International Journal for Research in Engineering Application & Management (IJREAM)
ISSN : 2454-9150 Vol-05, Issue-09, Dec 2019

The Potential of M-Services on improving benefits of Smallholder Farmers- A Study on Regions of Tanzania

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ABSTRACT - This study attempts to throw light on the Potential of M-services on improving benefits of smallholder farmers of three districts Nachingwea, Liwale and Ruangwa-Tanzania. The study endeavors to examine the use of mobile phones services as a means for improving the coverage of marketing services for agricultural products among the small holder farmers. The study adapted a cross sectional study design and a multistage sampling technique. Data were mainly collected using structured questionnaires through multi-stage sampling technique, a total of 67 smallholder farmers were interviewed for the present study. The result of the study reveals that most of the respondents utilized mobile phones and had a positive impression on the contribution of mobile phone in the process of increasing the exposure to various communication media. The results of the research additionally demonstrated that mobile phones offered wide range of information for smallholder farmers pertaining to agricultural benefits. The study inferred that the utilization of a mobile phone to disseminate information on agriculture relies upon the data needs of farmers. This study recommends that, farmers should be encouraged and supported to access M-services in order to enhance farming techniques and practices which will ultimately lead to increased sales of farm products. Quantitative data were analyzed using Statistical Package for Social Sciences (SPSS). The study not only makes a contribution to an under-researched area in the contributions of regional agricultural projects, but also provides insights into how to scale out sustainable benefits from on-farm activities in the region.

Keywords: M- services, Agriculture, Information Technology Small holder Farmers, Structural equation modeling and Tanzania.

I. INTRODUCTION

In Tanzania, agriculture utilizes 75% of its human laborer, adds to 24.1% of GDP, 30% of trade income, and 65% of raw materials for industries (URT 2013; Misaki et al., 2015; Barakabitze et al., 2015). Various ventures are dynamic in building up the agriculture sector in Tanzania (see for instance: Barakabitze et al., 2015). Lately, the role of Information Technology in farming has gained a lot of attention. Development informatics (DI) is a discipline that reviews the role of technology being developed (Heeks, 2014).

Apart from post-2015 development plan (PTDA), and few continuous technological projects (see Misaki et al., 2015), Information technology for agribusiness is as of now an understudied zone in the advancement of informatics domain (Heeks, 2014). In addition, development informatics is over-centered around Smallholder farmers in Tanzania face lot of difficulties, like, paying for quality seeds, compost, also, pesticide, and marketing. Intensifying this is an absence of post-harvest store rooms for yields and, in the event that accessible, their restrictive expense. Both the general population and private segment in Tanzania have made huge interests in the nation's budgetary framework in recent years; however the arrangement of credit, agriculture inputs and output markets for smallholders is as yet lacking. Mobile payment administrations are vital tools to bring the unbanked and those utilizing just informal monetary administrations into the formal monetary administration. They change a mobile phone from communication into a channel for low cost money related administrations, for example, savings, remittance, and credit . Mobile payment is built up and developing in Tanzania generally speaking, serving new business zones and empowering a more extensive scope of computerized installments, including among some smallholder farmers.

 DOI : 10.35291/2454-9150.2019.0554

Technology projects for agriculture vary a lot. They can, for example, target to improve agriculture research institutions (ARIs), extension officers, government officials, or various other initiatives and projects that are conducted in order to improve the agriculture sector. Technology projects can also directly target farmers and provide them, for example, with information about weather, crops, and market data (e.g. Misaki et al., 2015).

This study takes an approach to study the information needs and decision making processes of a group of smallholder farmers in Tanzania and its region regarding the market and sales of the farm products after production. The leading idea is to build grounds for future projects that directly address the challenges of smallholder farmers with the support of technology.

II. REVIEW OF RELATED LITERATURE

This section makes a short overview of certain noteworthy studies did in similar area. The literature related to this topic is discussed in various aspects. One of the fundamental aspects of research process is the review related to the literature. It assumes an important role in planning the research and to identify the existing gaps.

Communication media

Kiberiti et al. (2016) tried to explore on the entrance and utilization of mobile phones for improving the agricultural benefits among small holder farmers in the pre-gather phases of maize worth chain in Kilosa locale. The study analyzed the utilization of mobile phones as a method for improving the inclusion of rural expansion service. The study balanced a cross-sectional investigation structure and a multistage inspecting strategy. Information was mostly gathered utilizing organized polls. The outcomes uncovered that larger part of respondents utilized mobile phones and had an inspirational demeanor on the commitment of mobile phone in their cultivating business. The examination results likewise demonstrated that mobile phones offered a moderate answer for farmer's data needs and data necessities. The research presumed that the utilization of mobile phone to impart agrarian data relies upon data needs of farmers. The study resulted that farmers should be urged and bolstered to access and utilize mobile phones in their agriculture business.

F. Rutatora (2001) while agricultural expansion services in Tanzania have for the most part been given and financed by the public sector, the landscape is changing as to the arrangement of extension services in the country. Perceptions reveal that few non-governmental organizations (NGOs) and farmer-led activities have, after some time, enhanced supplemented extension service delivery of the public extension services with cost-sharing, but these experiences have not been formally integrated into the extension system nor have their potential to reduce public expenditure and improve quality of extension service been considered. As the government keeps on confronting financial related troubles, it has begun to reconsider the issue of public extension service andcurrently entertaining the possibilities of gradually divesting the public sector of extension, leaving the private sector and users to take an increasing responsibility. This paper brings to light major providers of extension services in Tanzania to help inform decision-makers on how various actors can support agricultural extension on a sustainable basis.

Smallholder Farmers

Misaki (2016) Small scale farmers (SSF) in Tanzania are tested by sustenance uncertainty, absence of foundation, absence of access to credit and administrations, and absence of dependable channels for cultivating data. In spite of different activities, the farming division in Tanzania has stayed poor. Inconsistent data has been found as one factor that upsets basic leadership and efficiency. This research is the initial phase in a structure science examines (DSR) way to deal with address farmer's difficulties straightforwardly with innovation. This exploration considered the intense challenges, data channels, and data holes of SSFs in Chamwino, Tanzania. In view of past subjective outcomes, an organized poll containing 76 things on a Likert scale was directed to 150 small holder farmers in Chamwino, Tanzania.

M-services

Misaki (2019) Climate change and changing climate variability are pressing problems that need urgent solutions. Climate change has global consequences, and is already being experienced, mainly by the most vulnerable groups of people in the global south. Research shows that farming activities in the global south are being complicated by added uncertainties in weather. To mitigate the effect of weather uncertainties, there is a need for holistic mobile climate services. This research took the first step towards the service by finding out the local information needs and current mobile usage patterns in Tambuu village, Tanzania. The results show that climate change is already complicating farmers' lives and therefore they have urgent need for information on how to prepare and adapt to changing conditions. From the technology perspective, the domination of voice calls and short messages in the current mobile usage limits the adoption of new services. However, modern uses of smart devices for farming activities were also found. Building on this ground, this study reveals designing climate service prototypes together with local farmers and other relevant stakeholders.

Baumuller (2016) conveys that the quick spread of mobile phones over the landscape offers chances to improve system conveyance for small scale farmers. Kenya has risen as a pioneer in M- services improvement in Sub-Saharan Africa. This section evaluates the key factors that have assisted the nearby development scene with emerging and audits existing rural m-benefits that furnish Kenyan farmers with access to data and learning, economic system, and info

 DOI : 10.35291/2454-9150.2019.0554

and yield markets. The potential effect of M- services is delineated with the case of the cost and promoting services M-Farm. The study also evaluates current versatile innovation patterns to offer an attitude toward potential future applications.

Most of these previous attempts were made to either understand the current trend on M-services in Tanzania with regard to agriculture that includes the target people as small holder farmers. Also, there have been evidences which show that a few studies have already conducted earlier to understand the M-services and its contribution to farmers. However, those attempts have left the nuances of the marketing techniques and intensity of mobile phone usage among the small holder farmers. This present study aims to fulfill the existing gaps. Thus, this study throws light on the benefits of M- services among the farmers in regions of Tanzania with the study that reveals the relationship between the study variables through structural equation modeling.

III. RESEARCH METHODOLOGY

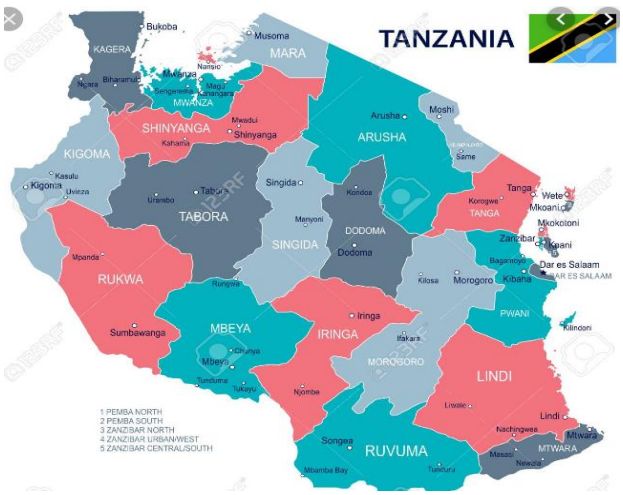
A combination of exploratory and descriptive research design has been used for the present study. The population of the study includes 67 smallholder farmers using mobile services (respondents). A questionnaire was prepared, pretested and used for data collection.

Component 1: Profile of the study area

Part A: Study Area: Tanzania

Tanzania officially called as United Republic of Tanzania is a country in East Africa. The Mount Kilimanjaro located in North-Eastern Tanzania. Over 100 different languages are spoken in Tanzania. This country doesn't have any official language but its national language is Swahili. Tanzania's climatic conditions vary gently. The temperature ranges between 10-20°C during cold and hot seasons respectively. The total population was 44,928,923 according to 2012 census. Dodoma is the capital of central Tanzania.Nachingwea, LiwaleandRuangwa

Figure 1.1 District map of Tanzania

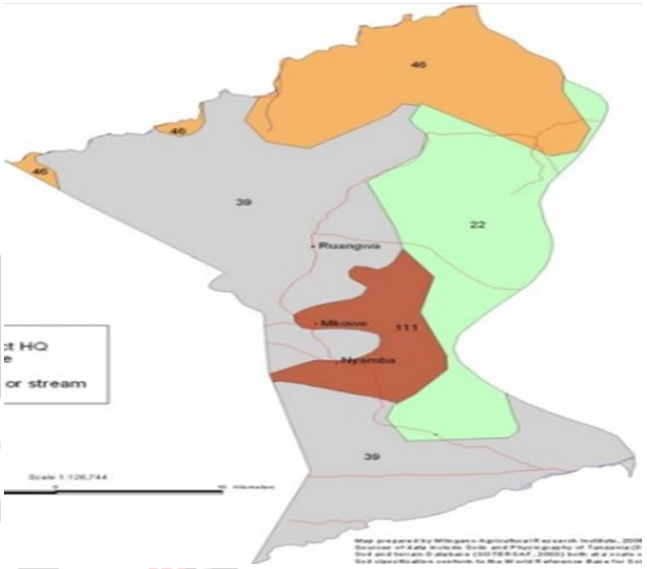


Source: https://www.google.com

Part-B: Selected regions

Ruangwa District:

Ruangwa is one of the five districts of Tanzania in the Lindi region. It is bordered to the north by Liwale city, to the south by Nachingwea town, and to the west by the province. According to the National Census of Tanzania in 2002, the Ruangwa District population was 1,204,516. The area boasts an abundance of minerals and a huge potential for agriculture. It has large deposits of graphite and uranium in the Ruvuma region, among other economically required minerals.



Profile of Nachingwea

Nachingwea is a hidden tourist zone in Southern Tanzania, remarkably known by its rich African societies, frontier history and the Mozambican freedom battle for autonomy.

Figure 1.2 Map of nachingwea

Source: www.maphill.com 1

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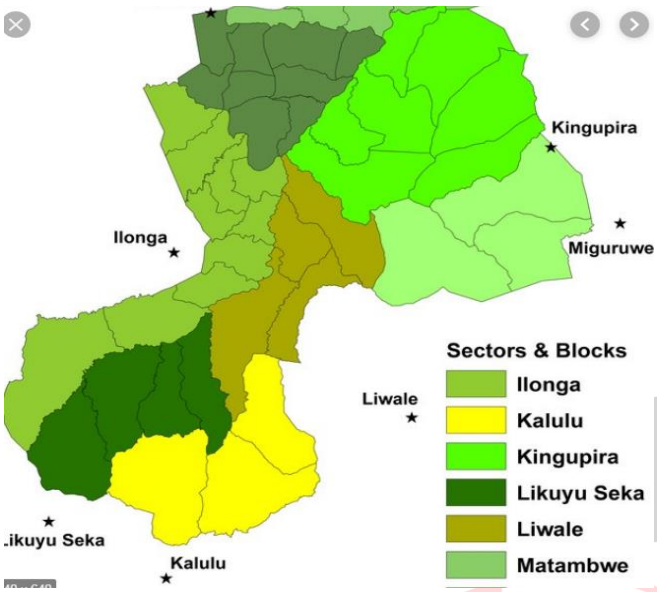
Profile of Liwale

Liwale district is a rich tourist attractive site by its history and cool weather combined with active thrilling places .Located in Lindi region, the district is an attractive site by its rich ancient Maji wars, cultural heritage and wildlife safaris inside Selous game reserve.

FIGURE 1.3 Map of Liwale



Source: www.maphill.com

Component 2: Research Methodology

Population of the Study

The Population for the proposed research includes all the Small holder farmers using Mobile services in Tanzania.

Conceptual Framework

The smallholder farmers of Tanzania use the mobile services as a way of communication to improve their benefits over marketing services to earn more profits through agriculture. Farmers may also use communication media for improving the effectiveness of M-services. The ultimate aim is to exaggerate the potential of M-services on improving benefits of Smallholder farmers of the Tanzania.

Objectives of the Study

1. To examine the impact of M-services for the small holder farmers in Tanzania
2. To study the exposure of small holder farmers towards various communication media.
3. To assess the intensity of mobile phone usage among small holder farmers.
4. To analyze the farming practices of small holder farmers in Tanzania.
5. To analyze the relationship between the study variables through structural equation modeling.

Hypotheses formulated for the Study

Null hypotheses

To fulfill the above objectives the following null-hypotheses have been formulated and included in the study.

Anova

H_{01}: There is no association between Gender groups with regards to the Communication media, Intensity of mobile phone usage, Farming practices, Effectiveness of market services and M-services.

$H_{02:}$ There is no association between with regards to Number of people who helps you in your farming practices with the Communication media, Intensity of mobile phone usage, Farming practices, Effectiveness of market services and M-services.

Correlation

H_{03}: There is no correlation between communication media and farming practices.

$H_{04:}$ There is no correlation between intensity of mobile phone usage and effectiveness of market services.

Structured Equation Modeling

Research question

Does the dimension Viz: Communication media, intensity of mobile phones usage, farming practices and effectiveness of market services have impact on M-services?

Hypotheses formulated for the study

H_{05}: The Communication media has an impact on M-services.

H_{06}: The Intensity of mobile phone usage has an impact on M- services.

H_{07}: The Farming practices have an impact on M- services.

H_{08}: The Effectiveness of market services has an impact on M- services.

Scope of the Research

The scope of the study will be limited to understanding the potentiality of M-services that are improving the benefits of small holder farmers of the three districts in Tanzania-Nachingwea, LiwaleandRuangwa districts.

IV. RESEARCH DESIGN AND DATA COLLECTION

The success of any research is solely depending on research design. Descriptive research was adopted for this study. The reason for choosing the descriptive research was that it helps in generalization to a greater extent. The study is based on both primary and secondary data. Where, Primary data is collected from a well framed and structured questionnaire to elicit the

 DOI : 10.35291/2454-9150.2019.0554

well-considered opinions of the respondents. The secondary data is collected from different Business Periodicals, Business journals, magazines, publications, reports, books, dailies, Research articles, websites, manuals and booklets.

Statistical Tools

The main tools used for statistical analysis were ANOVA test, Correlation and structured equation modeling (SEM).

Reliability

Cronbach alpha for items in each specific section used in research instrument for the survey are as follows: Communication media= 0.910, Intensity of mobile phone usage= 0.835, Farming practices= 0.816, Effectiveness of market services= 0.905, M-services= 0.875. (All the reliability test values are more than the minimum acceptable value of 0.7).

Limitations of this Research

A few significant limitations of this research are highlighted below:

- Data was collected as responses to Questionnaire issued only to the farmers of Tanzania of East Africa.
- These data were used to test various hypotheses. On account of the same, the observed relationships might have been overstated in some cases and may even have been susceptible to method bias.

ONE WAY ANOVA (GENDER)

H_{01}: There is no association between Gender groups with regards to the Communication media, Intensity of mobile phone usage, Farming practices, Effectiveness of market services and M-services.

TABLE 1.1

Dimensions		Sum of Squares	Df	Mean Square	F	Sig
Communication media	Between Groups	15.051	1	15.051	2.768	0.101
	Within Groups	353.427	66	5.437		
	Total	368.478	67			
Intensity of mobile phone usage	Between Groups	26.313	1	26.313	3.560	0.064
	Within Groups	480.404	66	7.391		
	Total	506.716	67			
Farming practices	Between Groups	11.112	1	11.112	0.731	0.396
	Within Groups	988.351	66	15.205		
	Total	999.463	67			
Effectiveness of market services	Between Groups	28.645	1	28.645	4.508	0.038
	Within Groups	412.997	66	6.354		
	Total	441.642	67			
M-services	Between Groups	157.070	1	157.070	7.498	0.008
	Within Groups	1361.706	66	20.949		
	Total	1518.776	67			

Significant at 0.05*

Inference

It can be seen from Table1.1 that null hypotheses are rejected as the p values are lesser than 0.05 for Effectiveness of market services and M-services. For all other dimensions, since the p value is greater than 0.05 null hypotheses is accepted.

There is an association between gender with Effectiveness of market services & M-services.

 DOI : 10.35291/2454-9150.2019.0554

ONE WAY ANOVA (NUMBER OF PEOPLE WHO HELPS YOU IN YOUR FARMING PRACTICES)

$H_{02:}$ There is no association between with regards to Number of people who helps you in your farming practices with the Communication media, Intensity of mobile phone usage, Farming practices, Effectiveness of market services and M-services.

TABLE 1.2

Dimensions		Sum of Squares	Df	Mean Square	F	Sig
Communication media	Between Groups	64.188	3	21.396	4.430	0.007
	Within Groups	304.289	64	4.830		
	Total	368.478	67			
Intensity of mobile phone usage	Between Groups	55.414	3	18.471	2.579	0.061
	Within Groups	451.302	64	7.164		
	Total	506.716	67			
Farming practices	Between Groups	145.840	3	48.613	3.588	0.018
	Within Groups	853.623	64	13.550		
	Total	999.463	67			
Effectiveness of market services	Between Groups	60.157	3	20.052	3.312	0.026
	Within Groups	381.485	64	6.055		
	Total	441.642	67			
M-services	Between Groups	122.803	3	40.934	1.847	0.148
	Within Groups	1395.973	64	22.158		
	Total	1518.776	67			

Significant at 0.05*

Inference

It can be seen from Table1.2 that null hypotheses are rejected as the p values are lesser than 0.05 for Communication media, Effectiveness of market services and Farming practices. For all other dimensions, since the p value is greater than 0.05 null hypotheses is accepted.

There is an association between Number of people who helps you in your farming practices with Communication media, Effectiveness of market services and Farming practices.

Correlation Analysis

Correlation between the Communication media and Farming practices

The following table gives the correlation between the Communication media and Farming practices

TABLE 1.3 Table showing the correlation between Communication media and Farming practices

Correlations			
		Communication media	Farming practices
Communication media	Pearson Correlation	1	.690
	Sig. (2-tailed)		.000
	N	67	67
Farming practices	Pearson Correlation	.690	1
	Sig. (2-tailed)	.000	
	N	67	67

(Source: Computed data) * Significance 0.05

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Inference

It can be understood from the table that the correlation coefficient between Communication media and Farming practices is 0.690**.** This implies that there exists a Positive correlation between the Communication media and Farming practices.

Correlation between the Intensity of mobile phone usage and the Effectiveness of market services

The following table gives the correlation between the Intensity of mobile phone usage and the Effectiveness of market services

TABLE 1.4

Table showing the correlation between the Intensity of mobile phone usage and the Effectiveness of market services

Correlations			
		Intensity of mobile phone usage	**Effectiveness of market services**
Intensity of mobile phone usage	**Pearson Correlation**	1	.643
	Sig. (2-tailed)		.000
	N	67	67
Effectiveness of market services	**Pearson Correlation**	.643	1
	Sig. (2-tailed)	.000	
	N	67	67

(Source: Computed data) * Significance 0.05

Inference

It can be understood from the table that the correlation coefficient between theIntensity of mobile phone usage and the Effectiveness of market services is 0.643. This implies that there exists a Positive correlation between theIntensity of mobile phone usage and the Effectiveness of market services.

Structural Equation Modelling (SEM)

The observed, endogenous variables were:

(i) Effectiveness of market services

(ii) M- servicess

The observed, exogenous variables were:

(i) Communication media

(ii) Intensity of mobile phone usage

(iii) Farming practices

The unobserved, exogenous variables were:

(i) e1 (error term for Effectiveness of market services)

(ii) e2 (error term for M- servicess)

Variable counts (Group number 1)

Number of variables in your model: 7

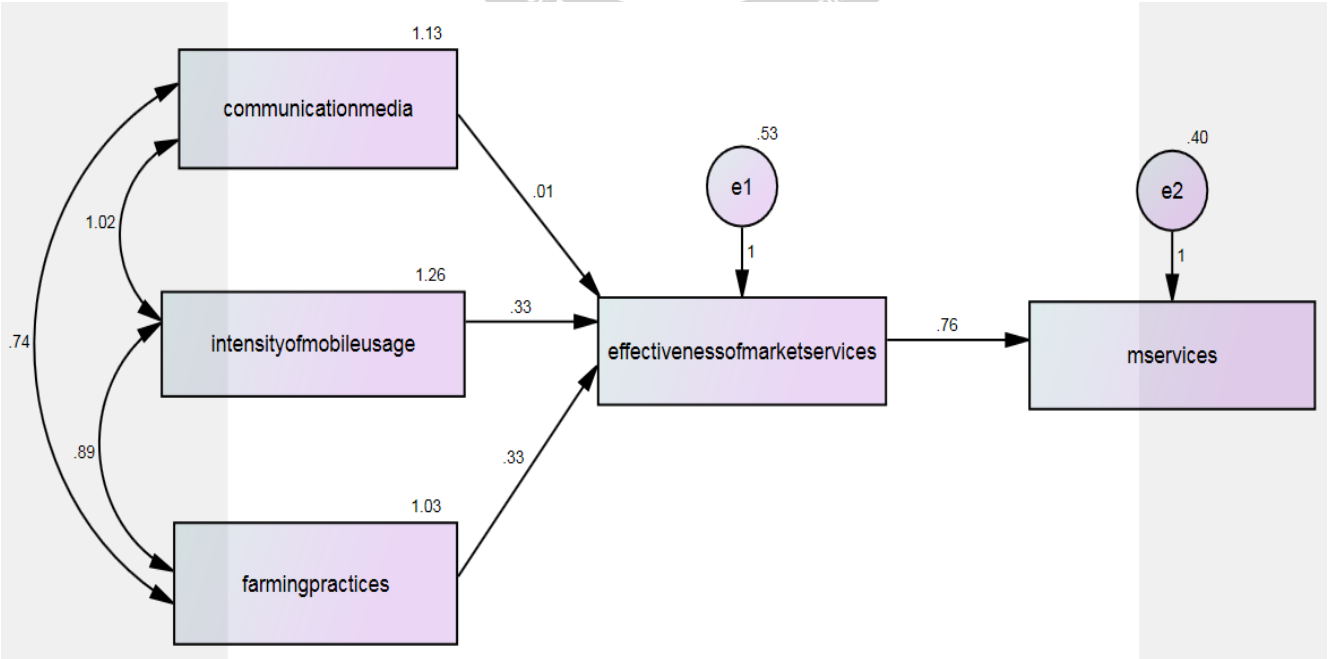
Number of observed variables: 5

Number of unobserved variables: 2

Number of exogenous variables: 5

Number of endogenous variables: 2

FIGURE 1.4 SEM Path Analysis



Source: Primary Data

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TABLE 1.5 Major Model Fit Indices Summary

Parameters	Acceptable values for Good Fit	Research Model values
GFI	>0.9	0.912
AGFI	>0.9	0.932
CFI	>0.9	0.941
RMSEA	<0.06	0.042
RMR	<0.10	0.101

Inference

It can be seen from the table 1.5 that the Goodness of Fit index (GFI) value was 0.912, Adjusted Goodness of Fit Index (AGFI) value was 0.932 and Comparative Fit index (CFI) value was 0.941. All these values were greater than 0.9 indicating a very good fit. It was found that Root Mean Score Error of Approximation (RMSEA) value was 0.042 (lesser than 0.06) and Root Mean Square Residual (RMR) value was 0.101 (lesser than 0.2).

Conclusion for the interpretation

The values indicate that the model is an extremely good fit.

V. CONCLUSION

M-services in farming are of paramount importance as this proves to the increased marketing benefits of smallholder farmers. The improved access of Information technology among the farmers has created more awareness about the techniques in the field of farming business. Thus, the M-services in the regions under this study has a positive and significant impact on small holder farmers.

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