Assessment of Mobile Phone Digital Literacy Skills among Fish Farmers in Iringa Region, Tanzania

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Abstract

The main objective of this study was to assess the level of mobile phone digital literacy skills of the fish farmers. Specifically, the study focused on assessing the level of mobile phone digital literacy skills of the farmers, exploring the influence of demographic data on the level of mobile phone digital literacy skills and identifying the types of information accessed through mobile phone among fish farmers. The study was carried out in two purposefully selected districts of Iringa Region, namely Killolo and Mufindi. The study involved 100 randomly selected respondents and employed a cross-section research design. It also employed quantitative and qualitative approaches in collecting data. Questionnaires, Focus Group Discussion, observation and key informants, interview were used to collect data. Quantitative data were analysed by using both descriptive and inferential statistics with the aid of SPSS version 20. Qualitative data were analysed using content analysis. Overall findings indicate that the level of mobile phones digital literacy skills were low. In addition, the study revealed that fish farmers were using mobile phones in accessing information on fishpond construction, fish feeds management and selection of improved fish species. Moreover, the income, age, sex and level of education was found to have statistical significant and positive relationship with the level of mobile phone digital literacy at $p<0.000$. Thus, it is recommended that information services providers and other responsible organs should empower fish farmers with training on mobile phone digital literacy particularly on communication, software and problem-solving skills. It is expected that this will encourage more farmers to utilise mobile phones for accessing fish farming information.

Introduction

Aquaculture farming in Tanzania plays a significant role in building and strengthening a strong national economy by increasing food security, employment opportunities and household income. In 2014, Tanzania fish farming or aquaculture sub-sector employed 183 800 full time fishermen and about 4.0 million people earned their livelihoods from fish farming related activities (URT, 2015). On top of that, the sector contributed 2.4% to the GDP (Economic Survey Report, 2014). In fish farming, information plays a very crucial role in determining the extent of fish farming productivity. This is due to the fact that farmers need to employ up-to-date aquaculture practices for higher yields. Access to and use of aquaculture information in fish farming enhance informed decisions on various improved farm yields, improved farm technologies, access to credits, provision of revenue and increased productivity (Soyemi & Haliso, 2015).

Fish farmers need to be updated with various aquacultural information in order to improve their fish farming management practices. This is backed by researchers (such as Benard *et al.* 2018; Adefalu *et al., 2013;* Ijatuyi *et al.*, 2016) who recommend that fish farmers need to be informed and updated with various information on construction of fishponds, fish spawning, fish processing, feeding and feed formulation techniques, storing and preservation, record keeping, identification of disease symptoms and stocking operations. These categories of information need to reach farmers through right communication channels and in the right time. In this regard, Information and Communication Technologies (ICT) particularly the mobile phone can play an important role. Mobile phone-based communication has rapidly grown in the recent past and become the most used communication among all ICTs of the current age. Recent statistics revealed that 62.9 per cent of the population worldwide already own mobile phones with 4.68 billion users on the planet (STATISTA, 2019).

In the fish farming context, the mobile phone has empowered the fish farmers to share fish farming experiences, improved fish farming technologies, markets and other important fish farming innovations (Kacharo 2016). Mobile phones facilitate the availability and accessibility of information to fish farmers and reduce the cost of communicating and disseminating the information. All these interventions are possible if farmers have a basic level of digital literacy skills that will help them in using mobile phones. Lankshear and Knobel (2008) describe digital literacy as the ability to read, write, view, listen, compose and communicate

information. Moreover, Martin (2008) defines a digital literate person as someone with the skill to identify, access, manage, integrate, evaluate, analyse and synthesise digital resources. A study conducted in China by Zhong and Qu (2018) on agricultural information literacy of farmers shows that farmers lacked skills in identifying the sources of information they preferred. A similar study by Eric *et al.* (2013) revealed that the overall digital literacy of the new generation farmers was relatively weak. The lack of knowledge prevented them from mastering and utilising modern ICTs tools like mobile phone and preventing their realisation of agriculture informatisation.

Mobile phone is the most popular ICT tool across the world today (Verma, 2012). Its popularity is due to the fact that mobile phone technology is perceived as a low cost and a widely available communication tool that holds considerable promise for knowledge mobilisation in various sectors including fish farming (Nyamba, 2012). With the use of mobile phones, fish farmers can share up-to-dated information on fish spawning or breeding operation, construction of fishponds, feeding and feed formulation techniques, fish processing, storing and preservation and stocking operations. This view is supported by Aker (2010) who claimed that one promising area for agricultural extension to reach farmers on time and with low cost is through using mobile phones. Making all these possible requires farmers to possess basic mobile phones and digital literacy skills. Hence, they can have access and use such information. According to Gilster (1997), digital literacy skills is the ability to use information and communication technologies (mobile phones) to find, operate, evaluate, create and communicate information. In this context, digital literacy skills are very important in helping farmers in accessing, using, retrieving, communicating and sharing information. They are also required for effective use of ICTs (Becker *et al.*, 2012).

Recent studies by Awadalla (2019) and CTA (2019) have revealed that farmers' low digital literacy, along with insufficient digital human capital development and infrastructure investments in rural areas, has been mentioned as the barriers and constraints for them to access and effectively use mobile phones in accessing information. However, there is scarcity of studies that have been done in Tanzania particularly in Iringa Region to assess the level of digital literacy skills among fish farmers. In supporting this view, Evans (2019) reported that farmers basic digital literacy skills, motivation values and use of information accessed through mobile phone were overlooked in past studies conducted in most developing countries including Tanzania. This study, therefore, intended to assess

the level of digital literacy skills among fish farmers and consequently improving fish farming information accessibility in Tanzania.

Research Objectives

The following research objectives guided this study.

Main objective

The main objective was to assess the level of digital literacy skills among fish farmers and consequently improving fish farming information accessibility in Tanzania.

Specific objectives

The specific objectives were:

i. to assess the level mobile phones digital literacy skills of the farmers.
ii. to identify types of information accessed through mobile phones.
iii. to explore the influence of demographic data on mobile phone digital literacy skills among farmers.

Concept of mobile phone digital literacy

In this study, farmers' mobile phone digital literacy implies the ability to identify, access and compose information. It also entails using mobile phones in communicating, reading, viewing, writing, retrieving and creating information through mobile phone. This definition was used to develop four measurements of the mobile phone digital literacy assessment tool. Those tools were:

Mobile phone Information literacy skills - writing a text message, opening a sent message and reading it, making phone calls, recording video clips and identifying missed calls.

Mobile phone Communication literacy skills - sending/receiving emails, skills on sending/receiving messages through social media, browsing through internet, skills on telephoning/video calls over the internet, skills on sending/receiving photos through social media and skills on uploading self-created content to any website.

Mobile phone Software literacy skills - skills to create accounts on social media, skills to update software/mobile applications, skills to install mobile applications, skills to use word processing software and skills to use software to edit photos, videos, or audio files.

Mobile phone Problem solving skills - online purchases, skills for using of government services using mobile applications, skills for obtaining information from public authorities/services websites, skills for finding information about goods/services from online resources and skills for selling online. The similar tools were adopted by Alant and Bukire (2021). This study, therefore, intended to assess the level of the mobile phone digital literacy skills among the fish farmers in Iringa Region, Tanzania.

Methodology

This study was carried out in Iringa Region specifically in Kilolo and Mufindi Districts. Iringa Region was chosen because it is among the regions with relatively big number of fishponds and well-developed mobile networks coverage. According to the URT (2018), Iringa, Ruvuma and Mbeya Regions have more fishponds than other regions in the country.

Sampling procedures and sample size

In this study, the sampling frame included all individual fish farmers from three divisions of the two districts, namely Kilolo and Mufindi. The districts were purposively selected based on the number of fish farmers and the presence of such basic ICT infrastructures as mobile networks. In this case, 60 fish farmers were chosen from Kilolo District and 40 farmers from Mufindi District. Simple random sampling to obtain a sample size of 100 respondents. According to Saunders *et al.* (2007), a sample size of 30 or more results in a sampling distribution that is very close to the normal distribution and the larger the absolute size of a sample the closer it becomes normal distribution**.** In addition, Bailey (1994) adds that a sample or sub-sample of 30 respondents is the bare minimum for studies in which statistical data analysis can be done.

Methods of data collection

The study employed both qualitative and quantitative approaches. A cross-sectional research design was used in collecting primary data. In this case, data were collected once from individual fish farmers. In order to ensure validity and reliability in this study, the copies of questionnaire were pretested. The value of 0.76 for reliability of scale (Cronbach's Alpha) for overall variables in this study was obtained. This indicated good internal consistency reliability for the tools. After conducting the pre-test, the questionnaire with both open-ended and closed-ended questions was amended and administered to 100 respondents using face-to-face interviews. One major advantage of the face-to-face interview is that

it allows the researcher to probe and clarify issues on the spot (Walliman, 2006). Two Focus Group Discussions (FGDs) were conducted. Eight participants who had an experience of five years in fish farming were purposively selected in each district. According to Lengua *et al.* (1992), a good Focus Group Discussion (FGD) is the one which normally consisting of 6-12 participants. The study also collected data from four key informants (two fisheries extension officers from each district) who were purposively selected and interviewed.

Data analysis

Famers mobile phone digital literacy skills were measured by the respondents responding to a list of mobile phone digital literacy skills on the following dimensions: Information skills (10 items), Communication skills (8 items), Software skills (8 items) and Problem-solving skills (8 items). Respondents were requested to rate their level on the items of each dimension using the scale highly sufficient, sufficient, moderate and insufficient. They were later scored as 4, 3, 2 and 1 respectively. Each respondent's self-assessment score was obtained by summing up all the information items for each dimension to get the level of access for each dimension. The higher values indicated high level of skills while low values indicated low skills. Furthermore, the level for each dimension was categorised as low, medium and high. For farmers, information skills have 10 items. Therefore, the highest possible score was calculated by multiplying 10 statements by 4 points to get 40 points. Conversely, the middle point was calculated by multiplying 10 statements with 3 points to get 30 points and the lowest possible score was calculated by multiplying 10 statements by 1 point to get 10 points. Therefore, 30 was the cut-off point and stood for moderate skills. Hence, scores from 10 to 29 on the overall scores were considered as low skills; while 31 to 40 stood for high skills.

Furthermore, overall total score was computed by summing up all items for all the items (34 items). The highest possible score was calculated by multiplying 34 items 4 points to get 136 points. On the other hand, the middle point was calculated by multiplying 34 statements with 3 points to get 102 points. The lowest possible score was calculated by multiplying 34 items by 1 point to get 34 points. Therefore, 102 was the cut-off point and stood for moderate overall skills. Hence, scores from 34 to 101 on the overall scores were considered as low overall skills while 103 to 136 stood for high overall skills.

The multiple linear regression equation used for analysis. It analysed the influence of demographic data on level of mobile phone digital literacy skills among fish farmers.

$Y = \beta_0+\beta_1X_1+ \beta_2X_2+\ldots+\beta_nX_n + \varepsilon,$

Where;

Y= Mobile phone digital literacy skills total score

β= Regression Coefficients

β_0= Intercept

i. Sex (1-Male, 0-Female)
ii. Age of the farmer was measured as respondent's age in number of years.
iii. Marital status (1; married, 0-Single)
iv. Education level (1=No formal Education, 2-Primary, 3-Secondary, 4-Tertiary)
v. Household size is the number of people living in a household
vi. Mobile phone use experience was measured as number of years the person had been engaged in using mobile phones.
vii. Membership on farmers groups/association (1=Member, 0-Non-Member)
viii. Annual income was measured in Tanzanian currency (Tsh).

Results and Discussion

Socio-economic characteristic of the respondents

Table 1 summarises the findings of the research study on demographic characteristics of the respondents. It was revealed in this study that 72% of the respondents were male while 28% were female. These findings are similar to those of Chenyambuga (2014), Benard *et al., (*2018) who also reported that almost all fishponds surveyed in Ruvuma, Kilimanjaro, Njombe, Morogoro, Mbeya and Dar es Salaam regions in Tanzania were owned and managed by male farmers. This probably could be due to the tedious nature of fish farming especially on pond management practices. This was also reported by Ofuoku *et al. (*2008) from Nigeria who noted that the male dominance in aquaculture farming suggests the labourious nature of farming operations which their female counterparts could not afford.

Similarly, findings reveal that nearly half (28%) of the respondents were in the age group of 41 to 50 (Table 01). This suggests that most of the respondents were within the economically active age group and this could have a positive influence

on digital literacy skills in the study area. Olaoye *et al.* (2014) opine that ages between 40 and 50 are considered highly productive and active to undergo energetic tasks associated with fish farming activities.

Furthermore, the research findings revealed that 34% per cent of the respondents had income level of more than TZS 1,250,000 per year. This means that income level of the fish farmers in the study area was below the per capital income of Tanzanian which is TZS 2,100,000 per year (TNBS, 2016). Income level can have positive or negative consequences on the level of digital literacy of the fish farmers.

Likewise, research findings noted that 53% per cent of the respondents had attained the primary level education. Ortindi and Katikpo (2015) describe that the level of education may affect mobile phone digital literacy level and information accessibility.

Table 1: Demographic characteristics (n=100)

Variable	Category	n	%
Sex	Male	72	72.0
	Female	28	28.0
Age	20 – 30	16	16.0
	31 – 40	27	27.0
	41 – 50	28	28.0
	More than 50	29	29.0
Household	1 – 3	24	24.0
	4 – 6	56	56.0
	More than 6	20	20.0
Marital status	Single	9	9.0
	Married	85	85.0
	Divorced	1	1.0
	Widowed	5	5.0
Education	No formal education	3	3.0
	Primary education	53	53.0
	Secondary education	39	39.0
	Tertiary education	5	5.0
Household income	100,000.00 – 500,000.00	28	28.0
	500,001 – 750,000	10	10.0
	750,001 – 1,000,000.00	16	16.0
	1,000,001 – 1,250,000.00	12	12
	More than 1,250,000.00	34	34.0

Mobile phone use experience	Less than 3	23	23
	3 – 6	29	29
	6 – 9	10	32
	More than 9	30	16
Use mobile phone	No	3	3
	Yes	97	97
Type of mobile phone used	Ordinary/basic	61	61
	Smart phone	39	39

It can be noted from Table 2 that the majority of the respondents (85%) had high level of information literacy skills toward mobile phone use. This implies that fish farmers had high sufficient knowledge on how to make such simple operations using mobile phones as writing a text message, opening a sent message and reading it, making phone calls, recording video clips and identifying missed calls. This result tallies with the findings of Komolafe *et al.* (2018) who revealed that most of farmers interviewed had a basic information literacy skill of preforming simple operation. This information literacy is very important as it encourages farmers to utilise mobile phones in accessing information and consequently improving fish farming productivity.

Likewise, further results showed that nearly half of the fish farmers (55%) had a low communication skill in mobile phone operations. This suggests that fish farmers had low sufficient skills on how to perform such different communication operations via mobile phones as sending/receiving emails, skills on sending/receiving messages through social media, browsing through internet, skills on telephoning/video calls over the internet, skills on sending/receiving photos through social media and skills on uploading self-created content to any website. These findings are similar to what have been reported by Domician (2017) who mentioned that only 36 (i.e. 35%) of farmers interviewed were found to make use of digital cameras, audios, videos and multi-social media on their mobile phones. This result could be attributed to the fact that some of the farmers were missing some important skills on how to perform important mobile communication features on their smart phones. Besides, some farmers were not aware of the existence of some important features. This is supported by results obtained through the FGDs from Boma in Mufindi District whereby one farmer narrated:

> *I have a smart phone, but I don't know how to operate some important functions like how to conduct a video call.*

This was evidenced during the interview with one of the fisheries officers in Kilolo who pointed out: "Some of the farmers have very good and modern smart phones but they are not aware of the existence of some of the important features using WhatsApp in sending videos". In confirming this, findings from a study conducted by Matuha *et al.* (2015) reported that the farmers were not aware of important application services/functionalities they could get through mobile phones.

Further, results reveal that more than a half (71%) of the fish farmers had low software skills on mobile phone operations. This implies that fish farmers had insufficient skills on how to perform different mobile phone software related such operations as skills to create accounts on social media, skills to update software/mobile applications, skills to install mobile applications, skills to use word processing software and skills to use software to edit photos, videos, or audio files. The results are similar to what have been reported by Alant and Busire (2021) who revealed that majority of the fish farmers interviewed were not able to the display use of the various mobile phone related skills such as activating/installing mobile application, sending and checking emails, creating social media account, downloading mobile applications and setting GPS. This could be attributed by the language barrier. This situation is possible because such operations use English language which could be difficult for the farmer to comprehend. In addition, another contributing factor can be the lack of technical training on mobile phone software operations and the lack of interest. In supporting this, findings from a study conducted by Benard *et al.* (2018) and Mabika (2019) reported that the education level of farmers play an important role in their utilisation of mobile phone application features to access farming information and in navigating through their phones.

Furthermore, study findings showed that 76% per cent of the fish farmers had low problem-solving skills on mobile phone operations. This suggests that fish farmers had insufficient skills on how to apply mobile phone problem solving skills in acquiring a certain solution. Such problem-solving skills were skills for online purchases, skills for use of government services using mobile applications, skills for obtaining information from public authorities/services websites, skills for finding information about goods/services from online resources and skills for

selling online. This could be explained by the fact those skills are not of much important to farmers. Some of the farmers are not aware of those skills, though some few farmers who had attained secondary school education were practicing some of those skills like selling their fish products online. This is supported by the results obtained through the FGDs in Ihalimba, whereby one farmer narrated:

> *Those functionalities use English language to operate. For example, preforming online purchase with my primary education will be very difficult to perform such a task.*

Thus, this indicates that there is a need of frequently training fish farmers especially on those areas with low mobile digital literacy skills. There is a need to encourage them on the full utilisation of mobile phones on accessing important information especially on fish farming.

Table 2: Level of mobile phone digital literacy skills of the farmers

Dimension	Low (%)	Medium (%)	High (%)
Information skills	14	1	85
Communication skills	55	1	44
Software skills	71	5	25
Problem-solving skills	76	3	21
Overall	63	0	37

The research findings as shown in Table 3 below indicate that some of the fish farmers (44%) used the mobile phone to request information/knowledge on pond construction. This is attributed to the fact that construction of fishpond requires technical knowledge. At the same time, due to limited numbers of fisheries officers, the immediate solution is for farmers to request such information from an expert via her or his mobile phone. This is supported by results obtained through the FGDs from Nundwe in Kilolo District, whereby one farmer narrated:

> *Due to the unavailability of fisheries extension officers nearby our farms, I normally use my mobile phone to browse through internet to obtain some important information required before pond construction.*

Matuha *et al.* (2015) confirm that due to technical skills required in fishpond construction and limited knowledge of fishpond construction, farmers usually seek technical guidance from experienced fish farmers via mobile phones.

Further, results reveal that nearly a half (43%) of the fish farmers use mobile phones in seeking information on where and how select and to improve fish

species. This is probably because of existence of low numbers of fisheries extension officers as the source of information in the study area. Thus, farmers use mobile phones as an alternative source of information whereby with mobile phones, farmers can quickly search and access such information through internet or by asking experts. Besides, the farmers may obtain information from other experienced farmers without travelling long distance looking for such knowledge. In confirming this, findings from a study conducted by Masuki *et al.* (2010) in Nigeria found that the use of mobile phones was appreciated by rural farmers because they are user-friendly, fast and convenient to share and get prompt answers of respective problems.

Moreover, other information that was requested by fish farmers via mobile phone was information on markets of their fish produce. This is due to the fact that with mobile phones, farmers can have ability to search wider markets from different sources or networks and sell their products in a greater number of markets. In supporting this, some fisheries extension officers claimed that they preferred to use mobile phones more frequently to communicate and update, share market information with farmers because they assisted them to overcome transport problems. Similarly, in confirming this also, during the FGD, one respondent in Ihalimba Division narrated:

> *Without a mobile phone, I would have been forced to walk and look for the fish market. That would have taken a lot of time.*

In addition**,** Matuha *et al.* (2015) pointed out that the existence of mobile phones has made it easier for a fish farmer to communicate with businessmen and middlemen by informing them of the availability of fish. Likewise, other information accessed by farmers through mobile phones were information on fish feed management, fish seed stocking and fishpond water quality management. This is also in line with Aphunu and Atoma (2011) who confirmed that mobile phones were highly applied in getting information with regard to the availability of fish seeds, fish harvesting techniques, fish stocking density and management of fishpond water parameters. This means that mobile phone play very important role and alternative source of knowledge particularly in a situation where fishery extension officers are unavailable or are limited in numbers.

Table 3: Types of information acquired through mobile phones

Types of information	n	%
Pond construction	44	44.0
Record keeping	25	25.0
Selection of improved species	43	43.0
Fish seed stocking	33	33.0
Pond water quality management	29	29.0
Fish feeding management	34	34.0
Harvesting	24	24.0
Feed formulation	28	28.0
Production of monosex fingering	12	12.0
Fish preservation	23	23.0
Water treatment management	15	15.0

Table 4 shows a regression model of the selected socio-demographic characteristics influencing mobile phone digital literacy skills among farmers. Eight socio-demographic factors were included in the model: sex, age, marital status, education level, household size, mobile phone use experience and membership on farmers' groups/association. The study results show that the Variance Inflation Factor (VIF) for all variables in the model ranged from 1.083 to 1.393 and meets the VIF as stipulated by Pallant (2011). Furthermore, the Durbin-Watson's d tests were used to test the autocorrelations. The results showed that the Durbin-Watson's is 1.644 which falls within the values of $1.5 < d < 2.5$ (implying that there was no autocorrelation) (Kutner *et al.,* 2005). Hence, there is no auto-correlation in the multiple linear regression data.

Results in Table 4 revealed that sex, income and level of education were positive while age were negative and statistically significant ($p<0.000$) with the level of mobile digital literacy skills.

The positive correlation between the sex of the farmer and level of mobile phone digital literacy skills implies that the male is more likely to have high level of mobile phone digital literacy than their female counterparts. This is probably because men have more access and are exposed to various mobile phone applications and features in searching various information that makes them to improve their digital literacy skills than women. This might be due to cultural practices which allocate most of the domestic responsibilities to women, leaving them with almost no extra time to allow them to pursue additional services related

to mobile phone use. In supporting this, findings from a study conducted by Rana (2009) and Mwalukasa (2018) reported that there were higher skills of mobile phone use in searching internet and other information in male than female who often did not dedicate much time on technological experimentation as compared to their male counter parts. This indicates that sex should be taken into account during the design of mobile phone application systems for delivering agricultural information to farmers.

Moreover, the positive correlation between the level of the education of the farmer and level of mobile phone digital literacy skills suggests that farmers with higher education levels have more digital literacy skills on mobile phone applications compared to one with low education level. This conforms to studies by Ali (2012) Mwalukasa (2018), Benard *et al.* (2018), as well as Alant and Busire (2021) who mentioned that farmers with higher education levels had a high digital skill on using mobile phone in searching agricultural information than farmers with low level of education. This shows that education plays an important role in increasing knowledge for improving mobile digital skills and the ability to receive new farming methods. Thus, information service providers should take into consideration the education levels of farmers during designing of mobile phone application system for information dissemination.

In addition, the negative correlation between the age of the farmer and level of mobile phone digital literacy skills implies that younger farmers had higher digital skills of using mobile phones in accessing various information in the study areas than the older farmers. This could be attributed to the fact that the older farmers are less interested in adopting technology than the younger ones. This leads to the older farmers have low mobile phone digital literacy skills than the younger ones. This is supported by a study by Nyamba and Mlozi (2012) who revealed that younger respondents in Tanzania had higher skills and chances of using mobile phones for accessing information than the older ones. Therefore, in designing any mobile phone related project training should be taking into account all age groups.

The positive correlation between the level of income of the farmer and level of mobile phone digital literacy skills implies that as the income level of farmer rises the use of ICTs will increase to escalate the mobile phone digital literacy skills. This is probably due to the fact that farmers with high income can afford to buy or use mobile phones. As a result, they can maintain them through airtime recharging, acquiring internet bundles and hence improving their digital literacy

skills. In confirming this, findings from a study conducted by Luqman *et al.* (2019) in Pakistan found that the increased income level of the farmer could persuade farmers to improve their digital literacy skills by accessing and using advanced ICTs.

Table 4: Influence of demographic data on mobile phone digital literacy skills among farmers

Factor	Unstandardised Coefficients		Standardised Coefficients			Collinearity Statistics	
	B	Std. Error	Beta	t	Sig.	Tolerance	VIF
(Constant)	26.558	11.750		2.260	.026		
sex	16.309	4.319	.262	3.776	.000	.829	1.206
Age	-.485	.173	-.209	-2.809	.006	.718	1.393
Number of family members	-1.184	.881	-.091	-1.344	.182	.862	1.160
Marital status	5.507	5.069	.071	1.087	.280	.923	1.083
Level of education	27.877	2.876	.642	9.692	.000	.909	1.100
Average income	1.869E-6	.000	.089	1.242	.0018	.772	1.295
Mobile phone use experience	-.337	.472	-.050	-.714	.477	.821	1.218
Being member farmers groups	5.996	4.345	.091	1.380	.171	.909	1.100

Multiple R=.808; R Square=.653; Std. Error of the Estimate=17.32331; $F_{8,87}$ =20.497p=0.000; Durbin-Watson=1.654

Conclusions and Recommendations

The findings established that the overall level of mobile phone digital literacy was low. This could greatly affect the adoption and use of mobile phones by farmers in accessing and sharing various important fish farming information and consequently poor fish farming productivity. From the findings, researchers, policy makers, information providers and ICT experts in Tanzania can come up with more relevant farmers' mobile phone digital skills training programmes. Such skills will assist fish farmers to use and access mobile phone. Therefore, to enhance mobile phone digital literacy skills among farmers, the study recommends the following:

i. Information services providers and other responsible organs should empower fish farmers with training on mobile phone digital literacy particularly on communication, software and problem-solving skills to encourage more farmers to utilise mobile phone for accessing fish farming information.

ii. Responsible organs like research institutions, policy makers and information providers should make sure that demographic characteristics

like farmers' sex, income, level of education and age that affect farmers mobile phone digital literacy skills are considered prior to introduction or designing of any farmers mobile application system. This could assist responsible organs to design the mobile phone application models that are relevant to fish farmers' needs.

iii. Likewise, there is a need for the NGOs, researchers, policy makers and the Government through her department of aquaculture extension, to consider establishing fish farmers' Mobile phone applications system to encourage sharing of more agricultural information on fish production and knowledge that is more relevant to the farmers.

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