mAgri Zambia Market Reserch Report

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TABLE OF CONTENTS

Table of Figures

List of Tables

EXECUTIVE SUMMARY

This research study aimed to establish baseline metrics for crop yields, animal production, and farmers' income in Zambia before the launch of the mAgri application. The study, conducted using a quantitative methods approach, involved structured interviews with 341 farmers across selected Zambia districts covered by the MTN mobile network. Key findings reveal that agricultural operations in Zambia predominantly rely on traditional farming practices, with limited mechanization and modern agronomic techniques. The survey data indicated that the majority were subscribers of MTN at 49% compared to 42% for Airtel. Zamtel came third at 9%. Maize emerged as the main crop planted by farmers, followed by soybeans, cassava, and tobacco.

The study also examined farmers' sources of agronomic advice, tools used for farming, and earnings from crop and animal product sales. The results underscore the need for efficiency improvements, crop diversification, and enhanced access to market information to boost productivity and income among smallholder farmers. These insights are essential for informing the development and launch of the user-centric mAgri application, which gives information to farmers and optimize farming operations, especially for underserved rural communities in Zambia.

1.0 INTRODUCTION

Sub-Saharan Africa has been among the fastest-growing mobile markets in the world for the last two decades. The growth has been spurred by the establishment of affordable mobile Chinese-made communication gadgets by companies such as Xaomi, Techno and Honor. Apart from easing the burden of communication among the poorest people in the world, the technology has brought remarkable benefits to the masses, the most famous being mobile banking. This technology has brought about socioeconomic transformation through financial inclusion in areas with limited coverage of formal banking infrastructure and general economic empowerment.

The advent of mobile phone technology, particularly the Unstructured Supplementary Service Data (USSD), has brought about a paradigm shift in how humans access information crucial for making optimal decisions that impact their daily lives. Mobile phone technology is extensively utilised for real-time data acquisition, be it for flood early warning, health updates, agricultural insights, trade trends, and more. This not only facilitates citizens in making timely decisions, but also significantly reduces the costs that would otherwise be incurred in the absence of such technology.

In the realm of agriculture, the application of mobile phone communication holds immense potential. Particularly for farmers, especially smallholders, it serves as a tool to bridge the information gap, empowering them to make informed and timely decisions. Notably, studies have established a direct correlation between increased farm productivity and profitability and the use of mobile phones among smallholder agriculture farmers in Tanzania. (Quandt et al., 2020) while reducing costs associated with farming. Despite these benefits, challenges have been recorded in terms of gadget affordability among smallholder farmers. This is one of the reasons behind the depressed productivity and profitability of many farming ventures since they do not have timely information regarding modern agronomic practices, marketing and pricing (Musungwini, 2018).

This report is an attempt to establish baseline metrics for crop yields, animal production, and farmers' income before the launch of Brastorne's mAgri application in Zambia. This is a USSD mobile application that has been designed to modernise the way farming communities perform. It enables smallholder farmers, especially those underserved from rural areas, to access the market with their goods and services. This platform enables service providers to create mobile stores and allow farmers to search for and compare prices on several products and services from any location as long as it is served with mobile communication coverage.

To obtain the baseline information, interviews with **341 respondents** were conducted. This information comprises individual demographics, farm operations, yields baseline and income baseline. A total of **166 females and 175 males** were interviewed.

2.0 CONCEPTUAL FRAMEWORK

The conceptual framework for this study is based on the premise that modernizing agricultural practices and enhancing access to market information can lead to increased productivity and income among smallholder farmers. The framework integrates key concepts including agricultural technology adoption, agronomic practices, market information access, and economic outcomes.

Agricultural Technology Adoption

At the core of the conceptual framework is the adoption of agricultural technology, represented by the mAgri application. This includes the utilization of mobile phone technology and USSD platforms to provide farmers with real-time information, market access, and agronomic advice.

Agronomic Practices

The framework considers the impact of modern agronomic practices on crop yields and animal production. This includes factors such as the use of improved seeds, mechanization, organic farming techniques, and efficient pest and disease management strategies.

Market Information Access

Access to timely and accurate market information is crucial for farmers to make informed decisions regarding crop selection, pricing, and marketing strategies. The framework examines how the mAgri application facilitates market information access and price transparency for farmers.

Economic Outcomes

The ultimate goal of the conceptual framework is to assess the economic outcomes of adopting effective agricultural practices and utilizing the mAgri application. This includes measuring changes in crop yields, animal production, and farmers' income levels before and after the application's launch.

Mediating Factors

The framework also considers mediating factors such as farmer demographics, land size, access to resources, and institutional support. These factors can influence the adoption and effectiveness of agricultural technologies and practices.

Impact Pathways

The conceptual framework outlines potential impact pathways, illustrating how the adoption of effective and modern agronomic practices and improved market information access can lead to enhanced productivity, profitability, and resilience among smallholder farmers.

Through the application of this conceptual framework, the study further aimed to provide valuable insights into the role of technology in transforming agricultural systems, improving livelihoods, and promoting sustainable economic development in Zambia's rural communities

3.0 SUMMARY OF KEY FINDINGS

i.The majority of farmers (40%) use hand tools for farming

ii. The survey data indicated that the majority were subscribers of MTN at 49% compared to 42% for Airtel. Zamtel came third at 9%.

iii.A total of 24% of sampled individuals indicate that they source agronomic advice from friends. 23% and 43% indicate that their sources are radio/TV and government, respectively.

iv. Maize is the main crop planted, followed by soybeans.

v.The mean number of 50kg maize bags harvested last year is 61 while the maximum number is 920. On the other hand, the mean number of harvested 50kg soybeans bags is 20 with a maximum of 60.

vi. The maximum price for a 50kg bag of maize was K600.00 with a mean of K303.00, while that for soybeans was K750.00 with a mean price of K363.00

vii. From the livestock output, a maximum price of K15,000.00 was reported with a mean price of K5,492.

viii. Farmers recommended the inclusion of interactive chat features, similar to WhatsApp groups, that enable them to share experiences and lessons within their farming journey. These chats should be location-specific to facilitate learning among farmers in similar agronomic zones. Additionally, business and market features should be incorporated, allowing users to create business profiles showcasing their name, location, and products for sale. Market features should include a search engine for identifying service providers and sellers based on location, interests, or other relevant attributes.

ix. Preferred Types of Agricultural Information by farmers includes practical, timely, and relevant information on weather patterns, market trends, pest and disease control, and upcoming agronomic technologies, delivered through mobile technology and mass media channels.

4.0 LITERATURE REVIEW

The literature on agricultural technology adoption and market dynamics in Africa spans a range of studies that highlight key trends and insights. Beyond the works of Musungwini (2018) and Quandt et al. (2020), other scholars have contributed valuable perspectives such as follows:

Market Information Systems and Access

Research by Ndiritu and Haile (2019) emphasizes the role of market information systems in enhancing market access for smallholder farmers in Africa. Their study explores how digital platforms can bridge information gaps, improve price transparency, and empower farmers to make informed market decisions.

Technology Adoption and Impact

The work of Mburu et al. (2021) delves into the impact of technology adoption on agricultural productivity and income levels among smallholder farmers. Their study assesses the effectiveness of digital extension services, mobile applications, and ICT tools in driving agricultural transformation and inclusive growth.

Sustainable Agriculture Practices

Pundits such as Mbatha and Mulinge (2020) and Kamau et al., (2019) focus on sustainable agriculture practices in Africa, including climate-smart farming, soil conservation, and agroecology. These studies highlight the importance of sustainable practices in mitigating climate change impacts, enhancing resilience, and promoting food security.

Financial Inclusion and Agribusiness Development

Research by Kamau and Gitonga (2022) explores the linkages between financial inclusion, agribusiness development, and rural livelihoods. Their study examines how access to financial services, digital payments, and credit facilities can catalyze agricultural entrepreneurship and value chain development.

Policy and Institutional Frameworks

The work of Ouma et al. (2017) and Kagumo et al. (2021) explores the role of policy and institutional frameworks in supporting agricultural innovation and technology adoption. These studies analyze policy interventions, regulatory environments, and institutional partnerships that foster a conducive ecosystem for agricultural transformation.

Gender Dynamics in Agriculture

Studies by Mwai et al. (2019) and Okoth et al. (2020) shed light on gender dynamics in agriculture, addressing issues of women's empowerment, access to resources, and participation in agricultural value chains. These studies highlight the importance of gender-responsive policies and programs in promoting gender equality and inclusive agricultural development.

Incorporating insights from these scholars expands the understanding of agricultural technology adoption, market dynamics, sustainability practices, financial inclusion, policy frameworks, and gender considerations in Africa's agricultural landscape. These diverse perspectives enrich the literature and inform strategies for promoting agricultural innovation and inclusive growth in the region.

Brastorne's work through the mAgri mobile application represents a transformative approach to addressing agricultural challenges and empowering farmers in Africa. The mAgri platform serves as a digital gateway, providing farmers with access to crucial agricultural information, market insights, and financial services tailored to their needs. By utilizing mobile technology, Brastorne aims to revolutionize the way farmers engage with agriculture, enhance productivity, and improve livelihoods across rural communities.

Through the mAgri application, Brastorne facilitates the following:

Access to Agricultural Information

Farmers can access real-time agronomic advice, weather forecasts, pest management strategies, and crop planning recommendations through the mAgri platform. This empowers farmers to make informed decisions and adopt best practices for optimal crop yields and sustainability.

Market Linkages and Pricing

The mAgri platform connects farmers to buyers, agribusinesses, and marketplaces, enabling them to access market prices, identify market opportunities, and negotiate fair prices for their produce. This enhances market transparency, reduces market inefficiencies, and improves farmers' bargaining power.

Overall, Brastorne's work through the mAgri mobile application represents a holistic approach to bridging the digital divide, advancing socio-economic equality and advancing agriculture in Africa. By addressing information gaps, enhancing market access, promoting financial inclusion, and fostering partnerships, Brastorne contributes to sustainable agricultural development, poverty alleviation, and economic empowerment of farmers across the continent.

Through the mAgri mobile application, Brastorne encompasses a comprehensive approach that integrates gender equality, social impact, economic empowerment, and aligns with the United Nations Sustainable Development Goals (SDGs). Here's how Brastorne's initiatives contribute to these areas:

Gender Equality

Brastorne recognizes the critical role of women in agriculture and promotes gender equality through its initiatives. The mAgri platform provides tailored information and resources to smallholder farmers, to which the majority of them are females fa, addressing specific challenges they face such market opportunities. By empowering women farmers with knowledge, skills, and market access, Brastorne promotes gender equality, women's empowerment, and inclusive agricultural growth, aligning with SDG 5 (Gender Equality).

Social Impact

Brastorne's work has a profound social impact, particularly in rural communities. The mAgri platform enables farmers to improve their livelihoods, increase food security, and reduce poverty by adopting sustainable farming practices, accessing markets, and enhancing productivity. Additionally, Brastorne's social cohesion, and inclusive development, contributes to SDG 1 (No Poverty), SDG 2 (Zero Hunger), and SDG 10 (Reduced Inequalities).

Economic Impact

Through the mAgri application, Brastorne drives economic impact by empowering farmers with market linkages, and business opportunities. This economic empowerment enhances rural economies, creates employment opportunities, and stimulates economic growth, aligning with SDG 8 (Decent Work and Economic Growth) and SDG 9 (Industry, Innovation, and Infrastructure).

SDG Alignment

Brastorne's initiatives are closely aligned with several SDGs beyond those mentioned above. By promoting sustainable agriculture practices and climate resilience Brastorne’s mAgri contributes to SDG 13 (Climate Action) and SDG 15 (Life on Land). Moreover, by leveraging technology for inclusive development and promoting partnerships for sustainable development, Brastorne supports SDG 17 (Partnerships for the Goals).

5.0 RESEARCH DESIGN AND METHODOLOGY

Using quantitative research method, the study gathered data from farmers within selected regions covered by the MTN mobile network. The areas included Kabwe, Kapiri-Mposhe and Mumbwa. A total of 341 farmers were interviewed through a structured face-to-face questionnaire.

5.1 MAIN OBJECTIVE

The main objective is to understand the current conditions of agriculture in Zambia to measure the subsequent impact of Brastorne's mAgri app after its launch. Specifically, this study aimed to identify the specific features and information preferences that farmers would prefer from the mAgri mobile application. Therefore, the research determined which features will enhance the application's utility in the field and which types of agricultural data are most valued by users. The findings will inform the development of an mAgri app that is more aligned with the practical needs and decision-making processes of the farming community, thereby improving chances of its adoption and effectiveness in supporting sustainable agricultural practices in Zambia.

5.2 SPECIFIC OBJECTIVES

The study endeavours to achieve the following:

a. Establish baseline crop yields, animal production, and farmer's income.
b. Identify key features farmers need on the mAgri app to enhance their daily agricultural operations.
c. Determine the preferred types of agricultural information and methods of information delivery that support farmers in their decision-making and farm management activities.

6.0 SAMPLING METHODOLOGY

The purposive sampling method was utilised to select farmers and stakeholders, ensuring participants are likely to be impacted by or may have an interest in the mAgri app.

7.0 STUDY LOCATIONS

The following are the locations targeted by the study. The justification for choosing these were based on the farmer's access to MTN mobile network.

Table 1: Study target locations

PROVICES	AREA
Lusaka	**1. Mumbwa**
Centeral Province	**2. Kapiri- Mposhi**
Southern Province	**3. Chibombo**

8.0 DATA COLLECTION METHODS

8.1. QUANTITATIVE DATA COLLECTION

Structured interviews were conducted with 341 farmers across the above-identified provinces and areas. The survey questionnaire was developed with metrics including crop yields, animal production, and farmer income. This is attached in the Appendix page.

9.0 DATA MANAGEMENT AND ANALYSIS

9.1. QUANTITATIVE ANALYSIS

The Statistical Package for Social Sciences (SPSS) software was used to enter, clean, and analyse the survey data. Descriptive statistics was conducted to summarise the various baseline measures. Most of the questions to determine the farming operations and practices and yield baselines are of a multiple-response nature, meaning that a subject could identify with multiple options from a given question. The analysis has taken this into consideration.

10. RESULTS

10.1 TOOLS USED FOR FARMING

The research results indicated that the majority of the sampled subjects used rudimentary farming techniques at 40%. The prevalence of mechanisation is less pronounced as 1.2% of the sampled subjects reported using machinery like tractors. Use of improved seeds, incorporation of organic manure and chemical fertilisers are also limited at 18%, 11% and 29% respectively.

Table 2: Tools used for farming

		N	Percent	Percent of cases
Tools Used for Farming	Hand tools	307	40.1	90.0
	Tractors	9	1.2	2.6
	Special seeds	139	18.2	40.8
	Manure or natural ways	85	11.1	24.9
	Chemicals like fertilisers and persticides	225	29.4	66.0
Total		765	100.0	224.3

Source: Author's computation from the survey data

10.2 MOBILE NETWORK USED

Since accessing the agronomical practices will require mobile communication coverage, it was important to identify the most preferred mobile choice of the sampled subjects. The survey data indicated that the majority were subscribers of MTN at 49% compared to 42% for Airtel. Zamtel came third at 9% as the table below indicates.

Table 3: Mobile communication service provider

		N	Percent	Percent of cases
Mobile Network Used	Mobile netowrk MTN	305	49.2	89.4
	Mobile netowrk Airtel	257	41.5	75.4
	Mobile network Zamtel	58	9.4	17.0
Total		620	100.0	181.8

Source: Author's computation from the survey data

Comparing the mean subscription to the two network carriers statistically supports the idea that MTN should be the primary partner to anchor the mAgri application when the alternative hypothesis that the mean carrier levels are not the same is tested at the 95% confidence interval. The results of this hypothesis test are shown in the table below.

Table 4: F-Test Two - Sample for Variances

	MTN	Airtel
Mean	0.8944	0.7537
Variance	0.0947	0.1862
N	341	341
Degrees of freedom	340	340
F	0.5086	
P(F<=f) one-tail	3E-10	
F Critical one-tail	0.8364	

Source: Author's computation from the survey data

Since the computed value 3E-10 is infinitesimally smaller that the critical value of 0.05 at the 95% confidence level, the results are significant, leading to the conclusion that the statistical means of subscription to the two carriers are different.

10.3 FARMER SOURCE OF AGRONOMIC ADVICE

Modern agronomic advice is a crucial variable in the success of any farming enterprise. It enhances agricultural productivity and sustainability, helping increase yields and assisting farmers in lowering their production costs through optimal seed selection, fertiliser application, and pesticide use.

Table 5: Farmers' source of agronomic advice

		N	Percent	Percent of cases
Source of crop advice	Other farmers of friends	143	23.6	41.9
	Radio or television	138	22.8	40.5
	Government	263	43.4	77.1
	Mobile phone or internet	41	6.8	12.0
	Self	21	3.5	6.2
Total		606	100.0	177.7

Source: Author's computation from the survey data

This study revealed that most farmers obtain such information from government (at 43%), from peers (at 24%) and from the radio/television (at 23%).

10.4 MAIN CROPS PLANTED

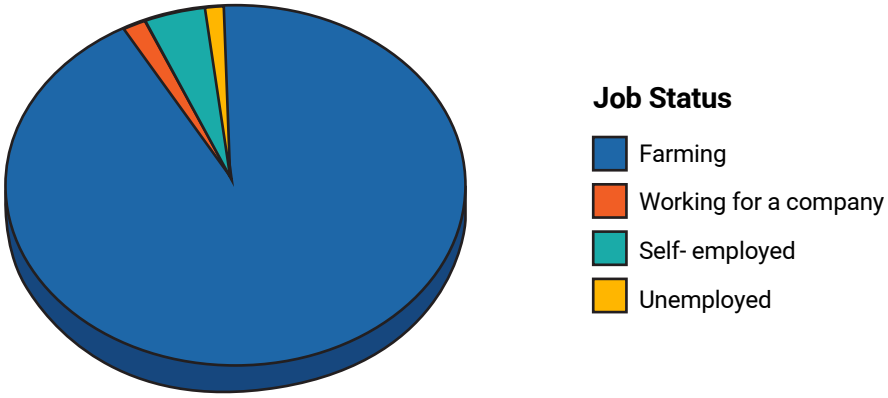
Most of the sampled subjects, who are mostly into farming as their source of livelihoods, indicated maize as the main crops planted at 41%. This was followed by soybeans at 26%, tobacco and cassava at 27 % and 26% respectively.

Table 6: Main crops planted

		N	Percent	Percent of cases
Source of crop advice	Maize	275	41.0	81.1
	Soybeans	174	25.9	51.3
	Cassava	110	16.4	32.4
	Tobacco	112	16.7	33.0
Total		671	100.0	197.9

The choice of maize as the main crop planted is likely influenced by the role the crop plays in the household food security situation (Siatwiinda et al., 2021). Likewise, soybeans also plays a crucial role in ensuring household food security, especially for feeding infants, as well as a cash crop (Chilambwe et al., 2022)

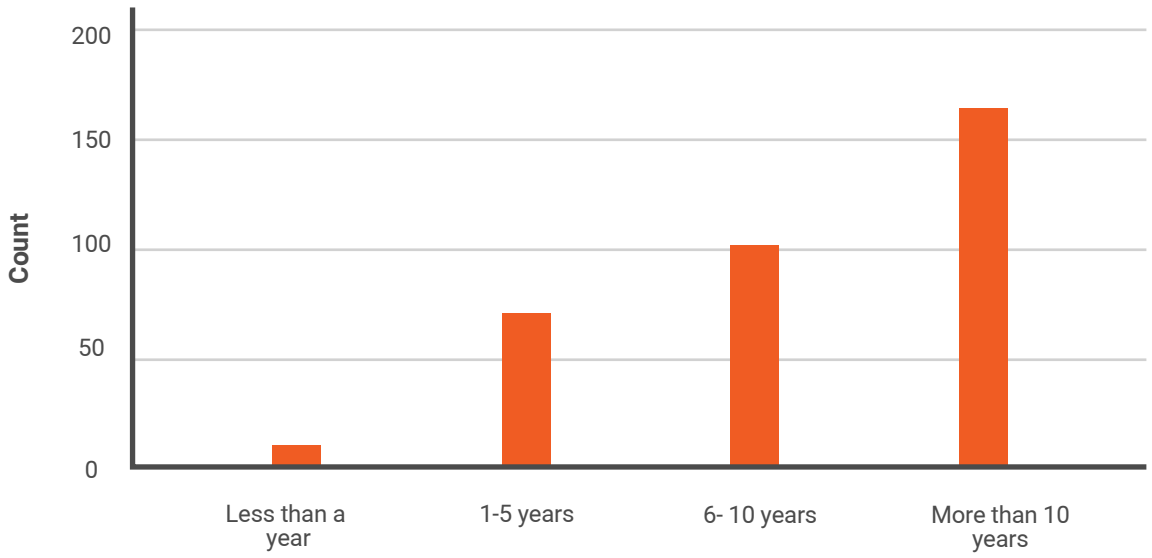
Figure 1: Respondents' job status



Source: Author's computation from the survey data

As it can be observed from Figure 1 above, the majority of respondents identified farming as their primary means of earning a livelihood. This scenario is expected considering that all the survey respondents identified themselves as rural dwellers. In addition, the majority of the respondents had been in agriculture for more than 10 years as the figure below indicates.

Figure 2: Farming years



Source: Author's computation from the survey data

10.5 PRODUCE HARVESTED IN 2023

The maximum number of 50 kg bags of maize harvested in 2023 from the sampled subjects was 920, with a mean of 61 bags of the same weight from a given magnitude of farm size. On the other hand, the reported maximum number of 50kg bags of soybeans harvested was 60, with a mean of 20 bags from a farm of size. Other crops like groundnuts and sunflower produced a maximum of 20 bags of 50kgs, with a mean of 13 bags of the same weight.

10.6 REVENUE GENERATED FROM MAIZE AND SOYBEAN SALES

The survey has revealed that the maximum amount of money realized from the sale of a single bag of maize weighing 50 kg is K600.00 with a mean value of K304.00 from the single bag of the same weight. In the same vein, a maximum value of K750.00 was realized from the sale of a single bag of soybeans with a mean value of K363.00 as the table below indicates.

10.7 INCOME GENERATED FROM THE SALE OF ANIMAL PRODUCTS

Table 7: Descriptive statistics for crop values

	N	Maximum Value (Kwacha)	Mean value (Kwacha)
How much was earned (Maize)	304	600.00	303.55
How much was earned (Soybeans)	190	750.00	362.55
Valid N (listwise)	180		

Source: Author's computation from the survey data

The amount realised from the sale of animal outputs reached as high as K15,000 with the mean value of K2,781.00 as the table below indicates

Table 8: Descriptive Statistics of earnings from animal output

	N	Maximum Value (Kwacha)	Mean value (Kwacha)
Sales from animal output	260	15,000.00	2781.40
Valid N (listwise)	260		

Source: Author's computation from the survey data

The amount realised from the sale of animal outputs reached as high as K15,000 with the mean value of K2,781.00 as the table below indicates

10.8 FARM SIZE

Table 9: Farm size

		Frequency	Percent	Vaild Percent	Percent
Vaild	Under 5 hectares	160	46.9	46.9	46.9
	6 to 10 hectares	103	30.2	30.2	77.1
	More than 11 hectares	31	9.1	9.1	86.2
	Not sure	47	13.8	13.8	100.0
	Total	341	100.0	100.0	

Source: Author's computation from the survey data

Around 77% of the sampled farmers have pieces of land of up to 10 hectares, with those owning between 6 to 10 hectares accounting for 30 percent of the sampled total. This is remarkable considering that land holding size has been on the decline in many parts of Africa due to population pressure. However, what is evident is the very low productivity considering the number of yields that have been reported from the same parcels of land.

10.9 KEY FEATURES NEEDED BY FARMERS ON THE MAGRI APP

Farmers suggested interactive chat features (like a WhatsApp group) that allow farmers to share experiences and lessons learned in their farming journey. They further suggested that chats should be location-specific so that farmers in similar agronomic zones are able to learn from a position of commonality.

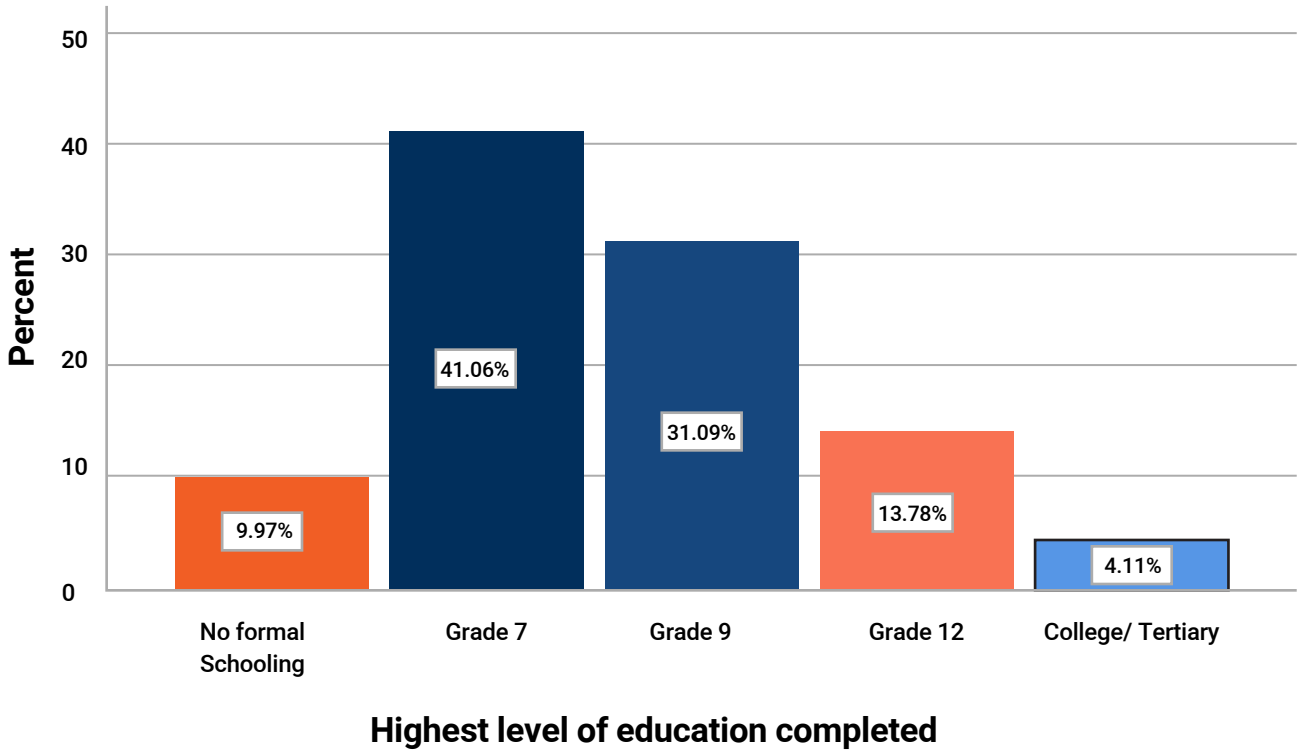
Business and market features could also be incorporated where a user is able to create their business profile that showcases their name, location and products that are on sale. Market features could include a search engine that permits the identification of service providers and sellers based on location, interests or other attributes.

10.10 PREFERRED AGRICULTURAL INFORMATION AND DELIVERY METHODS

In general, farmers indicated their preference for information that is as practical as it is relevant and timely to support their farming operations. Specifically, the preferred type of information was on weather patterns, markets, pest and disease control, and on upcoming and affordable agronomic technologies. Preferred mode of delivery should be mobile technology as well as the mass media (radio and television).

10.11 DEMOGRAPHIC ANALYSIS

Figure 3: Highest Level of Education Attained



The table above indicates that 9.97% of farmers have not received any formal education, while only 4.11% have attained tertiary or college education. The highest level of education achieved by the majority is Grade 7 (equivalent to the completion of primary schooling in Botswana), followed by 31.09% who have completed Grade 9, and 13.78% who have completed Grade 12.

Optimizing Information Delivery Method (USSD and IVR)Based on Farmers' Educational Attainment

Given that 51% of farmers have education levels ranging from no formal education to Grade 7, it can be inferred that approximately half of the target population may experience slight to moderate difficulties with reading. This suggests that Interactive Voice Response (IVR) could be an effective method for disseminating agronomic information to this group. For the remaining half, who possess higher literacy levels, Unstructured Supplementary Service Data (USSD) may still be appropriate.

However, observational data from the survey revealed that less than 10% of the 341 respondents required assistance to complete the questionnaire. This suggests that even those with education levels not exceeding Grade 7 are capable of reading, comprehending, and writing to a functional degree. Therefore, a combination of IVR and USSD would be suitable for delivering information to farmers.

An Exploration of Gendered Barriers to Optimal Harvests

When asked about reasons inhibiting optimal harvest yields, respondents of both male and female identities delineated the challenges they face. The ensuing tables provide a gender-specific elucidation of these factors hindering agricultural productivity

Reason 1: Reasons for bad harvest (Bad weather)

Crosstab				
Count				
		Reason for bad harvest (Bad weather)		
		No	Yes	Total
Sex	Female	15	151	166
	male	29	146	175
Total		44	297	341

Chi- Square Tests					
	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	4.304[a]	1	.038		
N of Valid Cases	341				
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 21.42.					
b. Computed only for a 2x2 table					

There is a statistically significant difference (x2 = 4.30, p< 0.05) between male and female farmers in terms of bad weather being a reason for a bad harvest. 151 out of 166 female farmers and 146 out of 175 male farmers cited bad weather as a reason for a bad harvest. Female farmers appear to be more affected by bad weather compared to male farmers.

Reason 2: Pests and diseases

Crosstab				
Count				
		Reason for bad harvest (Pests and diseases)		
		No	Yes	Total
Sex	Female	50	117	166
	male	54	121	175
Total		104	236	341

Chi- Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	.985[a]	2	.611
N of Valid Cases	341		
a. 2 cells (33.3%) have expected count less than 5. The minimum expected count is .49.			

117 out of 166 female farmers and 121 out of 175 male farmers mentioned pests and diseases as a reason for a bad harvest. There is no significant difference (x2 = .985, p>0.05) between male and female farmers when it comes to pests and diseases being a reason for a bad harvest.

Reason 3: No access to input capital

Crosstab				
Count				
		Reason for bad harvest (No access to input capital)		
		No	Yes	Total
Sex	Female	69	97	166
	male	70	105	175
Total		139	202	341

Chi- Square Tests					
	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.087[a]	1	.769		
N of Valid Cases	341				
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 67.67.					
b. Computed only for a 2x2 table					

97 out of 166 female farmers and 105 out of 175 male farmers reported no access to input capital as a reason for a bad harvest. There is no significant difference (x2 =.087, p>0.05) between male and female farmers in terms of lack of access to input capital being a reason for a bad harvest.

Reason 4: Market access challenges

Crosstab				
Count				
		Reason for bad harvest (Market access challenges)		
		No	Yes	Total
Sex	Female	124	42	166
	male	119	56	175
Total		243	98	341

Chi- Square Tests					
	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.867[a]	1	.172		
N of Valid Cases	341				
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 47.71.					
b. Computed only for a 2x2 table					

42 out of 166 female farmers and 56 out of 175 male farmers cited market access challenges as a reason for a bad harvest. There is no significant difference ($x2 = 1.87$, $p>0.05$) between male and female farmers regarding market access challenges being a reason for a bad harvest.

Reason 5: Lack of mechanisation

Crosstab				
Count				
		Reason for bad harvest (Lack of mechanisation)		
		No	Yes	Total
Sex	Female	142	24	166
	male	140	35	175
Total		282	59	341

Chi- Square Tests					
	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.829[a]	1	.176		
N of Valid Cases	341				
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 28.72.					
b. Computed only for a 2x2 table					

24 out of 166 female farmers and 35 out of 175 male farmers mentioned lack of mechanization as a reason for a bad harvest. There is no significant difference (x^2 =1.83, $p>0.05$) between male and female farmers in terms of lack of mechanization being a reason for a bad harvest.

Reason 6: Lack of information on best practices

Crosstab				
Count				
		Reason for bad harvest (Lack of information on best practices)		
		No	Yes	Total
Sex	Female	131	35	166
	male	137	39	175
Total		266	74	341

Chi- Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	1.115[a]	2	.573
N of Valid Cases	341		
a. 2 cells (33.3%) have expected count less than 5. The minimum expected count is .49.			

35 out of 166 female farmers and 39 out of 175 male farmers reported lack of information on best practices as a reason for a bad harvest. There is no significant difference (x2 =1.115, p>0.573) between male and female farmers when it comes to lack of information on best practices being a reason for a bad harvest.

Implications of the above findings

Female farmers appear to be more significantly affected by bad weather compared to male farmers. This suggests that female farmers may be more vulnerable to the impacts of climate change and adverse weather conditions. Furthermore, both male and female farmers face similar challenges when it comes to pests and diseases, lack of access to input capital, market access, lack of mechanization, and lack of information on best practices. These issues seem to affect farmers regardless of gender.

Conclusion

The study has revealed that agricultural operations remain basic in Zambia with the majority of subsistence/smallholder farmers still using traditional farming practices. With the reported land parcels being relatively large, it is evident that there are efficiency losses due to under-developed agronomic setup. The potential for mAgri mobile application to yield substantial results in Zambia is evident, given the enthusiastic willingness of farmers to embrace such technological solutions. Unlike the current scenario where farmers typically receive agricultural information infrequently, typically once a year from government sources, the advent of mAgri mobile application promises transformative benefits. It offers farmers the agility to access critical information at their convenience, indicating a paradigm shift towards timely and tailored insights essential for optimizing agricultural practices and outcomes.

In view of the above, the rollout of the mAgri application should take into consideration the need for crop diversification and overall efficiency increases so that more produce is achieved from existing land parcels.

Recommendations

The analysis of the mobile network usage among farmers in Zambia reveals a notable difference between users of MTN and Airtel networks. Specifically, MTN holds a market share of 49% among farmers, while Airtel accounts for 42%, indicating a difference of 7%. This distribution highlights that nearly half of the farmers use MTN, which is advantageous for Brastorne's strategy. However, it is concerning that the remaining percentage is not diversified among multiple networks, but instead, a significant portion (42%) is concentrated with a single competitor, Airtel. This suggests a competitive landscape primarily dominated by these two networks. Therefore this study suggests the fololwing reccomendations:

MTN SIM cards: During the launch of the mAgri app in Zambia, strategic emphasis should be placed on the necessity for farmers to possess an MTN SIM card. This recommendation is based on the premise that owning an MTN SIM card will be essential for accessing and benefiting from the mAgri app. Communicating this requirement clearly will ensure that farmers are aware of the benefits associated with using MTN, thereby potentially increasing the app's user base and its overall effectiveness

Timely information via partnerships: The study reveals that a significant proportion of farmers (43%) rely on government sources for their agricultural information. Consequently, it is recommended that Brastorne partners with government stakeholders to ensure the mAgri app disseminates well-informed and up-to-date information on farming trends and best practices. Such a partnership would enhance the credibility and relevance of the app's content.

A focus on key crops: Given that maize and soybeans are the primary crops cultivated by Zambian farmers, it is essential that the agronomic information provided through the mAgri app is tailored to focus on these crops. The content should be contextualized to address the specific needs and conditions of local farmers, ensuring the information is both practical and applicable

Promoting mechanization and modern farming techniques: With only 1.2% of farmers using tractors and low adoption of improved seeds, organic manure, and fertilizers, there is a need to encourage the use of modern farming techniques to enhance productivity. On this, the mAgri app could provide content on training, subsidies, or information on where users can access credit to help farmers acquire the necessary tools and inputs.

Diversifying crop production: While maize and soybeans are the main crops planted, encourage farmers to diversify their crop portfolio to include other high-value crops suitable for their agro-ecological zones. This can
help mitigate risks associated with relying on a few crops and open new market opportunities.

Promoting value addition and agro-processing: With farmers earning an average of K304 per 50kg bag of maize and K363 per 50kg bag of soybeans, there is an opportunity to increase income through value addition and agro processing. Support the development of small-scale processing facilities, provide training on value addition techniques, and link farmers to markets for processed products.

Tailoring information delivery to farmers' preferences: Farmers prefer practical, relevant, and timely information on weather patterns, markets, pest and disease control, and affordable agronomic technologies. Ensure the mAgri prioritize these topics and display the information in an easily understandable format for users.

Fostering peer-to-peer learning and location-specific interactions: Incorporate interactive chat features on the mAgri app to allow farmers/users to share experiences and lessons learned with others in their agro-ecological zones. This can facilitate knowledge exchange and the spread of best practices among farmers facing similar challenges.

Access to input capital: Partner with financial institutions or develop a feature within the app that connects farmers with micro-credit providers, subsidies, or grant opportunities to help them access the necessary input capital for their farming activities. The app should also be able to provide information or location/contact details of various farming micro-credit landers available locally.

Weather Forecasting: Incorporate weather forecasting and early warning systems in the app to help farmers, especially female farmers, better prepare for and mitigate the impacts of bad weather. Provide timely alerts and advice on how to protect crops and adapt farming practices based on weather conditions.

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APPENDIX 1: FARMERS QUESTIONNAIRE

SECTION 1 : Demographics

District : _____

MTN Mobile Number: _____

AGE:

1. Under 18
2. 18-30
3. 31-45
4. 46-60
5. Over 60
6. Prefer not to say

SEX

1.Female
2. Male
3.Prefer not to say

LOCATION DESCRIPTION

1. Village
2. Town
3. City
4. Other (please specify): _____

DEPENDANTS

1. None
2. 1-2
3. 3-5
4. More than 5

HIGHEST LEVEL OF EDUCATION COMPLETED

1. No formal schooling
2. Grade 7
3. Grade 9
4. Grade 12
5. College/ Tertiary

FULL-TIME JOB

1. Farming
2. Working for a company
3. Self-employed
4. Unemployed
5. Other (please specify): _____

FARMING YEARS

1. Less than a year
2. 1-5 years
3. 6-10 years
4. More than 10 years

SECTION 2: MAIN QUESTIONS

FARMING OPERATIONS AND PRACTICES

1. How big is your farm?

1) Under 5 hectares
2) 6 to 10 hectares
3) More than 11 hectares
4) Not sure

2a. Are you part of a farmer's cooperative in your area
1) Yes
20 No
2b.) If answered yes to question 2 above, name the farmer's cooperative_____.

2c.) What assistance do you get from the farmer's cooperative you are part of?

3. What tools or ways do you use to grow your crops?

1) Hand tools (like hoes or spades)
2) Machines (like tractors)
3) Special seeds
4) Manure or natural ways
5) Chemicals (like fertilizers or pesticides)
6) Other (please explain): _____

4. What mobile Network do you use?
1) MTN
2) Airtel
3) Zamtel

5. Where do you get advice on how to look after your crops?
Probe: Who or what helps you decide when to plant or how to deal with plants/ livestock?

1) Other farmers or friends
2) Radio or TV programs
3) Government or community officers
4) Mobile phone or internet
5) I figure it out myself
6) Other (please explain): _____

6.How would you like to get advice on how to look after your crops/ livestock?

1) Other farmers or friends

2) Radio or TV programs
3) Government or community officers
4) Mobile phone or internet
5) I figure it out myself
6) Other (please explain): _____

7. What farming information would you like to receive through your phone?

1) Weather forecasts
2) Crop management tips
3) Market price updates
4) Pest/ disease alerts
5) Agricultural best practices
6) Other (please explain): _____

YIELDS BASELINE

8. What are the main crops you plant?

1) Maize
2) Soybeans
3) Cassava
4) Tobacco
5) Other (list) : _____

9. How many 50kg bags of your crops did you produce last year (2023)
1) Maize _____ bags
2) Soybeans _____ bags
3) Cassava. _____ bags
4) Tobacco. _____ bags
5) Other: _____ bags

10. What problems make it hard for you to get a good harvest?

1) Bad weather (like droughts or floods)
2) Pests and diseases
3) Lack of access to input capital
4) Market access challenges
5) Lack of mechanization
6) Lack of farming information on best practices
7) Other (please explain): _____

11. Which animals do you rear?

1) Cattle
2) Poultry
3) Goats
4) Sheep
5) Pigs
6) Other (list): _____

12. What do you rear these animals for?
1) Meat production
2) Milk production
3) Egg production
4) Other (list): _____

INCOME BASELINE

13. From the crops you produced above, how much in Zambian Kwacha did you sell per 50 Kg bag of the following:

1) Maize _____
2) Soybeans _____
3) Cassava. _____
4) Tobacco. _____
5) Other (list): _____

14. From the animal output you produce, how much in Zambian Kwacha do you make? (You can provide a range of the income).

_____

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