

## Communication, Information Exchange, and Service Delivery Mobile Platforms and Agricultural Success among Dodoma and Singida Sunflower Farmers in Tanzania

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### Abstract

This paper presents the findings of a study that examined the impact of mobile platform capabilities in terms of communication, information sharing and service delivery on agricultural success among sunflower farmers, grounded in Human Capital Theory and Innovation Diffusion Theory. It highlights the roles farmers' innovativeness, technical skills, and personal relationships play in driving agricultural success. Survey data collected from Dodoma and Singida sunflower farmers were analysed using Structural Equation Modelling (PLS-SEM). The study found that the three aspects of mobile platform capabilities (innovation, technical skills, and personal relations) positively and significantly influence the success of sunflower farmers. These results suggest that mobile technologies enhance farmers' ability to innovate, improve skills, and foster stronger networks, all of which contribute to greater agricultural success. As such, farmers should receive further support and training to leverage mobile platforms effectively. For policymakers and practitioners, the findings underscore the importance of integrating mobile technologies into agricultural policies and development initiatives to boost productivity.

**Keywords:** Mobile platforms, Communication, Information Exchange, Service Delivery, Agricultural success, Sunflower Farmers

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### Introduction

Studies on the determinants of farmers' success have long been a key focus in strategic management and remain highly relevant in agricultural research (Reddy, 2022; Saiz-Rubio & Rovira-Más, 2020). The existing literature has explored factors influencing farmers' success, including some attention to internet-based determinants (Reddy, 2022) but there is no clear framework that links mobile platforms to farmers' success. This issue might be particularly



relevant for sunflower farmers, as research on mobile platform usage and its impact on their success remains limited. In this regard, Stallkamp and Schotter (2021) and Gawer (2021) contend that the use of mobile platforms varies across economic sectors, mainly due to sector-specific characteristics. Thus, there is a lack of studies examining how these platforms influence the success of sunflower farmers, especially in developing contexts such as Tanzania.

The individual knowledge perspective suggests that key success determinants can explain a significant portion of the variation in farmers' success (Kom, Nethengwe, Mpandeli, & Chikoore, 2022). In the context of mobile platforms, Pejić Bach, Ivančić, Bosilj Vukšić, Stjepić, and Milanović Glavan (2023) argue that specific internet-based applications are more influential than others in shaping success. Consequently, research on mobile platform usage has increasingly shifted focus from individual-level technological tools to firm-specific applications (Stallkamp & Schotter, 2021). Mobile platforms consist of digital tools and applications that enable communication, information exchange, and service delivery. These platforms integrate knowledge across individual, group, and community levels, allowing users to collaborate, share expertise, and enhance decision-making and productivity (Pejić Bach et al., 2023). Stallkamp and Schotter (2021) contend that mobile platforms offer unique value, especially for farmers, which is not found in other internet-based applications. Additionally, mobile platforms empower farmers to deploy agricultural experts to perform specialised tasks and improve their operational efficiency (Emeana, Trenchard, & Dehnen-Schmutz, 2020; Kamal & Bablu, 2023).

The importance of mobile platforms is widely recognised, yet the literature reveals inconsistent findings regarding certain aspects of mobile platform usage and their relationship to individual success in various activities (Emeana et al., 2020). One such variable is individual innovativeness, which has produced conflicting results in studies on its impact on success. Whereas some research indicates a strong link between innovativeness and success (Abbas et al., 2020) others report a weaker relationship (Lam, Nguyen, Le, & Tran, 2021). Kapoor et al. (2021) highlight the importance of users' technical skills but do not directly link them to individual success. Although relational capabilities are acknowledged as critical to success, most studies do not specify which types of relationships influence success (Lam et al., 2021). Moreover, individual capabilities for deploying mobile platforms may differ from organisational ones, suggesting that studies focused on organisations, particularly in developed and established economies, may not fully apply to individual success in agricultural activities, especially sunflower farming in developing countries like Tanzania (Atobishi, Moh'd Abu Bakir, & Nosratabadi, 2024; Balyk, Shmyger, Vasylenko, Oleksiuk, & Barna, 2020). Unlike organisational success, individual success in sunflower farming may rely more on the ability to comply with changes and leverage new features offered by mobile platforms. These abilities include product innovation, the proper use of mobile platforms, and the capacity to build personal relationships (Ali, Hao, & Aijuan, 2020; Miguel, De-Pablos-Heredero, Montes, & García, 2022).

Building on the aforementioned background, this paper explores the influence of mobile platform usage capabilities on the success of sunflower farmers in Tanzania. Specifically, it examines how farmers' innovativeness, personal relationships, and technical skills contribute to the success of sunflower farming activities (Liberio, 2012). Theoretically, the paper enhances our understanding of farmers' capabilities in the context of mobile platform usage and sunflower farming in a developing economy. Empirically, the study provides valuable insights into how these capability dimensions, which are innovativeness, usage skills, and

personal relationships, are linked to farming success. Exploring this relationship will enable the paper to provide actionable recommendations to strengthen farmers' capabilities to utilise mobile platforms to improve their farming practices effectively (Ali et al., 2020). These insights will contribute to the development of policies that foster the enhancement of key capabilities, including skills, personal relations, and innovativeness, that enable farmers to better leverage platforms and boost agricultural success.

The empirical setting for this study is the Dodoma and Singida regions in Tanzania, one of Africa's developing countries. As is common in many developing nations, Tanzanians' motivation to engage in agricultural activities has been hindered for decades due to limited access to essential resources such as modern technology, quality seeds, fertilisers, and machinery (Aku, Mather, Bryan, Mpenda, & Mpunde, 2023). Moreover, agricultural production has historically yielded low profits because of factors like outdated farming techniques, limited value addition, and price volatility in the local market (Felipe, Leidner, Roldán, & Leal-Rodríguez, 2020). These challenges have led many farmers to seek alternative livelihoods. Ronoh (2022) further highlights that insufficient agricultural education and training, particularly in rural areas, impede success. Without knowledge of modern farming techniques, many Tanzanians may not view agriculture as a viable or lucrative career option. In such an environment, farmers must capitalise on their capabilities to learn and adapt farming techniques from various sources (YuSheng & Ibrahim, 2020).

On the other hand, sunflower customers demand higher-quality products that adhere to industry standards for purity, consistency, and nutritional benefits (Dhakal, Paudel, Pokharel, & Koirala, 2024). As health-conscious consumers become more knowledgeable about the benefits of sunflower products, they are more likely to prioritise quality and sustainability when making purchasing decisions. To meet these expectations, farmers must possess the necessary capabilities to implement best farming practices, quality control measures, and effective post-harvest handling techniques to deliver products that align with customer needs consistently (Ariong, Okello, Otim, & Paparu, 2023). These capabilities are crucial for ensuring that farmers can meet market demand, increase product marketability, and build consumer loyalty (Li & Zhang, 2024). Additionally, developing these capabilities allows farmers to access premium markets, resulting in higher profit margins and long-term success (Ariong et al., 2023). Despite the crucial role of capabilities in agricultural success, studies on their impact in Tanzania remain limited. Moreover, no research has explicitly examined farmers' platform usage capabilities and sunflower farming success in the region, indicating a significant gap that warrants further research to understand how these capabilities drive success in the sunflower farming sector.

## **Theoretical and Empirical Review**

Theories in strategic management have introduced various frameworks to explain differences in success, with two of the most widely recognised being Human Capital Theory (HCT) by Becker (2009) and Innovation Diffusion Theory (DIT) by Rogers (1961) HCT emphasises the importance of education, training, skills, and experience in determining an individual's potential for success (Aboobaker, 2020), while DIT focuses on how new ideas, technologies, and practices spread within a society, contributing to success (Pinho, Franco, & Mendes, 2021). DIT advocates that adopting innovative practices through digital technologies leads to success (Pinho et al., 2021), while HCT highlights the role of individual knowledge, technical expertise, and personal relationships in shaping success (Aboobaker, 2020). These theories



provide valuable insights into success, with HCT emphasising the importance of personal relationships and skills, while DIT emphasises individual innovativeness as a key driver of success.

Albayrak, Rosario González-Rodríguez, Caber, and Karasakal (2023) proffer that resources provided by mobile platforms are essential for success but, on their own, do not guarantee favourable outcomes. The key to agricultural success lies in the farmer's ability to effectively use these platforms and adopt and apply innovative practices in a strategic manner (Abdurrahman, Gustomo, & Prasetio, 2024). These platforms also play a crucial role in fostering personal relationships, enabling farmers to connect with suppliers, buyers, and other key stakeholders, thereby enhancing collaboration and knowledge-sharing and ultimately contributing to more informed decision-making and market access (Albayrak et al., 2023). The development of technical skills enables farmers to fully leverage mobile platforms, improve productivity and seize opportunities, collectively driving greater success in their agricultural ventures (Kapoor et al., 2021).

Initially, studies focused on the possession of assets and their direct link to firm success, emphasising that owning the right technology was key to achieving competitive advantage (J.-h. Kim, Seok, Choi, Jung, & Yu, 2020). However, by the 2010s, attention shifted toward capabilities required to effectively deploy and leverage those assets, particularly those embedded in individuals within the organisation (Ferreira & Coelho, 2020). This change in focus recognised that having access to technological assets alone was not enough; it is individuals' capabilities to utilise these resources strategically that ultimately determine success. For instance, Ferreira and Coelho (2020) argued that possessing the right assets does not guarantee success, as these assets can remain static and unproductive. Instead, success is more likely for individuals who possess the right capabilities to strategically utilise available opportunities. Thus, it is not merely the possession of technologies but the ability to adapt, innovate, and integrate these tools into practical solutions that may truly drive success in agricultural (B. Kim, Yoo, & Yang, 2020). This highlights the critical role of human capabilities in translating technological potential into tangible outcomes to drive success in farming practices.

Various studies have identified key capabilities that contribute to success, such as the effective use of technology, including mobile platforms and digital tools, which enhance productivity and align with modern demands (Abdurrahman et al., 2024; Ali et al., 2020). Additionally, innovation plays a critical role, enabling the development of new ideas, approaches, or products that provide a competitive edge in dynamic environments (Ali et al., 2020). Furthermore, building strong relationships with key stakeholders allows individuals to access valuable resources, knowledge, and opportunities for collaboration, all of which are essential for success (MacDonald, Clarke, & Huang, 2022). In sunflower agriculture, however, capabilities appear to be more closely associated with individual farmers, who may play a key role in strategic decision-making, resource development, and the development of competencies that could influence their success. To thrive, these farmers must proactively cultivate their own capabilities to enhance effectiveness in the agricultural sector (MacDonald et al., 2022). Specifically, in the context of mobile platform usage, these capabilities are defined by farmers' knowledge and skills, which are deeply embedded in their innovativeness, personal relationships, and technical expertise (Ferreira & Coelho, 2020). Tanzanian sunflower farmers, these capabilities may be particularly important, as many farmers lack formal training in internet technologies and must navigate an ever-evolving technological environment (Khan, Ray, Zhang, Osabuohien, & Ihtisham, 2022).

In this dynamic environment, farmers' capabilities must continuously evolve to meet emerging challenges and opportunities (Khan et al., 2022). This evolution depends on farmers' ability to take proactive capacity-building initiatives, which enable them to access essential resources and build valuable relationships through networking and collaboration (Moeenian, Khamseh, & Ghazavi, 2022). Capacity-building efforts may include training programs, community support, and partnerships with agricultural experts to enhance technical skills, strengthen personal relationships, and expand knowledge (Musungwini, Gavai, Munyoro, & Chare, 2023). Therefore, the three core concepts of innovation, personal relationships, and technical skills are crucial to fostering the development of farming capabilities, especially among sunflower farmers in Tanzania. These concepts will be further explored to understand their impact on farmers' success in leveraging mobile platforms and improving agricultural productivity, and to help them navigate Tanzania's ever-evolving technological and agricultural sectors.

In Tanzania, sunflower farmers face significant constraints due to a lack of institutional support, which hinders their ability to form formal business partnerships (Isinika & Jeckoniah, 2021). This lack of institutional capacity limits farmers' access to critical resources, including information, facilitators, and expert advice, further exacerbating the challenges they face (Akimowicz, Del Corso, Gallai, & Képhaliacos, 2021). As a result, many farmers must navigate these obstacles on their own, often relying on informal networks for guidance and assistance. During raw material shortages, for instance, farmers are compelled to establish informal relationships with suppliers to secure the resources they need to sustain their operations (Akimowicz et al., 2021). In these situations, personal connections can become more vital than traditional business relationships, as these informal ties often provide more immediate and flexible solutions. Skaalsveen, Ingram, and Urquhart (2020) argue that, in the absence of formal connections, individuals frequently turn to these informal relationships to access crucial resources and agricultural information, as they offer a more accessible and responsive means of support.

Relational capabilities are critical for the acquisition, use, and sharing of resources and information, as well as for monitoring socio-economic and environmental conditions (Ngugi et al., 2010). These capabilities help reduce uncertainty by facilitating the flow of information and lowering the cost of interactions between individuals, such as buyers, suppliers, experts, and other agricultural stakeholders, which can ultimately lead to agricultural success (Skaalsveen et al., 2020). Zohdi et al. (2013) found a significant positive relationship between relational capabilities and performance (Mikalef, Krogstie, Pappas, & Pavlou, 2020). The literature identifies three types of relationships: individual contacts, communication relationships with government and other institutions, and business networks (Capriotti, Zeler, & Camilleri, 2021; Sashi, 2021). While these studies highlight the importance of relational capabilities for success, they primarily focus on firms and do not specifically address the networks that influence success in sunflower farming. Given the individualistic nature of sunflower farmers, they may not have the capacity to form formal relationships, which is why these extensive studies may not fully capture the role of relational capabilities in sunflower farming in Tanzania. Consequently, we hypothesise:

**H1.** *There is a positive relationship between farmers' relationships and the success of sunflower farming.*

According to Ali et al. (2020), innovativeness refers to the ability to develop new ideas, new ways to do things, and creativity in the methods of operation or produce products that provide



a competitive edge in dynamic environments. Innovativeness enables farmers to creatively incorporate ideas from customers and competitors, leading to the development of new and unique products (Lone & Baba, 2024). Sarkar, Hazhar, Rawa, and Rezhwan (2024) suggest that in a competitive environment, where substitutes are abundant, and various sellers offer similar products, the ability to innovate becomes crucial for achieving success by differentiating products and meeting evolving consumer needs. Similarly, Kamyab et al. (2023) found that introducing highly innovative products increases sales, highlighting the importance of innovation for organisational success. However, some studies, such as those by Nguyen, Nguyen, and Nguyen (2023) and Iddris, Mensah, Adjanor-Doku, and Yaa Akyiaa Ellis (2025), report weak or insignificant correlations between innovativeness and success. Researchers argue that innovative enterprises may struggle to profit from their innovations due to high costs (Iddris et al., 2025), whereas imitators can easily replicate these efforts and benefit from them. For instance, Nguyen et al. (2023) demonstrated that while innovation may not directly impact the operational performance of small and medium-sized enterprises, it significantly improves product quality.

However, in Tanzania, innovativeness in sunflower farming is highly relevant for three key reasons. Firstly, there is a lack of studies on innovation and success in sunflower farming, underscoring the need for further research to understand better how innovation affects sunflower farming success in Tanzania. Secondly, as customers increasingly demand higher-quality sunflower products (Adeleke, 2020) farmers must innovate to meet these expectations and comply with market standards (Reddy, 2022). Innovation in cultivation practices, processing methods, and packaging can improve product appeal and customer satisfaction, helping farmers maintain a competitive advantage and effectively meet consumer needs (Reddy, 2022). Thirdly, as competition intensifies among sunflower farmers competing for the same customer base, innovation becomes vital, particularly in packaging design and sales strategies (Shodiya, Akintaro, & Olopade, 2024). Creative and eye-catching packaging can improve product appeal, help farmers differentiate their offerings in the marketplace, and ultimately lead to greater success (Sarkar et al., 2024). Based on the reviewed literature, the following hypothesis has been formulated:

**H2:** *There is a positive relationship between innovativeness and the success of sunflower farmers.*

Technical skills, in the context of mobile platform usage among sunflower farmers, refer to the ability to effectively navigate and utilise mobile applications for tasks such as accessing markets, receiving weather updates, and managing crop information (Bernacki, Greene, & Crompton, 2020). These skills enable farmers to harness technology to boost productivity, make informed decisions, and improve overall farm success. According to Hargittai, Piper, and Morris (2019), workers' technical skills are closely linked to organisational marketing performance because these capabilities enable employees to execute tasks efficiently, adapt to changing technologies, and contribute to better decision-making, thereby enhancing the organisation's ability to market its products effectively. However, empirical findings from Pramono, Sondakh, Bernarto, Juliana, and Purwanto (2021) in Indonesia indicate no relationship between technical skills and firm success among SMEs due to various factors, such as a lack of infrastructure to support the effective use of these skills, insufficient training, or the possibility that other factors, such as market conditions or managerial capabilities, have a more significant impact on success than technical skills alone (Hendrawan, Chatra, Iman, Hidayatullah, & Suprayitno, 2024).

Hendrawan et al. (2024) and Hargittai et al. (2019) found that employees' skills directly influence new product development and volume, which in turn impact business performance. However, while these studies highlight the importance of employees' skills for organisational success, they do not specifically examine how the availability and application of technical skills contribute to success in the agricultural sector, particularly in sunflower farming. In developing countries such as Tanzania, sunflower farmers have traditionally relied on basic hand tools, including hoes, machetes, and manual ploughs (Lyakurwa, 2021). A lack of advanced technical skills can hinder the adoption of modern agricultural techniques. These basic tools are inefficient for large-scale farming, as they require more labour and time, making farming operations more labour-intensive and less productive. (Coggins et al., 2022). In contrast, modern farming practices, such as using machinery (tractors, seeders, and irrigation systems), proper harvesting methods, and effective packaging, require technical expertise to operate (Xu, Meng, Li, Chen, & Wang, 2024). Relying on outdated tools limits productivity, reduces efficiency, and hampers farmers' ability to scale their operations, ultimately affecting their success in sunflower farming (Kom et al., 2022). Based on this, the following hypothesis has been proposed:

**H3:** *There is a positive relationship between technical skills and the success of sunflower farmers*

## Methodology

### Sampling Procedure and Sample Size

The study adopted a positivist philosophy, using a quantitative approach and an explanatory design to examine cause-and-effect relationships objectively. A structured online survey questionnaire was purposively distributed to sunflower farmers in Dodoma and Singida, Tanzania, where over 74 per cent of sunflower farmers are registered mobile platform users (Kisanjara & Matimbwa, 2024). It is indicated that of the 74 per cent of sunflower farmers, 32 per cent are based in Dodoma and 42 per cent in Singida. As the list of all registered farmers is available with M-mkulima Voda, a stratified simple random sampling technique was used to select respondents, who were then contacted to complete self-administered questionnaires. A systematic sampling procedure was conducted. To ensure data accuracy, only farmers with at least three years of experience using mobile platforms were included, as studies suggest this level of experience yields more reliable insights into usage and performance (Fox, Mooney, Rosati, & Lynn, 2021). Sunflower farmers served as the unit of inquiry and analysis because of their knowledge and engagement with mobile platforms in their agricultural activities.

In this regard, Berinsky, Margolis, Sances, and Warshaw (2021) contend that self-administered questionnaires are appropriate because they allow respondents to provide their answers independently, reducing interviewer bias and enabling more accurate data collection from larger samples. In line with the requirements for Structural Equation Modelling (SEM), which typically necessitates a sample size of 200 or more observations (Hair et al., 2010), a total of 368 farmers were included in this survey, representing 89 per cent of all farmers in the two regions. After data cleaning, 358 valid responses were analysed. SEM was then used with SmartPLS software to test the hypothesised relationships among variables within the designated theoretical framework. SEM using Smart PLS is appropriate for this survey because it allows analysis of complex relationships among variables, handling large datasets



and non-normal data distributions, and providing robust results for testing theoretical models (Russo & Stol, 2021).

Scholars have utilised both financial and non-financial measures to assess success in technological usage (Kori, Muathe, & Maina, 2020; Monteiro, Vale, Leite, Lis, & Kurowska-Pysz, 2022), as these metrics provide a comprehensive evaluation of the economic impact and broader organisational or user-level outcomes (Kori et al., 2020). In developing economies, however, objective measures of success are often difficult to obtain, as individuals frequently lack proper record-keeping due to limited access to formal education and inadequate business management training (Monteiro et al., 2022). Furthermore, the lack of infrastructure and resources exacerbates the challenge, making it difficult for individuals and businesses to implement efficient record-keeping systems and maintain accurate financial data (Moyo, Litshani, Mashau, & Mohale, 2021). To address these challenges, survey questionnaires capturing perceived financial success were used to measure the dependent variable, farming success. These measures, adapted from Govindarajan and Gupta (1992) and Hoque (2004), included items such as increased sales, customer satisfaction, firm growth, cash flow from operations, market share, and increased profits.

The seven-point Likert scale, ranging from 1 (strongly disagree) to 7 (strongly agree), was used to measure the variables, as it provides a balanced range of responses, allows for more detailed feedback, reduces central tendency bias, and improves findings' reliability and validity (Kusmaryono, Wijayanti, & Maharani, 2022). The study consists of two types of variables: dependent and independent variables. The independent variables comprise innovativeness, personal relations, and technical skills. Innovativeness (INV) was measured using a modified version of Akman and Yilmaz (2008) and Issack, Charles and Selomon (2016) instruments, which are named to emphasise better product design (INC1), resource improvement (INC2), the impact of platforms on improvements (INC3), the creation of new production lines (INC4), work system enhancements (INC5), and quality improvement through mobile platforms (INC6).

The study assessed Personal relations (PRL) using the Peltier and Naidu (2012) instrument, which focused on relationships with suppliers (PRL1), customers, experts (PRL2), government officials (PRL3), support from government institutions (PRL4) and other farmers in the agricultural sector (PRL5). Farmers' technical skills (TS) were measured using Bacon (2001) instrument, with factors such as initiative (TS1), training, expertise (TS2), talents (TS3), teamwork (TS4), experience (TS5), competence (TS6), and technical know-how (TS7). Scholars have relied on both financial and non-financial measures to explain success; however, due to poor record-keeping among farmers, obtaining financial data is challenging. As a result, perceived success (SCC) informed the dependent variable, with measures adopted from Selomon, Urassa, and Allan (2016), conceptualized as increased sales (SCC1), market share (SCC2), cash flow from operations (SCC3), business growth (SCC4), customer satisfaction (SCC5), agricultural expansion (SCC6), and increased profits (SCC7).

### **Univariate analysis**

The demographic characteristics of the study participants. The largest age group for farmers was 20–29 years (42.8%), followed by 30–39 (24.82%), 18–19 (10.66%), 40–49 (10.12%), 50–59 (8.48%), and 60+ (3.12%). In terms of education, 30.4 per cent were university graduates, 26.46 per cent had completed technical or vocational college, 23.78 per cent had a high school education, 9.48 per cent had completed middle school, 4.92 per cent had primary

education, and 4.96 per cent fell into other categories. Regarding occupation, 41.08 per cent were employed in other sectors but also engaged in agriculture, 20.12 per cent were students engaging in agriculture, 17.48 per cent were self-employed in agriculture, 12.28 per cent worked in government but also engaged in agriculture, 7.3 per cent identified with other occupations, 0.96 per cent were unemployed, and 0.78 per cent were retired. Marital status data showed that 62.72 per cent were married, 34.94 per cent unmarried, and 2.34 per cent classified under other categories.

### Measurement and Structural Model Evaluation

The study assumes that all latent constructs are antecedents of their indicators because they are reflective constructs. Thus, to evaluate the measurement model, indicators, and construct reliability, as well as convergence and discriminant validity, analyses were carried out. Table 1 presents the results. The reliability of the variables was evaluated using factor loadings, Cronbach's Alpha, composite reliability, and the average variance extracted (AVE). The reliability of the indicators was evaluated based on their loadings, all of which exceeded the minimum threshold of 0.5. Loadings below 0.7 are generally recommended for removal only if doing so improves the Average Variance Extracted (AVE) or Composite Reliability (Hair, 2022). Since both criteria were met, with AVE above 0.5 and Composite Reliability above 0.7 (see Table 1), all items were retained in the final model, confirming their reliability. (Napitu, Simanjuntak, & Amal, 2021). Additionally, Cronbach's Alpha and composite reliability supported the constructs' reliability. Convergent validity, assessed through AVE, showed that all values were greater than 0.5, confirming the internal consistency of the reflective instruments (Grymowicz et al., 2020).

**Table 1: Outer Model Results for 24 Items Corresponding to Four Variables**

Items	Mean	SD	Loadings	Cronbach's Alpha	AVE	CR
<b>Innovativeness</b>				0.816	0.521	0.867
INV1	4.589	1.500	0.694			
INV2	4.535	1.433	0.714			
INV3	4.575	1.387	0.732			
INV4	4.604	1.273	0.756			
INV5	4.742	1.322	0.741			
INV6	4.698	1.343	0.692			
<b>Technical Skills</b>				0.862	0.55	0.895
TS1	4.367	1.435	0.744			
TS2	4.658	1.429	0.791			
TS3	4.524	1.300	0.625			
TS4	4.545	1.460	0.802			
TS5	4.716	1.359	0.754			
TS6	4.68	1.460	0.765			
TS7	4.738	1.342	0.695			



<b>Personal Relations</b>				0.765	0.587	0.85
PRL1	4.818	1.342	0.530			
PRL2	5.135	1.221	0.727			
PRL3	5.116	1.268	0.809			
PRL4	5.229	1.219	0.776			
PRL5	5.145	1.296	0.750			
<b>Farming Success</b>				0.798	0.505	0.857
SCC1	5.029	1.235	0.517			
SCC2	5.451	1.535	0.784			
SCC3	5.164	1.361	0.825			
SCC4	5.058	1.339	0.752			
SCC5	4.582	1.286	0.697			
SCC6	5.044	1.398	0.647			

**Notes:** Significance and standard deviation (SD) were assessed using a bootstrapping procedure with 10,000 subsamples. AVE (Average Variance Extracted) is reported, and all loadings are significant at the 0.05 level. **Source:** Survey Data (2024)

Convergent validity was confirmed as the Average Variance Extracted (AVE) values exceeded 0.5, indicating that each construct explains more than half of the variance in its indicators (Hair, 2022). Discriminant validity was assessed using the Fornell–Larcker criterion and the Heterotrait-Monotrait Ratio (HTMT). The HTMT values for all three constructs were below 0.85, indicating sufficient discriminant validity for reflective variables (Napitu et al., 2021). The highest HTMT index was 0.697 (see Table 2). Additionally, the Fornell–Larcker criterion showed that the square root of the AVE for each construct was greater than the correlations between that construct and all other constructs (see Table 3). With both criteria satisfied, we confirm that the constructs exhibit satisfactory discriminant validity, ensuring the robustness of the measurement model.

**Table 2: Discriminant Validity through Heterotrait-Monotrait Ratio**

Variables	Farming Success	Innovativeness	Personal Relations	Technical Skills
Farming Success				
Innovativeness	0.697			
Personal Relations	0.678	0.347		
Technical Skills	0.604	0.542	0.446	

Note: Heterotrait–monotrait (HTMT) ratio values are less than 0.85. **Source:** Survey Data (2024)

**Table 3: Discriminant Validity through Fornel-Larker Criterion**

	Farming Success	Innovativeness	Personal Relations	Technical Skills
Farming Success	<b>0.711</b>			

Innovativeness	0.576	<b>0.722</b>		
Personal Relations	0.513	0.270	<b>0.707</b>	
Technical Skills	0.521	0.455	0.341	<b>0.742</b>

Note: square roots of AVE are > the underneath values, indicating discriminant validity was established. Source: Survey Data (2024)

### Path Analysis

The structural model analysis begins by evaluating potential multicollinearity through the variance inflation factor (VIF) (Napitu et al., 2021). As shown in Table 4, all VIF values are below 3, ranging from 1 to 2.090, which indicates no multicollinearity issues (Kock, 2015). Next, a bootstrapping procedure with 10,000 resamples was performed to compute t-statistics and percentile-based confidence intervals. The coefficient of determination ( $R^2$ ) for the dependent variables, along with the magnitude and effect size ( $f^2$ ) of the standardised regression coefficients, was also assessed (Hair et al., 2017). Table 4 and Figure 1 present the results:

**Table 4: Structural Model Assessment Results**

Hypothesis	Path	SD	T-values	P-values	$f^2$	$Q^2$	95CI	VIF	Supported
INV (H1)	0.379	0.061	6.17	0.000	0.228	0.105	0.268,0.474	1.286	Yes
PRL (H2)	0.330	0.056	5.91	0.000	0.192	0.120	0.231,0.402	1.154	Yes
TS (H3)	0.236	0.059	3.994	0.000	0.085	0.109	0.145,0.337	1.349	Yes

Source: Survey Data (2024)

Based on Table 4, the path coefficients for the hypotheses are positive, indicating that the independent variables positively influence the outcome variable (Russo & Stol, 2021). Hypothesis 1 (H1) examines the relationship between innovativeness (INV) and farming success (SCC). As shown in Table 4 and Figure 1, the path coefficient is 0.379 with a significance level of  $p < 0.000$  and a t-value greater than 1.96, indicating a significant positive relationship (Kisanjara & Matimbwa, 2024) between innovativeness and farming success. Hypothesis 2 (H2) anticipated a significant relationship between personal relations (PRL) and SCC, with a path coefficient of  $\beta = 0.33$ ,  $p < 0.05$ , and  $t > 1.96$ , suggesting a significant positive relationship. Hypothesis 3 (H3) predicted a relationship between technical skills (TS) and SCC, with findings revealing a positive and significant relationship ( $\beta = 0.236$ ,  $p < 0.05$ ,  $t > 1.96$ ), indicating that technical skills influence farming success.

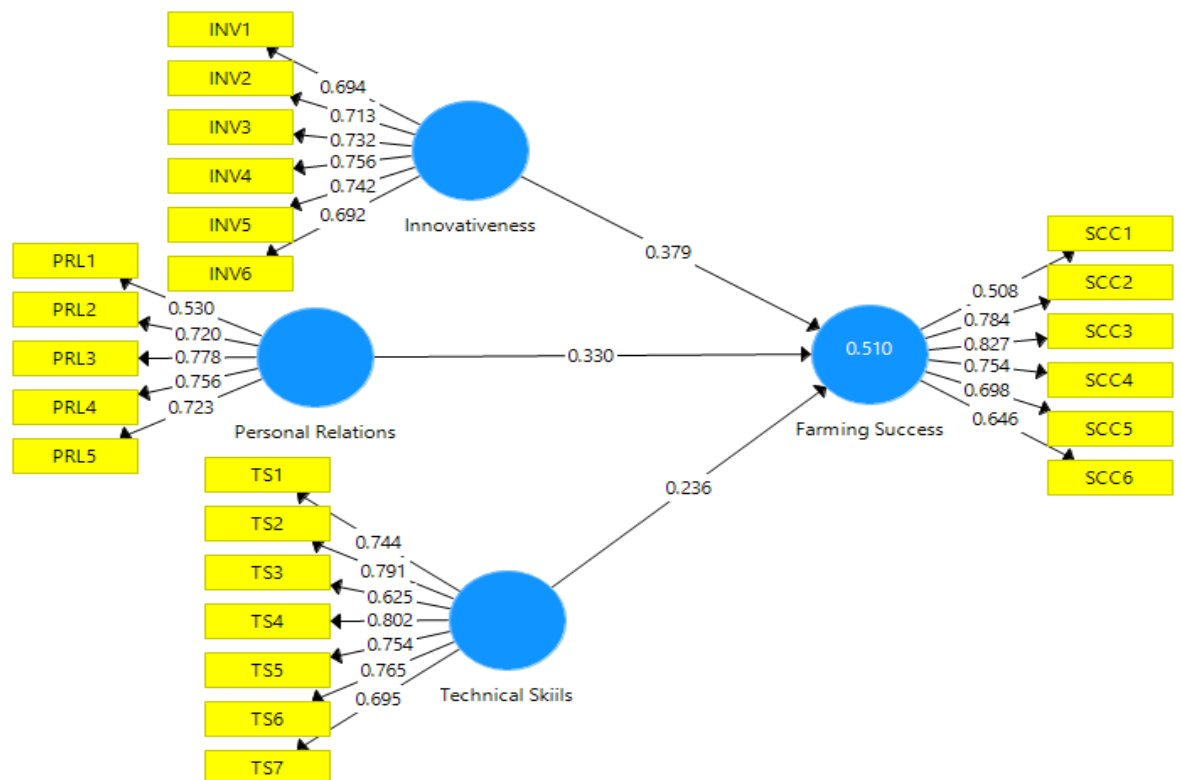
The standard deviation values are below 3, suggesting that respondents generally agree on the positive impact of mobile capabilities on agricultural success (Hendrawan et al., 2024). The t-values, exceeding 1.96 at the 5% significance level, confirm the relationships' statistical significance. The p-values below 0.05 further confirm the significance at the 5% level. The  $f^2$  values, all above 0.02, indicate that the effect sizes exceed the threshold for a small effect, with  $f^2$  measuring the contribution of each independent variable to the  $R^2$  of the dependent variable, as per Hair (2022). The  $Q^2$  values assess predictive relevance; values greater than 0 indicate that the model is predictive of the endogenous constructs (Purwanto & Sudargini, 2021). The 95 per cent confidence intervals (CI) for the path coefficients show that if the interval does not include zero, the path is considered significant (Napitu et al., 2021). Finally, VIF values below 3 suggest no significant multicollinearity issues (Kock, 2015). Given these



favourable indices, significant path coefficients, high  $f^2$ , positive  $Q^2$ , and low VIF, the relationships in the model are robust and reliable.

### Research Model

The research model developed from the survey data demonstrates that the three aspects of mobile platform capabilities (innovativeness, personal relations, and technical skills) are positively and significantly related to success in sunflower farming, as shown in Table 4. Strategically, mobile platform capabilities arguably positively and significantly influence the success of sunflower farming, aligning with the predicted hypothesis and the assumptions of Human Capital Theory (HCT) and Innovation Diffusion Theory (DIT).



Source: Survey Data (2024)

Figure 1: Research Model

### Discussion of Findings

Our study findings reveal that sunflower farmers' innovativeness (INV) has a positive and significant impact on farming success (SCC), supporting existing literature that underscores the role of innovativeness in achieving success. Specifically, we suggest that innovative farmers are better equipped to apply techniques for improved product design, resource optimisation, the creation of new product lines, and quality enhancement through mobile platforms. These results align with the findings of Wang and Lin (2021) and Azeem, Ahmed, Haider, and Sajjad (2021), who also identified a significant relationship between innovativeness and success. In sectors such as agriculture in Tanzania, where standardised product lines are less common (Mpogole, Dimoso, & Mayaya, 2020), innovation becomes

exceptionally crucial. Many farmers operate as sole producers (Mpogole et al., 2020), and their success depends heavily on their ability to leverage agricultural tools creatively, such as mobile platforms (Musungwini et al., 2023). Consequently, farming success is closely linked to farmers' capacity to develop cost-effective agricultural solutions. Although experience is valuable, those with a strong understanding of the sector and the ability to innovate are better positioned to outperform their competitors.

This study identified a significant positive relationship between personal relations (PR) and farming success (SCC), suggesting that farmers can access and exchange valuable information and resources through collaboration with fellow farmers, suppliers, agricultural experts, and product buyers (Shukla, Kapoor, Gupta, & Arunachalam, 2023). These interactions help farmers to develop strategies and tactics needed to thrive in a dynamic environment. Our findings align with Chang, Shih, and Peng (2022), which highlights that personal relational capabilities promote innovation and value co-creation, where farmers and other stakeholders can jointly create value through cost or revenue benefits. However, it is important to note that farmers in Tanzania operate in an economically unstable environment, lacking formal institutions that may support farmers and other stakeholders' relationships (Mpogole et al., 2020). In such conditions, farmers often rely on personal relationships to access expertise, share information, and secure markets and resources (Mpogole et al., 2020). Specifically, when information about material supplies is limited, personal connections with suppliers and agents help farmers access the resources they need.

Farmers' technical skills (TS) were positively and significantly related to farming success (SCC). This finding aligns with previous research showing that individual technical skills directly influence their success (Khayyer, Talukder, Bao, and Hossain, 2020) and Susanto, Rachmadtullah, and Rachbini (2020). This highlights the crucial role of technical skills in enabling farmers to adopt and use new technologies effectively. On mobile platforms, these technical skills become even more important. Mobile platforms can provide farmers with access to valuable information, tools, and resources that enhance decision-making, improve crop management, and increase overall productivity (Kamal & Bablu, 2023). Farmers with strong technical skills (TS) are better equipped to leverage these platforms, adapting them to their specific farming needs and maximising their benefits. This positive relationship between TS and SCC highlights the need for continuous training, particularly in effectively utilising mobile technologies. By enhancing farmers' technical skills in using platforms, they can access real-time data, weather forecasts, market prices, and expert advice, ultimately leading to greater success. Thus, fostering both TS and mobile platform literacy is essential for farmers to remain competitive and thrive in a rapidly evolving agricultural and technological environment.

## **Conclusion and Implications**

The findings of this paper suggest that innovativeness (INV), technical skills (TS), and personal relations (PRL) each play a crucial role in driving farming success (SCC). The positive relationship between these variables indicates that farmers who are INV, possess strong TS, and maintain effective personal relationships are more likely to succeed in their agricultural endeavours. Innovativeness enables farmers to adopt new technologies and practices, enhancing productivity and adaptability. TS equips farmers with the expertise to implement these innovations and manage their farming operations efficiently. Additionally, personal relations foster collaboration, knowledge sharing, and access to resources, all of



which contribute to improved decision-making and agricultural opportunities. These findings imply that, for SCC, farmers must focus on developing the three key areas of INV, TS, and PRL through training, education, and building strong connections within the agricultural community.

This paper's findings contribute to the theoretical discourse by applying the Human Capital Theory (HCT) and Innovation Diffusion Theory (DIT) to sunflower farmers in a developing economy, focusing on how farmers' capabilities affect mobile platform usage to enhance SCC. This approach sets it apart from most previous studies, which have primarily been theoretical. In examining the practical application of these theories, the study provides empirical evidence on how factors such as INV, TS, and PRL contribute to SCC in agriculture. Furthermore, this research is among the few that explore how farmers' capabilities on mobile platform usage enhance success, specifically in Tanzania's agricultural sector, providing important insights into how mobile platforms can enhance SCC in regions with limited formal support. The findings bridge the gap between theory and practice, offering policymakers and agricultural practitioners valuable insights to improve farmers' skills and maximise the potential of mobile platforms for better SCC.

The findings on the significance of capabilities can provide policymakers with valuable guidance, helping them better understand how these factors contribute to the SCC of the agricultural sector. Based on these results, we may recommend that the government introduce programs to build farmers' capacities, particularly by enhancing their INV, TS, and PRL through specialised training. For instance, in Kenya, the success of flower farmers is partly due to investments in high-quality training and boosting entrepreneurial capabilities (Cheruiyot, 2022). This approach has been integral to transforming the agricultural sector, positioning the country as Africa's leading flower producer. From a practical standpoint, the results carry several important implications for farmers. Firstly, they underscore the critical role that individual capabilities play in achieving success in farming. Secondly, they highlight the value of these capabilities, especially in regions where formal institutions are limited in their ability to support resource mobilisation in agriculture. Thirdly, they suggest that farmers should prioritise continuous skill development and foster collaboration within the agricultural community to remain competitive and respond to shifting agricultural demands.

The study focused on the capabilities of mobile platform usage among sunflower farmers. However, it would be valuable to explore this topic in non-agricultural contexts or to examine other crops within agriculture for a broader understanding. Expanding the study of mobile platform capabilities beyond sunflower farmers and agriculture more broadly is important because it could provide valuable insights into how these technologies impact various sectors. By doing so, we could better understand the broader applicability of these platforms in enhancing productivity, innovation, and success across diverse industries. Additionally, focusing on other crops in agriculture would enable a comparative analysis of how mobile technologies support different farming practices, potentially revealing sector-specific challenges and opportunities. Such studies could guide the development of tailored interventions and policies that maximise the benefits of mobile platforms across sectors, ultimately driving economic growth and technological advancement across a wide range of contexts.

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