operators (MNOs), without necessitating a bank account. This service is governed by both company regulations and telecommunications authorities. In Africa, MNO-based services have experienced faster growth compared to bank-based mobile services. While South Africa granted the first mobile money license in 2004, the notable success story is that of M-Pesa in Kenya. Introduced jointly by Safaricom in Kenya and Vodacom in Tanzania in 2007, M-Pesa witnessed remarkable adoption rates. By 2011, more than half of Kenya's adult population had an M-Pesa account, a figure that surged to 90% by 2016 (Ahmad et al., 2020). This proves that the technology in one region doesn't need to be similar to the other region. Innovators need to know what works in the specific region.

Mobile money technology has revolutionised the payment system in East Africa. One does not always need cash to pay for the service rather will use LIPA NAMBA to pay. Lipa Namba (pay by number) is a service where the merchant uses a single mobile account number to receive

payments from any other mobile account provider (Domingo et al., 2023). Similarly in Kenya, M-Pesa provides several services to businesses, but the most popular among retailers is "Lipa na M-Pesa," which translates to "pay with M-Pesa" in Swahili. This service includes Paybill and M-Pesa Business Till "Buy goods." Paybill allows businesses to receive remote payments for various services, including online retail and utility bills, while M-Pesa Business Till is mainly used for in-person transactions at places like supermarkets and restaurants. Transactions through these services are instantaneous and cost-effective, and both parties receive confirmation messages. Moreover, smaller businesses like food vendors and small retailers who don't qualify for Paybill or Business Till can manage their funds separately using "Pochi la Biashara," or business wallet, on their M-Pesa line (Njoroge, 2021).

Microfinance offers financial products and services to low-income individuals and micro-enterprises (Dang & Vu, 2020). The lack of clear documentation/identification and collaterals made Muhamed Yunus create a Group lending model that used trust among the group members. Currently, the digital revolution has impacted documentation/identification, it is the payment system that is used for microbusiness. These are the bright spots that are going to be used to theorize the digital microfinance model which does not exclusively need group lending model. The challenges of the group lending model have already been shown in the previous chapter.

The Digital Microfinance Model

Contrary to the group lending model, the digital microfinance model suggests that the group should have at least one person. This means, that being in a group is not necessary, if people wish to form a group it should be purely voluntary. Mohamed Yunus suggested the group have at least five people (Protter & Quintos, 2022). Another assumption that the Digital Microfinance model has that is distinct from the group lending model is trust. In this model, the financial institutions need

to know their customer(s). Knowing the customers is beyond knowing the names and addresses, which are not essential in the digital age. The key issue here is knowing the transaction history of the customer which gives a good method to estimate the customer's ability to pay. The digital microfinance model targets micro-enterprises. The digital microfinance model requires collaboration between financial institutions, the government and mobile money operators. The assumption is that a good number of people and micro-enterprises use disruptive financial innovations like mobile money.

This model needs formal identification and a synchronized system that makes identification and financial history accessible to microfinance companies. Biometrics is the current unique way of identification. The Digital microfinance model theorizes poor people get loans biometrically without meeting anyone or being in a group if they opt to.

Identification and synchronization.

One fundamental thing for the model is the identification. The authority for identifying people should be digitalized and collecting all the information about the person. The collection of data starts at birth where a person will have a be given a number for identification, but his/her information will be stored. Necessary issues like education, travelling, employment and other services. That is, upon receiving the service, will not only identify the person but also update the documentation. For example, when one registers for elementary school, if the number has been used, the system should update itself that a certain person has started school at a specific place. The kind of information to be collected may not be financially beneficial, however, the collected information should be vast to avoid having multiple entities for collecting data. This identification and documentation process will be used in registering a sim card and registering the till number for receiving payments for the microenterprises. At this point, if a microenterprise

is getting a till number to receive payments, the one who has registered will be known and will have less option of having another till number because the systems synchronize information. The system knows you have the number.

Securing loans

Recently, mobile networks provide micro-loans to their clients by checking their transactional history (Gikunda et al., 2014; Omwansa & Waema, 2014). But the microloans given are miners, mostly for buying airtime. The model that gives enough money as microloans from mobile network providers follows the group lending model, for example, M-Koba of Vodacom/Safaricom. M-Koba is a financial product accessible exclusively through M-Pesa, aimed at savings groups. It facilitates the safe and transparent saving of collections with a deposit-taking financial institution, mirroring traditional savings group operations while digitizing each process. The M-Koba account, initiated by the group leader via USSD, enables the addition of members using their mobile numbers, with members confirming their status upon receiving notifications (Muhura, 2020). The Digital Microfinance model goes a bit further, by not employing the M-Koba which is a digitalized group lending system and does not aim to give a loan that can just give a few seconds of airtime. It is on this where security comes in.

Instead of using a phone number, the digital microfinance number uses a till number, which is used to receive payments from microbusinesses products or services. When a microentrepreneur wants a loan can to use the till number she/he must see how much she/he can secure. The security is the amount and the number of transactions that a microenterprise makes in a day. By checking the history of payments, a microfinance company can see if a micro-business can repay the loan and reducing the defaulting risk. That is, the business can be informal as they are now, but the information about the business and somebody owning the business is known to the

microfinance company. The enterprises will encourage mobile payments to be in a good position to get loans. Repaying the loans will be declared at the time of borrowing, where there will option for the time an enterprise can repay the loan. If the payment history is known the mobile network may suggest the installment amount that the enterprise can pay. The recommended amount for installment should consider the time that the enterprise has chosen to pay.



Picture showing trolley of micro-businessperson displaying a pay bill number for receiving payments in Nairobi Kenya.

If it is more than one micro-enterprise wants to borrow. The instalments will be calculated based on the group payments average, while the application will require every micro-enterprise to provide a till number to check the payments history. The repayments will be reduced from the business account of the customer based on the agreement that has been agreed upon at the time

of issuing the loan. That, there will be no need for a physical visit to the office to submit the repays. Also, the likelihood of default is reduced because of the available security. This is more like, "*I sell this much in a day, can you lend me some?*"

While I have used till number or lipa Namba to illustrate the model, this does not make this model to be region-specific. Other developing countries have payment systems which can be tracked, and hence similar model can be applied. And there comes the collaboration, government will be responsible for collecting information and verifying the identification of the micro-enterprise. Microfinance will be there to provide the money that people want. Mobile networks are there to ease the accessibility of microfinance to the micro-enterprises.

The government in some countries have their microfinance programs (Duflo & Banerjee, 2011). A similar model is applicable. For example, the Tanzanian government has introduced several funding initiatives, such as the National Entrepreneurship Development Fund (NEDF), Youth Development Fund (YDF), and Women Development Fund (WDF). Programs like the Small Entrepreneurs Loan Facility (SELF), National Income Generating Programme (NIGP), Presidential Trust Fund (PTF), and Community Development Trust Fund (CDTF) have been established in collaboration with development partners. Local government authorities are mandated to allocate 10% of their revenue to the Youth and Women Development Fund (YWDF). However, reports from the Controller and Auditor General (CAG) reveal instances where local government authorities (LGAs) did not meet this give the funds (Nyonzo, 2022). And some do not befit the targeted people (Kweka & Fox, 2011). Now through the digital microfinance model, the likelihood of benefiting untargeted people is reduced. The identification system has information about sex, age, disability, employment etc. This is to say the government

on the other hand has the advantage of using the model to distribute the funds, also to benefit the targeted group.

The digital microfinance model is not about digitalizing the group lending model. It is the model that theorizes against the current technological progress and the possibilities of lifting people out of poverty. Instead of trust, it needs documentation and identification. Hence the government's role is to invest more in identification and increasing digital accessibility. The digital microfinance model considers the nature of humans in putting her/his interests first. However, personal data protection is needed. Institutions should be given access to the data that is only needed for them. As in microfinance, the microfinance companies should state clearly that they need some information putting much emphasis on business information. This is to avoid, microfinance companies having data that has no use in issuing loans such as data about the height or weight of a microfinance client, disease history etc.

The benefits of the model

The digital microfinance model has impacts at the individual level and national level. At the individual level, people are expected to be lifted out of poverty. This is because many people will have access to finance. At the national level, this model acts as a nudge to the informal sector. Taxing the informal sector remains a challenge in several developing countries. Sub-Saharan Africa as a developing region is among the regions which fail to tap tax revenue from the informal sector. Makochekanwa, (2020) like many other scholars calls for the formalization of the informal economy to bring more taxpayers into the tax net. However, the informal sector is utilized to evade regulation and intentionally circumvent tax obligations (Sebele-Mpofu & Msipa, 2020). That is, formalizing the informal sector is a challenge as people would not submit themselves to the taxation system. A nudge refers to any element of the decision-making

framework that influences people's actions in a foreseeable manner without prohibiting choices or substantially altering their financial motivations (Thaler & Sunstein, 2009). For an intervention to be classified as a simple nudge, it should be effortless and inexpensive to circumvent.

Micro-enterprises will encourage digital payments such as mobile payments and electronic payments. This will help the revenue authorities to know the exact amount that the microenterprises have sold during the given time and thus tax the required amount. On the other hand, the government will be in a position to know the business which is no longer micro-enterprise from the sales. This also will strengthen the revenue collection and thus the developing nations will no longer experience the problem of taxing the informal economy.

However, these benefits are not empirical but theoretical. There is a need for an experimental/quasi-experimental study which will apply the model as an intervention and evaluate the impact. As for start East African region is a good experimental region as many people use mobile money as a means of payment and the identification system is digitalized.

Conclusion

In conclusion, the digital microfinance model presents a novel approach to alleviating poverty by leveraging advancements in technology and rethinking traditional lending practices. Contrary to the group lending model, which relies heavily on trust and collective accountability, the digital microfinance model emphasizes formal identification, transaction history, and collaboration between financial institutions, governments, and mobile money operators.

This innovative model addresses the shortcomings of the group lending approach, such as the trust crisis, moral hazard, and limited scalability. By utilizing digital identification and payment

systems, microfinance institutions can assess the creditworthiness of individuals and micro-enterprises more accurately, reducing the risk of default and increasing financial inclusion.

The digital microfinance model has the potential to nudge the informal sector towards formalization, thereby enhancing tax revenue collection for governments. By encouraging digital payments and electronic record-keeping, micro-enterprises can become more transparent and accountable, contributing to the overall economic development of their countries.

While the benefits of the digital microfinance model are promising, further empirical research and experimentation are needed to validate its effectiveness in practice. The East African region, with its widespread adoption of mobile money and digital identification systems, presents an ideal environment for testing and refining this innovative approach.

In essence, the digital microfinance model represents a significant step forward in the fight against poverty, offering a scalable, efficient, and sustainable solution that aligns with the goals of financial inclusion and economic development. Through collaboration and innovation, we can harness the power of technology to create lasting positive change in the lives of millions around the world.

References.

Abad-Segura, E., González-Zamar, M. D., López-Meneses, E., & Vázquez-Cano, E. (2020). Financial Technology: Review of Trends, Approaches and Management. *Mathematics 2020, Vol. 8, Page 951*, *8*(6), 951. https://doi.org/10.3390/MATH8060951

Adhikary, B. K., Kutsuna, K., & Stephannie, S. (2021). Does the government credit guarantee promote micro, small, and medium enterprises? Evidence from Indonesia. *Journal of Small Business & Entrepreneurship*, *33*(3), 323–348.

Ahmad, A. H., Green, C., & Jiang, F. (2020). Mobile money, financial inclusion and development: A review with reference to African experience. *Journal of Economic Surveys*, *34*(4), 753–792.

Bhasin, B. (2018). Evolution of technology in financial markets. *International Journal of Information Research and Review*, *5*(8), 5663–5666.

Bicchieri, C. (2016). *Norms in the wild: How to diagnose, measure, and change social norms*. Oxford University Press.

Dang, T. T., & Vu, H. Q. (2020). Fintech in Microfinance: a new direction for Microfinance institutions in Vietnam. *Asian Journal of Business Environment*, *10*(3), 13–22.

de Luis-García, R., Alberola-Lopez, C., Aghzout, O., & Ruiz-Alzola, J. (2003). Biometric identification systems. *Signal Processing*, *83*(12), 2539–2557.

Demirgüç-Kunt, A., & Klapper, L. F. (2012). Financial inclusion in Africa: an overview. *World Bank Policy Research Working Paper*, *6088*.

Domingo, E., Arnold, S., & Apiko, P. (2023). *Interoperability of digital payment systems: Lessons from the East African Community*.

Donovan, K. (2012). Mobile money for financial inclusion. *Information and Communications for Development*, *61*(1), 61–73.

Duflo, E., & Banerjee, A. (2011). *Poor economics* (Vol. 619). PublicAffairs.

El-Gack, N. (2013). *Rural Development and Microfinance Projects in Sudan: with special attention to community participation*. The Edwin Mellen Press Ltd.

Epstein, M. J., & Yuthas, K. (2011). The critical role of trust in microfinance success: Identifying problems and solutions. *Journal of Developmental Entrepreneurship*, *16*(04), 477–497.

Gelb, A., & Clark, J. (2013). Identification for development: The biometrics revolution. *Center for Global Development Working Paper*, *315*.

Gikunda, R. M., Abura, G. O., & Njeru, S. G. (2014). Socio-economic effects of Mpesa adoption on the livelihoods of people in Bureti Sub County, Kenya. *International Journal of Academic Research in Business and Social Sciences*, *4*(12), 348.

Hermes, N., & Lensink, R. (2020). Microfinance and development. In *Contemporary issues in development finance* (pp. 51–72). Routledge.

Jain, A., Hong, L., & Pankanti, S. (2000). Biometric identification. *Communications of the ACM*, *43*(2), 90–98.

Kweka, J., & Fox, L. (2011). The household enterprise sector in Tanzania: why it matters and who cares. *World Bank Policy Research Working Paper*, *5882*.

Luhanga, E., Sowon, K., Cranor, L. F., Fanti, G., Tucker, C., & Gueye, A. (2023). User Experiences with Third-Party SIM Cards and ID Registration in Kenya and Tanzania. *ArXiv Preprint ArXiv:2311.00830*.

Makochekanwa, A. (2020). *Informal economy in SSA: Characteristics, size and tax potential*.

Massele, J., Fengju, X., & Masele, J. Z. (2015). *The role of government microfinance credit scheme in Tanzania, A case of NEDF-SIDO*.

Milana, C., & Ashta, A. (2020). Microfinance and financial inclusion: Challenges and opportunities. *Strategic Change*, *29*(3), 257–266.

Milton, F. (1993). Why government is the problem. *Essays in Public Policy*, *39*, 1–11.

Morduch, J., & Armendariz, B. (2005). *The economics of microfinance*. mit Press.

Mossang, M., & Yomso, M. (2022). Role of Informal Micro-Finance System (Fund association) in the Apatani Society. *Journal of Positive School Psychology*, *6*(3), 9236–9243.

Muhura, A. (2020). M-Koba: Vodacom Tanzania's Innovation to Digitise Savings Groups. In *Global System for Mobile Communications Association (GSMA)*. https://www.gsma.com/mobilefordevelopment/region/sub-saharan-africa-region/m-koba-vodacom-tanzanias-innovation-to-digitise-savings-groups/

Njoroge, J. (2021). *The role of M-pesa in enabling e-commerce in Kenya*.

Nurudeen, S. L., & Adekola, A. A. (2023). Poverty Reduction Strategies: An Assessment of Development Initiatives in Africa. *Lapai Journal of Economics*, *7*(1), 116–131.

Nyonzo, F. (2022, March 29). *Legal and Financial Environment for Micro-Enterprises in Tanzania - African Association of Entrepreneurs*. African Association of Entrepreneurs (AAE). https://aaeafrica.org/tanzania/legal-and-financial-environment-for-micro-enterprises-in-tanzania/

Obamuyi, T. M. (2009). Credit delivery and sustainability of micro-credit schemes in Nigeria. *Journal of Enterprising Communities: People and Places in the Global Economy*, *3*(1), 71–83.

Ojong, N., & Simba, A. (2020). Trust-building mechanisms in group-based microfinance: a Cameroonian perspective. *Forum for Social Economics*, *49*(2), 180–201.

Omwansa, T., & Waema, T. (2014). The impact of pure mobile micro-financing on the poor: Kenya's Musoni experience. *Institute for Money, Technology & Financial Inclusion (IMTFI), Working Paper*, *2*.

Pakhnenko, O., Rubanov, P., Hacar, D., Yatsenko, V., & Vida, I. (2021). Digitalization of financial services in European countries: Evaluation and comparative analysis. *Journal of International Studies*, *14*(2).

Protter, P., & Quintos, A. (2022). Optimal group size in microlending. *Annals of Finance*, *18*(1), 121–132.

Randhawa, B., & Gallardo, J. (2003). *Micro finance regulation in Tanzania: implications for development and performance of the industry*. https://policycommons.net/artifacts/1442274/micro-finance-regulation-in-tanzania/2072624/

Sachin, B. S., Rajashekar, V., & Ramesh, B. (2018). Festival spending pattern: its impact on financial vulnerability of rural households. *Social Work Foot Print*, *7*(5), 48–57.

Sachs, J. (2005). *The End of Poverty: Economic possibilities for our time*.

Sapienza, P., & Zingales, L. (2012). A trust crisis. *International Review of Finance*, *12*(2), 123–131.

Sebele-Mpofu, F. Y., & Msipa, C. (2020). Feasibility of Administering Informal Sector Taxation: Approaches and Hurdles. A Case of the Informal Sector in Bulawayo, Zimbabwe. *International Journal of Innovative Science and Research*, *5*(2), 193–208.

Sherratt, L. (2016). *Can microfinance work?: How to improve its ethical balance and effectiveness*. Oxford University Press.

Sinclair, H. (2012). *Confessions of a microfinance heretic: How microlending lost its way and betrayed the poor*. Berrett-Koehler Publishers.

Sydorovych, O., Perchuk, O., Fedyk, M., Klymenko, S., Matviy, I., Chupryna, L., & Yaremko, I. (2021). Digitization of the financial system in the world economy. *Koreascience.KrO Sydorovych, O Perchuk, M Fedyk, S Klymenko, I Matviy, L Chupryna, I YaremkoInternational Journal of Computer Science & Network Security, 2021•koreascience.Kr*, *21*(12). https://doi.org/10.22937/IJCSNS.2021.21.12.84

Tambe, S., Patnaik, S., Bisaria, J., Pandey, A., Sarma, U. K., & Vadivelu, G. A. (2017). How does government microfinance impact the rural poor? Evidence from Madhya Pradesh. *Economic and Political Weekly*, 81–87.

Thaler, R., & Sunstein, C. (2009). NUDGE: Improving Decisions About Health, Wealth, and Happiness. In *Nudge: Improving Decisions about Health, Wealth, and Happiness* (Vol. 47).

Todaro, M. P., & Smith, S. C. (2010). *Economic development*. Collins Bartholomew Ltd.

Tonkiss, F. (2009). Trust, confidence and economic crisis. *Intereconomics*, *44*(4), 196–202.

United Nations. (n.d.). *Goal 1 | Department of Economic and Social Affairs*. Retrieved March 19, 2024, from https://sdgs.un.org/goals/goal1#progress_and_info

Yenawine, B. H. (2015). *Benjamin Franklin and the invention of microfinance*. Routledge.