

Understanding the Drivers and Distributional Effects of Digital Agricultural Platforms in Africa.

FRR VOLUME
8 No 2

Authors

Dayo Phillip and
Biola Phillip



Understanding the Drivers and Distributional Effects of Digital Agricultural Platforms in Africa

Authors:

Dayo Phillip and Biola Phillip

Director, Centre for Agriculture and Rural Development Studies, Federal

University of Lafia, Nasarawa State, Nigeria

Department of Economics, College of Entrepreneurial and Development Studies,

Federal University of Agriculture, Abeokuta, Ogun State, Nigeria

Citation

Dayo Phillip and Biola Phillip: Understanding the Drivers and Distributional Effects of Digital Agricultural Platforms. Forum for Agricultural Research In Africa, Forum for Agricultural Research In Africa, Volume 8 Number 2: PP 1 -42

FARA encourages fair use of this material. Proper citation is requested.

Forum for Agricultural Research in Africa (FARA)

No. 7 Flower Avenue, New Achimota Mile 7, Accra, Ghana Tel: +233 302 772823 / 302 779421

Fax: +233 302 773676 Email: info@faraafrica.org Website: www.faraafrica.org

Editorials

Mr. Benjamin Abugri (babugri@faraafrica.org)

Dr. Fatunbi A.O (ofatunbi@faraafrica.org)

ISSN: 2550-3359

About FARA

The Forum for Agricultural Research in Africa (FARA) is the apex continental organisation responsible for coordinating and advocating for agricultural research-for-development. (AR4D). It serves as the entry point for agricultural research initiatives designed to have a continental reach or a sub-continental reach spanning more than one sub-region.

FARA serves as the technical arm of the African Union Commission (AUC) on matters concerning agricultural science, technology and innovation. FARA has provided a continental forum for stakeholders in AR4D to shape the vision and agenda for the sub-sector and to mobilise themselves to respond to key continent-wide development frameworks, notably the Comprehensive Africa Agriculture Development Programme (CAADP).

FARA's vision is; "Reduced poverty in Africa as a result of sustainable broad-based agricultural growth and improved livelihoods, particularly of smallholder and pastoral enterprises" its **mission is the** "Creation of broad-based improvements in agricultural productivity, competitiveness and markets by strengthening the capacity for agricultural innovation at the continental-level"; its **Value Proposition is the** "Strengthening Africa's capacity for innovation and transformation by visioning its strategic direction, integrating its capacities for change and creating an enabling policy environment for implementation". FARA's strategic direction is derived from and aligned to the Science Agenda for Agriculture in Africa (S3A), which is in turn designed to support the realization of the CAADP vision.

About FARA Research Result (FRR)

FARA Research Report (FRR) is an online organ of the Forum for Agricultural Research in Africa (FARA). It aims to promote access to information generated from research activities, commissioned studies or other intellectual inquiry that are not structured to yield journal articles. The outputs could be preliminary in most cases and in other instances final. The papers are only published after FARA secretariat internal review and adjudgment as suitable for the intellectual community consumption.

Disclaimer

"The opinions expressed in this publication are those of the authors. They do not purport to reflect the opinions or views of FARA or its members. The designations employed in this publication and the presentation of material therein do not imply the expression of any opinion whatsoever on the part of FARA concerning the legal status of any country, area or territory or of its authorities, or concerning the delimitation of its frontiers"

Table of Content

Acknowledgement.....	4
1.0 Introduction	5
1.1 Objectives of the study.....	5
1.1.1 Identifying the Drivers of Digital Platforms.....	5
1.1.2 Analysis of Distributional Effects.....	5
1.1.3 Impact on Agricultural Markets.....	6
2.1 Research questions.....	11
2.2 Method of data analysis:.....	11
2.2.1 Producers involved in the platform:.....	11
2.2.2 Non-Participating Farmers (FGDs):.....	12
2.2.3 Interviews with platform providers.....	12
2.2.4 Interviews with Input and Output Dealers:.....	12
2.3. Data Analysis:.....	12
3. Results and Discussion.....	13
3.1.0 Identifying the Drivers of Digital Platforms.....	13
3.1.1 The Digital Platform-AgroMall Digital Discovery and Extension Limited.....	13
3.1.2 Transaction cost-cutting opportunities:	14
3.1.3 Platform Complementarity.....	14
3.1.4 Factors that contribute to the scaling of digital platforms	15
3.2.0 Analysing Distributional Effects	15
3.2.1 Agripreneurs Participating in digital platforms (or not).....	15
3.2.2. Participation of Women and Young Entrepreneurs on the Platform.....	23
3.2.3 Benefits of Digital Platforms to Respondents -	25
3.2.4 How the revenue generation models of the platforms influence the distribution of financial returns generated through the platforms.....	30
3.2.5 Creating an environment for small-scale agripreneurs (including women and youth) to participate in platform-enabled markets and thereby increase their incomes.....	31
3.2.6 Groups disadvantaged by the platform,	33
3.2.7 Enabling conditions needed to support equitable outcomes	34
3.3 Impact on Agricultural Markets.....	34
3.3.1 How are platforms changing vertical integration?.....	34
3.3.2 Impact of platforms on transaction costs	35
3.3.3 Digital Technology-Induced Changes in Transparency of Market Transactions.....	36
3.3.4 Digital Platforms and Market Concentration	36
3.3.5 Beneficiaries and Non-beneficiaries	39
3.3.6 In what ways, by what type of platform?	39
3.3.7. Conditions that Support Equitable Outcomes.....	40
4. Summary, Conclusion, Policy Recommendation and Areas of Further Research.....	41
References.....	43

List of Figures

Figure 1: Interest in the digital platform.....	15
Figure 2: Age Distribution of Farmers.....	16
Figure 3: Composition of the household.....	16
Figure 4: Level of Education of Farmers.....	17
Figure 5: Membership of a Farmer Organisation.....	17
Figure 6: Commodities (crops and livestock) produced.....	18
Figure 7: Year the Farmers Joined the Platform.....	18
Figure 8: Years of Working as an Agro-Input Dealer.....	19
Figure 9: Category of Input Dealership.....	20
Figure 10: Inputs sold through the platform.....	20
Figure 11: Interaction with the Digital Platform_Input Dealers.....	21
Figure 12: Years of Working as an Agro-Output Dealer.....	21
Figure 13: Category of Output Dealership.....	22
Figure 14: Commodities Bought Via the Digital Platform.....	22
Figure 15: Commodities Sold Via the Digital Platform.....	23
Figure 16: Gender distribution of respondents who are farmers.....	24
Figure 17: Age distribution of the respondents who are farmers.....	24
Figure 18: Inputs farmers receive via the platform.....	25
Figure 19: How do you source your inputs through the platform (Farmers)?.....	26
Figure 20: Type of information Farmers receive from the platform.....	27
Figure 21: Benefits of Interacting on AgroMall Platform for Output Dealers.....	28
Figure 22: Impact of AgroMall's Digital Platform on Output Dealers.....	29
Figure 23: Effect of Digital Platform on Business of Input Dealers.....	29
Figure 24: Effect of the Digital Platform on Sales and Profits of Input Dealers.....	30
Figure 25: Effect of Digital Platform on Business _ Output Dealer.....	31
Figure 26: Commodities sold through the platform by output dealers.....	32
Figure 27: Commodities sold via the platform by farmers.....	32
Figure 28: How do you source your inputs via the platform as farmers?.....	35
Figure 29: Impact of digital platform on price of inputs purchased by dealers.....	36
Figure 30: Effect of digital platform on the number of input dealers.....	37
Figure 31: Effect of Digital Platform on Number of Output Dealers.....	38
Figure 32: Effect of Digital Platform on Sourcing for Inputs.....	38
Figure 33: Effect of digital platform on the sales of inputs.....	39

List of Plates

Plate 1: A cross section of the producers surveyed.....	6
Plate 2: A cross section of the producers surveyed.....	7
Plate 3: A cross section of the producers surveyed.....	7
Plate 4: A cross section of the producers surveyed	8
Plate 5: Visit to a storage facility	8
Plate 8: An output dealer surveyed.....	9
Plate 6: Across-section of the output dealers surveyed.....	9
Plate 9: Across section of non-participating farmers surveyed.....	10

Acknowledgement

The study was made possible through partnerships between national and international agencies and individuals. The Agricultural Research Council of Nigeria (ARCN) hosted the study "Understanding the Drivers and Distributional Effects of Digital Agriculture Platforms in Africa: Insights from Nigeria", on behalf of the Federal Ministry of Agriculture and Rural Development, Abuja, Nigeria. Through its 'One World, No Hunger' programme, the German government continues to partner with Africa to achieve relevant agricultural innovations and poverty reduction. The current research was funded through the Programme of Accompanying Research for Agricultural Innovation (PARI) (research4agrinnovation.org) project, coordinated by the Centre for Development Research (ZEF), University of Bonn, with a group of countries (Nigeria and Kenya) as partners. The authors wish to acknowledge the contributions of different individuals from ZEF and FARA in reviewing the survey instruments and the final results of the research. The contributions of Dr. Fatunbi Oluwole and his team in FARA, as well as Dr. Heike Baumüller and her team at ZEF, are especially acknowledged. The authors acknowledge the Chief Executive Officer of AgroMall, Adefemi Adeniyi, for releasing the Head of Agriculture at AgroMall, Aniedi Essien, to interact with the research team on several occasions. We appreciate the role of key actors in the conduct of the study, Matthew Dada, who led the team that visited AgroMall and conducted a series of interviews. Amin Salihu and Shaibu Bello elucidated information from farmers, input, and output dealers, in addition to focus group interviews for non-participating farmers. This is appreciated.

1.0 Introduction

In the vast tapestry of Nigeria's economic landscape, the agricultural sector emerges as both a historical anchor and a contemporary crucible of challenges and opportunities. This chapter sets the stage for an in-depth exploration of the transformative forces at play within this sector, particularly focussing on the rise of digital agricultural platforms. As the heartbeat of Nigeria, agriculture not only contributes significantly to the nation's GDP, but also sustains the livelihoods of a substantial proportion of its population. In the face of climatic uncertainties, market inefficiencies and the imperative for sustainable development, the integration of digital technologies into agriculture has become a beacon of promise, ushering in an era of innovation that seeks to redefine the very nature of farming practices.

The dawn of the 21st century has witnessed an unprecedented surge in the adoption of digital technologies across sectors worldwide. In agriculture, this wave of digitisation has materialised in the form of innovative platforms that take advantage of information and communication technologies to address age-old challenges. Mobile applications offering real-time weather updates (Aker & Mbiti, 2010), data analytics tools that facilitate precision agriculture, and online marketplaces connecting farmers directly to consumers, all embody the multifaceted digital tools now deployed in the service of agriculture.

In the Nigerian context, the rise of digital agricultural platforms is not just a technological trend, but a strategic response to the unique challenges facing farmers and stakeholders in the agricultural value chain. These platforms, ranging from simple mobile applications to complex data-driven systems, have the potential to revolutionise the sector by enhancing productivity, improving market access, and fostering sustainable practices. The impetus behind this transformative wave stems from a confluence of factors, be it the need for resilient farming practices in the face of climate change or the imperative to empower smallholder farmers with tools for informed decision making (Barrett, 2008).

This research is driven by a comprehensive set of objectives aimed at unravelling the complex dynamics surrounding digital agricultural platforms in Nigeria and understanding their implications on various aspects of the agricultural landscape.

1.1 Objectives of the study

1.1.1 Identifying the Drivers of Digital Platforms

One of the main objectives is to dissect the drivers behind the proliferation of different types of digital agricultural platforms in Nigeria. Understanding the motivations and catalysts for the development of these platforms is essential to discern the contextual factors that have propelled their growth. This involves an examination of technological, economic, and policy drivers, considering the diverse array of platforms: from mobile applications that provide weather forecasts to sophisticated data analytics tools that facilitate precision farming. Insights into these drivers will not only contribute to academic discourse, but will also inform policymakers, technology developers, and stakeholders about the specific needs and opportunities within the Nigerian agricultural sector.

References suggest that factors such as the ubiquity of mobile phones (Aker & Mbiti, 2010), the need for improved market access (Barrett, 2008), and the broader global trend toward digital transformation in agriculture (FAO, 2019) are likely to be influential drivers.

1.1.2 Analysis of Distributional Effects

The study also aims to investigate the distributional effects of digital agricultural platforms in different segments of the farming community. This involves an examination of how these platforms impact various stakeholders, including smallholder farmers, women and youth in agriculture, input and output dealers, and individuals with varying levels of digital literacy. Understanding the nuanced ways in which benefits are distributed is crucial for ensuring that the positive outcomes of digitalisation are inclusive and do not exacerbate existing socioeconomic disparities. Addressing access, representation, and resource disparities issues will be integral to formulating strategies that promote equitable benefits.

Literature indicates that digital platforms have the potential to either exacerbate or alleviate existing inequalities (FAO, 2019). Gender dynamics and disparities in digital literacy, for example, can influence the distribution of benefits (Aker & Mbiti, 2010).

1.1.3 Impact on Agricultural Markets

The growth of digital agricultural platforms has profound implications for agricultural markets in Nigeria. The study seeks to explore how these platforms influence market dynamics, including aspects such as price transparency, market access for farmers, and overall efficiency of the agricultural value chain. An in-depth analysis of market impacts will provide valuable insights into how digital platforms are reshaping the traditional structures of agricultural markets and facilitating more efficient and transparent transactions.

References suggest that advances in digital agriculture can improve market participation for smallholder farmers and other actors in the agricultural value chain and contribute to overall agribusiness growth (World Bank, 2019). Understanding these impacts is vital to designing policies that support a sustainable and thriving agricultural market ecosystem.

In summary, the objectives of this study are designed to provide a holistic understanding of the drivers behind digital agricultural platforms, assess their distributional effects, and analyse their impact on agricultural markets. By addressing these objectives, the research aims to provide nuanced insights that contribute to informed decision making and the formulation of policies that promote a sustainable and digitally inclusive agricultural future for Nigeria.



Plate 1: A cross section of the producers surveyed



Plate 2: A cross section of the producers surveyed



Plate 3: A cross section of the producers surveyed



Plate 4: A cross section of the producers surveyed



Plate 5: Visit to a storage facility



Plate 6: A cross-section of the output dealers surveyed



Plate 8: An output dealer surveyed



Plate 9: A cross section of non-participating farmers surveyed

2.1 Research questions

This study provides answers to the following questions.

1. What are the drivers of different types of digital platforms?

- To what extent are the formation and functions caused by market and service expansion opportunities and transaction cost-cutting opportunities, and by context and other factors?
- Are the platforms complementary to each other?
- What factors contribute to scaling digital platforms (e.g. infrastructure, skills, finance, collective action, digital skills)?

2. What are the distributional effects of digital agriculture platforms? How to ensure equitable benefits.

- Which agripreneurs are participating in these platforms (or not)? Are women and young agripreneurs part of the platforms? How are different types of agripreneurs benefiting (e.g. through price, market linkages, knowledge, loans, etc.)?
- How do the revenue generation models of the platforms influence the distribution of financial returns generated through the platforms?
- How can small-scale agripreneurs (incl. women and youth) be enabled to participate in platform-enabled markets and thereby increase their incomes?
- What groups are disadvantaged by the platform? In what ways, by what type of platform?
- What enabling conditions are needed to support equitable outcomes?

3. How does the growth of these platforms impact markets?

- How are platforms changing vertical integration?
- How are platforms impacting the transaction costs of marketing?
- How are digital technologies changing the transparency of market transactions?
- Do platforms lead to market concentration?
- Who is benefiting from these changes? Who is disadvantaged? In what ways and by what type of platform?
- What enabling conditions are needed to support equitable outcomes?

2.2 Method of data analysis:

The study was conducted in Nigeria, recognised as a prominent contributor to the evolution of digital agricultural platforms in Africa. A combination of qualitative and quantitative research methods was used to comprehensively explore the landscape of digital agricultural platforms, with a specific focus on AgroMall in Nigeria.

The initial phase involved mapping the landscape of the digital agricultural platform through a detailed review of the literature, analysis of the platform websites, and interviews with key informants. A standardised Excel template was designed to facilitate systematic organisation of information, and to provide a comprehensive overview of key players and dynamics in the field.

Agromall was selected in Nigeria. Interviews were conducted with various stakeholders, including producers engaged with the platform, non-participating farmers, platform providers, and input/output dealers within the platform's operational region.

2.2.1 Producers involved in the platform:

A survey approach was adopted, employing a random sampling procedure to select 326 farmers who actively use the platform. Enumerators, trained specifically for this research, administered a structured instrument to producers who were registered/interacted with the digital platform. Within the household, the person who interacted/communicated most frequently with the platform was engaged. The survey focused on aspects such as transaction patterns, log-in behaviour, and the perceived impact of the platform on their agricultural practices.

2.2.2 Non-Participating Farmers (FGDs):

Focused group discussions (FGD) were held with farmers who were aware of the platform but choose not to participate. A random walk sampling technique was used in Niger state, one of the states in Nigeria where AgroMall has a continuous rollover of activities on a yearly basis. Five groups were scheduled, including two exclusively comprising women farmers, providing valuable insights into barriers or concerns preventing certain demographics from participating on the platform.

2.2.3 Interviews with platform providers

Structured interviews were used to extract pertinent information from the identified platform providers. AgroMall participated in our comprehensive interactions. With the approval of the Chief Executive Officer/ Managing Director, interviews were conducted with the officer responsible for agriculture and related services. Information was sourced from official documents, phone calls and face-to-face interviews.

2.2.4 Interviews with Input and Output Dealers:

Input and output dealers operating in the region where the platform functions were engaged through in-person interviews. A total of 51 input and 56 output dealers were randomly selected using a random walk technique. These stakeholders were already established in their businesses before the advent of digital platforms, providing valuable perspectives on the transformational impact of these technologies on the agricultural supply chain.

2.3. Data Analysis:

Data analysis for this study involved a meticulous process facilitated by the Statistical Package for the Social Sciences (SPSS). Primary data collected through surveys, focus group discussions (FGDs), and interviews were subjected to a thorough examination using simple descriptive statistics. This approach allowed the exploration and interpretation of key variables, offering insights into the patterns and characteristics of the data collected.

The data analysis process, carried out using SPSS and simple descriptive statistics, provided a comprehensive understanding of the digital agricultural landscape in Nigeria. The combination of quantitative and qualitative analyses offered a nuanced perspective on platform usage, challenges, and opportunities, contributing to the richness of the findings presented in this report.

3. Results and Discussion

3.1.0 Identifying the Drivers of Digital Platforms

3.1.1 The Digital Platform-AgroMall Digital Discovery and Extension Limited

The study conducted in 2023 investigated the activities of AgroMall Digital Discovery and Extension Limited (AgroMall). AgroMall was founded in 2017 as an AgriTech firm that helps smallholder farmers and agribusinesses create prosperity using digital platforms. The company started with the idea of building and maintaining a farmer database to provide a solution to the 'dearth of data' in the digital age for the development of the agriculture sector of the Nigerian economy. The birth of the digital platform was aided by the organisation's ability to respond to opportunities to expand the market and service. Working with its database, AgroMall was able to respond to business opportunities in agriculture using digital technology.

The first digital app developed by the organisation was the AgroMall Digital Agricultural Platform (ADAP). The platform was designed to use digital technology, knowledge of agricultural practices, and other tools to improve production efficiency. The primary function of the app was to help farmers obtain economic identities and agricultural finance. It also helps them leverage on agronomic information, produce aggregation services, and access to input and output markets.

Data gathering through ADAP involves the onboarding of participants. This involves profiling farmers and farms to assess their eligibility to participate in the platform (Appendix 1). Participants on the platform are required to indicate their interest in interacting with the platform by obtaining and completing a form. After successfully passing the screening process, the prospective member is engaged. AgroMall's trained extension agents use ADAP biometrics and GPS coordinate technology to capture and validate individual farmlands.

By using different devices to collect data on moisture, soil fertility, weather conditions, and plant health, AgroMall wirelessly streams the data to cloud servers for analysis and prediction of harvest dates, yield quantities, and quality, which are then transmitted to farmers. In addition, extension services are provided to farmers through the Measurement and Evaluation (M&E) component of the platform. The technology also enables AgroMall to calculate the economics of the farmer's crop production on varying types of land.

AgroMall expanded ADAP and launched Tell Agric (TelAgri). TelAgri enabled AgroMall to provide (in addition to the functions provided by ADAP), increased transaction transparency to agribusinesses, farmer cooperatives, and government intervention programmes. Migration from ADAP to TelAgri was an improvement in technological capacity and coverage. This created an environment for financial inclusion for farmers through access to a variety of digital financial services, such as input credits and payment for transactions, agronomic advisory services and digital procurement (direct market access for input and sale of produce).

AgroMall uses its internal resources, skills, capabilities, strength, and foresight to expand its boundaries to take advantage of opportunities.

In the next phase, AgroMall is working on launching a new app called The Agricultural Options (TAO). TAO is an agricultural platform that aims to bring all those involved in the Nigerian agricultural space and enthusiasts together. The application includes TelAgri, Bank of Agricultural Transformation (BoAT), The Junction, FarmTinda, and Young Rancher. This is in an effort to expand its scope and further drive the agricultural industry in Nigeria.

BoAT is a community where farmers interact with each other. There are different circles according to interests. It allows for financial transactions where farmers can seek loans (monetary or input loans) and fund the buying and selling within the FarmTinda.

The Junction is also a platform on the TAO app that deals with agricultural news, articles, and the dissemination of innovations to farmers. In addition to publishing, The Junction also produces technical podcasts on crops and animal husbandry. It will also provide current agricultural business plans and production economics, taking the six political zones in Nigeria into account.

FarmTinda is designed to serve as an online marketplace where farmers and buyers can meet. The interaction on this platform can also leverage FinTech from BoAT.

The Young Rancher is a platform where farmers can receive training according to their area of interest. It is a form of Do-It-Yourself (DIY) with avenues to ask questions through the TAO chatbot (AI chatbox). In addition to AI, the BoAT community and other social media platforms will be opened to guide farmers in DIY.

3.1.2 Transaction cost-cutting opportunities:

Platforms that focus on transactions and try to integrate transaction-related services vertically (like AgroMall) would relate to their capabilities in the form of assets, resources, and activities. This becomes advantageous as the business expands with opportunities for systemic internal innovation through access to technology and information. Using transaction cost-cutting opportunities, platforms can reshape the agricultural value chain and attract users to their platforms by creating additional value for the main users of the platform (Saroniemi et al., 2022).

AgroMall provides improved seeds and fertilisers (two critical inputs for crop production) at comparatively lower costs to farmers through the platform. Participants in the AgroMall platform have access to quality inputs that are supplied directly to farmers in their communities. They also engage in the aggregation of products to platform members at harvest at no additional cost. Furthermore, the M&E segment of the platform fills a large void by providing extension services to farmers in Nigeria (at minimal cost) where the government has failed in its responsibility to provide such services, thus providing the drive for digital platforms.

Users are looking for convenient platforms. Meeting users' expectations is important for the success of digital platforms, which AgroMall has done successfully. Farmers perform many transactions using their mobile phones through chats or text messages. Navigating through the platform is simplified because the platform providers are informed about the social-cultural characteristics of the potential users of the platform, hence the high demand for the platform among farmers.

Other factors that could drive digital platforms include social-cultural and environmental factors that impact decision making in the demand for services. The focus group interaction during the study revealed that some farmers were sceptical of the authenticity of such a platform, and hence their refusal to join. AgroMall also works on social norms that limit women's ability to benefit from innovations such as the lack of title deeds on farmland and the inability to make independent decisions without the consent of their spouses. Some of these are exogenous to platform providers, but knowledge of how to take advantage of such conditions sometimes creates opportunities for digital platforms to thrive, a matter that the platform provider is addressing (Appendix 2)

The AgroMall platform evolved from an agribusiness model which maintained a farmers' database, vertically integrated into multiple opportunities for agroservice within the value chain.

Thus, AgroMall leverages transaction cost economics, user-centric design principles, and broader contextual factors to drive the adoption of digital platforms.

3.1.3 Platform Complementarity

The complementarity of platforms is important in driving successful digital platforms in agriculture. This requires the integration of various technologies and platforms that create synergy with the ecosystem and improves the overall efficiency and profitability of agricultural enterprises.

Integrating digital platforms with precision agriculture technologies is a key component of platform complementarity. Precision farming involves the use of advanced technologies and data analytics to optimise farm management. By integrating precision farming data with digital platforms, AgroMall is working with agripreneurs to contribute to effective agricultural operations in Nigeria.

Using appropriate software with planning, M&E, along with appropriate agronomic practices fully integrated with the digital platform is transforming farm activities in the study area.

Furthermore, the combination of the digital platform with financial technology solutions (FinTech) improves the financial inclusion of agricultural practices. The AgroMall digital platform has integrated payment systems to provide access to credit and facilitate transparent transactions in the agricultural value chain.

3.1.4 Factors that contribute to the scaling of digital platforms

The digital platform would need infrastructure to scale up to meet the demand of the participants in the platform. The platform must have enough space to back up and be able to recover information from its repositories. AgroMall is futuristic in taking advantage of its competitive edge in the digital platform space in Nigerian agriculture by planning the launching of a more robust and versatile platform. The Agricultural Options (TAO) in the first quarter of 2024.

It is also open in terms of collaboration with other platforms that complement its service delivery, for example, Apps used for weather prediction.

The digital agricultural platform will also need to optimise its use of resources such as front-end technologies, content delivery, and a seamless user interface. Until now, the digital platform seems to have these because the respondents in this study expressed satisfaction with the delivery of AgroMall's services. Scaling up will require increasing the capacity of the platform to meet the technical requirements for the next level. The study shows that many farmers who are not platform users are willing to join if they can be enrolled (Figure 1). When asked if they knew other farmers who would like to join the digital platform, 61% of respondents (farmers) reported the willingness of other farmers. The result of the Focus Group study also showed the willingness of all respondents to join the digital platform.

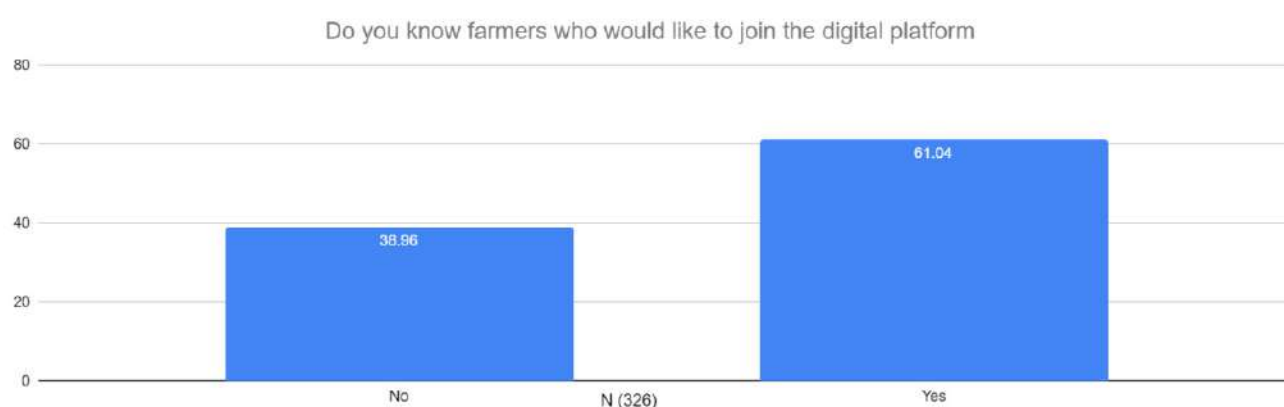


Figure 1: Interest in the digital platform

3.2.0 Analysing Distributional Effects

3.2.1 Agripreneurs Participating in digital platforms (or not)

During the course of the study, three groups of users of the digital platform were identified, namely farmers, input dealers, and output dealers. The study elucidated responses from 326 farmers, 51 agricultural input dealers, and 57 output dealers.

Farmers

Farmers comprise the highest percentage of AgroMall clients, as the main objective of establishing AgroMall was to increase the participation of youth in agriculture and improve the livelihood of farmers throughout the country. Of the 326 farmers in the study, only 68, are women (Figure 17).

The average age of the farmers in the study was recorded to be forty (40) years, with a range of 57, from 18 to 75 years. About 55% of the respondents are less than or equal to forty years old. It tends to suggest a platform that is favourable for the patronage of youth (Figure 2)

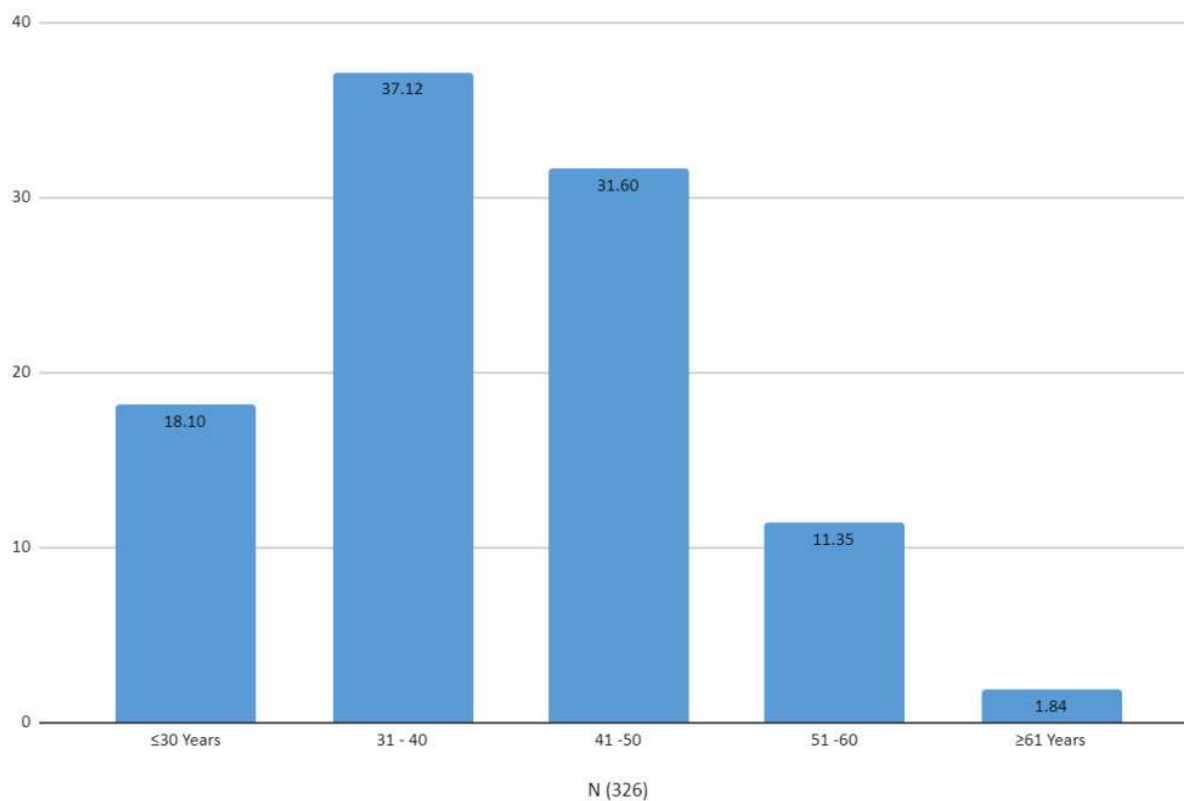


Figure 2: Age Distribution of Farmers

The composition of the household reflects the traditional extended family in Africa consisting of the core family (52.1 %), grandparents (25.5%), son or daughter (13.2%), and others (Figure 3). This is sometimes advantageous to the household who participate in the platform in the sense that the youth within the household assists the elderly while interacting on the platform. The household assets are also leveraged when AgroMall is onboarding new farmers.

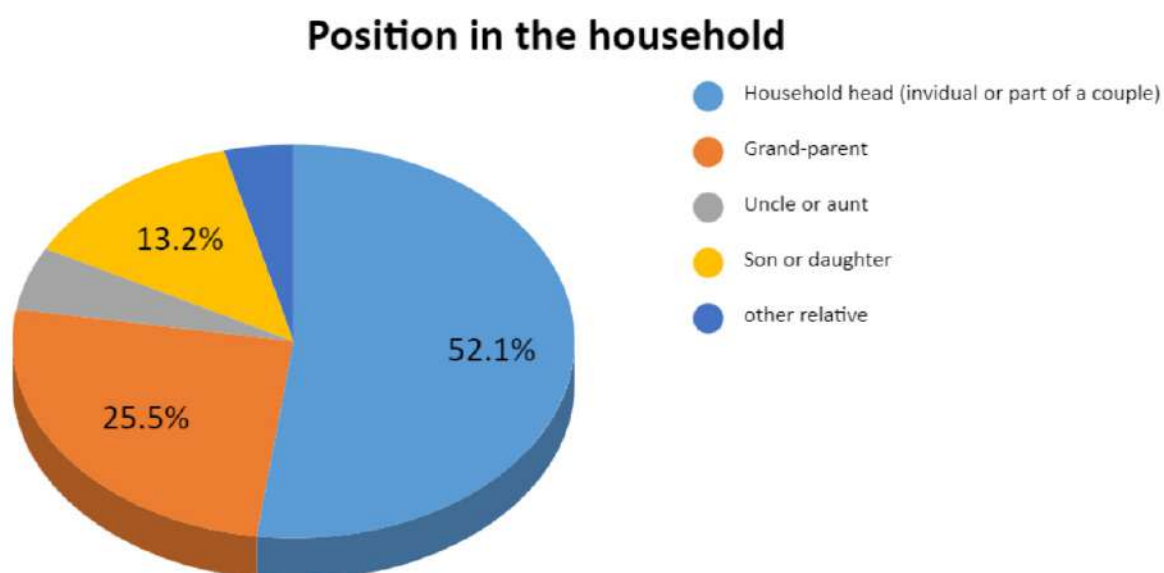


Figure 3: Composition of the household

The level of education of the farmers shows that the respondents have a low level of education. Nearly half of the respondents (48.2) percent have no formal education. The distribution of those with some education showed that some have six (32.5%), nine (4.5%), twelve (10.1%) and sixteen (1.5%) years of schooling representing primary school, junior secondary, senior secondary and university education, respectively. With more than

70% of farmers having had less than six years of education, most of them depend on relatives or extension agents to interact on the digital platform (Figure 4). The mean years of schooling also have implications for the kind of technology adopted by the platform.

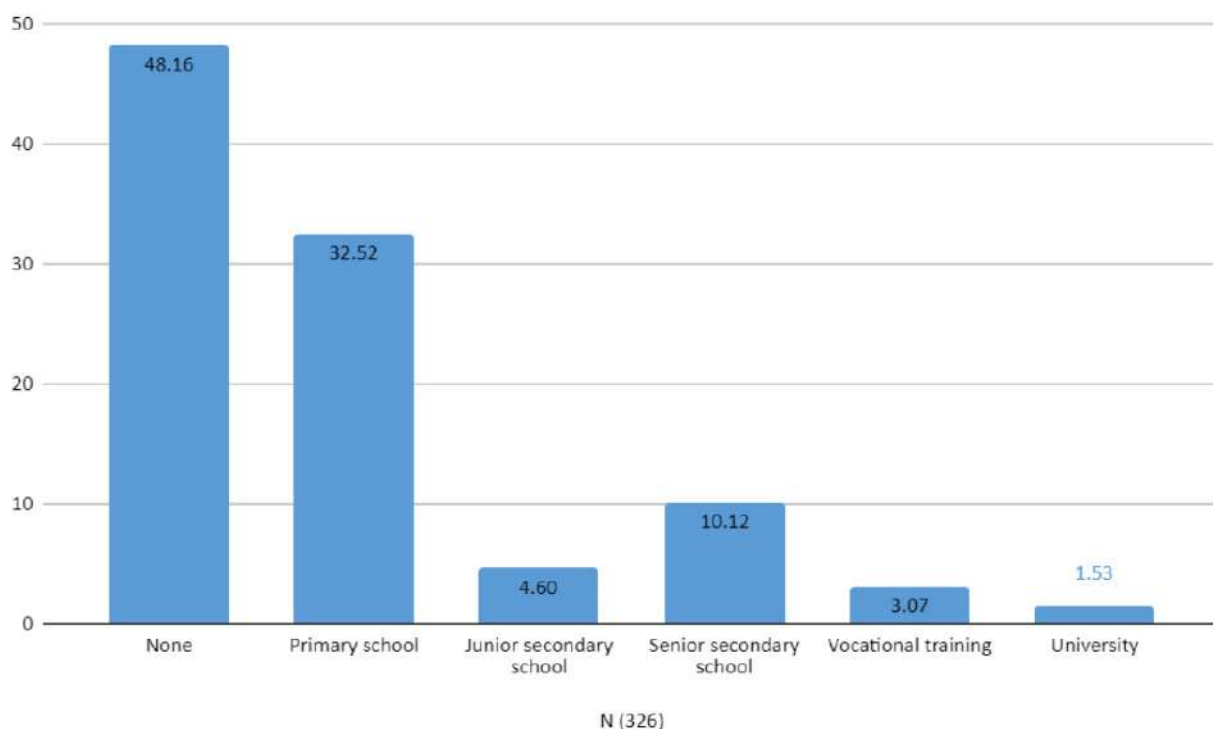


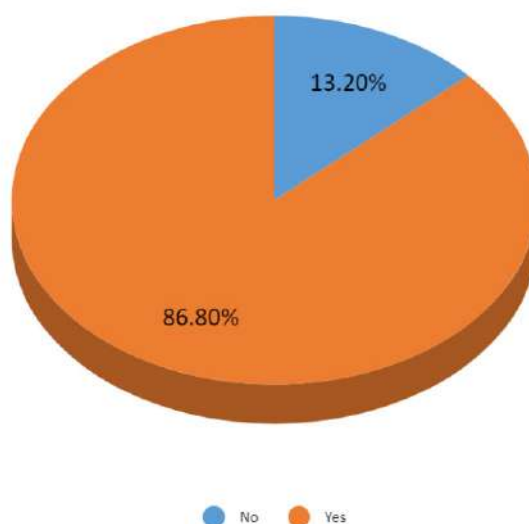
Figure 4: Level of Education of Farmers

Many (86.8%) of the farmers belong to a farmer organisation (Figure 5). Membership in farmer organisations has pecuniary benefits for on-farm support and information sharing. It could serve as a way of promoting the platform among non-users, consequently bringing in more farmers.

Figure 5: Membership of a Farmer Organisation

Farmers are engaged mainly in crop farming. The dominant crop in the study area is rice. Rice is grown to generate income, while other minor crops and vegetables are grown for household consumption (Figure 6).

Membership of a farmer organisation



Commodities (crops and livestock) produced

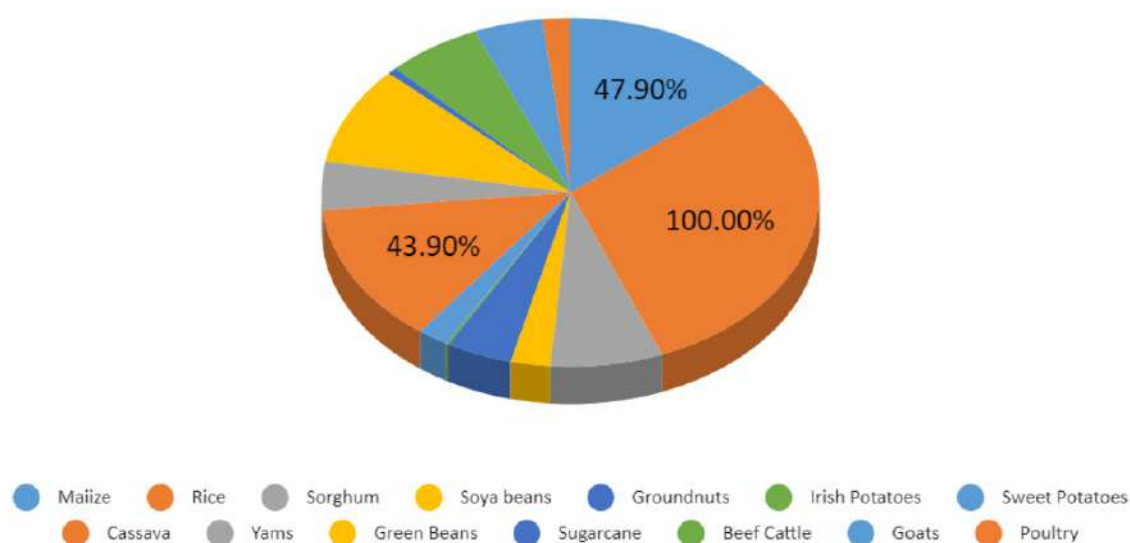


Figure 6: Commodities (crops and livestock) produced

Many of the farmers (87.7%) joined the digital platform in 2021, while the remaining 9.8 and 1.5% joined in 2019 and 2020, respectively (Figure 7). This confirmed the platform engagement process, as explicitly stated by AgroMall, which is an annual process. There is no preference given to male applicants, but female farmers stand a higher chance because the organisation reserves a certain percentage of the available slots for female farmers.

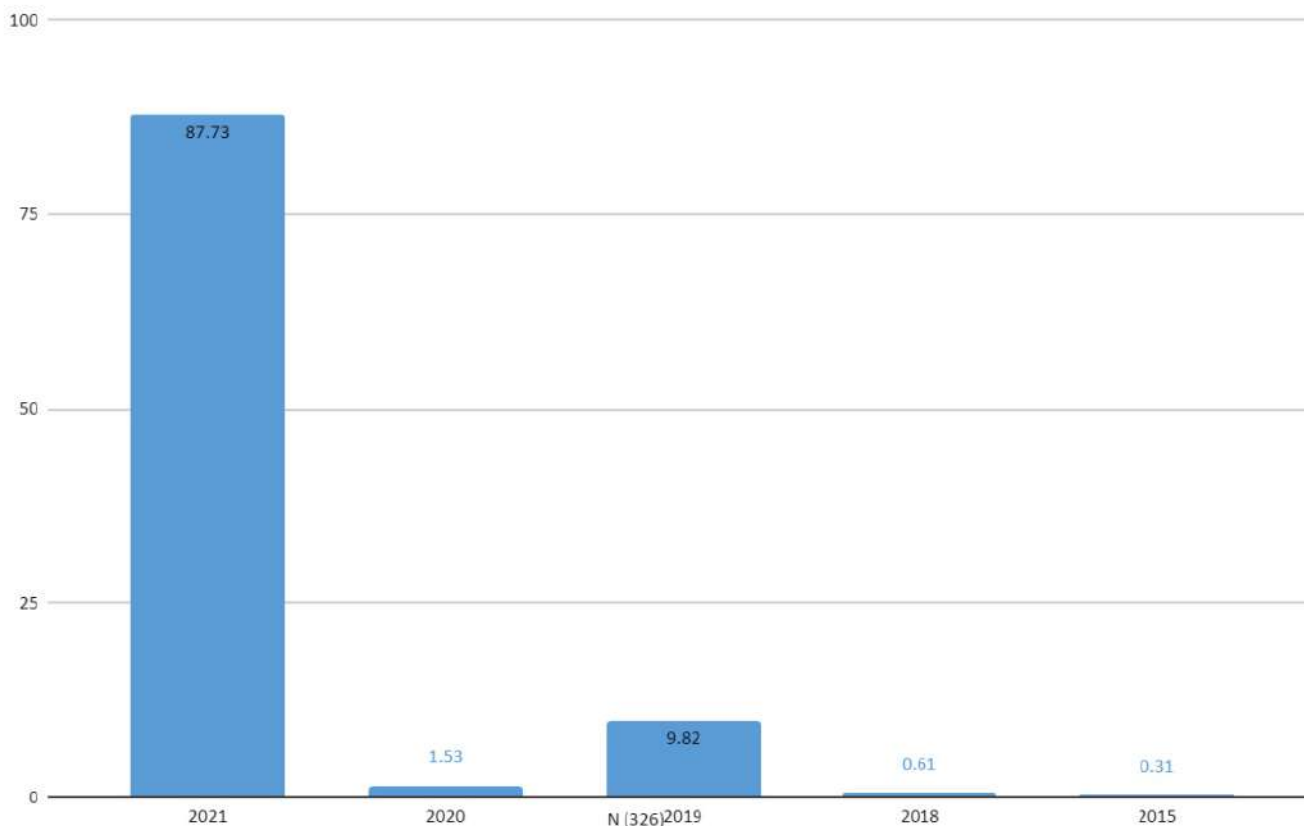


Figure 7: Year the Farmers Joined the Platform

As shown in Table 1, many farmers obtain major variable inputs for crop farming through the digital platform. All the farmers buy fertilizers (100%) and improved seeds (99.4%) through the platform. About half

of them buy insecticides and pesticides (48.2%) from the platform while only 15% and 13.5% of the farmers buy livestock drugs and other inputs, respectively, from the platform. As other information from the study revealed (Figure 6), the low percentages for the purchase of livestock drugs and pumping machines reflect that majority of the farmers crops; rice and maize, have no use for those inputs rather than their unwillingness to buy via the platform.

Table 1: Inputs Received by Farmers via the Platform

	Percentage (%)
Fertilizer	100.0
Improved seeds	99.4
Pesticides and insecticides	48.2
Other livestock drugs	15.0
Other input (pumping machines)	13.5

Input and Output Dealers

Other agripreneurs interacting on TelAgri are input and output dealers.

The input dealers have many years of experience in the business. Most (67%) of the dealers have been in business for more than 10 years, with only 31% of the dealers with less than 10 years of experience as input dealers (Figure 8).

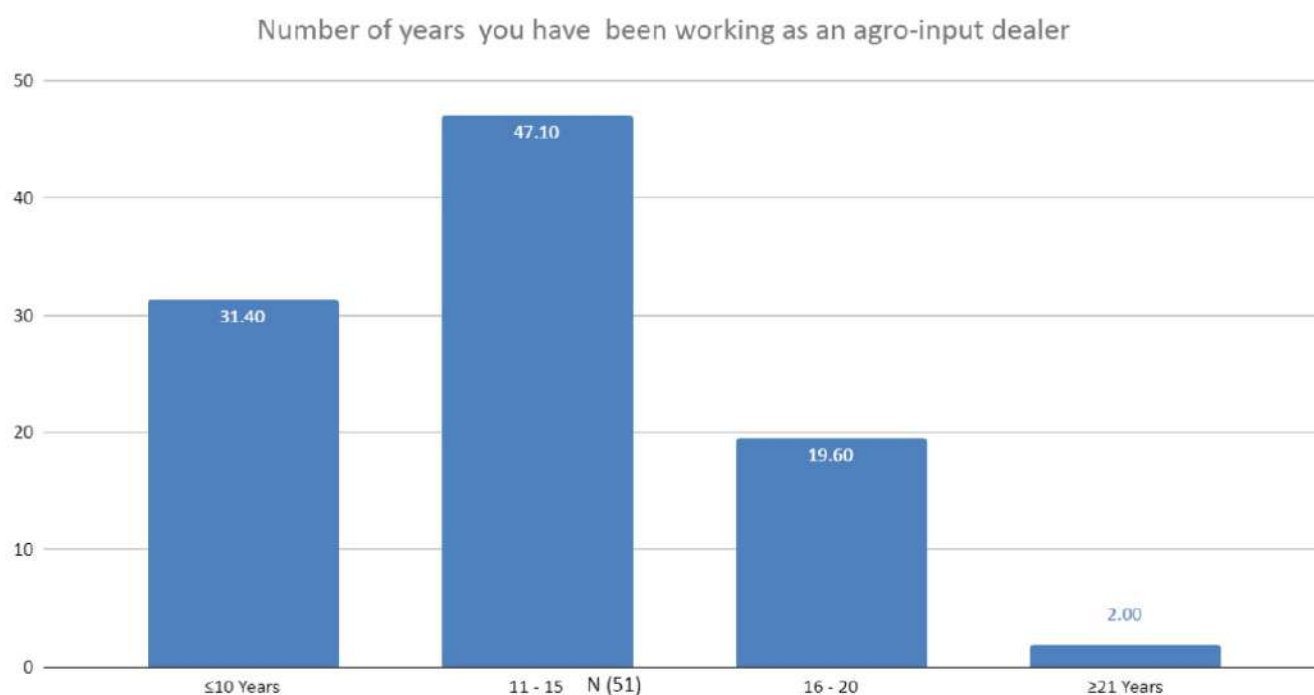


Figure 8: Years of Working as an Agro-Input Dealer

The majority (47.1%) of input dealers are retailers operating stores in the market. Approximately forty-one percent of the input dealers are wholesalers/distributors of agricultural input, while a negligible percentage (7.8%) own agrochemical and seed companies (Figure 9).

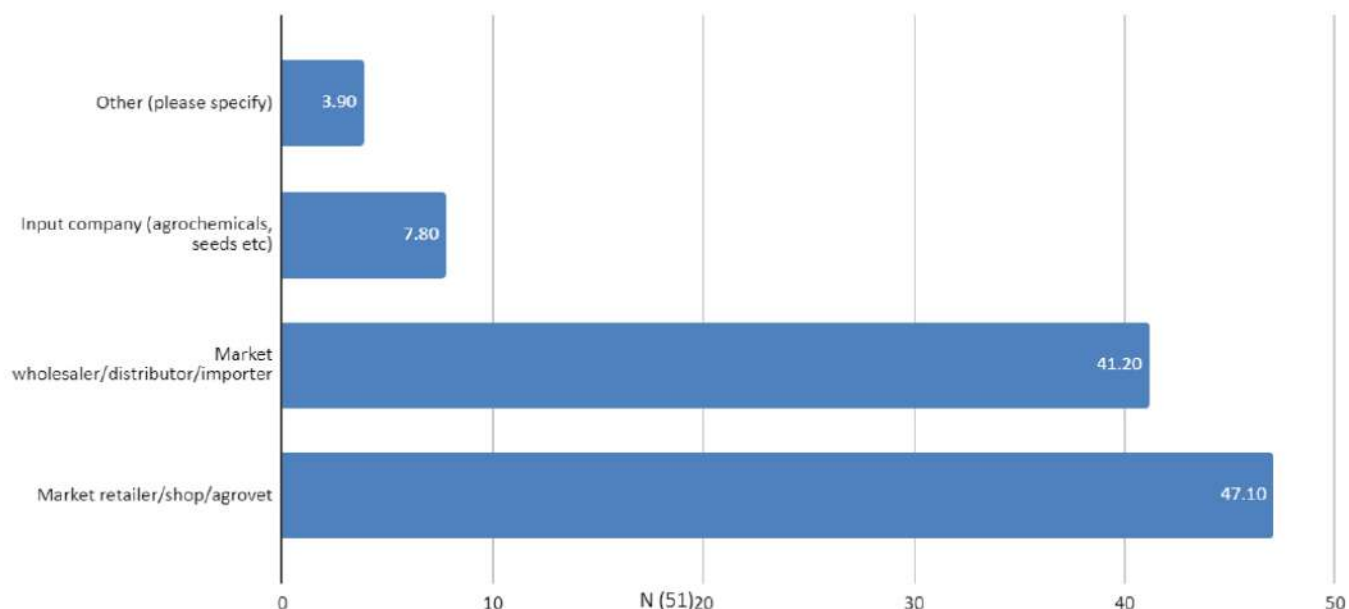


Figure 9: Category of Input Dealership

According to the survey, most of the input dealers sell fertilizers (82.4%), about 55% sell improved seeds, while 29% sell pesticides and insecticides. A small percentage of the dealers (19%) sell pumping machines used for irrigation farming. The input dealers sell almost the same inputs (through the platform) as AgroMall. This is indicative of some level of competition for the sale of inputs (Figure 10).

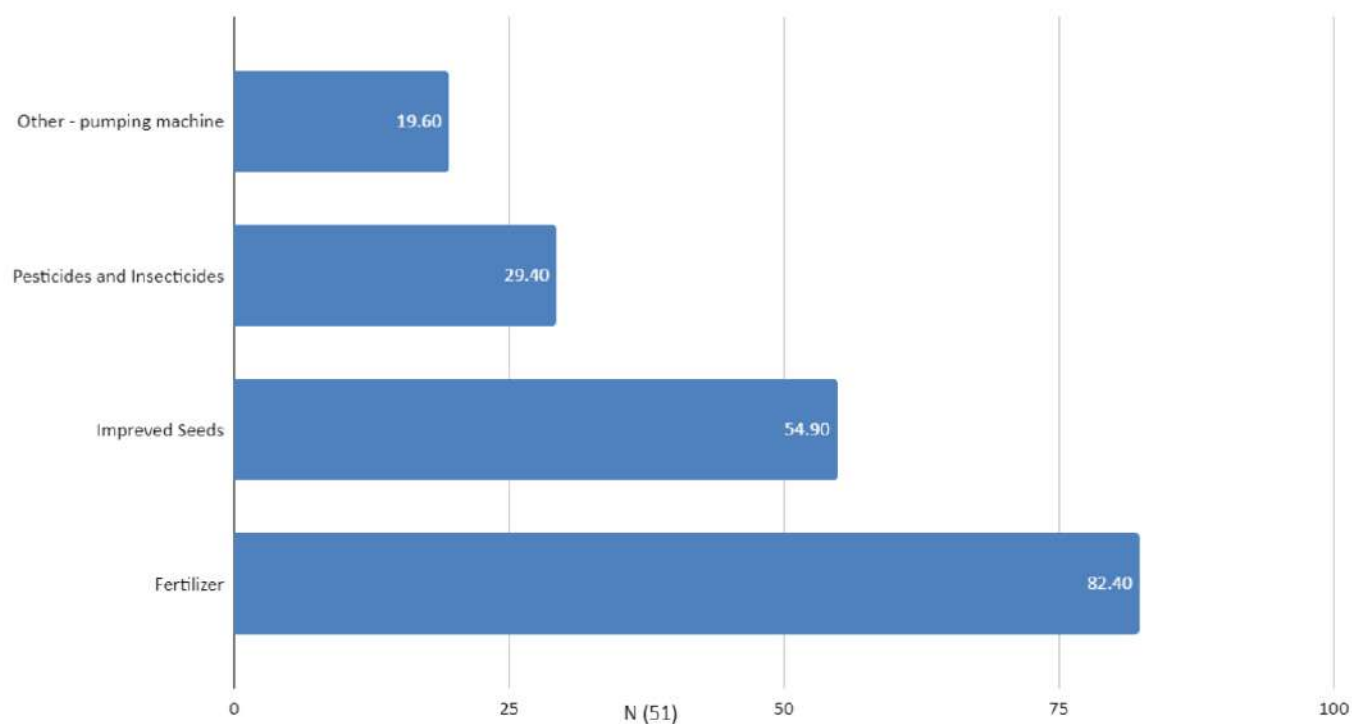


Figure 10: Inputs sold through the platform

The input dealers actively interact on the digital platform (Figure 11). Eighty - six percent of the dealers interact with farmers and among themselves.

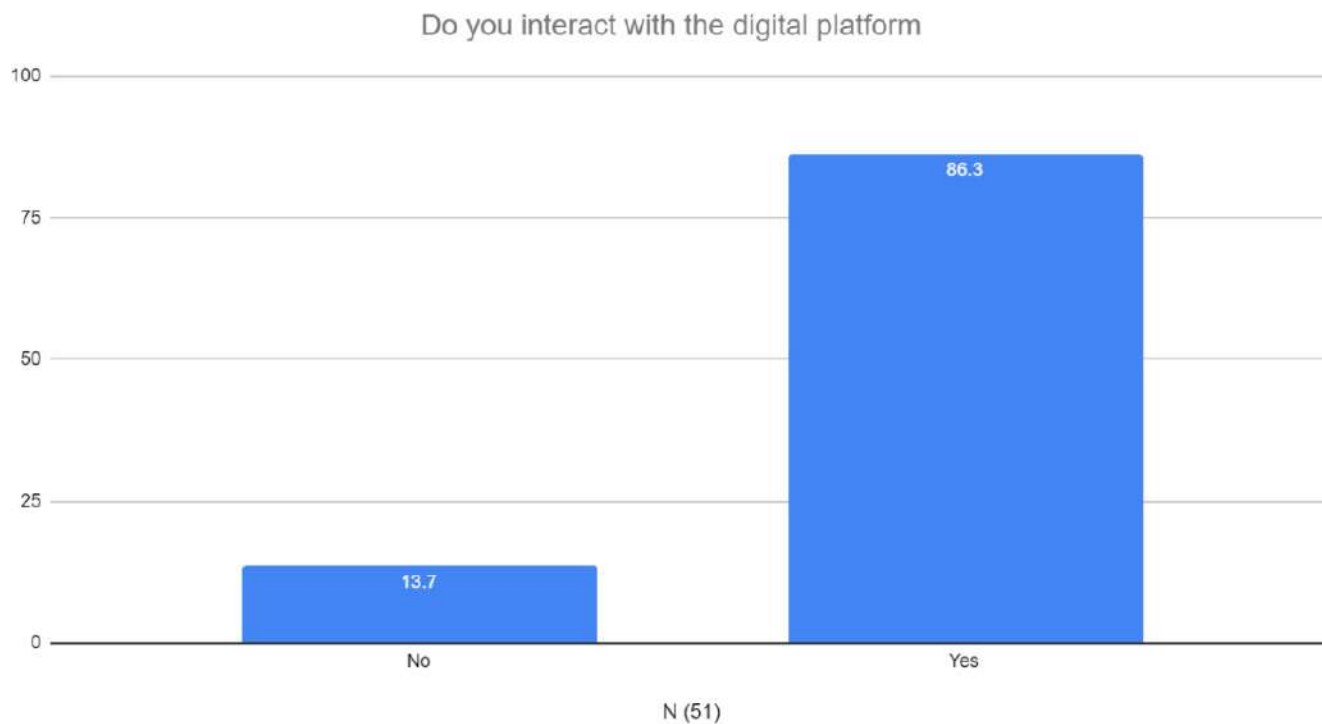


Figure 11: Interaction with the Digital Platform_Input Dealers

The majority (75%) of the output dealers on the other hand have been involved in Agribusiness for over 10 years (Figure 12).

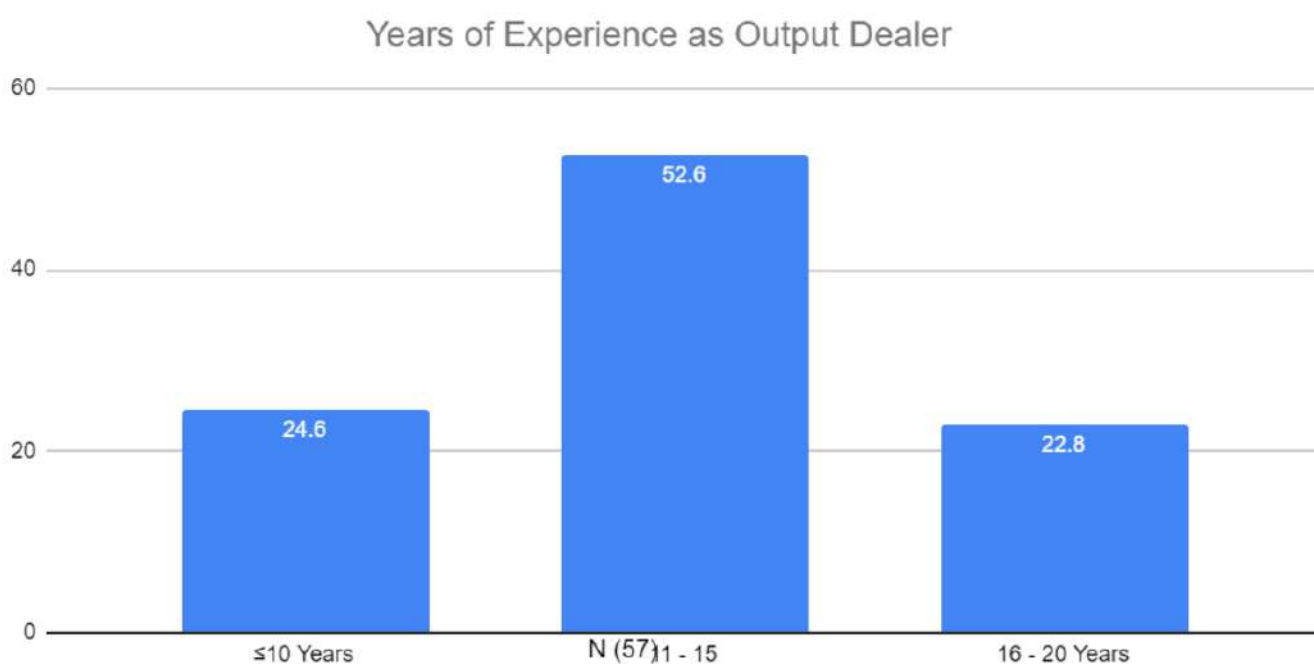


Figure 12: Years of Working as an Agro-Output Dealer

Most are processors (50.9%), some engage in wholesaling (24.6%), and retailing (7.0%) while others are aggregators (8.8%) and producers' selling agents (Figure 13).

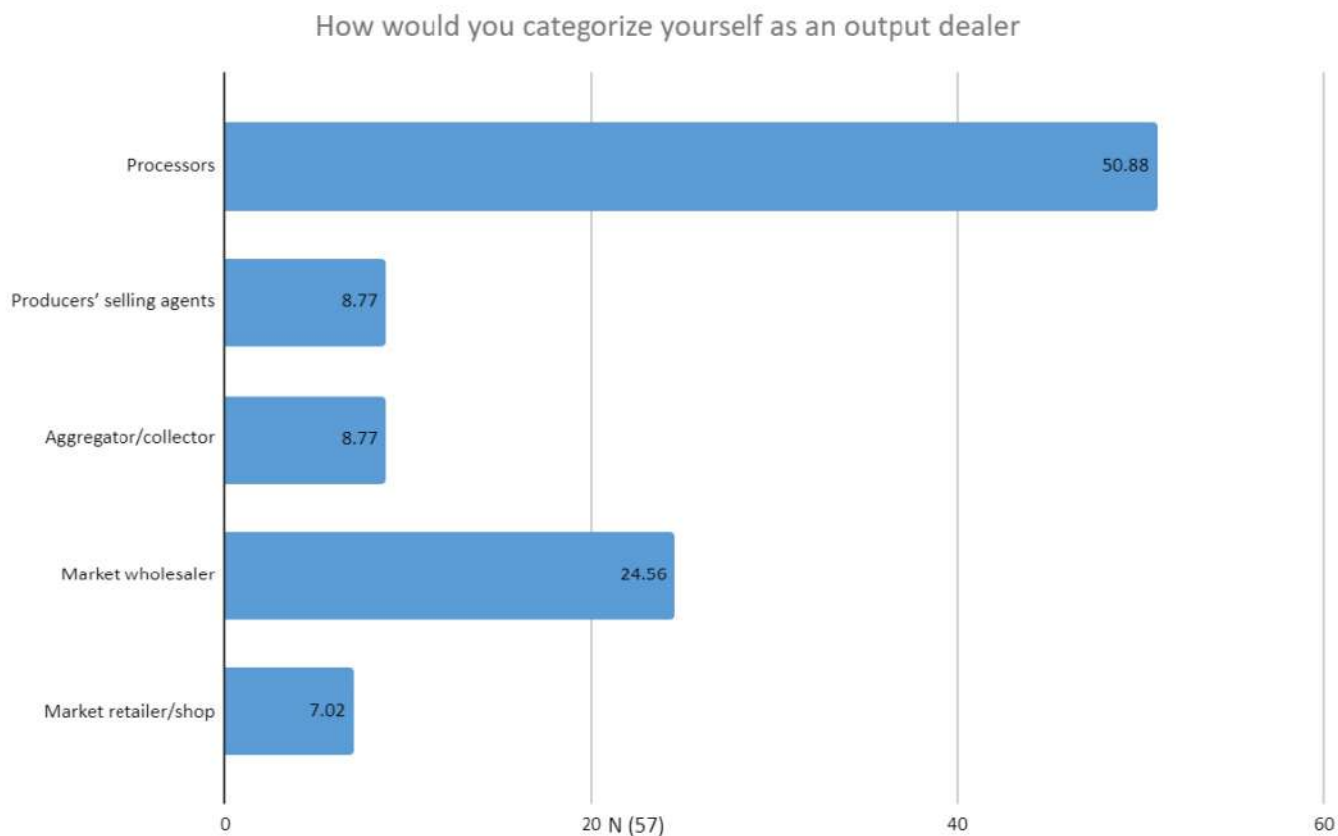


Figure 13: Category of Output Dealership

Rice is the commodity purchased through the platform by most (82%) of the output dealers. Less than 50% of dealers purchase green beans (26.3%), soya beans (15.8%) and casava/maize (3.5%) from farmers through the platform (Figure 14).

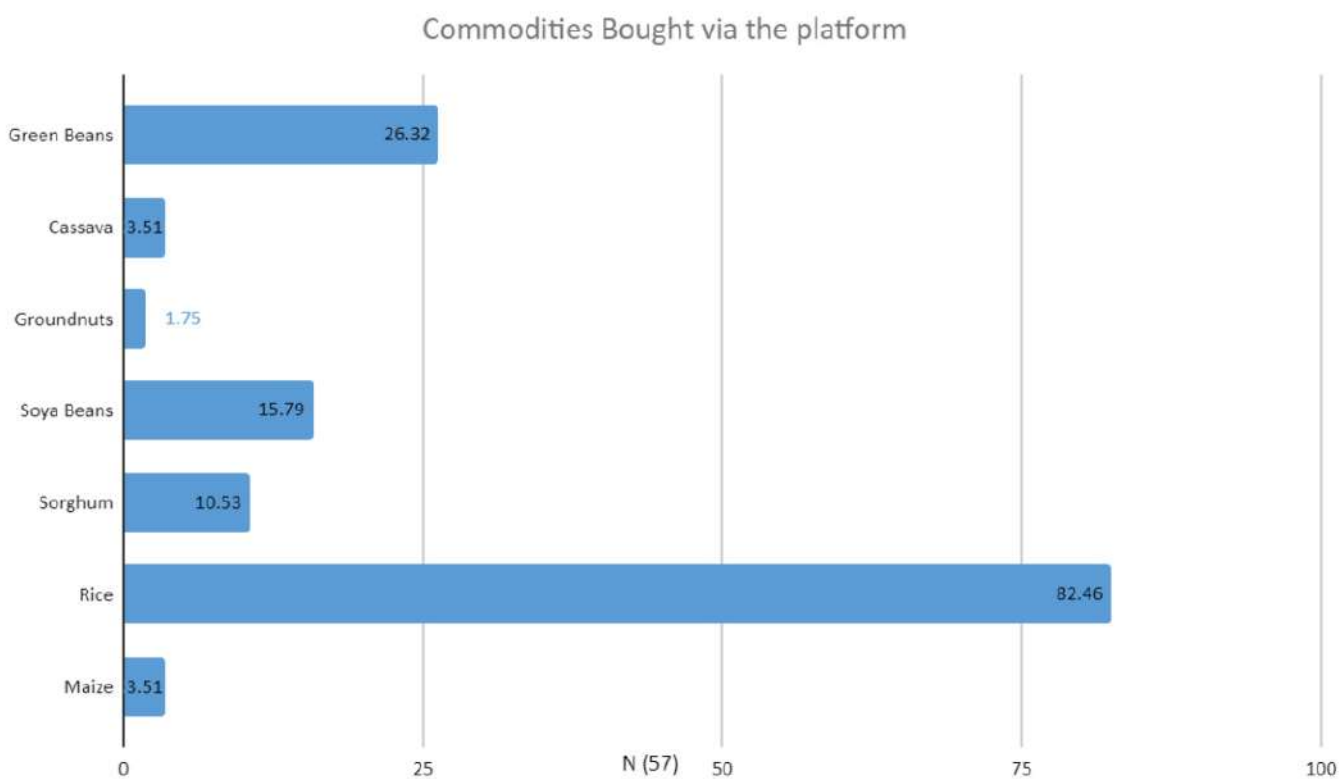


Figure 14: Commodities Bought Via the Digital Platform

A small percentage of output dealers also sell rice (29.8%) and maize (1.7%) through the platform (Figure 15).

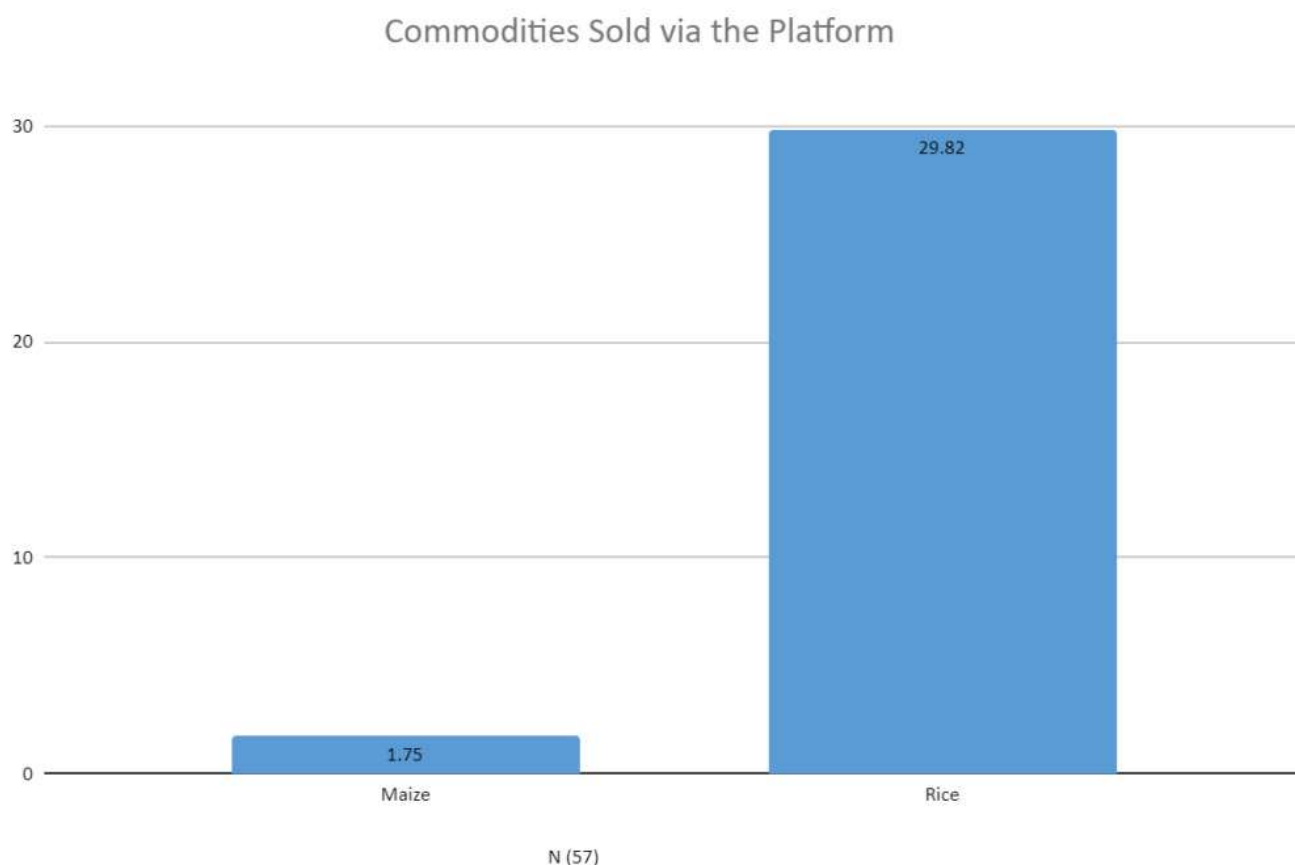


Figure 15: Commodities Sold Via the Digital Platform

The study revealed that the marketing of inputs and outputs in the study area is exclusive to men, that is, there are no female input or output dealers. Although Baumüller et al. (2021) reported that about 27% of the input and output dealers in Nigeria were women, this study fails to confirm the earlier finding. Although, AgroMall's Head Office is located in Lagos, most of her farming activities (and by implication the utilization of the digital technology) take place in the North Central geopolitical zone of the country. According to AgroMall, 7,000 out of the 10,000 farmers that were active on the platform in 2022 were domiciled in Niger State. Furthermore, many of the farmers and input and output dealers in the study area have participated in the activities of AgroMall since 2017. The result in the present study is indicative of the reality of the participation of input and output dealers on AgroMall digital platform. This is evidence that, based on certain social and cultural factors, engaging in certain trade or business activities in Nigeria tends to be gender biased.

3.2.2. Participation of Women and Young Entrepreneurs on the Platform

About 21% of the farmers participating on the AgroMall platform are women. While this figure does not reflect the overall population distribution of Nigeria by gender (which is almost equal, that is 50%), it is representative of the labour force participation rate. The entry of women into the labour force is conditioned on early marriage and the start of a family, coupled with gender gaps in education and other influencers such as religion and geographic location of the woman, which play critical roles in gainful employment for women (Enfield, 2019). Female participation in the platform fluctuates from year to year, although the organisation is deliberate about improving female participation on the platform (Figure 16).

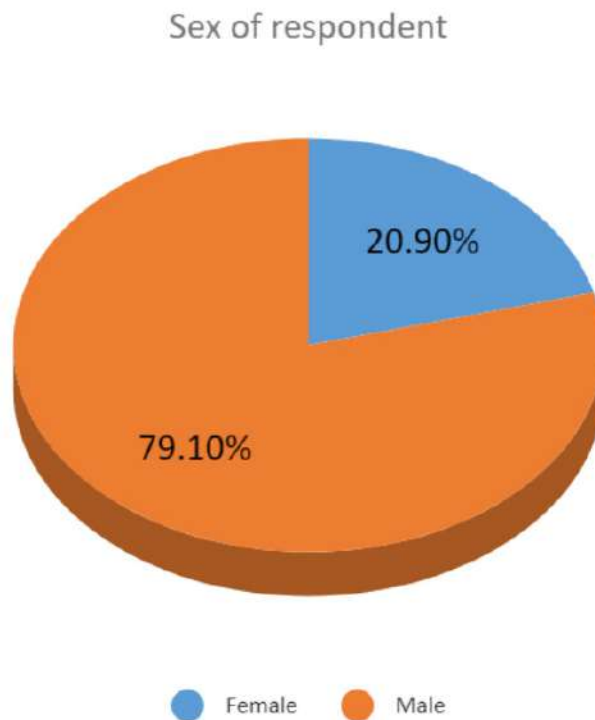


Figure 16: Gender distribution of respondents who are farmers

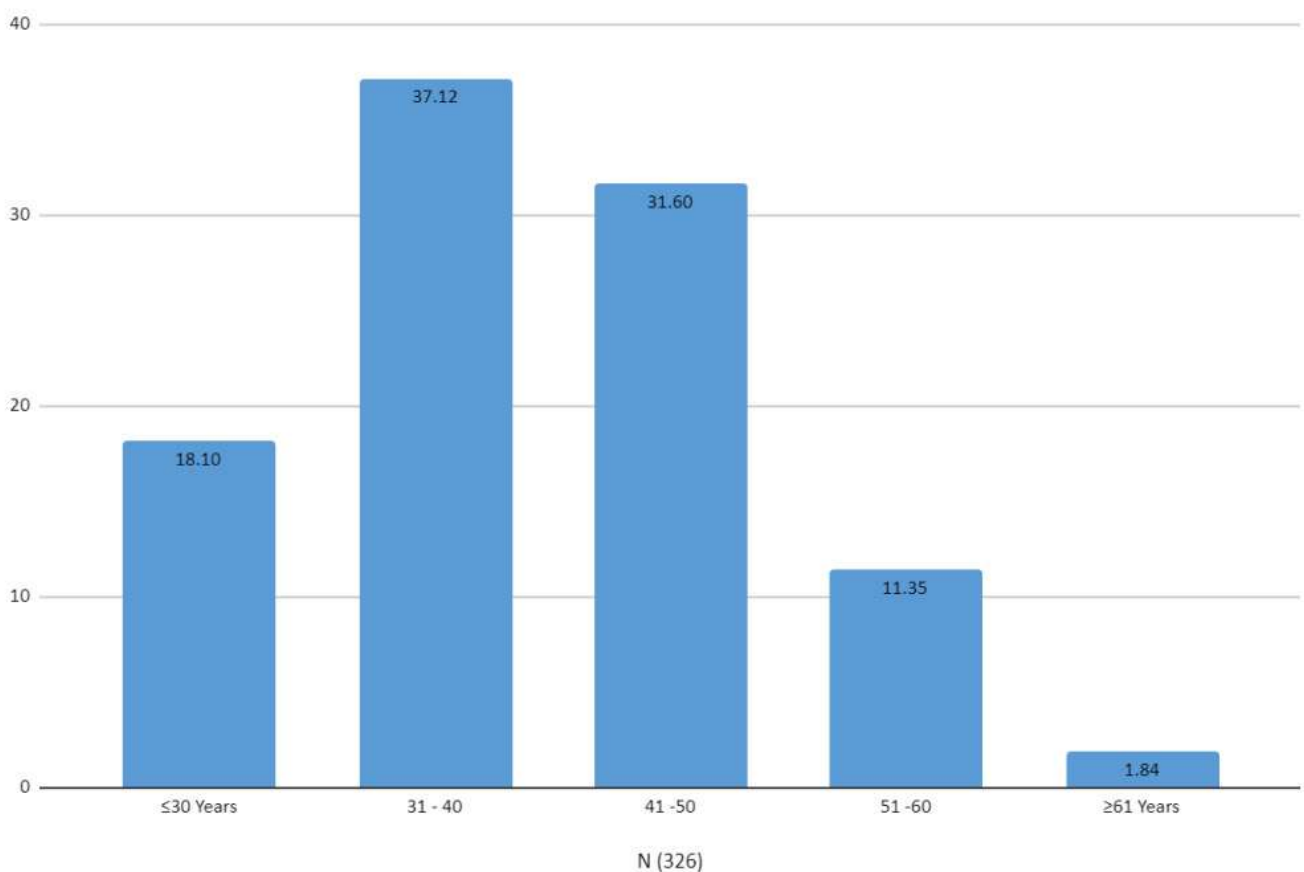


Figure 17: Age distribution of the respondents who are farmers

A significant percentage (55.2%) of farmers are youth, under 40 years of age. The average age of the farmers is 40 years, with 37.1% between 31 and 40 years old. Only a negligible percentage (13.1%) are older than 51 years of age. The study revealed that youths are well represented among the participants on the platform (Figure 17).

3.2.3 Benefits of Digital Platforms to Respondents -

Farmers

By design, farmers participating on the AgroMall platform are screened annually. Any farmer that scales through the screening (Appendix 1) is onboarded and gets a financial benefit in the form of annual credit finance between 150,000 to 200,000 Naira for the cultivation of one hectare of farmland. The interest-free loan, which is often given in the form of inputs, is repaid at harvest time. The farmer repays the loan in cash or gives farm produce to AgroMall valued at the prevailing market price for the commodity.

The farmer also has access to buy input from the platform, in addition to the value of the credit facility, either from AgroMall or any of the input dealers participating on the platform. This includes improved seeds, fertiliser, insecticides/pesticides, and pumping machines. Farmers are assured of good quality (unadulterated) inputs. In addition, because the inputs are purchased by Agromall in bulk, directly from manufacturers, they are cheaper than the market retail prices. Some financial benefits are associated with the farmers who participate in the platform and buy inputs from AgroMall through the platform. This includes prompt supply of inputs in the farmers' community. According to AgroMall, the supply of inputs must meet the recommended application time.

Figure 18: Inputs farmers receive via the platform

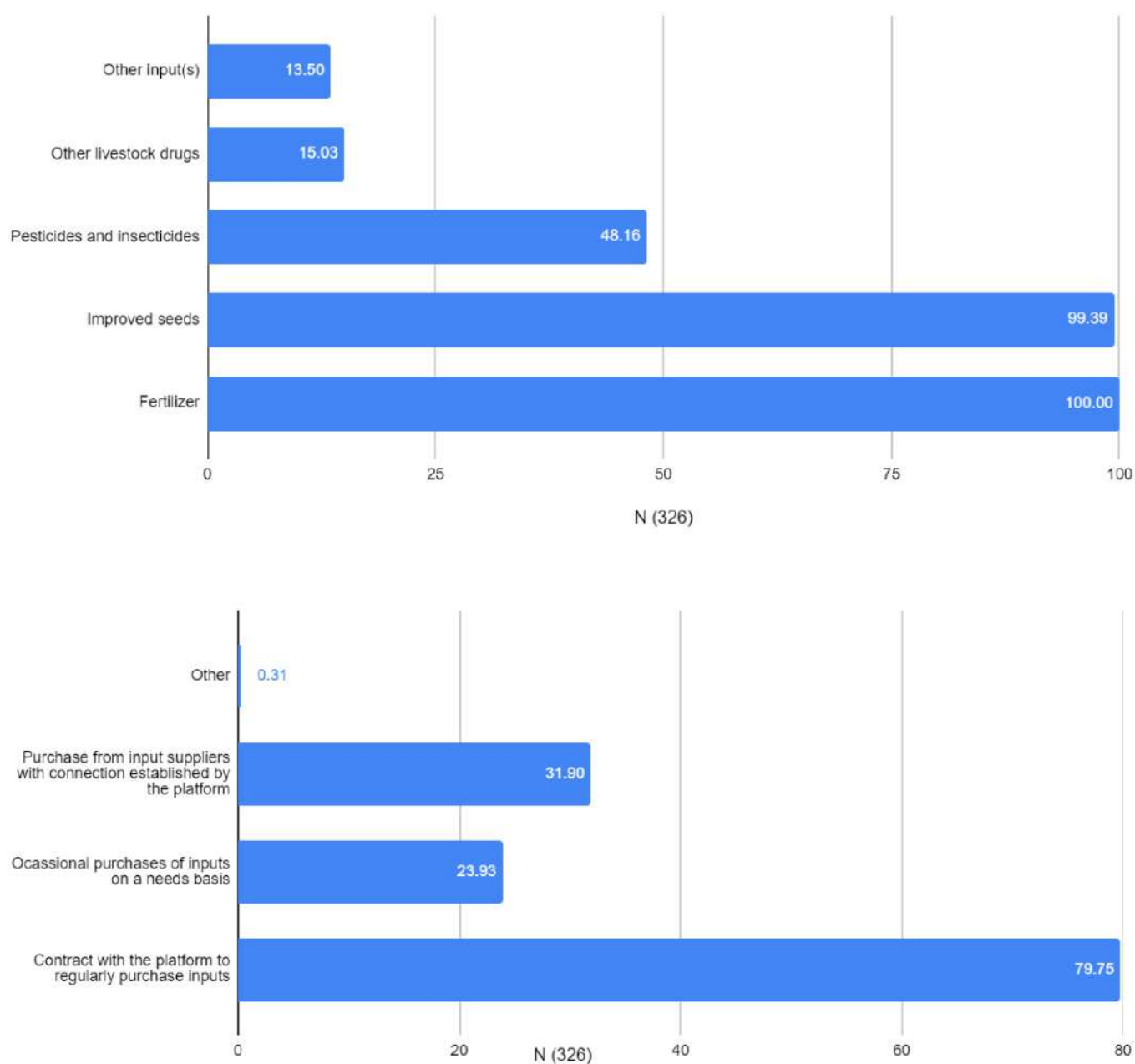


Figure 19: How do you source your inputs through the platform (Farmers)?

Farmers who participate on the platform also benefit from extension services. This includes digitised input management, which enables the farmer to be accurately informed about the right type and quantity of inputs required for optimum output. The technology enables regular updates of farm and agronomic management data per farmer. Such data are processed instantly, and feedback is readily available even in the most remote locations.

Farmers also benefit from weather advisory services that are sent directly to participants' phones as text messages. For instance, they will usually be informed of expected rainfall in their locality relating to the optimal time for fertiliser application or the use of pesticides and herbicides.

TelAgri also validates the harvest information per farmer. The benefit of harvest validation is to check whether the produce harvested compares with the predicted harvest. Digital technology also grades the quality of the farmer's produce. Harvest validation and grading are a great step forward for farmers in assessing premium prices for produce with the highest grade as opposed to selling to dealers in the community who will neither sort nor grade the commodities. Harvest validation essentially completes the monitoring and evaluation (M&E), which aptly concludes the cropping season.

TelAgri has an inbuilt account management system (FinTec) that enables participants to make financial transactions, such as making instant payments for goods and services. This enables farmers to pay for inputs either to AgroMali or to input dealers. It also allows farmers to receive payments for goods sold within the platform. The study revealed that membership in the platform automatically enabled farmers to become account holders. Because account opening is facilitated by AgroMall, and the farmers are registered with the same bank. This reduces the hassles involved in interbank transfers in developing economies like Nigeria, in addition to reducing bank charges for financial transactions on the platform.

Table 2: Impact of the Digital Platform on Farmers

COMPONENTS	INCREASE (%)	DECREASE (%)
Use of Hired Labour	98	2
Commodity Yields	100	0
Output Sold	100	0
Speed of Selling Output	100	0
Speed of Receiving Payments for Outputs Sold	99	1
Use of Digital Payments to Sell Outputs	62	38
Involvement of Middlemen in the Selling Process	53	47
Amount of Income from Farming Activities	100	0
Amount of Income from Non-Farming Activities	22	78
Stability or Reliability of Income	99	1
Savings	100	0
Loans	97	3
Marketing Chains	97	3
Transport Access	98	2
Electricity Access	60	40
Mobile Connectivity	100	0

The result of the study (Table 2) shows that the digital platform has a very significant impact on farmers in many ways. For example, 98% agreed that the digital platform has increased the use of hired labour. This can reduce unemployment and poverty, leading to an increase in household income and means of livelihood. This is in line with the government's empowerment policy to reduce poverty and raise the standard of living in the six geopolitical zones of the country.

All respondents (100%) confirmed that their participation in the digital platform has increased their commodity yields, output sold, the rate of selling output, household income, and standard of living. When asked specifically about the impact of the digital platform on income, all farmers (100%) confirmed that the digital platform increased the amount of income from farming activities. This could increase people's interest in farming activities, as it is now serving as a good source of income. Furthermore, 78% of farmers agreed that the digital platform has reduced the amount of income from non-farm activities. Due to the good income performance of the farm businesses, it is likely to attract more people, increasing the possibility that farm businesses expand and become more vibrant, economically stable, and reliable.

The study also revealed that a large proportion of farmers (99%) affirmed that the digital platform has increased the stability and reliability of income among farmers who participated in the platform. Farmers (100%) agreed that the digital platform has significantly increased savings. An increase in savings is fundamentally necessary for investment and future income generation. A higher proportion of farmers (97%) confirmed that the digital platform has significantly increased loan access, which must have increased their investment and income.

In terms of ease of transactions, 99% of the farmers confirmed that the digital platform has increased the rate of receiving payments for sold output and the use of digital payments (62%) when selling the output. This has implications for transactions among farming communities.

Furthermore, 97% of farmers reported an improvement in the production chain with the arrival of the platform. This has an impact on income generation and economic posterity among the farmers and the rural communities. Farmers (98%) also agreed that the digital platform has increased access to transport and mobile connectivity 100%. An increase in transport access is fundamental to effective movement of goods and services in addition to networking among the farming communities. The improved communication network has implications for agricultural productivity, especially in the long run. A higher proportion of farmers (60%) reported that the digital platform has significantly increased access to electricity, which is fundamental to smooth operational efficiency and socioeconomic livelihood of farmers.

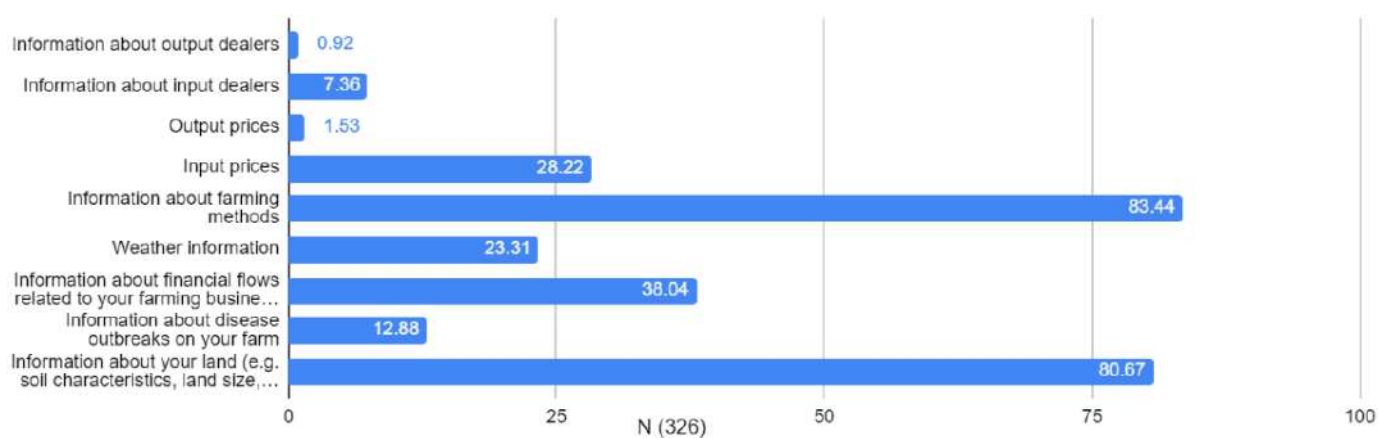


Figure 20: Type of information Farmers receive from the platform

For the most part, information dissemination is important to farmers. As revealed in Figure 20, 83.4% of farmers rely on the platform for information on farming methods, 80.7% for land management, 38.0% for financial flows, 23.0% for weather, and 28.2% for input prices. These are information that they would otherwise not have access to without the presence of AgroMall and the digital platform. The benefits derived from having access to these type of information in rural farming communities are impactful for farm management and agricultural production.

Input and Output Dealers

AgroMall provides linkages for input and output dealers. Dealers rely on the digital platform for a variety of information. For example, the output dealers (Figure 21) obtain information on the digital platform on where to buy (68.46%) and sell (12.3%) commodities. About 27% of the output dealers share information among themselves through TelAgri on where to sell or buy farm produce. Most of the output dealers buy (86%) commodities via the platform, while 31% sell commodities through the platform. The platform provides avenues for dealers to interact with farmers (59.6%) and among themselves.

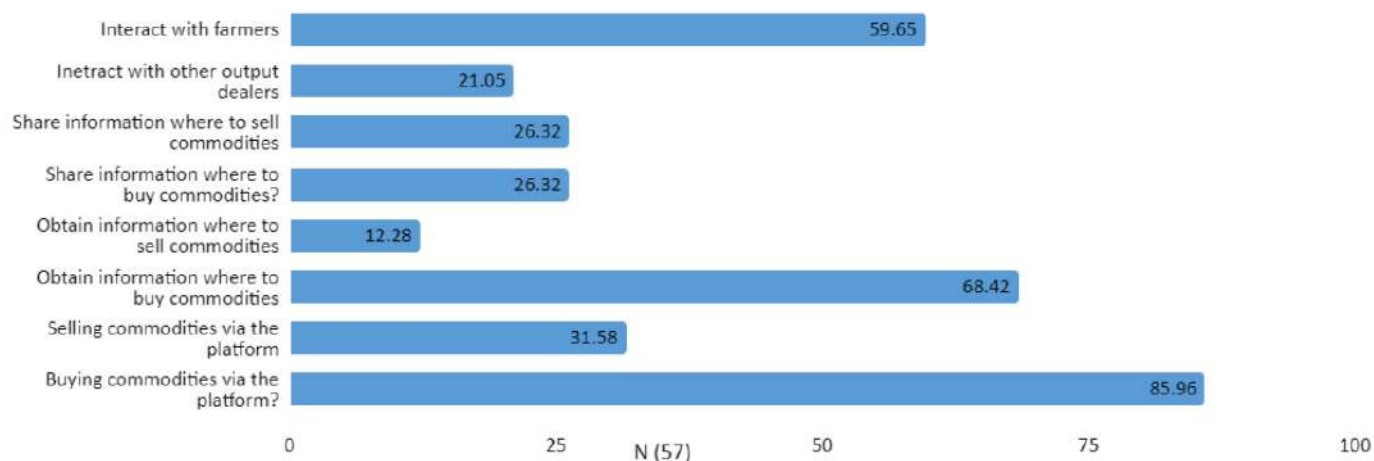


Figure 21: Benefits of Interacting on AgroMall Platform for Output Dealers

Generally, output dealers are very important in the marketing value chain. They are the major actors in produce aggregation. They buy farm produce to sell immediately or store them to sell later, yet others process the commodities for value addition before selling. As indicated in Figure 21, only 31 percent of the output dealers sell via the platform primarily because they buy the output, store some for future sales, and process some.

As shown in Figure 22, almost all output dealers affirmed that the platform has improved the availability of marketing infrastructure (98.2%), transport infrastructure (95%) and electricity infrastructure (94%). Improvements in these infrastructure will have implications for the decrease in transaction costs and the increase in income of dealers. Such improvements will enhance the ease of doing business for dealers. Other areas where the study revealed an improvement in the activity of the output dealers that participate in the platform are mobile connectivity (95%) and the general condition for the demand and supply of agricultural commodities (100 %). These improvements are natural derivatives or externalities of some of the infrastructure put in place to enable the operationalisation or functionality of the AgroMall digital platform.

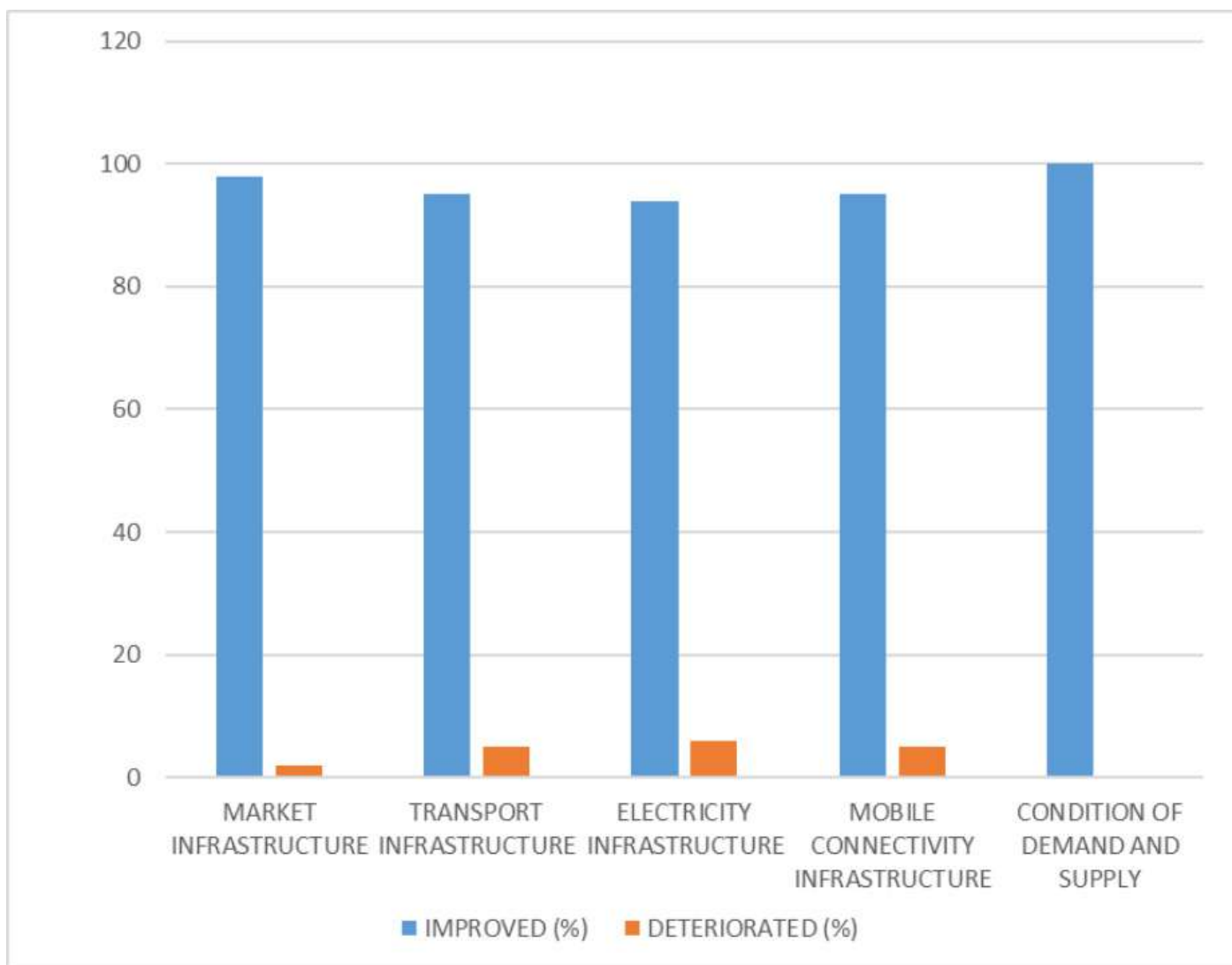


Figure 22: Impact of AgroMall's Digital Platform on Output Dealers

The study revealed that 90% of the input dealers agreed that their participation in the digital platform creates additional business for them in their area of operation. Approximately 4% of dealers feel that it has no impact on their businesses, while 5.9% feel that it is taking away their business (Figure 23).

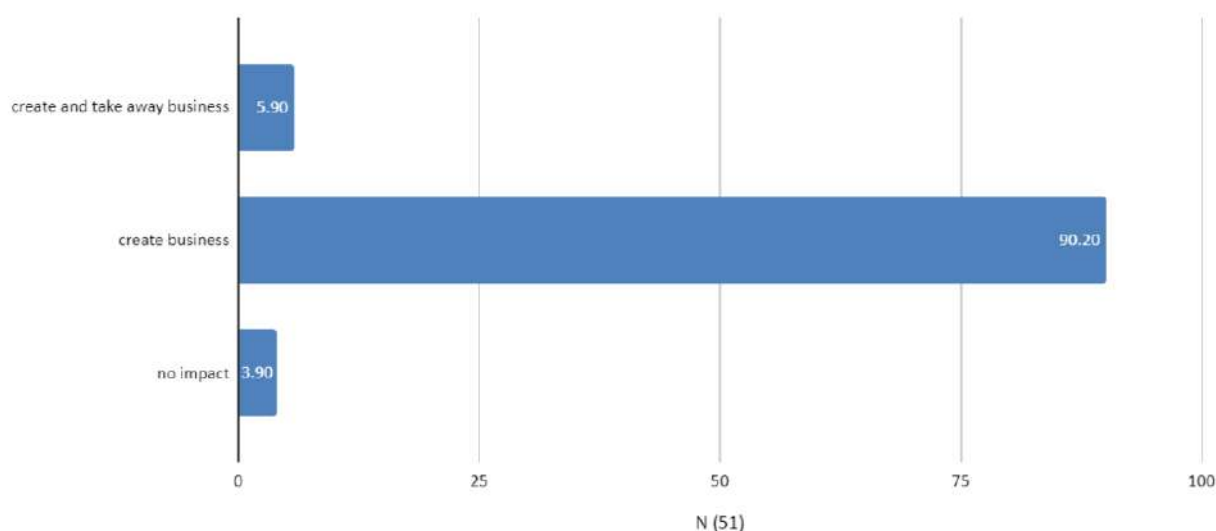


Figure 23: Effect of Digital Platform on Business of Input Dealers

But more specifically, 43.1% agreed that it has increased the demand and supply of inputs, 35.3% agreed that sales and profit have increased in the same period, while 13.70% reported that the AgroMall platform has given them better digital access (Figure 24).

The general impression of agripreneurs is that the arrival of the digital platform has positively impacted agripreneurs in Nigeria.

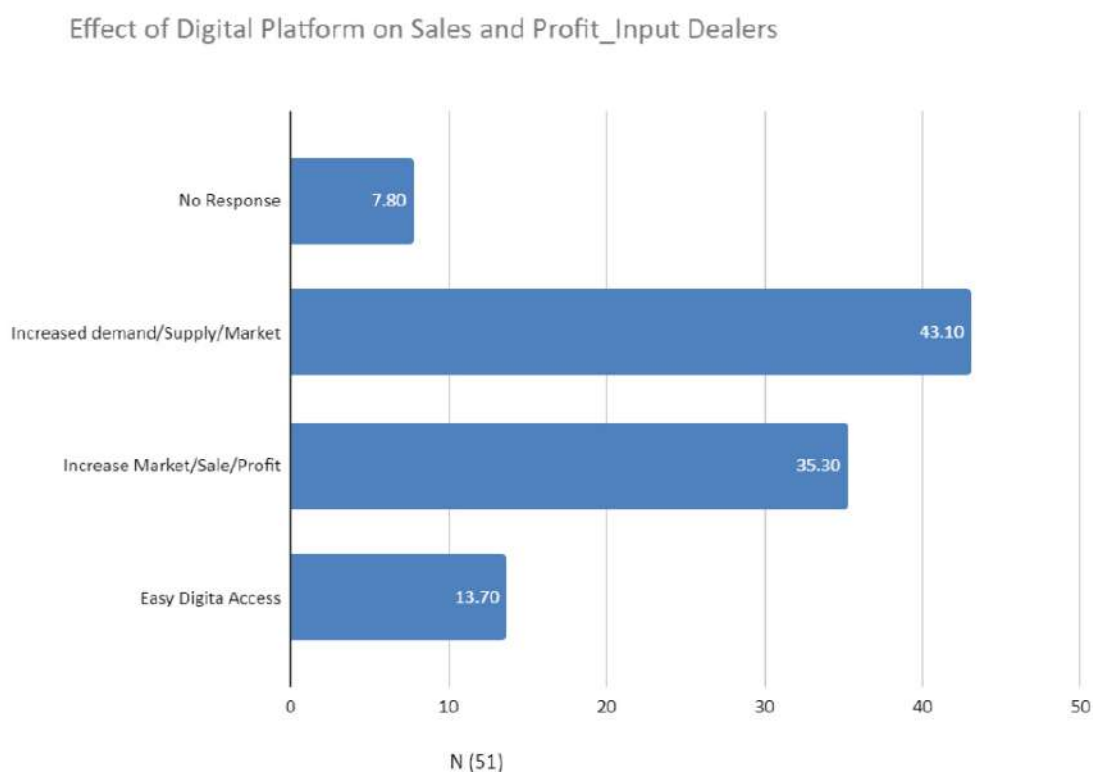


Figure 24: Effect of the Digital Platform on Sales and Profits of Input Dealers

3.2.4 How the revenue generation models of the platforms influence the distribution of financial returns generated through the platforms

AgroMall derives her income from the sale of inputs. The organisation purchases the input directly from manufacturers or major distributors at wholesale prices and sells to farmers at rates lower than the prevailing market prices. The organisation can leverage the margin it makes on the inputs sold because of the quantity purchased and the timing. The inputs are usually purchased very early in the year before the farming season starts. At that time also, the documentation for the farmers would have indicated the quantity of inputs they are entitled to based on the amount of credit they have received. Farmers also receive the inputs delivered to them in their communities. Farmers enjoy implicit cost savings that include interest-free farm credit, lower input costs, and the cost of transporting inputs to their communities.

In addition, the farmers obtain the inputs at the beginning of the cropping season, but pays for them when the crops are harvested. At that point, they can choose to pay in cash or give farm produce valued at the prevailing market price at the time of swap. These are implicit gains and revenue generation for farmers, although it is difficult to quantify the additional income or revenue derived from these transactions.

Another area of revenue sharing on the platform is crop production and aggregation. AgroMall is an active participant in agribusiness. The organisation engages in direct crop production, especially rice and maize. They also serve as crop aggregators during harvest. They buy farm produce directly from farmers and output dealers through the platform. Their stock is then sold to processors (such as millers) and others in the value chain, e.g., flour mills. The benefit rubs off on the entrepreneurs operating within the platform.

The AgricTech digital solution app is a component of Telagri dedicated to support services. This is the main source of revenue for the platform. The platform provides services in M&E, digital crop advisory, aggregation, and other related services in return for financial gain. For example, the Central Bank of Nigeria used the platform from 2018 to 2021 to implement the Anchor Grower programme. The project was nationwide and the AgroMall digital platform provided M&E, extension, and digital crop advisory services to the farmers seeded to them during the period.

In addition, some farmer organisations such as the Maize Association of Nigeria (MAN) and the Rice Farmers Association of Nigeria (RIFAN) also participate in the platform to anchor certain programmes. At different points in time, the AgroMall platform helps international organisations - such as Global System for Mobile Communications (GSMA) - implement agricultural intervention programmes in Nigeria.

3.2.5 Creating an environment for small-scale agripreneurs (including women and youth) to participate in platform-enabled markets and thereby increase their incomes.

Digital agriculture is youth-oriented. One of the objectives of AgroMall is to engage small-scale agripreneurs. This is evident in the simplified requirements for participating in the platform and in making the interface user-friendly. To onboard a farmer, the individual must have a working bank account, National Identification Number (NIN), and farm size of less than or equal to 2 hectares.

AgroMall is intentional about engaging more women farmers on the platform. Women are excluded from paying any form of registration fee. The registration fee is used for the opening and activation of the bank account, and the money (fee) remains the farmer’s money, and can be withdrawn by the farmer after registration. AgroMall often set targets to include a high percentage of women and youths as the farmers they intend to work with at the beginning of each farming season. There is a deliberate plan to ensure an annual increase in the number of participating women and youths. Although the study revealed that about 21% of farmers using the platform were women, the official report of AgroMall from the study showed that the composition of female entrepreneurs for the same period was 25%. More importantly, the preparation for the pre-season for the 2024 farming season indicated that 50% of agripreneurs will be women. The youngest male agripreneur in the study was 18 years old at the time of the survey. Given the mean age of 40 years and about 55% of the respondents being less than or equal to 40 years of age, the age of farmers in the sample tend to skew toward the youth.

Scaling up the number of agripreneurs on the platform will have far-reaching effects on women and youths who are empowered with the opportunity to earn additional income. This will require AgroMall to increase the number of extension agents and inject additional funds into the system. It will be important for the platform to at least aim at maintaining a 50-50% female-to-male ratio or perhaps increase it. About sixty -three percent (63.2%) of the output dealers agreed that the platform had a positive impact on their business (Figure 25).

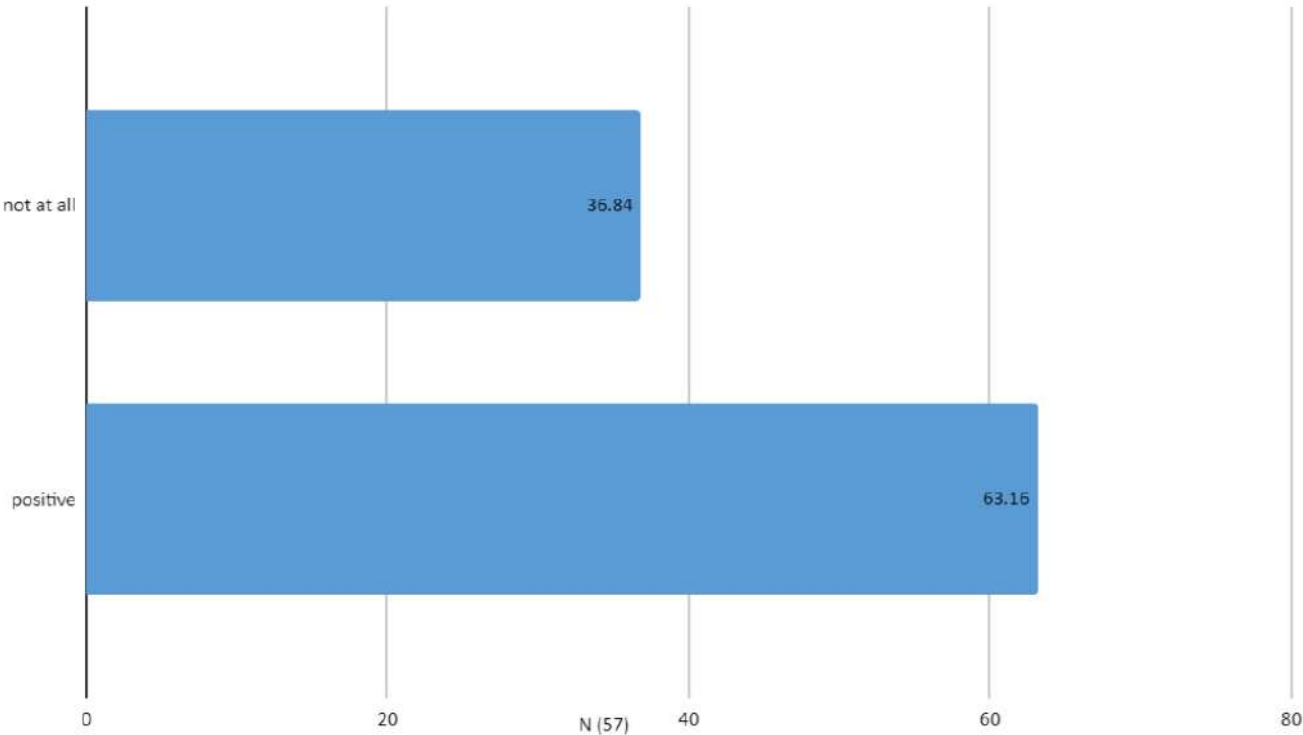


Figure 25: Effect of Digital Platform on Business _ Output Dealer
Agripreneurs trade on the platform. Approximately 94.1% of output dealers sold paddy rice through the platform, while the remaining 6% sold maize (Figure 26).

Commodities Sold via the platform

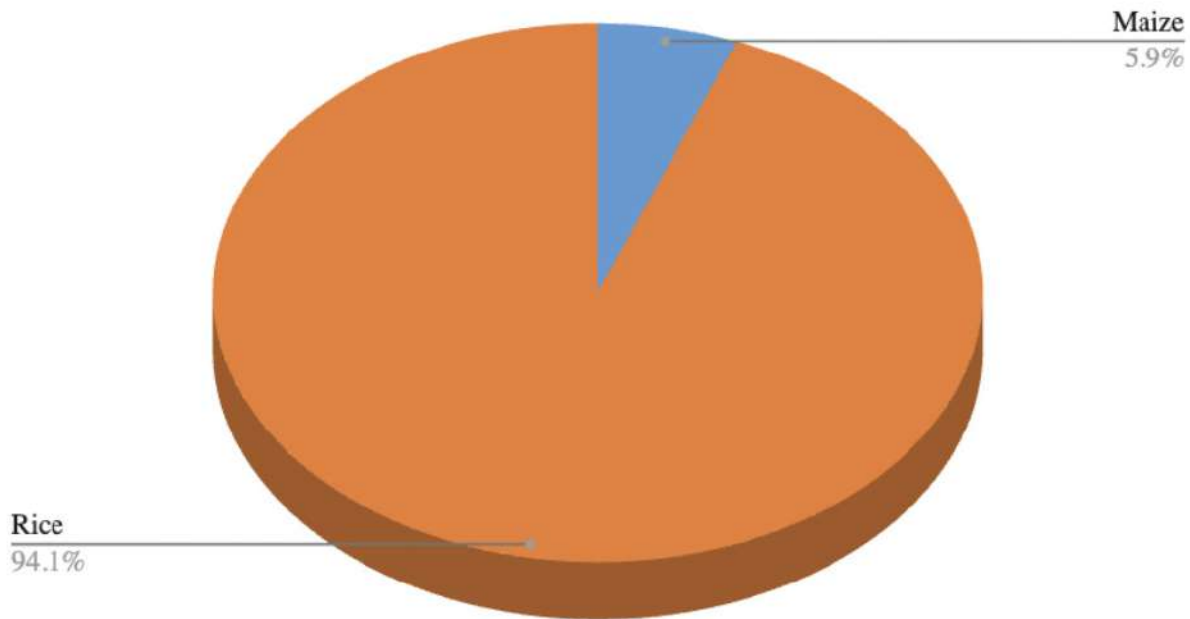


Figure 26: Commodities sold through the platform by output dealers

The farmers, however, sold a wider variety of produce through the platform. As shown in Figure 27, about 57% of the produce sold on the platform was rice, followed by green beans (18.3%), soya beans (11%) and sorghum (7.3%).

Commodities Bought via the platform

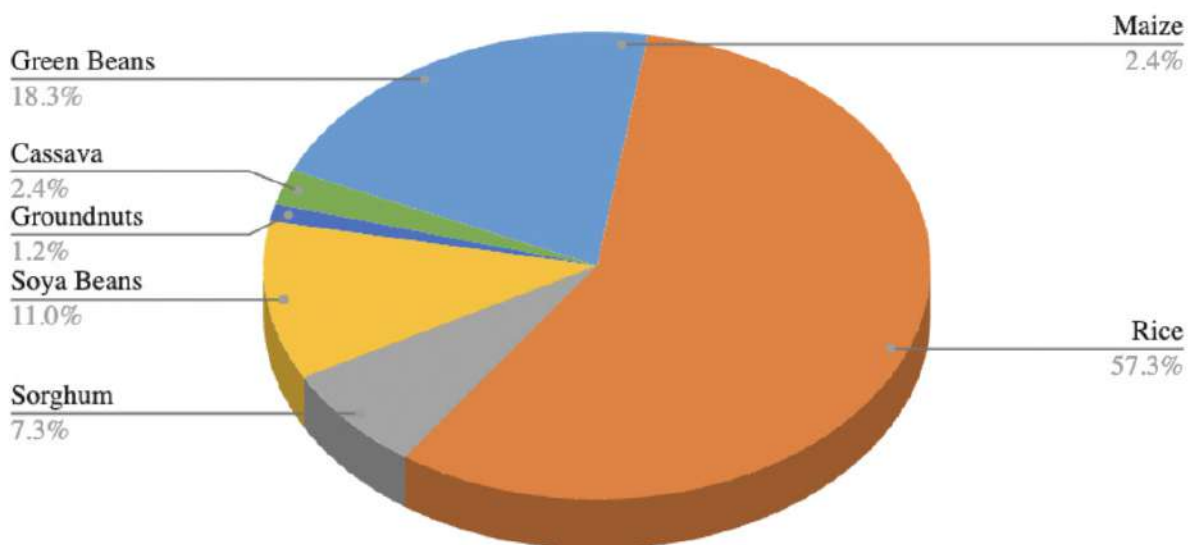


Figure 27: Commodities sold via the platform by farmers

3.2.6 Groups disadvantaged by the platform,

The platform used by AgroMall was essentially designed as a service provider. It became operational in 2018 and the services rendered through the platform include farm and farmer Identification, land identification and validation, input management, an automated agricultural Inventory system, and harvest validation.

The AgroMall app (Telagri) was designed to bring technology to the farmer to increase their income and general socioeconomic well-being. The organisation, in addition to its projects, partners with governments, funding agencies, non-governmental organisations (NGOs), farmer groups, and other agencies to provide services to farmers in Nigeria. The platform is accessible nationwide.

Primarily, AgroMall operates a policy of equal opportunity engagement in the execution of its projects. The eligibility to participate in the platform is unbiased as long as the farmer satisfies the engagement requirements. The first step in the engagement process is that trained extension agents will inform communities in the relevant states of planned interaction. Thereafter, the agents will visit the communities to carry out an exercise termed Know-Your-Customer (KYC). Farmers are informed about the project and eligibility criteria, which is essentially to provide evidence that the applicant is a farmer who has a minimum of farm size of less than or equal to 2 hectares, a bank account, a phone, and Bank Verification Number (BVN).

Some female subscribers often do not pass the screening due to their inability to meet the credit eligibility criteria because the women do not have evidence of land ownership. In 2021 AgroMall embarked on a deliberate policy targeting increasing women's participation in the platform to 60%. The special programme employed a model that used alternative scoring for credit eligibility for women by removing the traditional collateral, land. The model, tagged Transformed Score, allows unsecured lending based on alternative forms of data to assess willingness and ability to repay. This resulted in an increase in the number of women beneficiaries to 25.6%. AgroMall discovered that the low participation of women in the platform could be traced to obstacles or barriers created by social norms and culture. For example, some men would rather have the women front for them rather than allowing the women become independent and economically empowered. Some men are concerned that the economic empowerment of women might change household dynamics and that men would have less influence on women and there is possibility that women will even leave their husbands.

Other groups that could be disadvantaged are farmers without phones, those who are not financially literate, and those with less than a hectare of farmland.

The AgroMall app (Telagri) is used to onboard farmers and the bank verification number is part of the KYC (Know Your Customers) data collected to authenticate the farmer. The phone is also necessary because there are phone calls from extension agents and digital agriculture advisories are sent via Short Message Services (SMS). The AgroMall app and programme are designed to support small-scale farmers - farmers with less than 2 hectares of land.

The inputs supplied to farmers are sometimes inadequate for farming activities during the cropping season. Such farmers seek alternative means of sourcing inputs, which could be at higher costs.

There is a greater population of farmers who lack access to the platform because AgroMall has limited engagement capacity. In 2021 and 2022, AgroMall was active in Bauchi, Kano, Kwara, and Niger States, but in 2023 they engaged about 7000 farmers in only Niger state. The widest reach of the digital platform was from 2018 -2021 when the platform hosted the Anchor programme of the Nigerian government. While AgroMall's technology can handle national projects, funding is a major limitation in reaching more farmers. The non-platform users interviewed using the Focus Group indicated a willingness to join the platform, but many may not have access due to limited funds.

3.2.7 Enabling conditions needed to support equitable outcomes

AgroMall has taken steps to address the challenge of creating enabling conditions to support equitable outcomes in digitalising agriculture. However, additional support is needed for equitable outcomes.

One of these is community sensitisation to ensure that AgroMall deals with genuine farmers. AgroMall has increased her community engagement by involving religious and community leaders, and heads of families through community outreach and enlightenment programmes. This aims to create awareness of the platform among farming communities. They are partnering with community-based organisations to engage more women and youth as beneficiaries.

AgroMall has also introduced other loan products that require land lease rather than ownership. The programme is specially aimed at women and youth to enable them to cultivate more crops, increase their income, and gain access to other credit packages in the future.

Accountability is also crucial for equitable outcomes. Some farmers operate multiple platforms and may not be accountable at the end of the season. This leads to loan defaults, and it has implications for future engagements and the success of the programme.

One of the pecuniary benefits to agripreneurs who are participants in the platform is that they are bank account holders and have a track record which can be a reference point for credit reports. There is ample evidence that the platform has impacted agricultural production and produce marketing in the Nigerian economy, and scaling up is necessary for equitable outcomes.

3.3 Impact on Agricultural Markets

3.3.1 How are platforms changing vertical integration?

The creation of the digital platform has allowed innovative convergence to occur, which leads to the emergence of a new model of vertical integration in marketing in Nigeria. The platform has created an environment of integrating the supply of inputs, banking services, agricultural production, transportation, and produce aggregation, processing, and selling of commodities within the reach of the participants.

AgroMall works with input manufacturers and major input distributors for uptake by the farmers. They also work with other organisations in land preparation while utilising their technology for soil testing.

They link up with other organisations using their application programming interface (API) to collect data, such as weather forecast. AgroMall collects data on moisture, soil fertility, weather conditions, and plant health and wirelessly stream the data to cloud servers for analysis, and also makes predictions of yields and disseminate the results through the platform to the point of need. The platform connects input dealers with farmers for prompt supply of needed materials to complement Agromall's supplies. This increases the source of input supply to farmers who are members of the platform.

Farmers also have increased access to more output dealers in addition to AgroMall for the sale of their produce. In essence, AgroMall, through the agricultural platform, obtains pertinent information from other parts of the value chain and processes this into the different areas of need, such as transportation and logistics, and the management of other agents in the value chain for efficient integration of the value chain.

This model implies that rather than relying solely on the village or local markets for the procurement of inputs and the sale of outputs on stipulated rigid market dates, the platform has eased the agricultural value chain by bringing it closer to the farmer right at the press of a button.

3.3.2 Impact of platforms on transaction costs

In general, the platform has impacted the cost of marketing since the birth of the AgroMall app (Telagri) in the study area. Following Eggertsson's (1990) definition, the platform seems to have absorbed the cost of searching for information, bargaining, defining the terms of the contract, and enforcing the contract.

The digital platform has simplified the traditional marketing process, eliminating intermediaries and reducing associated costs such as transportation, storage, and handling.

Poor infrastructure, distance from the market, high market margin of local merchants plus imperfect information that would have increased the price band for transactions have effectively been eliminated by membership of the platform. The study revealed that farmers sell and receive payments for output faster (Table 2). They can access a wider market without the need for physical presence (Figure 28). This expanded reach has led to better matching of demand and supply, reducing the costs associated with inefficiencies in the logistics of physical transactions.

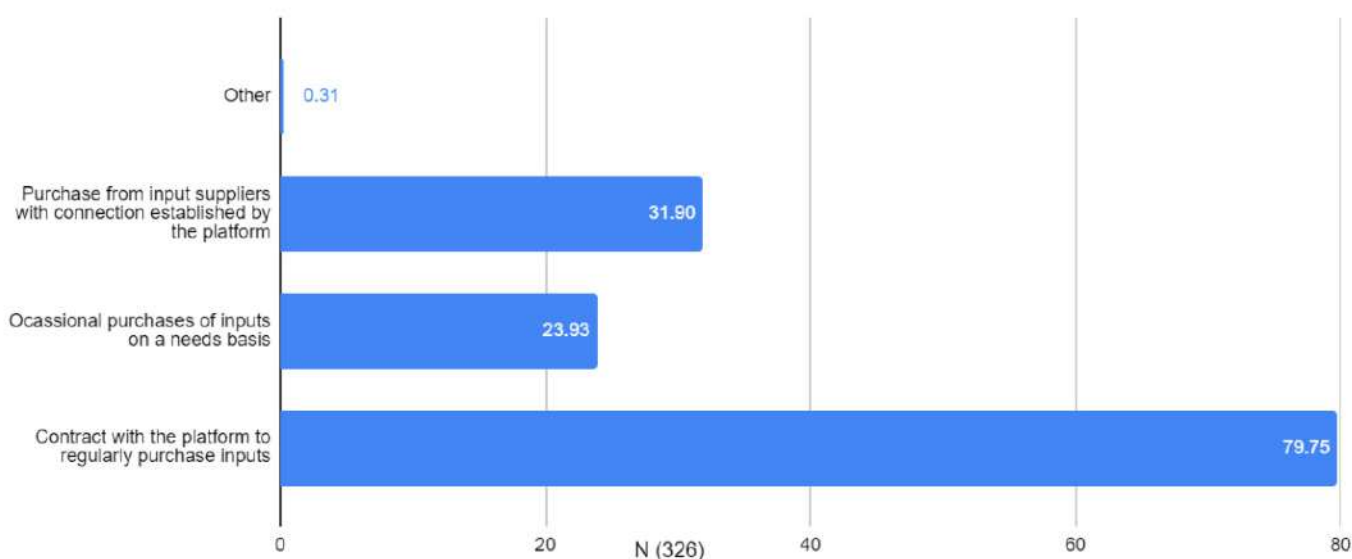


Figure 28: How do you source your inputs via the platform as farmers?

The digital platform is data-driven. This implies that informed decisions are made on the platform, based on current or historical data. This will reduce transaction costs.

Crop aggregation is an area of strength for AgroMall. This leads to economies of scale, reducing per-unit transaction costs for the platform participants and increasing incomes and profits.

The results presented in Figure 29 indicates increased demand for inputs (23.5%), a decrease in the price of inputs due to a larger quantity (52.9%) and the speed of platform payments (3.9%). This supports the decline in transaction costs that will impact profits and income.

The digital platform has created a more efficient, transparent and inclusive agricultural marketing ecosystem, which benefits both farmers, and input and output dealers in terms of cost saving, improved decision making, and overall market efficiency.

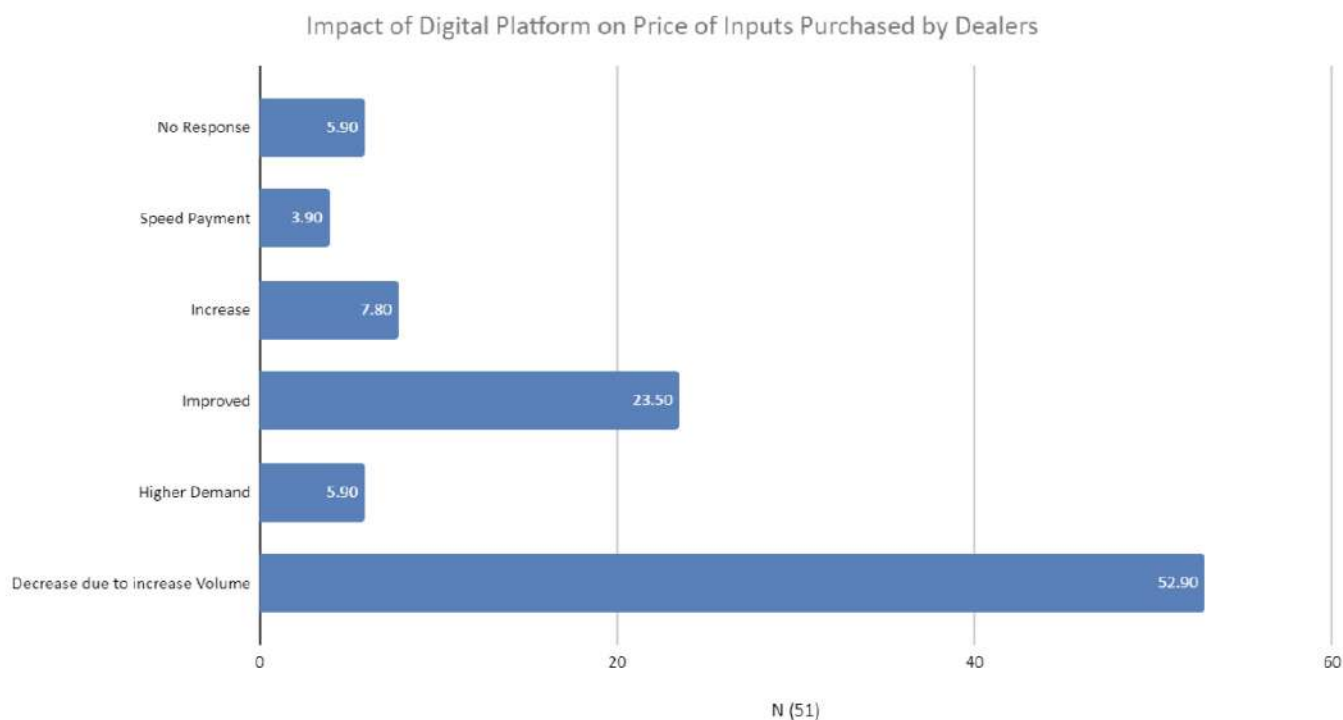


Figure 29: Impact of digital platform on price of inputs purchased by dealers

3.3.3 Digital Technology-Induced Changes in Transparency of Market Transactions

The result revealed changes in terms of the precision and accuracy of measurement in market transactions. The technology has enabled instant capture and documentation that is verifiable and stored for future reference. The price movements for inputs and outputs are easily assessed daily, via the platform directly or by SMS to AgroMall's extension agents. The digital platform ensures that contractual agreements are monitored and enforced through available technology.

Digital grading systems have replaced traditional methods of sorting and grading agricultural produce. The system is cheaper, faster, non-labour intensive, and more efficient, consequently leading to higher income for the participants.

The digital platform has brought great ease and authenticity to financial transactions in the agribusiness sector in Nigeria. Cashless transactions have relieved farmers, input and output dealers of delayed payments and risks associated with the movement of cash.

3.3.4 Digital Platforms and Market Concentration

Platforms can lead to market concentration, but that is unlikely to happen in the case of the AgroMall digital platform. The coverage or current sphere of influence in the agricultural value chain in Nigeria is such that it is not likely to attain market power in the foreseeable future to lead to market concentration that will be disadvantageous for agripreneurs on the platform. Digital platforms can modify the linear value chain of production and distribution, and transform this arrangement by leveraging the networked relationship of consumers, producers, and other operatives, but the competitive agribusiness in Nigeria will not permit this occurrence. Currently, many farmers belong to multiple platforms because there are no contractual ties with AgroMall beyond the annual credit facility.

The objective function of the platform is crucial (Cennamo, 2019). The objective function of AgroMall tends more towards social and economic welfare rather than the capitalist approach of profit maximisation. The current identity of the platform, which includes technological capabilities that inform the level of interaction between the different components and the participants, is unlikely to lead to a concentration of the market. Platforms may adopt a low-price policy that undercuts competition but enables the platform to scale up and build market dominance by its size. For example, a platform can offer low registration fees in addition to low transaction fees, just to attract clients. Thus, the activities of the platforms over time will determine whether or not the market is concentrated.

As Figure 30 indicates, the respondents agreed (78.4%) that the digital platform, TelAgri, increased the number of input dealers in the study area. If the increase continues in the long run, it will increase competition rather than encourage market concentration.

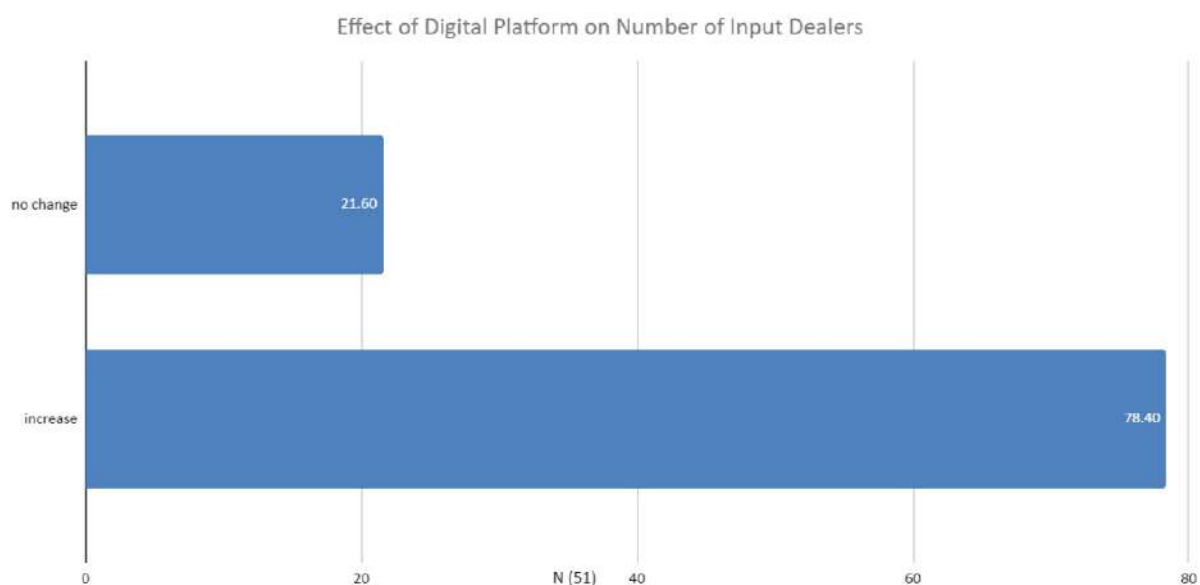


Figure 30: Effect of digital platform on the number of input dealers

In the case of output dealers, 52.6% of the respondents did not observe any change in the number of output dealers consequent upon the presence of the digital platform. However, 47.4% of the respondents observed an increase in output dealers in the study area (Figure 31).

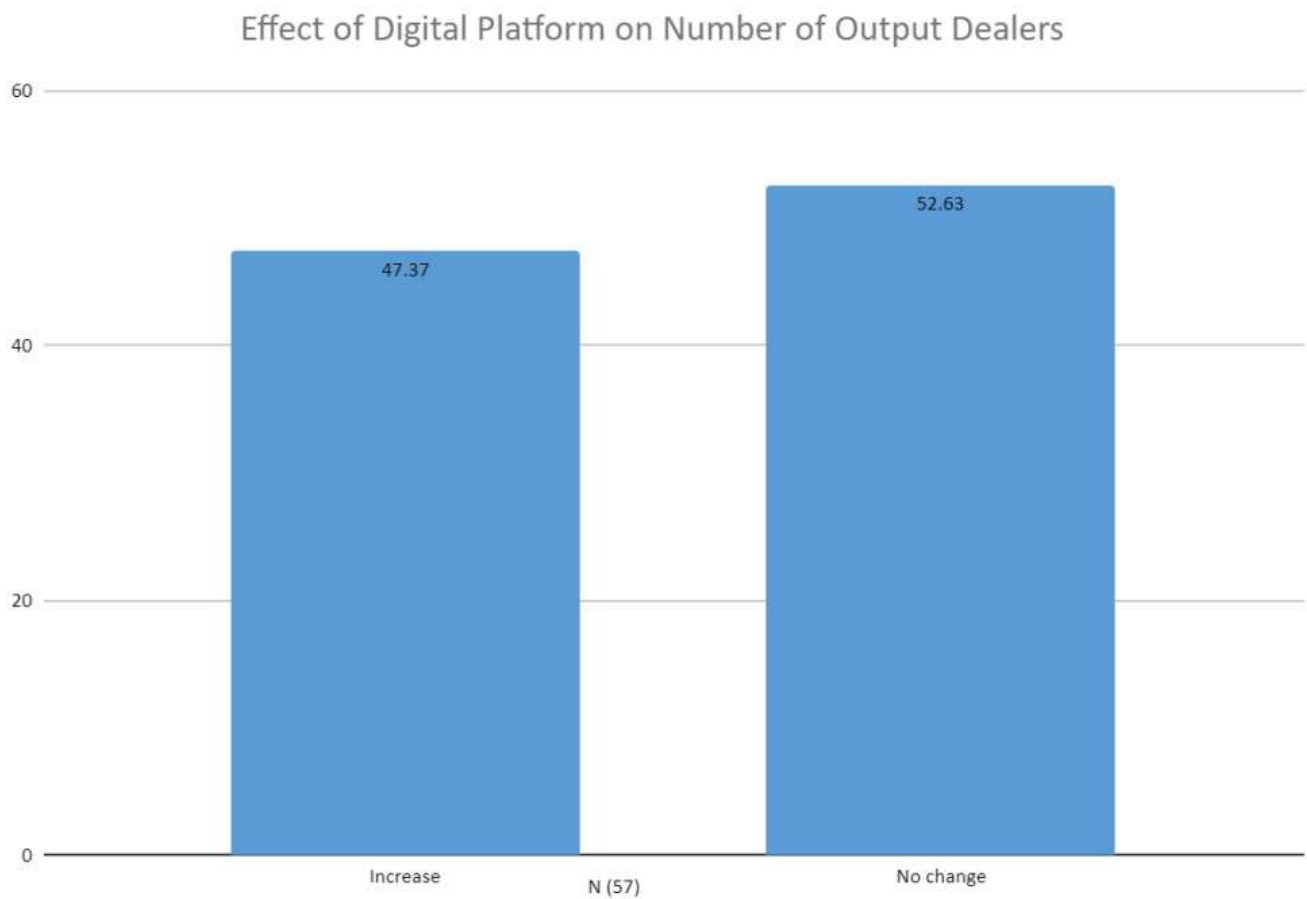


Figure 31: Effect of Digital Platform on Number of Output Dealers

As seen in Figures 32 and 33, the digital platform has little effect on input sourcing and sales in the study area. About 61% of input dealers believe that digital platforms do not affect input sourcing while 70.6% do not see the effect on the sales of inputs.

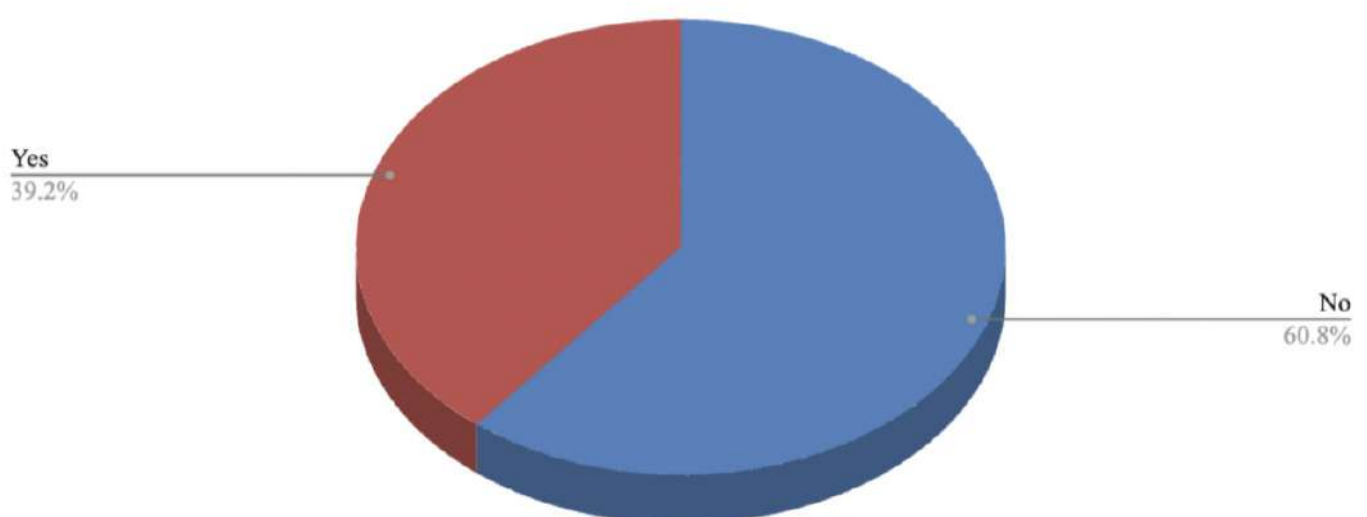


Figure 32: Effect of Digital Platform on Sourcing for Inputs

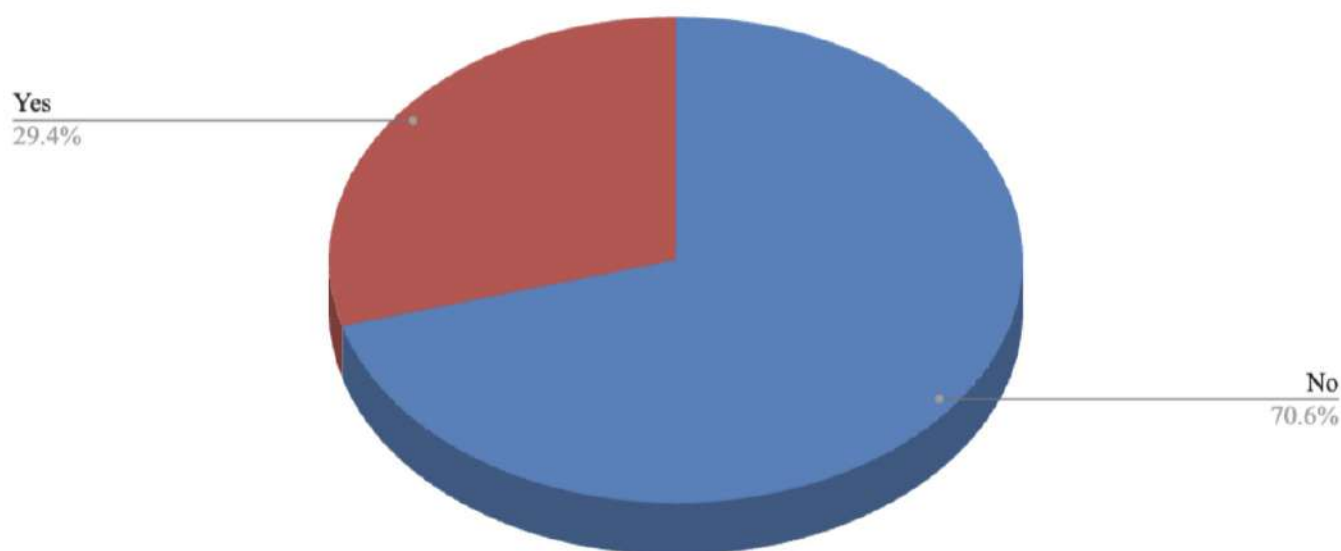


Figure 33: Effect of digital platform on the sales of inputs

3.3.5 Beneficiaries and Non-beneficiaries

The organisation (AgroMall), farmers, dealers and the economy benefit from digitalised agribusiness. AgroMall has transformed from a small firm in FinTech to become a household name in digital agribusiness in Nigeria. If the planned scaling up of the digital platform to TAO occurs in the first quarter of 2024, that will increase its capabilities, growth, and impact in the agricultural sector of the Nigerian economy.

Farmers, input, and output dealers are beneficiaries of digitalised agribusiness. If AgroMall scales up its operations, it implies onboarding more farmers, increased demand for inputs, increased agricultural production and output, and more income and savings for the farmer and other actors in the value chain. This has implications for food security, employment generation, poverty reduction, and economic growth and development.

The niche that AgroMall occupies has affected only a tiny fraction of the Nigerian agriculture value chain. The presence of AgroMall is felt only in about six states at the peak of operations. In each of the states, the largest pool of farmers are non-beneficiaries.

AgroMall tends to focus more on grain production (maize and rice) which has excluded a considerable number of farmers and other agripreneurs.

3.3.6 In what ways, by what type of platform?

Many prospective members would be challenged by the acceptance of new agronomic practices that they are not familiar with, in addition to trying to meet the required land size for participation in the AgroMall platform. Due to the average literacy level of farmers, many are lagging behind in the acceptance of new ideas. As the study shows, most farmers (about 81%) have either no education (48%) or just primary education (32.5%). The low years of educational attainment will pose some impediments in navigating the platform on their own and accessing/adopting the needed information. This is despite the presence of extension agents who visit communities and farms weekly.

Farmers on the platform might have multiple platforms to which they belong. Navigating between AgroMall and the other platforms can be disadvantageous, especially with respect to fulfilling obligations.

For instance, repayment of loans can be difficult due to multiple loans they might have obtained, with different conditions. Some farmers will not only default, but they may end up with very little produce left for household consumption after meeting part of the loan repayment.

There are members of the platform who may for some reason not use the platform for all required operations. For instance, some goods might be sold directly to the processor, cutting off middlemen and retailers. Others may choose to procure their inputs from non-platform operators, which in most cases are more expensive.

A large number of farmers are excluded from the digital platform due to the inadequacy of the available resources at the disposal of AgroMall.

3.3.7. Conditions that Support Equitable Outcomes

AgroMall received support for the migration of digital agriculture from GSMA. The organisation has indicated readiness to launch a new application that has a wider scope, improved technology, and greater versatility. This is in an effort to scale up her service delivery to agribusiness in Nigeria. To ensure a more equitable outcome, AgroMall will need financial and technical support.

Credit is always needed in agribusiness. The loan default rate in the AgroMall platform is quite low and returns on investment are high. There is a need for additional support for the organisation to increase the capacity to onboard more farmers, especially women, onto the platform.

Education is important for equitable outcomes in digital agribusiness. Many of the farmers have no formal education (more than 50%). Lack of education makes communication difficult and reduces the ability to maximise the use of the platforms and compliance with the guidelines and instructions of the platform. Improvements in human capital through education not only increase productivity, but also increase the ability to obtain market information. Investing in education in farming communities can greatly improve agricultural productivity.

The study also revealed that timeliness in operation and lack of accountability on the part of platform operators also hinder equitable outcomes. Some clients of the AgroMall platform are also registered with other agricultural platforms, such as One-acre and Baba Gona. This sometimes results in the farmer's inability to deliver on several operations as at when due and others are unable to remain accountable to the contractual agreement at the end of the farming season. There is a need to continue to train and retrain members of the platform to adhere strictly to the rules of engagement to ensure equitable outcomes.

4. Summary, Conclusion, Policy Recommendation and Areas of Further Research

Summary

This study was conducted in Nigeria with AgroMall Digital Discovery and Extension Limited as the focal point and aimed to comprehensively investigate the drivers, distributional effects and the impacts on agricultural markets of the digital platform. AgroMall's transition from the Agricultural Discovery and Adoption Platform (ADAP) to Telagri marked a significant technological upgrade, with plans underway for a new app named The Agricultural Options (TAO) to further scale up operations.

Drivers of the Digital Platform

AgroMall's foray into digital agriculture was driven by its agility to respond to market opportunities and expand services. The platform capitalised on its internal resources, capabilities, and foresight, using digital technology for activities such as measurement and evaluation, input supply, produce aggregation, Fintech, and extension services. The migration from ADAP to Telagri represented a technological improvement, aligning with the need for expanded coverage. The key drivers on the demand side included the optimisation of transaction costs in marketing, leading to cost reduction, direct farmer-buyer interactions, efficient information flow, logistics efficiency, secured transactions, data-driven decision-making and access to finance.

Platform Integration and Services

AgroMall strategically integrated precision farming technologies into its platform, offering complementary services such as planning, monitoring and evaluation, agronomic practices, and Fintech solutions for transparent transactions. The platform effectively connects farmers with input dealers, streamlining the supply chain and improving the efficiency of the agricultural value chain. The digitisation of agronomic and extension services, facilitated by the Application Programming Interface (API), allow for data collection on weather forecasts, moisture, soil fertility, weather conditions, and plant health. These data are then analysed on cloud servers, enabling predictive yield quantities and facilitating informed decision-making.

Impact on Agricultural Markets

Membership in the AgroMall platform proved instrumental in eliminating barriers faced by farmers, such as poor infrastructure, distance from markets, high market margins, and imperfect information. The platform facilitates faster sales and payment for farmers, improved demand and supply matching, reduced transaction costs, and achieved economies of scale through crop aggregation. The study revealed enhanced transparency, efficiency, and inclusivity in the agricultural marketing ecosystem, benefiting both farmers and input/output dealers.

Focus on social and economic welfare

AgroMall's objective function exhibited a focus on social and economic welfare rather than solely profit maximisation. There was no evidence of market concentration; instead, the study identified an increase in the number of input dealers in the study area. The platform contributed to the improvement of infrastructure services, including marketing, transport and electricity, leading to a decrease in transaction costs and increased income for dealers.

Socioeconomic Impacts

The study demonstrated positive impacts on standard of living, household income, and overall agricultural productivity, with increased access to financial services for farmers. Crop yields, output sold, and the speed of selling output all experienced notable improvements.

Challenges and Disadvantaged Groups

Although the platform presented numerous benefits, challenges were identified, particularly for farmers without phones, those without financial literacy, and those with smaller landholdings. Female farmers comprised only 21% of platform users, indicating a gender disparity. Limited platform capacity also hindered the participation of some farmers, leading to alternative means of input sourcing at potentially higher costs.

Conclusion

The AgroMall digital agriculture platform has significantly impacted the agricultural landscape in Nigeria, fostering efficiency, transparency, and inclusivity. Although challenges persist, the overall contribution of the platform to digitalised agriculture is evident, benefiting farmers, dealers, and the economy alike.

Policy Recommendation

1. Develop and implement policies that specifically address gender disparities in platform usage. Encourage and support the participation of female farmers through targeted initiatives, training programmes, and awareness campaigns.
2. Invest in the expansion of AgroMall's platform capacity to accommodate a larger user base. This will ensure broader engagement and provide more farmers, especially those currently facing limitations, with access to the platform's services.
3. Establish a fund or programme to support research and development initiatives in digital agriculture. This can encourage innovations like AgroMall's precision farming technologies and contribute to the continuous evolution of the agricultural sector.
4. Prioritise infrastructure development, especially in rural areas, to improve market connectivity, transportation, and electricity. Enhanced infrastructure will contribute to the reduction of transaction costs, benefiting both farmers and input/output dealers.

Areas of further research

1. Comparative study between AgroMall and other digital agricultural platforms to identify best practices, challenges, and opportunities. This will contribute to a broader understanding of the digital agriculture landscape and inform potential improvements.
2. Resilience of digital agricultural platforms to external shocks. Evaluate how the platform contributes to market stability, particularly in times of crises such as pandemics or economic downturns.
3. Evaluation of the data security measures used by the digital agriculture platforms (AgroMall). Assess the privacy policies, data protection mechanisms, and measures taken to protect sensitive farmers' information.

References

- Aker, J. C., & Mbiti, I. M. (2010). Mobile Phones and Economic Development in Africa. *Journal of Economic Perspectives*, 24(3), 207–232.
- Barrett, C.B. (2008). Smallholder market participation: Concepts and evidence from eastern and southern Africa. *Food Policy*, 33(4), 299–317.
- Cennamo, C. 2019. "Competing in Digital Markets: A Platform-Based Perspective," *Perspectives Vol.*
- FAO. (2019). Digital Agriculture Transformation: Pathways and Enablers. Food and Agriculture Organisation of the United Nations.
- Saroniemi, R., Koskinen, K., & Tunainen, V.K. (2022). Vertical Integration of Digital Platforms in the Agricultural Industry. Hawaii International Conference on System Sciences. DOI:10.24251/HICSS.2022.816
- World Bank. (2019). Growing Africa: Unlocking the Potential of Agribusiness. World Bank Group.



Forum for Agricultural Research in Africa (FARA)

No. 7 Flower Avenue, New Achimota Mile 7, Accra, Ghana

Tel: +233 302 772823 / 302 779421 Fax: +233 302 773676

Email: info@faraafrica.org

Website: www.faraafrica.org | www.datainforms.faraafrica.org