

ANALYSIS OF FARMERS' DIGITAL APPLICATIONS (APPS) FOR AVAILING AGRICULTURE-RELATED INFORMATION SERVICES

*Mohammad Sahadat Hossain¹; Manik Mahmud²; Mohammad Mahbubur Rahman³;
Sarmin Akter Simul⁴; and Md. Masum Billah⁵*

Abstract

Krisoker Digital Thikana (Farmer's Digital Platform) is an on-line and off-line based application to provide different agriculture-related services to farmers. There are many pictures and videos of different plant diseases along with symptoms, prevention and treatment available in Krisoker Digital Thikana. The study is conducted through the use of a quantitative method to evaluate the newly introduced application in the agricultural sector from the TCV (Time, Cost and Visit) perspective comparing it to the manual agriculture-related services provided to farmers. In comparison to the previous procedure, the average time has been reduced by 68% by using the Krisoker Digital Thikana electronic application for agriculture-related services. Similarly, the average cost has been reduced by 96% by getting services through the Krisoker Digital Thikana. Since time and cost have been reduced through the use of the new procedure, visits have also been reduced by 27%. It is also observed that 30% of the service recipients have been very satisfied with using the new procedure while 66% are not satisfied. Besides, 4% of the respondents have been moderately satisfied with using the Krisoker Digital Thikana. Nevertheless, farmers are now availed to get modern agriculture-related services from Krisoker Digital Thikana though there are still some challenges, as a considerable number of farmers is still not aware of the application. Hence, an awareness raising campaign should be launched to inform farmers about this revolutionary and innovative service.

Keywords: Agrarian Country, Agriculture, Agricultural Services, Krisoker Digital Thikana, TCV (Time, Cost and Visit).

Introduction & Background

The agricultural sector is one of the driving forces for the economic development of Bangladesh, as well as its largest contributor of income generation activities for rural people. The agricultural sector plays an important role in the economy of the country accounting for 15.5% of its total GDP (2015).⁶ Of the total labour force of the country, about 48% is engaged in this sector, while 70% of the rural population depends on agriculture for their livelihoods.⁷ Agriculture is a major source of rural jobs in Bangladesh. Over 87% of rural people derive at least some of their income from

¹ Upazilla Agriculture Officer, Belkuchi Upazilla, Sirajgonj and Innovator of Farmer's Digital Address (Krisoker Digital Thikana) Application. Email: muhammadsiddique@gmail.com

² Capacity Development Specialist, Access to Information (a2i) Programme. Email: manik.mahmud@a2i.gov.bd

³ Capacity Development Expert, Access to Information (a2i) Programme. Email: mahbubur.rahman@a2i.gov.bd

⁴ National Consultant (Project Monitoring & Research), Access to Information (a2i) Programme. Email: shimul.unique@gmail.com

⁵ National Consultant (P2G Payment), Access to Information (a2i) Programme. Email: masumiswr.du@gmail.com

⁶ http://databank.worldbank.org/data/reports.aspx?Code=NY.GDP.MKTP.KD.ZG&id=af3ce82b&report_name=Popular_indicators&popularitytype=series&ispopular=y

⁷ http://www.mof.gov.bd/en/budget/13_14/gender_budget/en/27%20Chapter%2029_43_Ministry%20of%20Agriculture_English.pdf

agriculture, although two thirds of rural households rely on both farm and non-farm income.⁸ Therefore, it is imperative to ensure the desired growth in this sector. The target of an annual GDP growth rate of 7% will depend on the growth of agriculture at the rate of 4 to 4.5% (Ministry of Agriculture, 2018).

Agriculture is the one of the most ancient occupations of the people of Bangladesh. In this context, as farming is an ancient occupation most farmers still follow traditional cultivation processes and methods. As a result, they do not manage to get optimal levels of production. On the other hand, for farmers to get the necessary information and advice from the Upazilla Agriculture Offices, they often have to travel 20 to 30 km, which is a costly and time consuming process, and in some cases, they have to repeat the journey as they fail to meet with the Upazilla Agriculture Officers.

Thus, in order to reduce the associated hassles and increase their agricultural production, a new mobile application through the use of ICT is reaching the farmers' doorstep. This application has been operational since the beginning of July 2014 at the Belkuchi Upazilla in the Sirajgonj District. This application – the so called 'Krisoker Digital Thikana' – is available to the local farmers, fertiliser and insecticide sellers, Union Digital Centres (UDC) and other agriculture-related government officers. Farmers are able to receive the necessary agriculture-related services and information through this application using their android-operated mobile telephones and/or through the use of a laptop or a desktop computer. The application is available, both on-line and off-line. Consequently, there is no longer a need for farmers to visit the Upazilla Agriculture Office to identify any plant disease or receive advice on their crops.

Figure 1: Map of Sirajganj District



⁸ <http://www.worldbank.org/en/news/feature/2016/05/17/bangladeshs-agriculture-a-poverty-reducer-in-need-of-modernization>

When a farmer comes to the Agriculture Office to meet with an agricultural extension worker, sometimes fails to describe correctly a symptom of the disease, or to explain the problem clearly to the extension worker and thus it becomes difficult for the extension worker to identify the disease. In this case the extension officer needs to make a field visit to identify the problem and suggest requisite solutions to overcome the problem. The process is costly in terms of both money and time. The complexities and costs associated with this conventional system can be improved through the introduction of an online dynamic system, since nowadays, mobile and internet access enables farmers to have all these services through e-specialised resources at their doorstep.

It has now become easier for farmers to identify plant and crop diseases because there are many pictures and videos of different diseases along with their symptoms, prevention and treatment available in Krisoker Digital Thikana. In addition, if farmers want, they can call the agriculture officer and agronomist because all agriculture officers and their agriculture office and agriculture extension office numbers are also available in this application. They may also acquire agriculture-related services they require, by dialling the number **16123**. Furthermore, capacity development training has been provided to the entrepreneurs of UDC, Deputy Assistant Agriculture Officers, insecticide sellers and representatives of farmers to serve as alternative service providers. Consequently, farmers need no longer to travel long distance for obtaining more advanced agriculture-related services; they can get them at walking distance. Krisoker Digital Thikana has reduced farmers burdens by providing agriculture-related services in less time and at lower cost.

Literature Review

The rural economy in Bangladesh is one of the important components of the country's economic growth. The rural economy is mainly agriculture oriented. Thus, it is necessary to ensure provision of quick agriculture-related services to farmers at lower cost in increasing their production and adopting modern cultivation methods. These goals are expressed through the Agricultural Sector Development Strategy used for the preparation of the 7th Five Year Plan (2015), as the agricultural sector is seen as an important part of the country's economic development. Therefore, the numerous challenges faced by the agricultural sector, such as raising productivity and profitability, increasing diversification of production in line with consumption, reducing instability of production and so on need to be tackled. For example, one of the causes for a relatively poor performance of agriculture is the comparatively poor rate of taking up new technologies in production and adopting crop diversification systems, especially by small and marginal farmers – the majority of farmers – who are endowed with poor financial resources and cannot afford the comparatively high cost of acquiring front-line technologies in their work. Thus, support is needed in improving the situation in all fronts.

Gautam & Faruquee (2016) highlight that rural economy means agriculture and agriculture is vital for economic growth and reduction of poverty in Bangladesh. Moreover, agricultural development is essential for ensuring food security for the vast population of Bangladesh. The Unnayan Omneshan Organisation (2013) has found that many challenges exist in the country's agricultural sector, including population growth, climate change, loss of arable land, lack of quality seeds, food habits of people,⁹ inadequate credit support to the farmers, unfair pricing,

⁹ About 90% is rice-based.

insufficient investment in agricultural research and agricultural mismanagement in terms of irrigation and use of fertilisers and pesticides. Furthermore, a variety of economic policies and programmes, such as fiscal policies, import/export regulations and initiatives for agricultural productivity growth affect the development of the agricultural sector in Bangladesh (Raihan, 2011). However, the growth of the domestic agricultural sector does not only depend on domestic policies and programmes, but also on global and regional trade policies, which have important implications for the sector.

In sum, it is necessary to tackle the challenges in the agricultural sector in line with increasing demand. Using ICT-based applications will contribute to modernising the cultivation process and adopting crop diversification and thus increase the overall agricultural production yields in Bangladesh.

Objective of the Study

This study has been conducted to explore the required time, cost and visit (TCV) of potential beneficiaries for availing agriculture-related services from Krisoker Digital Thikana in comparison with the currently used conventional process. Thus, its main objectives were to:

- Assess the benefits derived for service recipients in terms of TCV benefits by using the services provided through Krisoker Digital Thikana;
- Assess the level of satisfaction of service recipients of the Krisoker Digital Thikana application; and
- Discover the major challenges that the beneficiaries are facing while getting services from Krisoker Digital Thikana.

Methodology of the Study

This study has adopted both a quantitative and a qualitative methodology. Quantitative data were collected through the use of a questionnaire. Qualitative data were a result of in-depth interviews – Key Informants Interviews (KII) and Focus Group Discussions (FGD).

The key technical characteristics of this study are:

Research Design – a descriptive survey design has been used to conduct this study to provide an accurate portrayal of the characteristics of the research, and thus capture the opinions, level of satisfaction, knowledge and behaviours of individuals and groups of farmers and other stakeholders.

Study Area and Population - the study was conducted in the Belkuchi Upazilla situated in the Sirajgonj District. The farmers of the Upazilla who received agriculture-related services both from the Krisoker Digital Thikana and the conventional method in use.¹⁰

Sample Size - N= 10,000; 95% confidence interval, value of Z = 1.96 and E = 0.05, margin of error = 5%. The actual sample was 370 individuals.¹¹

Limitations - The researchers faced several challenges while collecting data in terms of limited time, sample size and lack of records of service recipients, as well as difficulties in

¹⁰ The total number of beneficiaries of Krisoker Digital Thikana is about 10,000.

¹¹ $n = \frac{((1.96)^2 \times 0.5(1-0.05))}{(0.05)^2} \frac{((1.96)^2 \times 0.5(1-0.5))}{(0.05)^2 \times 10,000} = 384.16 / 1.038416 = 370$.

reaching beneficiaries due to distance of places and their unavailability the time interviews were to take place.

Data Analysis - Data entry was done concurrently with data collection. Data was analysed using the SPSS statistical software. The data has been reviewed, edited and cleaned by a series of frequency and data checks.

Findings

The findings of the study have revealed that the Krisoker Digital Thikana application has saved a huge amount of cost, time and number of visits of service recipients. Findings also suggest that, provision of service through Krisoker Digital Thikana took less time and effort than through the conventional system.

Figure 2: Age of service recipients

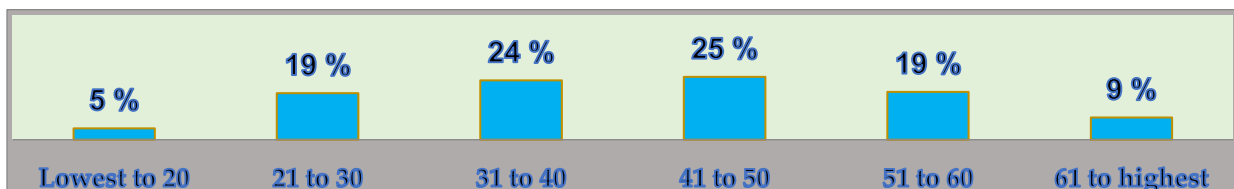
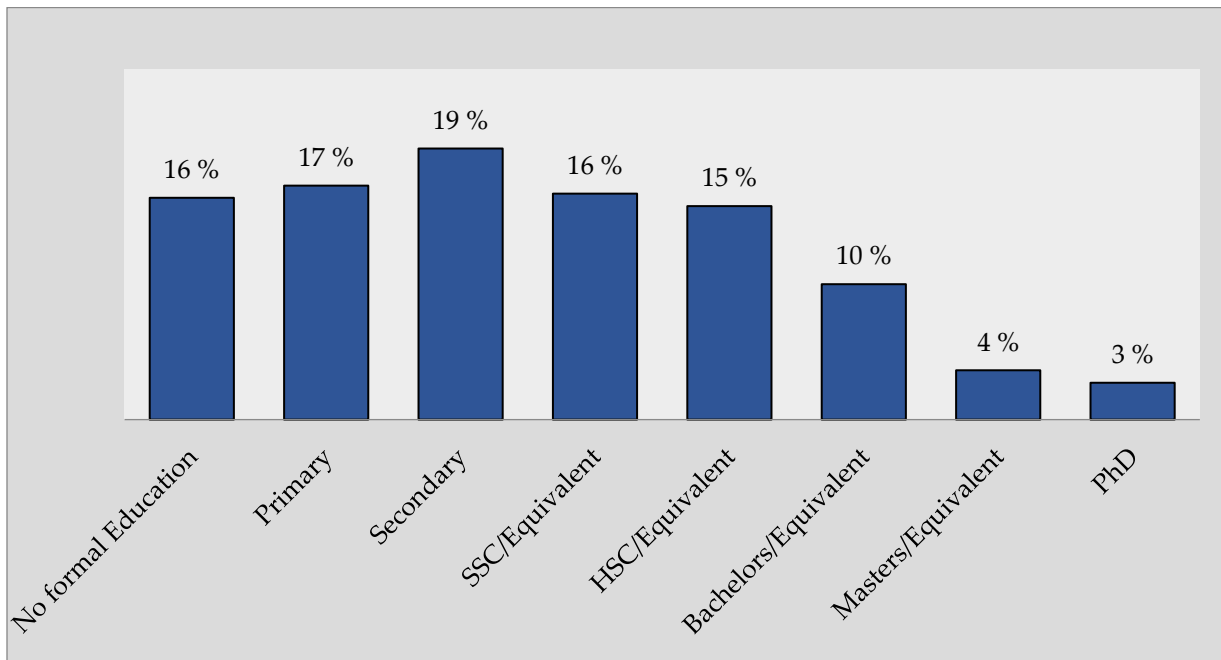


Figure 2 provides information about the age of the service recipients. It can be observed that the highest percentage of respondents (25%) were in the 41 to 50 age group, while the lowest percentage of respondents (5%) were in the less than 20 years age group. In contrast, only 9% of service recipients were in the 61+ age group.

Figure 3: Education qualifications of service recipients



Data in figure 3 reveal that 16% of service recipients had no formal education, whereas 17% had primary and 19% secondary education. In contrast, only 3% had a PhD, 4% masters or equivalent and 10% a bachelor's degree or equivalent.

Figure 4: Family income of service recipients

Figure 4 illustrates the family income of the service recipients. It is seen that for almost half of the service recipients had a family income less than 10,000 BDT (USD 120 approximately), whereas 32% of the service recipients had a family income between 10,000 to 20,000 BDT. In contrast, 10% of service recipients said that their family income was between 20,000 and 30,000 BDT while 7% said that their family income was 30,001+ BDT.

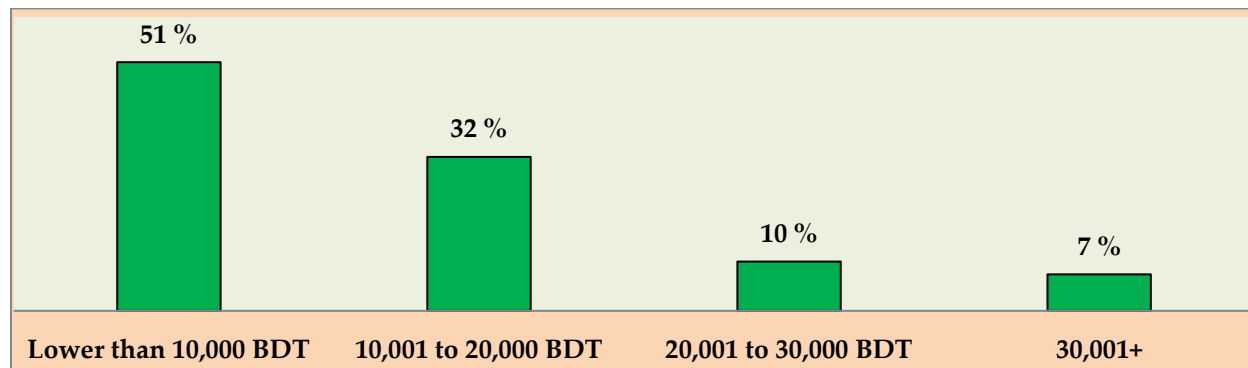
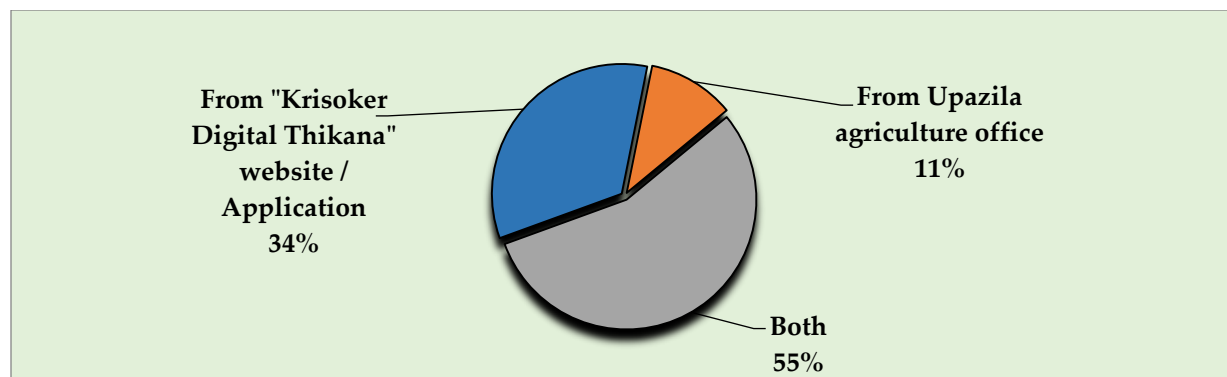


Figure 5: Location receiving agriculture-related services



Farmers may receive agriculture-related services from Krisoker Digital Thikana, from the Upazilla agriculture office or both. According to the data in figure 5, a major proportion of respondents (55%) obtain agriculture-related services from both systems. These respondents mentioned that after finding out the name of a plant or crop disease through the Krisoker Digital Thikana, they visited the Upazilla Land Office for more detailed information. On the contrary, 34% of service recipients obtained agriculture-related services from the Krisoker Digital Thikana, while 11% from the Upazilla Agriculture Office only.

Figure 6: Agriculture-related services received from the Krisoker Digital Thikana

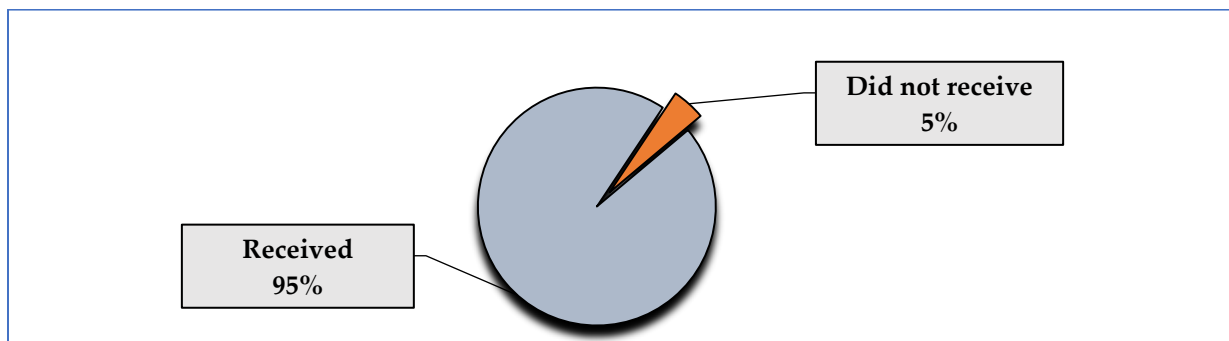
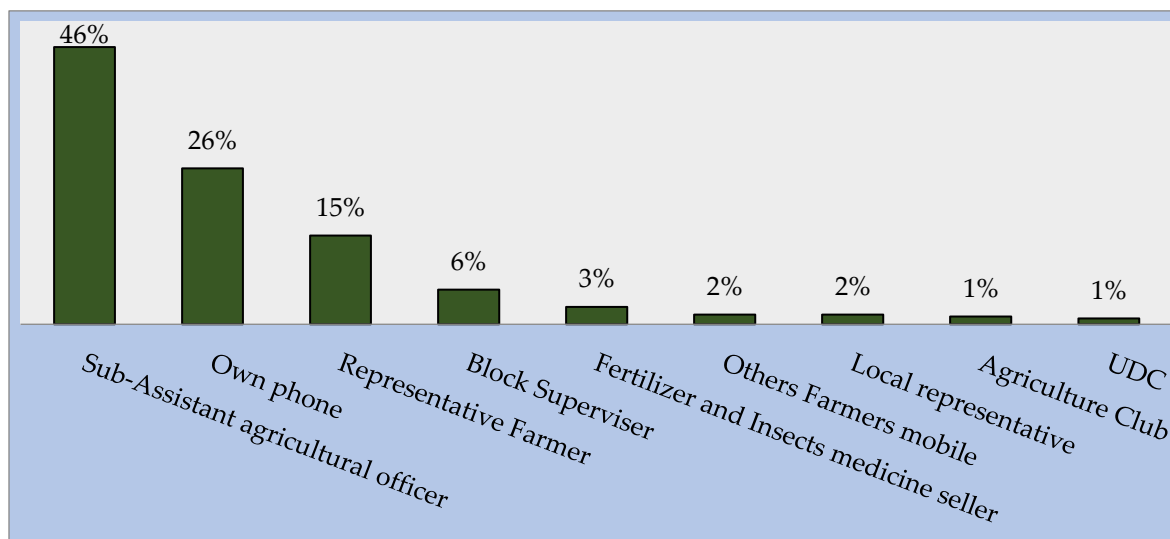


Figure 6 data show the percentage of respondents who received agriculture-related services from the Krisoker Digital Thikana, and those who did not. 95% received services through the Krisoker Digital Thikana and 5% from other service providers.

Figure 7: Location and modality for accessing the Krisoker Digital Thikana application



Farmers are availing to use applications or websites from different places, as the systems is available online and offline. Figure 7 reveals that the highest number of service recipients used the agriculture-related service applications with the assistance of Agricultural Officers, while the lowest number of respondents used it from the UDC or an agriculture club. 26% of respondents received agriculture-related services through their own mobile telephone devices, while 15% of service recipients have used the application through the representatives of farmers.

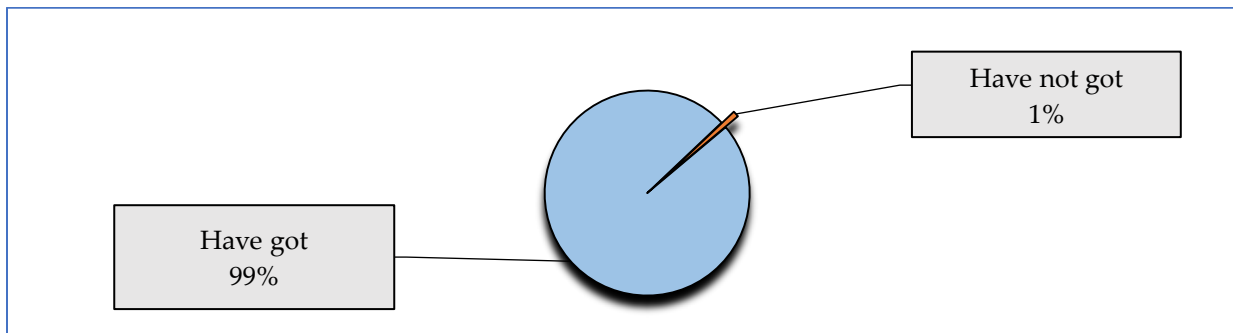
Table 1: Services received from Krisoker Digital Thikana (multiple responses)

Types of Services	Percentages (%)
Identifying insecticides & weeds	92
Cure of crop diseases	75
Increasing production	52
Selecting quality fertilisers & seeds	45
Using Agro-technology	31

Farmers have taken different types of agriculture-related services from Krisoker Digital Thikana. It can be observed that 92% of the respondents have utilised information from Krisoker Digital Thikana to identify insecticides and weeds, while 75% used it to cure crop diseases. To increase their agricultural production 52% of farmers took advice from Krisoker Digital Thikana, whereas 45% used it to select quality fertilisers and seeds.

Figure 8 below shows whether service recipients managed to get their desired service from Krisoker Digital Thikana or not. It is encouraging that 99% of service recipients expressed the opinion that they received their desired service from Krisoker Digital Thikana while only 1% had the opposite opinion.

Figure 8: Percentage of respondents getting desired services



The data in figure 9 reveal how service recipients have found out about the existence of the Krisoker Digital Thikana. Most service recipients (67%) were informed by the local block supervisors, where another 44% from the Upazilla Land Office and 33% from fertiliser and insect pesticides sellers. Additionally, another 17% of service recipients found out about the application from the Government Office.

Figure 9: Source of information about the Krisoker Digital Thikana

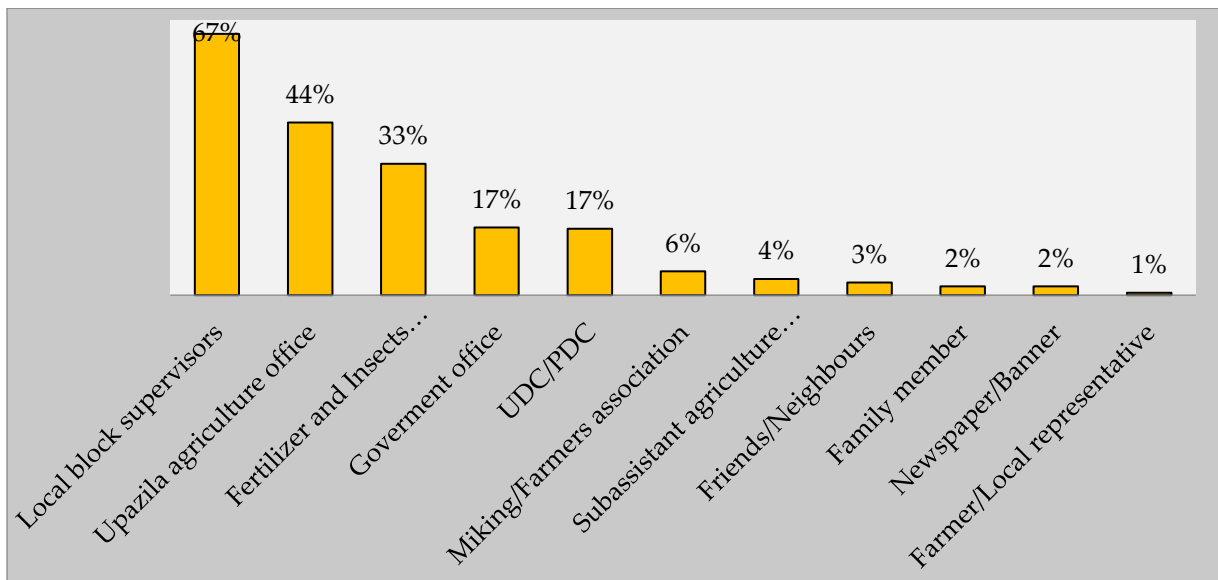


Figure 10 presents data on what distance service recipients had to travel in order to receive the desired information. The data indicate that 81% of service recipients received agriculture-related services by travelling less than half-a-kilometre, a substantial difference with using the conventional system, where only 3% of service recipients travelled less than half-a-kilometre. Furthermore, 63% of the respondents said that they needed to travel more than 3 km to obtain the desired agriculture-related services, whereas this percentage dropped to only 2% through the use of the Krisoker Digital Thikana.

Figure 10: Distance required for both procedures

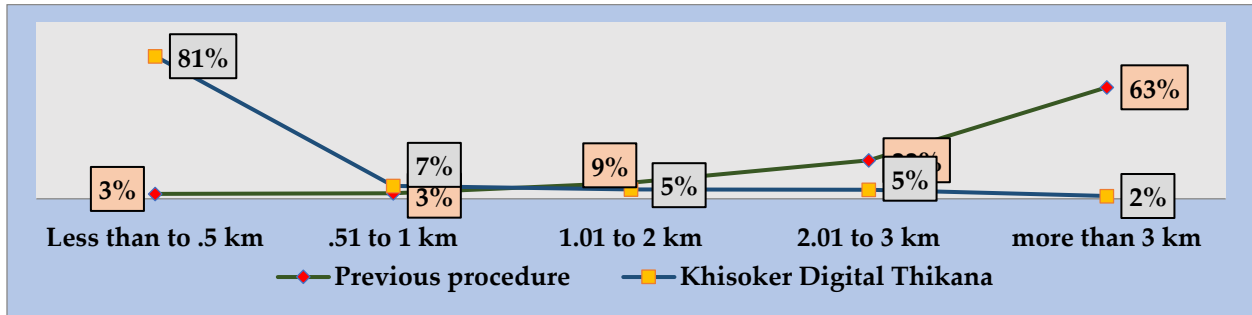


Figure 11: Time required to using both procedures

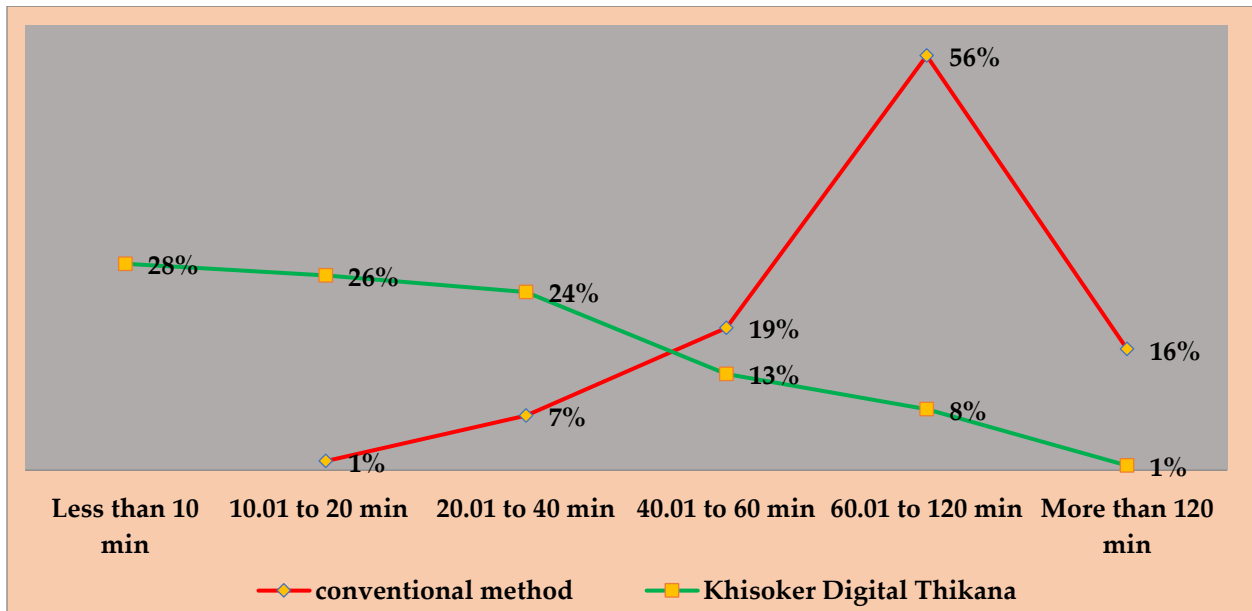


Figure 11 provides information about the total time required in both procedures. It is observed that 28% of respondents said that they managed to receive their agriculture-related services within 10 minutes from Krisoker Digital Thikana, which is not possible through the conventional means. Additionally, 26% of the respondents said that they received desired services within 10 and 20 minutes through the Krisoker Digital Thikana, compared to 1% when using the conventional procedures. Conversely, 24% of service recipients obtained their desired agriculture-related services in 20 to 40 minutes, whereas only 7% of the respondents managed to do the same while using the conventional method. The findings also show that there exists a huge difference for service recipients who consumed between 60 and 120 minutes to getting the desired

services from Krisoker Digital Thikana and the conventional methods. 56% and 8% respectively. Similarly, for those service recipients who spent more than 120 minutes in receiving desired services, the percentage for using the conventional modality was 16% and for using the Krisoker Digital Thikana only 1%.

Figure 12: Costs associated with both service delivery modalities

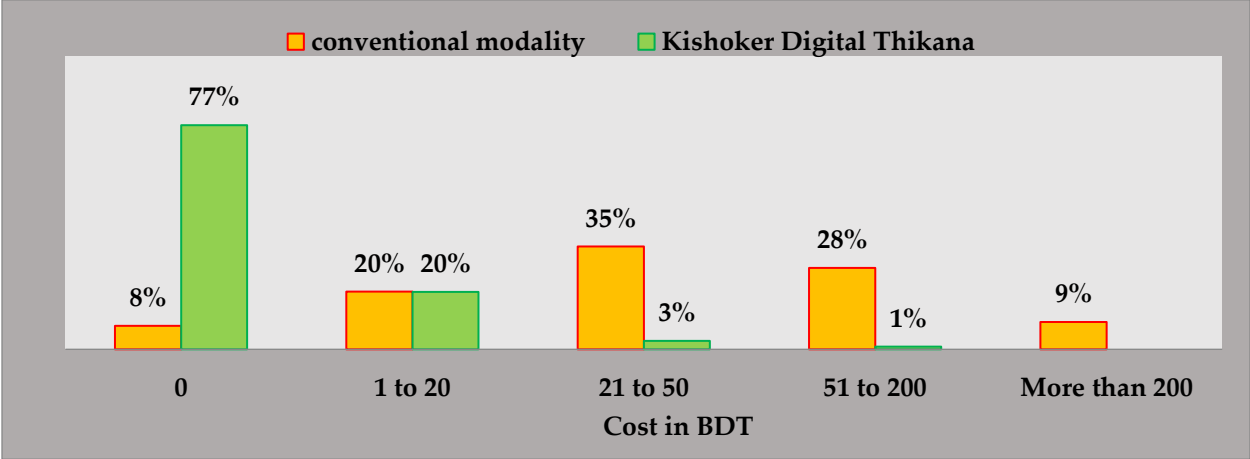
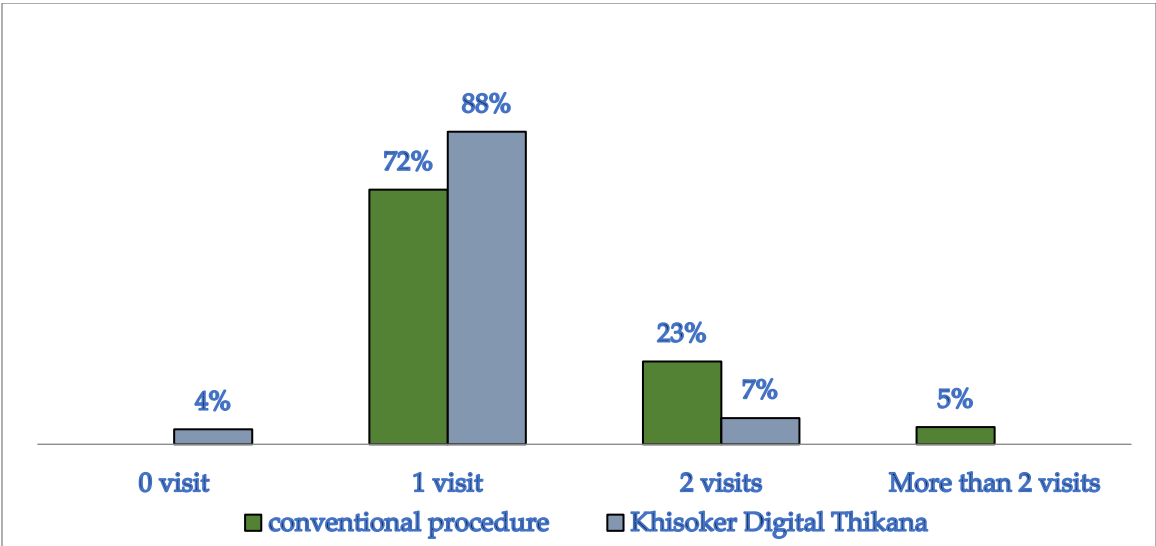


Figure 12 depicts the costs associated with both service delivery modalities. The overwhelming majority of respondents (77%) said that there was no cost associated with obtaining the desired agriculture-related services using the Krisoker Digital Thikana, as opposed to 8% who used the conventional modality. For costs ranging between 1 and 20 BDT, the percentage of respondents was 20% for both modalities. In contrast, for costs between 21 and 50 BDT, the percentage of respondents, who incurred such costs was 35% using the conventional method and only 3% using the Krisoker Digital Thikana. Similarly, for costs between 51 and 200 BDT, 28% of respondents incurred such costs using the conventional modality and 1% using the Krisoker Digital Thikana.¹²

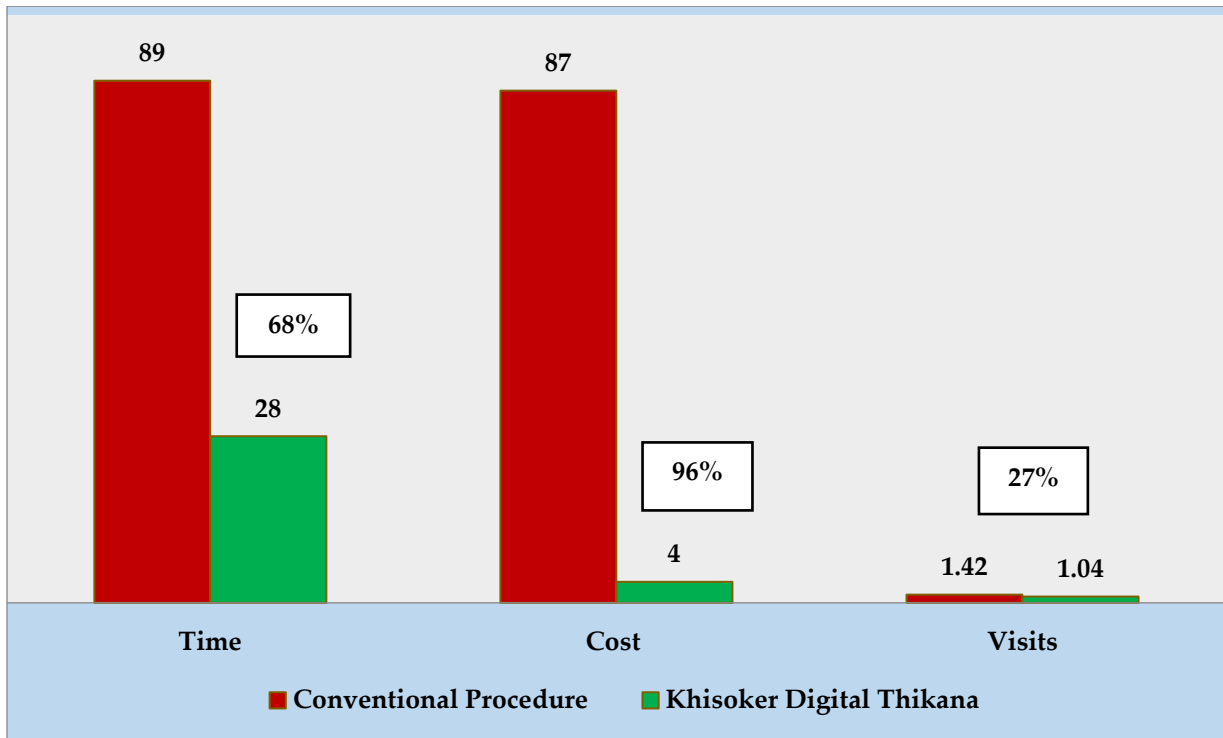
Figure 13: Number of visits required for using both service modalities



¹² USD to BDT exchange rate was 78.4 BDT on 30 November 2016. Source: <http://usd.fxexchangerate.com/bdt/>

Figure 13 reveals the number of visits required for obtaining agriculture-related services using both modalities. It is observed that 4% of respondents needed no visits for getting the desired services from Krisoker Digital Thikana, something that is not possible when using the conventional modality. Conversely, 88% of service recipients said that they needed one visit to obtain desired services through Krisoker Digital Thikana 88% in contrast with 72% of service recipients who were using the standard modality. Additionally, 23% of respondents said that they needed two visits for obtaining agriculture-related service, while only 7% of respondents said the same while using the Krisoker Digital Thikana application.

Figure 14: Average time, cost and visit for both service delivery modalities



Data in figure 14 provide the average time, cost and number of visits for both service modalities. The average time for obtaining agriculture-related services through the Krisoker Digital Thikana has been reduced by 68% when compared to the conventional service delivery modality. Similarly, the average cost has been reduced by 96% in getting agriculture-related services through the Krisoker Digital Thikana application. The same trend applies for the number of visits, which have been reduced by 27%.

The data also show that the average time savings amount to 61 minutes, the average costs have been reduced by 27% and the number of visits has been reduced by 38 visits for obtaining the desired agriculture-related services through the Krisoker Digital Thikana application when compared to the conventional modality of service delivery.

Furthermore, there are several advantages in using the Krisoker Digital Thikana platform. Data in table 2 depict that 90% of service recipients said that getting agriculture-related services through Krisoker Digital Thikana required less cost, while 84% mentioned it as a quick service delivery platform. Conversely, 77% of the respondents mentioned that there was longer needed

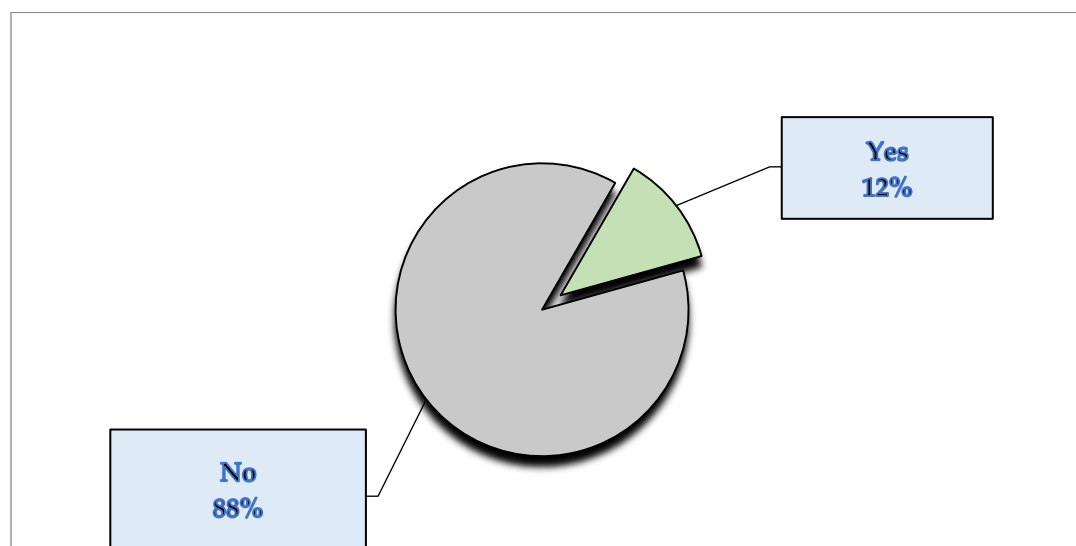
to travel far for getting agriculture-related services through the digital application and 76% that the digital service modality consumes less of their time. Furthermore, about 66% of the respondents mentioned that because of the new platform, it has now become easier to communicate with specialised agriculture officers and to receive their advice, while 66% of the respondents mentioned that it has also become easier to get information of modern cultivation methods. In contrast, 60% of the service recipients said that due to Krisoker Digital Thikana it has become easier to remedy plant diseases, while 49% cited that they have increased their crop production.

Table 2: Advantages in using Krisoker Digital Thikana (multiple responses)

Advantages of Krisoker Digital Thikana	Percentage (%)
Less cost	90
Quicker service	84
No need to go far	77
Less time	76
Specialised agriculture officer’s advice	66
Information of modern cultivation method	66
Easy to remedy plant diseases	60
Increase agriculture production	49
24/7 service	31
Update information regularly	20

Data in figure 15 provide information on whether service recipients faced any challenges in using the Krisoker Digital Thikana application. It is observed that 88% of the respondents did not face any challenges, against 12% of service recipients who said that they did face some challenges.

Figure 15: Challenges faced in using Krisoker Digital Thikana



Indeed, some challenges exist in using the Krisoker Digital Thikana application. The data in table 3 show that about 14% of the respondents had the opinion that they faced some challenges in using Krisoker Digital Thikana. According to their responses, the main challenge was that “they

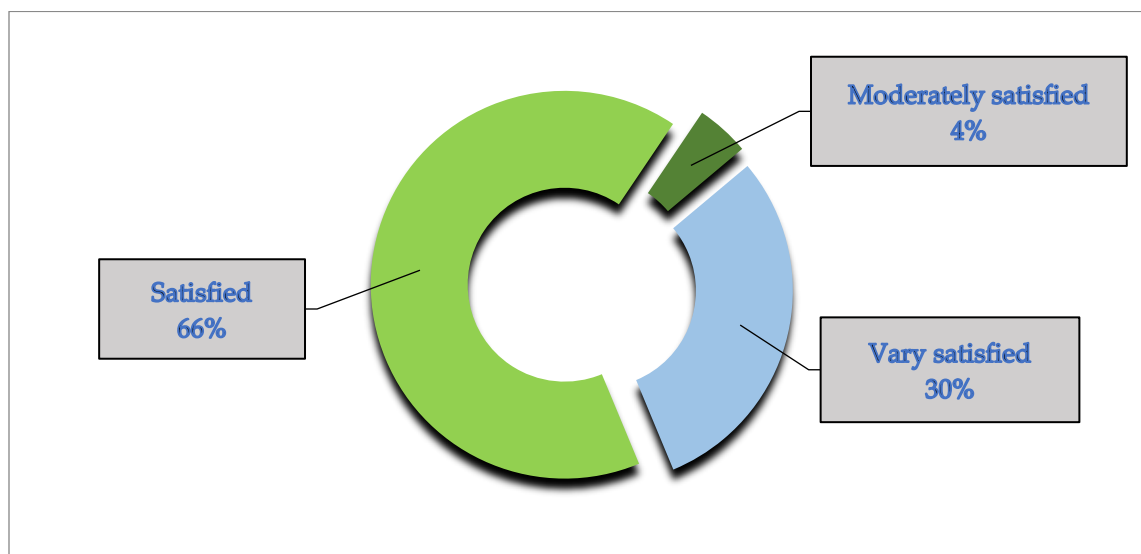
cannot use the application in a conventional mobile” (59%), while 36% said that there is “no complaint system” embedded in the Krisoker Digital Thikana application. In addition, 13% of the respondents mentioned that there is lack of information regarding all plant and crop diseases in the Krisoker Digital Thikana, whereas 8% said that they faced difficulties in accessing the application due to slow internet speeds.

Table 3: Types of challenges faced in using the application

Challenges	Percentage (%)
Cannot use the app in normal mobile	59
No complain system	36
Lack of information regarding all disease	13
Slow internet speed	8
Don't receive phone in maximum time	8
Lack of information about new medicine	8
More time	3
Don't know about the use of apps	3

The data in figure 16 indicate that the majority of the respondents (66%) were satisfied in using the application, where another 4% were moderately satisfied and the remaining 30% that were very satisfied.

Figure 16: Satisfaction levels using the Krisoker Digital Thikana



The reasons that affect the levels of satisfaction of the service recipients using the Krisoker Digital Thikana are depicted in table 4. 92% of the respondents considered the application as an easy service modality, while 91% said that it is a good service. In addition, 91% of the respondents considered the Krisoker Digital Thikana as a modern way of obtaining agriculture-related services, since there was no transportation cost involved (88% of the respondents) and 69% of the respondents said that they are satisfied because by using the Krisoker Digital Thikana application they did not need to travel far.

Table 4: Reasons for being satisfied with the use of the application (multiple responses)

Reason behind satisfaction on present procedure	Percentage (%)
Easy service	92
Good service	91
Modern agriculture service	91
No transport cost	88
No need to go far	69
Less difficulties	64
Service at any time	59
Service at doorsteps	58
Cordial behavior of agriculture officer	58
Less time	56
Free cost of app user	56
Receiving advice from agriculture officer	37

The survey has also revealed that the Krisoker Digital Thikana application has saved service recipients time. Data in figure 17 depict how service recipients use their saved time. It is seen that 51% respondent spent their saved time by doing daily activities while 45% spent their saved time in agricultural activities. In contrast, 25% of the service recipients have utilised their saved time for family activities while 16% for business activities.

Figure 17: Utilisation of time saved

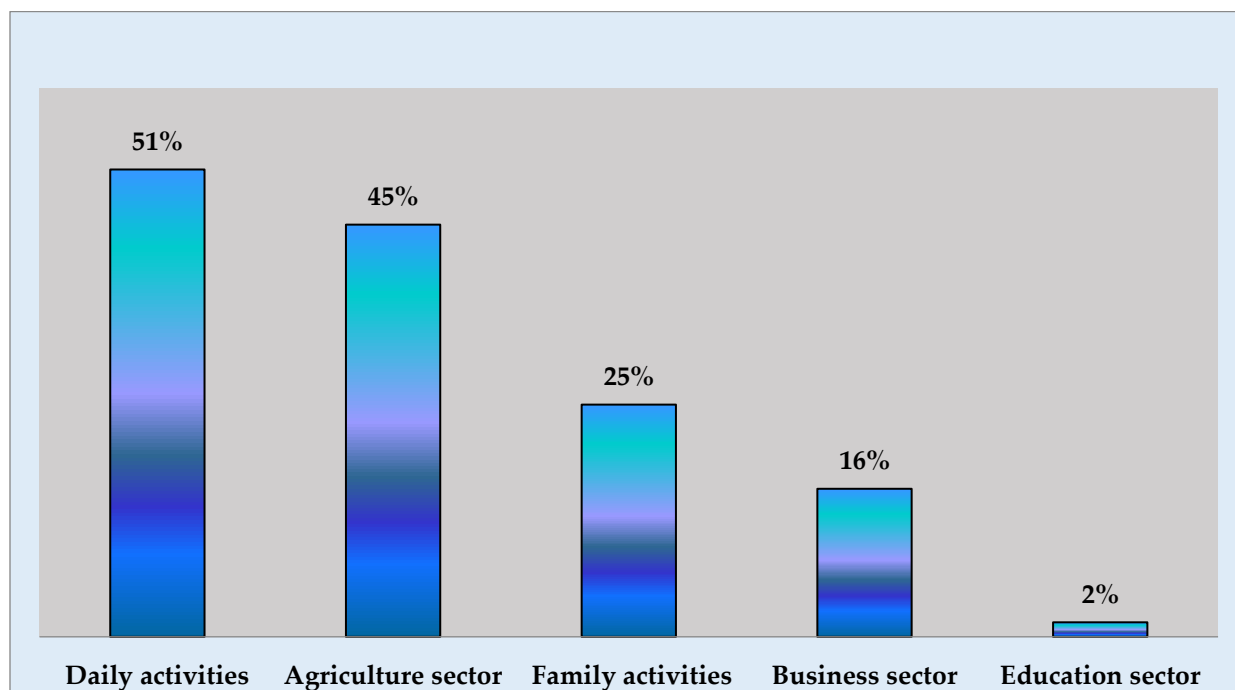


Figure 18 provides information on how respondents utilise the money saved by using the Krisoker Digital Thikana application. The data show that 55% of respondents spend it on family expenses, while another 44% spend it on their daily activities. An additional 42% of service recipient spend it in their work, whereas 9% on education.

Figure 18: Utilisation of costs saved

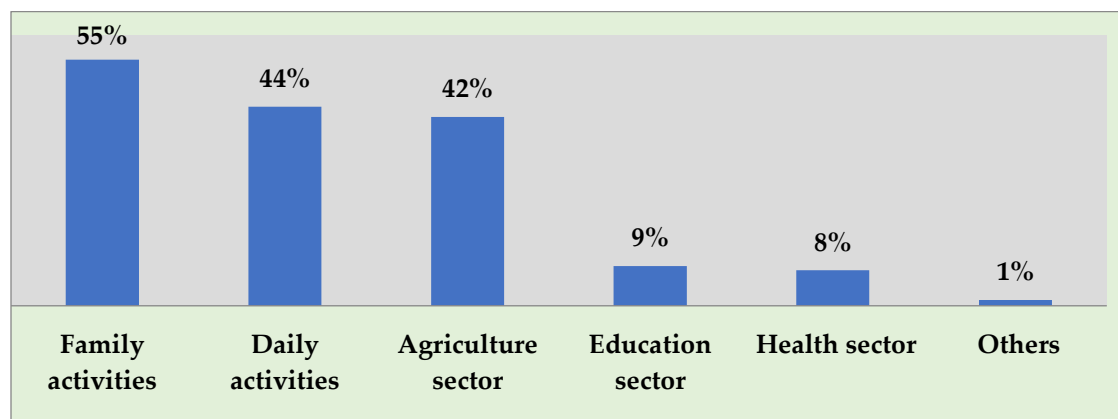
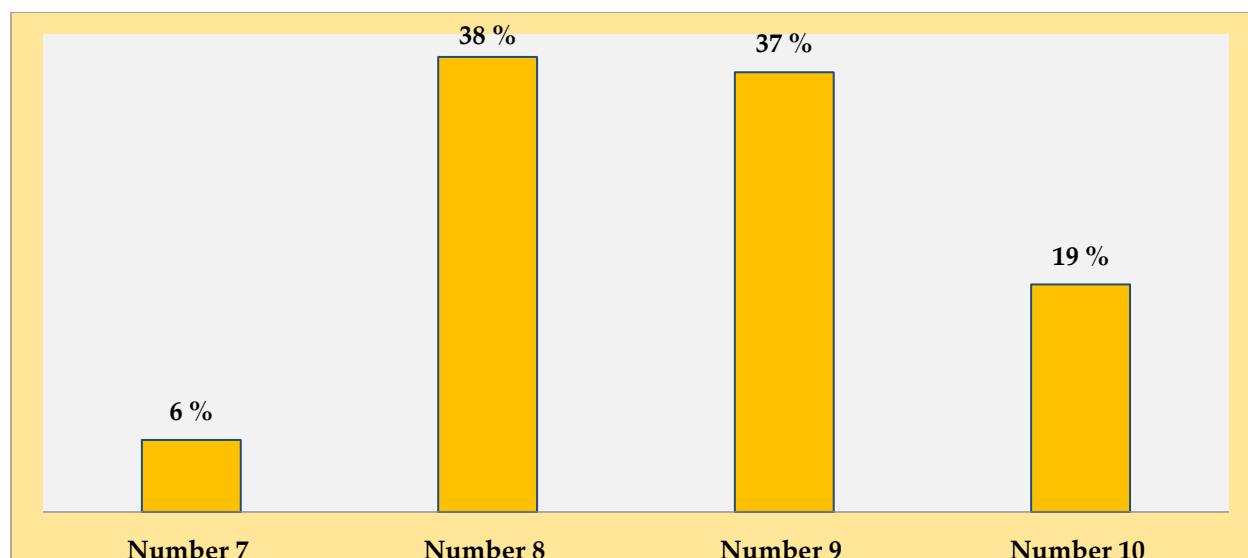


Figure 19 shows the results of respondents rating the Krisoker Digital Thikana application, on a scale of 1 to 10, where 10 is the highest score, indicating very high satisfaction. As respondents did not provide any ratings below 7 on the scale, only the results for ratings 7, 8, 9 and 10 are presented. 19% of the respondents rated the application with 10, 37% with 9, 38% with 8 and 6% with 7.

Figure 19: Rating the Krisoker Digital Thikana application



Conclusions

As agriculture is a large source of employment and a backbone of the national economy of Bangladesh, it is imperative to modernise the agriculture services process and ensure that farmers have access to modern agriculture-related services. Krisoker Digital Thikana is a modern package providing different agriculture-related services. It is also an easy modality for accessing agriculture-related service. Since different videos are available in Krisoker Digital Thikana along with diseases names and remedies, so that it is not required to visit Upazilla Agriculture Office and if necessary, farmers can make a call to the Agriculture Officer. Furthermore, it is now feasible to change traditional cultivation processes and try new ones by getting advice and ideas from the

Krisoker Digital Thikana application. Krisoker Digital Thikana saves the time, cost and number of visits of the service recipients in getting agriculture services.

Krisoker Digital Thikana is an online and offline based platform providing agriculture-related services to farmers. This platform is most important for farmers who live in remote areas of the country, as previously they had to travel a considerable distance to visit the nearest Upazilla Agriculture Office to obtain the desired services. In those cases, they sometimes failed to explain adequately a crop disease, or they failed to meet with the Agriculture Officer, requiring them to make multiple trips to the nearest Upazilla Agriculture Office, which was time consuming and costly. The Krisoker Digital Thikana has brought the agriculture-related services at the farmers' doorsteps. This study was conducted in the Belkuchi Upazilla situated in the Sirajgonj District, where the application is available to farmers, Agriculture Offices and local sellers of fertilisers and pesticides.

The study has revealed that 99% of the targeted population in the Upazilla have obtained the desired agriculture-related services from the Krisoker Digital Thikana. Service recipients have mentioned several advantages of Krisoker Digital Thikana; such as less cost involved (90%), quick service provision (84%), no need to go far (77%) and so on. This study has also revealed that by using the Krisoker Digital Thikana application farmers save time and have to make less visits to the Upazilla Agriculture Office and thus use time saved for other productive activities.

Although the Krisoker Digital Thikana applications has brought many benefits to farmers, who have heard about this service, there is still a considerable number of farmers who are unaware of the service and others who have heard about it, but they are not able to use the application. Thus, it is necessary to initiative actions to make farmers aware of the positive features the application offers. It is also necessary to enhance the application by adding new pictures and videos, as well as updating the existing ones in order to provide farmers with a variety of agriculture-related services.

Recommendation

From the TCV perspective Krisoker Digital Thikana is considered successful in providing agriculture-related services. However, the system can be further improved, as service recipients comments have revealed. Considering the respondents' opinions, the following recommendations are put forward:

- A complaint feature needs to be added to the application in order to get feedback from its users and improve the service;
- An awareness raising campaign needs to be initiated in order to make the service known to as many farmers as possible;
- Information about plant and crop diseases needs to be constantly updated to keep up with development, including pictures and videos;
- It is necessary to provide some training to farmers in order to use the system efficiently.

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