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EFFICIENCY OF ICT TOOLS IN AGRICULTURE

Sapna Nagpal and Akshit Mehta

Associate Professor in Computer Science, Pt. JLN Govt. College, Faridabad, Haryana (India) Email- sapnanagpalg@gmail.com
AG-III (Technical), FCI, Chandigarh, M.Sc (Agriculture, Plant Pathology) CCSHAU, Hisar, Haryana (India)
Email- akshit20mehta@gmail.com

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ABSTRACT:
Agriculture is the key part of Indian economy and it provides employment to around 58% of the population of India. The portion of agriculture in gross domestic product (GDP) is approximately 20%. Agriculture sector has shown various changes in recent years. Being the major sector in our country, agriculture sector is still filled with uncertainty and low yielding profile. For growth of agriculture, it is important to disseminate the technology to the field. ICT has influenced all the parts of our lives but farmers, landless labourers and other agricultural workers are the sections of the society who are least benefitted by the advancements in ICT. The innovative use of ICT tools in agriculture will lead to the integrated development of farmers not only in terms of crop productivity but also will improve the livelihood as well as living standards of the farmers indulged in the process of primary producers feeding the masses. In this paper, a survey on the efficiency of ICT tools available in agriculture field has been carried out in the states of Haryana and Punjab to find out the actual efficacy of these tools. The paper concludes the areas that can be focused to make ICT based agricultural tools more useful to the farmers and meet the daily information needs of the farmers.

Keywords:- ICT Tools, Agriculture, Information Technology and Agriculture, Agriculture Tools.

INTRODUCTION :

From the times since agriculture is known to mankind, the farmers have progressed a lot from manually harvesting to combine harvester, from obsolete varieties to HYV seeds, Persian wheels to drip and micro irrigation, from open field to green house, sieves to colour sorters, cones dibblers to pneumatic planter, bakhar to rotavator, wide fields to low tunnel plastic house etc. These advances have proliferated agricultural production in India manifold but contrary to this, the condition of farmers in India is still very poor due to low income, fragmented land, unpredictable weather conditions, lack of credit facilities, dependencies on middleman for sales, bleak future and stress which has clutched the progress and development of the miserable farmers. With the changing socio-economic landscape and scientific developments, the prospects of agriculture in India have been muted without technological integration [4]. Punjab and Haryana have been the beloved descendants of the Green Revolution, which started in the 1960s and transformed India from a hunger-starving nation to self-sufficient nation, moreover now being known as a surplus producing country contributing in exports of foodgrains. But it is the time for ICT-led farming practices as right information at right time to the farmers can help them to prepare for dubious weather, undervalued produce (less than MSP), reduce input cost and improve their production in terms of productivity per unit area leading to more returns and profit.

Information and Communication Technology has affected all arenas of our lives. The use of ICT in Indian agriculture has increased over the time but still there is a long way to go. Exploring ICT and using its remarkable potential can help farmers in increasing productivity and enabling

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precision-farming in a subsistence way leading to lesser cost of production in terms of both financial and environmental aspects. Bringing the potential of IT for the qualitative improvement of life of farmers by providing timely and data inputs for decision making is inevitable [5]. Internet is a key media for information movement. The role of ICT in agriculture is mainly to disseminate latest agricultural information to the farmers and to assist and simultaneously guide in predicting incidence of pest and disease, timing of precautionary sprays, nutrient assessment and management, market fluctuations (for crop sale), avoiding distress sale and providing common platform to interact. The focus of this work is finding the utilisation of latest developments of ICT in rural India and to facilitate the effective penetration of ICT for dissemination of information to remote agricultural areas.

The advanced subsidiary accessories which come with the electronic devices have made it easier for a layman to communicate with the information systems. Though the access to computers and Internet has stretched in the hands of the farmers but still proper utilisation of ICT for agricultural purpose is still underutilised due to lack of awareness and accessibility in remote rural areas across the country. The farming sector still remains less acquainted with advance technology and the information revolution can be explored to make agriculture sector more predictable and stable. As green revolution bolstered the agriculture sector in mid 1960s, white revolution manifolded milk production drastically in 1980s, this era of IT revolution can elevate the term digital agriculture to provide, assess and utilise right information timely to save a great toll of production. ICT solutions ranging from computers, radio, television, tablets and mobile phones to advanced technologies such as blockchain, big data analytics, cloud computing, Internet of Things (IoT), chatbots, virtual assistants and artificial intelligence tools are trending in digitalising the world at present. Various ICT tools based on agriculture for example, Krishi, PGR Portal, Krishi Kosh, RiceXpert, Agri-Market Mobile App, mKishan Portal etc. are providing information to the farmers about pest and disease, weather conditions, new varieties/breeds, new management strategies, market information and much more. This paper endeavours to find the utility of these ICT tools for farmers and tries to find out the areas where these tools can be harnessed to make them more effective and useful. The paper presents the responses collected from 220 farmers and stakeholders engaged in agricultural activities regarding efficacy of these ICT tools and provides a discussion on the results.

REVIEW OF LITERATURE :

Baruah and Mohan (2018) have studied the factors governing the use of ICT in Extension delivery services in the Northern-Eastern region of India [2]. There is a problem of low outreach due to lack of sufficient staff and low operational budgets, especially in the far-flung North-eastern region (NER) of India. The successful projects such as Intelligent Advisory System for Farmers (IASF) and e-Arik, ICT-led agricultural extension have proved a significant role in improving the livelihood of farmers through facilitating the adoption of new technologies. Rasouliazar S. (2011) has done the study of importance and usage of ICT in agricultural system of Iran. The population of the study consisted of Personnel that working in the ministry of agriculture in Iran (N=1250). The study has concluded that there is a need to understand as to how far the ICT initiatives are able to address the agricultural experts need so that better solutions can be developed to address those increase usage ICT in their work field. Mahant et al. (2012) have attempted to try and better understand the ICT adoption issues involved and the barriers to effective ICT uptake for agriculture, agricultural

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development and rural viability [10]. Bansal et al. (2022) [14] reported about the awareness and use of different ICT tools by farmers. The study was conducted at village Gudli of Mavli block of Udaipur district of Rajasthan and the data was collected from 100 farmers. Results revealed that 100 per cent respondents having mobile without Internet, were aware about calling from mobile (82%), SMS and memory stick (68%), and were also using them. This is an ICT era, but till today, half of the farming community are suffering from various types of problems due to the gap between ICT and its use without need assessment and participation of farming community although farmers are using mobile phone for calling, gathering and exchange of information, entertainment etc.

Ayim et al. (2022) [17] reported that recent years has led to several initiatives in using ICT to improve agricultural productivity in Africa. They have reviewed the literature published from 2010 to 2019 in which ICT innovations were discussed. The analysis shows that the main ICT technologies adopted are text and voice-based services targeting mobile phones. The analysis also shows that radios are still widely used in disseminating agricultural information to rural farmers, while computers are mainly used by researchers. Though the mobile-based services were aimed at improving access to accurate and timely agricultural information, but the adoption of the services is constrained by poor technological infrastructure, inappropriate ICT policies, and low level of user skills, especially of farmers, in using the technologies.

MATERIALS AND METHODS :

ICT can prove out to be a major component to provide regular essential information such as weather, epidemics/pandemics, updated practices, market prices etc. to the farmers. There are many ICT tools such as Krishi, PGR Portal, Krishi Kosh, RiceXpert, Agri-Market Mobile App, mKishan Portal etc. for agriculture related activities provided by Government and other agencies. The tools are based on global positioning system, data science, weather monitoring, crop and soil sensor, RFID and security technologies and artificial intelligence to provide precise and timely information that can have not only positive impact but will upgrade the cultivation practices bringing new threshold in modern farming. But the tools are still not used at the peak of its potential by the farmers for which the tools were designed, and will still take a period of time to reach the masses. This paper has conducted a survey containing questions about agricultural tools/apps and responses were recorded from farmers including marginal, small, medium and large farmers, landless labours, agricultural students and teachers in the state of Haryana and Punjab. A questionnaire was prepared and shared among various respondents to collect the feedback on agricultural ICT tools/ Apps. A total of 220 responses have been received from this questionnaire survey. The responses have been collected through online as well as offline mode. The paper shows the result of the questionnaire responses and analyses the results to show the effectiveness of the agricultural ICT tools among the farmers.

Result of the Survey on Efficiency of ICT Tools in Agriculture

This section presents the results of the survey data regarding the efficiency of agricultural ICT tools which was collected from farmers, landless labours, agricultural students and teachers working in the core part of agriculture in the state of Haryana and Punjab. A summate of 220 responses were collected by the actual field workers by sharing the questionnaire with them. Various agricultural ICT tools are available at present times which provide information to the farmers about pest & disease incidence and their management, weather conditions, integrated nutrient management, soil condition and its

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ameliorate, new varieties/breeds, new management strategies, market information and so on. Figure 1 shows the responses of how many ICT tools in the field of agriculture are known to the respondents. Krishi is the utmost known ICT tool by 39.6% and followed by Agri Market Mobile App which is known to 27.8% of the respondents. Other tools are also popular among farmers such as KrishiKosh, Kisan Suvisha App, Crop Insurance Mobile App, mKishan Portal etc. Only 6.2% people said that they don't know even about a single agricultural ICT tool which indicates that ICT based Agricultural tools are known to the farmers and agricultural workers.

Since these agricultural ICT tools are developed in the past decade or so, it requires a chain to disseminate the information among the agricultural community. Majority of people (29.1%) said that they came to know about these tools from their friends and family (Figure 2). However, the information about these tools is also supplied in agriculture universities and through advertisements and fellow farmers. The data from Figure 1 and Figure 2 indicates that the farmers are learning about these ICT tools and are sharing the information in their community.

The agriculture-based ICT tools are available in multiple languages including their own regional languages. The preferred language for ICT tools is Hindi i.e. stated by 40.5% respondents of the states of Haryana and Punjab. However, people are even comfortable with English language i.e.37.9% (Figure 3). Whereas 21.6% people preferred local language for these tools. Even the respondents find these tools easy to use. The farmers have also found that the tools are helpful in their agricultural activities as 50.9 % of the respondents feel that the utility of these tools lies between 20 to 50% (Figure 4). The tools are designed in a user-friendly interface which is making them easier to use among farmers.

There are various methods to reach to the farmers and disseminate the information. The next question was asked about the medium to reach out to the farmers and 37% of the people feel that training on television is more effective (Figure 5). Surprisingly only 20.3 % feel that face to face interaction with farmers will work. However, 16.7% respondents suggested the mobile app medium for reaching out to the farmers. Another question was asked if the respondents are acquainted with ICT tool/Mobile App regarding agriculture-based information in which 60.4% of the respondents said that they are aware of ICT tools/mobile apps to facilitate online trading and direct benefit to farmers. Figure 6 shows the acquaintance of the farmers with the online Trading Apps. The farmers are familiar with Mandi Trades i.e. 34.8% and followed by Gramseva: Kisan which is known to 31.3% of the respondents while Agribuzz-Agriapp, Agrimarket are among other apps which are known but not so popular among the farmers.

Another important part is how the agriculture-based ICT tools can be made more effectice and popular. In response to this question, the farmers replied that new tools be developed to provide timely and data inputs about weather forcasting, new agriculture policies for farmers, nutirents, cost effective harvesting and cash crops etc (Figure 7). Sicne the farmers are facing many issues and need help to assist in predicting pest and disease incidence, precautionary sprays, nutrient assessment and management, market fluctuations, avoiding distress sale and providing common platform to interact. The tools should be developed to focus on these issues.

DISCUSSION AND CONCLUSION :

In this day and age, ICT is easily accessible to everyone and e-services are advancing in every field and corner of the world. ICT tools in Agriculture can go a long way to provide timely & precise information and agriculture services to the farmers. This paper is based on a survey done on farmers and agriculturists to know the eminence of agriculture-based ICT tools among

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them. The results of this survey illustrates that there are many ICT tools with which farmers, landless labourers and other agricultural workers are familiar with, but still there is a lot of miles to be covered. The respondents expressed their inclination towards seeking information related to updates related to crops, pesticides, alternate method of production, to contact officials etc. They frequently reach out for assistance whenever they encounter uncertainty, particularly before sowing a new crop or choosing a different farming enterprise. However, to enhance the effectiveness of these tools, it is imperative for authorities to implement a comprehensive program. There are different ways to reach out to the farmers in their work area. Officials can disseminate agricultural information in remote areas through the use of portable data devices and optical projectors, effectively reaching a broad audience at once. Similarly, voice-based training can be conducted to disseminate general agricultural information in hamlets and villages. The dissemination of information to the farmers in their native language can be more effective and can progress the required extension in better way. Once the farmers are familiar and hooked with these tools, it can be a part of their natural agricultural practice to seek information from Agricultural Apps. Farmers are more concerned to have timely and precise information about weather forecast, prevailing plant diseases and pest along with their control, new agriculture policies & schemes for farmers, new training programmes-cum-practices for cultivation and much more. Over 50% of the respondents believe that ICT tools can assist Indian farmers in navigating uncertainties and enhancing their incomes. Centralized management of these tools by authorities can promote uniformity and stability in the agriculture sector.

The information needs of farmers have increased as they have to make more and more complex decisions on how to use their land efficiently without increasing input cost with minimum soil degradation. Though it is another economical measure on How much to produce, What to produce and When to produce, but these ICT tools can help when and what crops to produce and how, in which markets to buy inputs and sell their products. By combining and analysing the efficiency of ICT tools together, agriculture sector can be made ready to embrace IT revolution. The advancement in information technology can prove out to deal with uncertainty and unpredictability in the farming sector in the country. Farmers and IT professionals together could contribute to the development of user-friendly systems which uses local languages. Today ICT can better be a key factor for improving the livelihood of famers by having timely and cost-effective access to the information. The result of the survey shows that ICT can go a long way to reach to the remote and far away areas to take technology reach there for constructive changes in the agriculture sector. The role of ICT in agriculture is still not utilised wholly and such an initiative can certainly attract more interest by the farmers. The uncertainty and risk in the field of agriculture can be minimised by disseminating timely information to the fields.

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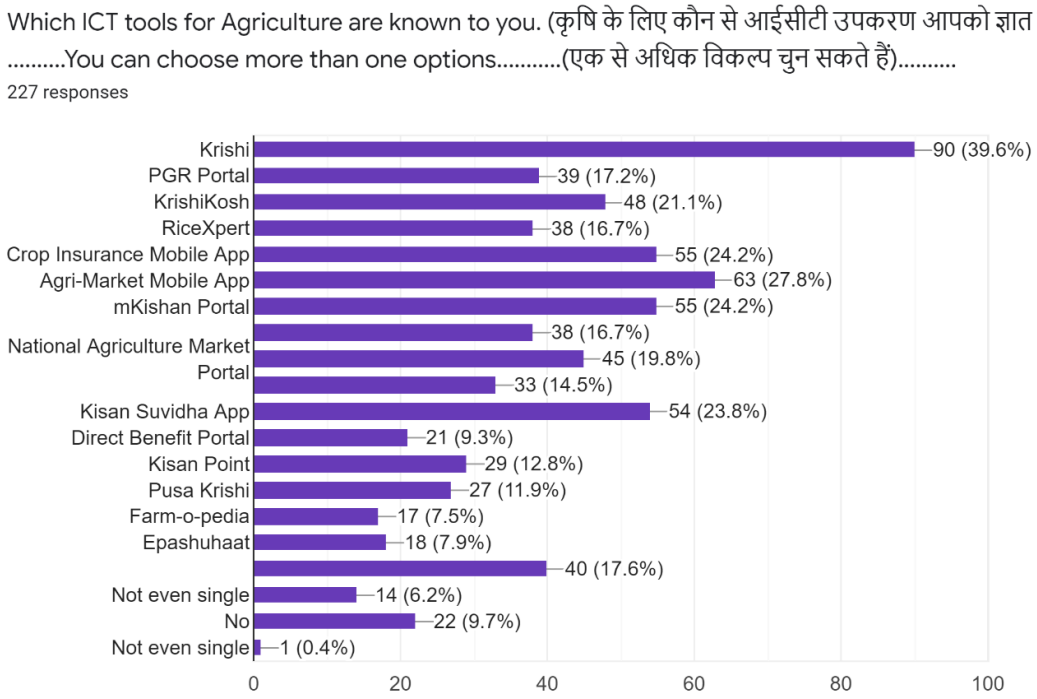

Figure1: Which ICT tools for Agriculture are known to you.

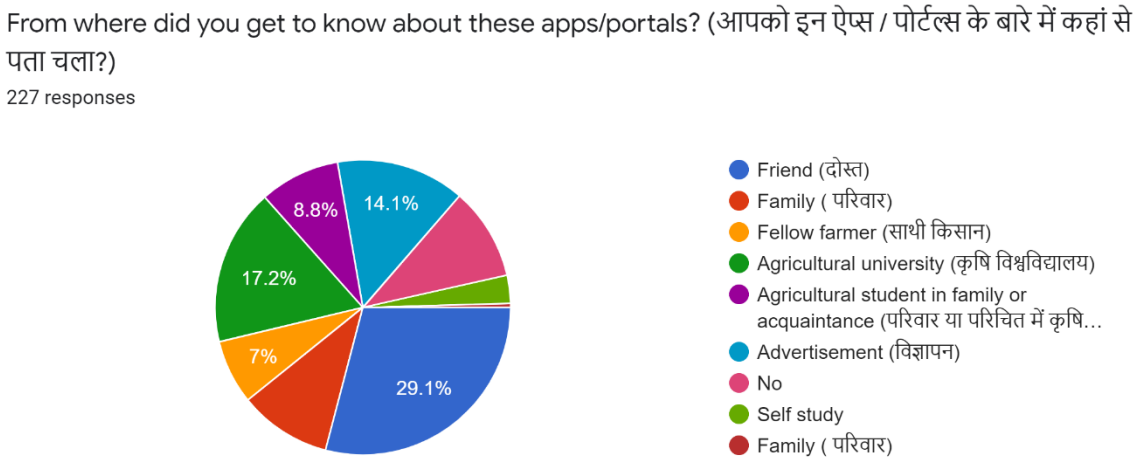

Figure2: From where did you get to know about these apps/portals.

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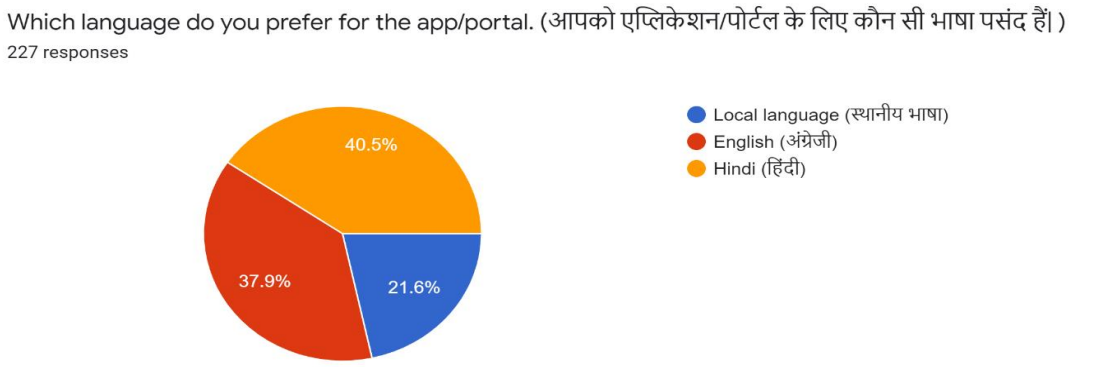

Figure 3: which Language is preferred for Agricuture App/tool.

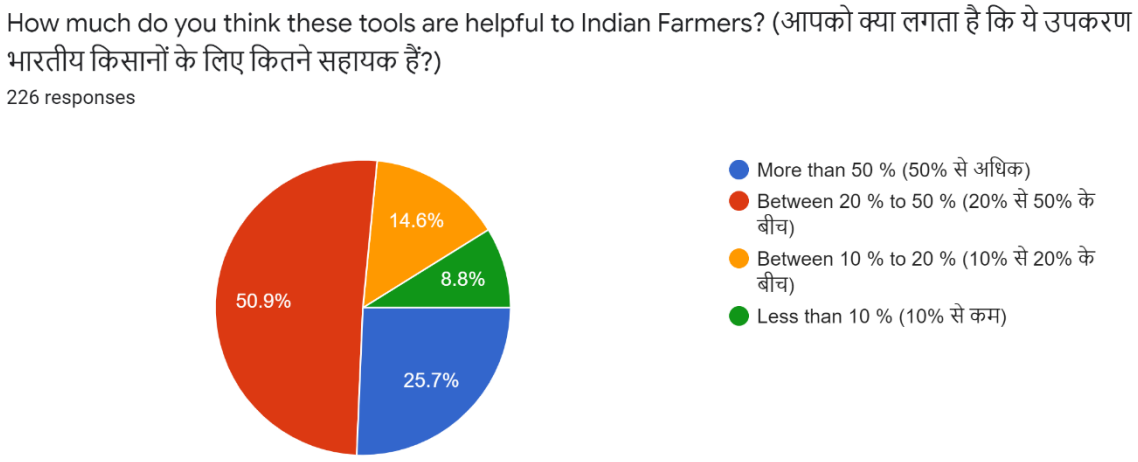

Figure 4: How much these tools are helpful to Indian Farmers.

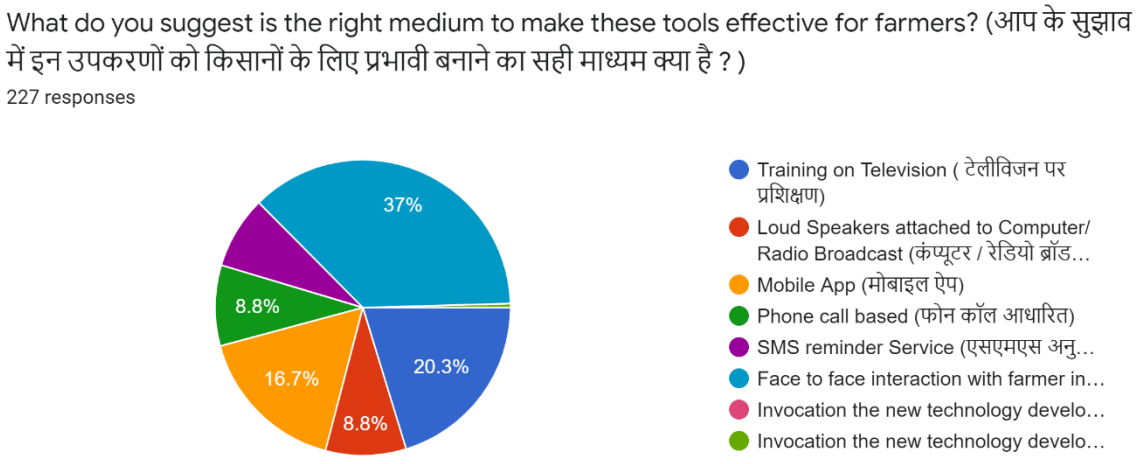

Figure 5 : Right medium to make these tools effective for farmers.

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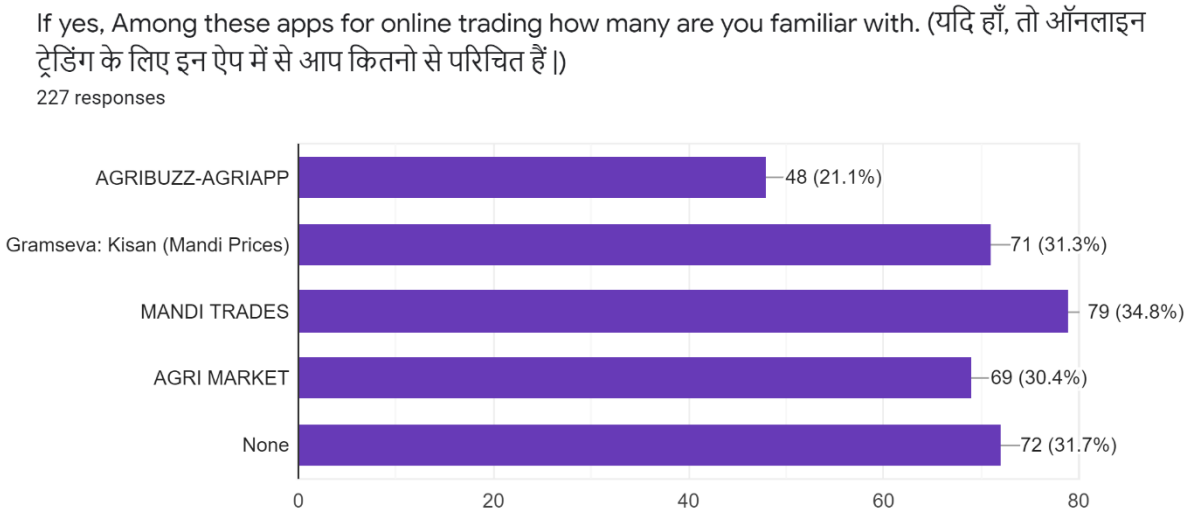

Figure6: Farmers' familiarity with Online Trading Apps.

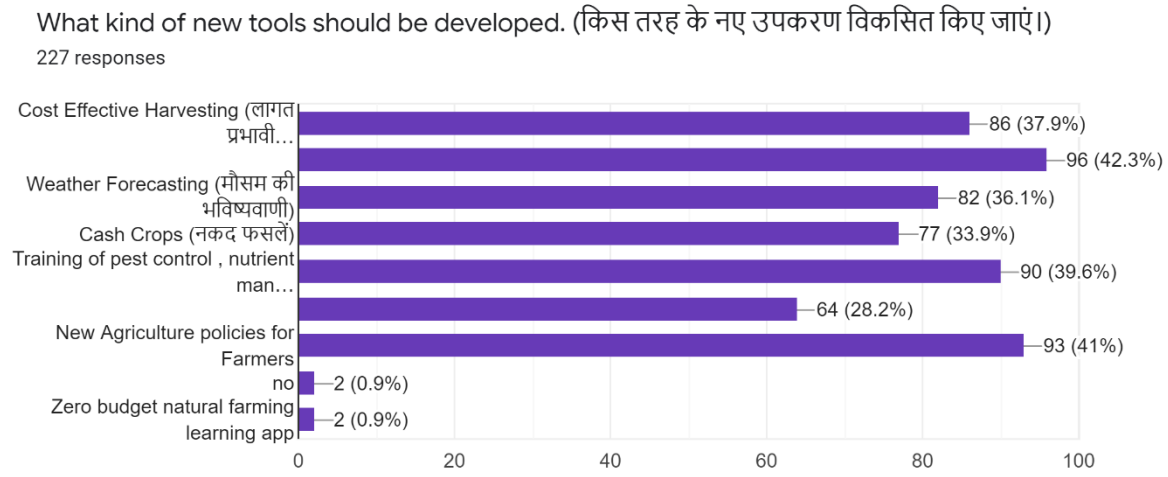

Figure7: New Tools to be developed.

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