Innovative Eextension Aapproach for Ssustainable Aagricultural Ddevelopment: WhatsApp Ggroups for Fframing Ssolution

Abstract

Extension system has to be broadened by incorporating innovative extension approaches to manage present day challenges in agriculture *viz.*, climate change, unpredictable and shifting weather, dwindling resources and population stress. With global competitiveness and market liberalization farmers are required to adjust their production portfolio to the emerging trends in food consumerism in domestic as well as global markets. With improving quality production and better job opportunities in rural areas the livelihood security of the farmers will definitely change the face of Indian agriculture. Sustainable agricultural development is very important for the security of rural livelihood. Farmers need information to make necessary decision to improve their production in agriculture for which a strong network of extension system is functioning~~,~~ along with government initiative, extension scientists and functionaries working for agricultural development. The role of extension system is to groom farmers into the most intelligent ~~and aware~~ decision maker. The use of internet, mobile and video- conferencing assist~~s~~ them for their favours ???not clear. A number of research works have~~Surveys~~ reported that sixty per cent of the farmer households did not access~~assess~~ any information on modern technology. Lack of better and up-to-date information that has made most farmers make ~~uninformed~~ fail to make informed decisions on farming practices leading to unnecessary losses. Mobile internet in India has the strong potential to improve small farmer's access to agricultural knowledge and information. The internet and social media ~~penetration~~ infiltration are likely to increase substantially in near future. This situation presents~~Here lies~~ an opportunity for farmers to use social media for sharing agrarian information to rural mobile internet users. WhatsApp~~,~~ one of the most popular social media tools offers many unique advantages~~,~~ which makes it a potent agricultural extension tool. However, its use ~~is~~ usher~~s in~~ed ~~by~~ many challenges~~tasks,~~ which ~~also~~ need to be addressed for~~, to use~~ it to be effective~~ly~~.

Keywords: Extension approaches, farmers, extension system, WhatsApp groups, innovative technology

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INTRODUCTION

India is predominantly an agrarian country where 70 per cent of the population is directly or indirectly involved in agricultural activitiese and allied sectors. People depend on agriculture for their livelihood. Agriculture stands on the very complex interaction between biological, climatic and geographical factors in addition to human activities. Agricultural system is unpredictable, unstable, subjective, site specific and reliant on empirical decision given the ~~inhered~~ inherent variability of biological phenomena. In spite of the nation's priorities and developmental strategies in post-independence period where greater emphasis is placed on reducing poverty, hunger and ensuring quality of life to its people, the country is~~we are~~ still ranked low in human development index(In coparison to which countries?). People particularly in small, marginal and landless farm households are living under deprived conditions and far from the reach of modern age amenities. Good education, better health facilities, required skill and attitude for ~~successful~~decent ~~living~~lives are beyond the reach of poor people. Living conditions of people are very miserable in terms of health, nutrition etc. India has about 6.4 lakh villages most with appalling physical infrastructure (road, power, and telecom), groaning social infrastructure (education and health) and ~~an underdeveloped institution~~underdeveloped institutions like~~(~~ banking and marketing~~)~~. Most of the villages are caught in the vicious ~~malicious~~ cycle of poor connectivity, low productivity, low income and low consumption (Provide evidence by citing current and relevant studies).

Agriculture sector provides employment to 65 per cent of the population in India (or where?). Agriculture alone contributes to 24 per cent of our total GDP. Indian~~Our~~ economy is based on agriculture but the condition of both farmers and farming is really serious(in bad state). Agriculture and allied sectors are providing employment and livelihood to many of the rural households. The green revolution from~~of~~ sixties to ~~—~~seventies has changed the face of Indian agriculture but currently~~now it seems that the~~ new approaches are required to meet present day challenges to compete in the global market. Our farmers are still using labour intensive agriculture production technique and there is lack of attitude for diversification in agricultural sectore. Most of the~~our~~ farmers are unaware of recent technologies and global demand. With the increasing ~~load of~~ population pressure on available land and stagnated agriculturale production this sector is headed for collapse. Subsistence ~~Smallholder~~ farming systems in India are much less productive and profitable as they should be (GOI, 2015). As per census of 2011, 54.3 percent of the population of India is engaged in agricultrl activitiese (GOI, 2015). However, t~~T~~echnology and information gap on credible farminf

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seems to be one of the major factors for poor agricultural productivity (Singh, 2002). This breach????? seems to be the result of insufficiencies of the current agricultural information delivery system. Yield increases of 50 percent or more often occur ~~;~~when improved inputs are used, and better technology and knowledge applied. Limited coverage, insufficient focus and attention to extension, shortage of manpower, budgetary constraints, infrequent interaction and absence of regular feedback have affected the quality of agricultural advisory services (Birner ~~&and~~ Anderson, 2007; Cole ~~& and~~ Fernando, 2012; Kaka *et al.* 2014; Glendenning *et al.* 2010).

Therefore, ~~T~~to meet the present-day challenges in agriculture due to climatic~~e~~ changes and global competitiveness and to minimize~~meet out~~ the technologicaly~~y~~ gap, there is an urgent need to reform agriculturale~~e~~ system. Lack of better and up-to-date information that has made most farmers make uninformed decisions on farming practices leading to unnecessary losses(where??). Scientific approach is required at the level of actual user to meet the challenge. Low-cost information and communication technology (ICT) tools promise the ability to deliver timely, relevant, and actionable information to farmers throughout the world (Aker, 2010; Cole and Fernando, 2012, World Bank, 2016). Among these tools, the mobile internet offers a futuristic scope for access to varied forms of dynamic information needed in agricultural production. The use of smart phones to provide localized agricultural information can help to reduce crop losses, improve yields as well as provide~~has~~ a much more powerful equalizing effect on the incomes of small scale farmers, including rural women (Shoham, 2015). Smart phone users spend considerably more time on social media platforms such as WhatsApp. Thus, there exists an ample opportunity to utilize WhatsApp for agricultural extension activities. This article reviews the scope of WhatsApp in enhancing the coverage of traditional agricultural extension????.

WhatsApp group for farming solution is a recent extension approach with the aid of internet and smart phones. Presently, most of the mobile agricultural information services being delivered in Asia are voiced and SMS based services. The ratio of featured phone users to the smart phone users in developing countries is nearly four to one (FAO, 2012). The number of internet users in India are likely to be over 500 million by 2020 (Morgan Stanley, 2015). In rural India, mobiles have become major ways to access the internet. Rural mobile internet use has grown from less than a million in 2010 to 25 million people in 2014. This rapid spread of mobile technology in rural areas of India offers a fresh channel for delivering agricultural services and an opportunity to engage ~~countrified~~ communities countrywide in new ways (Vodafone Foundation, 2015).

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Whatsapp has over a billion-people using it to stay in touch with their friends and families worldwide. It would be more ~~is~~ trendy to use it ~~even more~~ for agricultural information sharing. WhatsApp offers is a form of a social media tool that enables one to many and many to many types of conversation and sharing information and facilitating discussion (Andres ~~&and~~ Woodard, 2013). It has become the most preferred mode of communication among the farmers who use smart ~~phone using farmers~~. One can share information in multiple forms ranging from text-based messages to audios, visuals; audio-visual and even web links making it an information enriched platform. Additionally, information sharing is possible at any place and at any time without worrying about background disturbances. This tool is simpler and easy to use, has low internet data requirements, and is increasingly popular in rural India. Thus, it has a strong potential to be a viable agricultural extension tool for extension-based organisations in general and extension educators~~,~~ in particular~~,~~ to reach out to the WhatsApp using farming clientele. The applications of WhatsApp in agriculture are diverse. However, efficient use of WhatsApp goes beyond mere ~~by~~ information dissemination to exchange and user rendezvous.

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Advantages of U~~u~~sing WhatsApp

1. **Most convenient and suitable way of communicating with the farmers**

The existing forms of extension education methods *viz.*, face to face, mass media, etc. require a considerable time and efforts to communicate with the farmers. Farmers have to take efforts to reach plant clinics and to meet specialists. Mass media methods demand high infrastructure requirements, content preparation, refinement and delivery to produce the desired effect. In contrast, WhatsApp seems to be a relatively easier and simpler ICT tool for farmers. This does not require much of ICT skills. It can be easily operated through mobile internet.

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2. **Requires lesser I~~i~~nternet D~~d~~ata D~~d~~emands**

WhatsApp requires less internet when compared to other applications, which is highly beneficial for farmers. WhatsApp usage has reduced transaction costs as well as made interaction with farmers more frequent. In the Indian State of Karnataka, the Department of Agriculture has made it mandatory for its development officials to have a smartphone so that they could share information, messages, and circulars through WhatsApp (Chander, 2016).

3. **Extends S~~s~~cope for A~~a~~gricultural E~~e~~xtension**

Extension services can be rendered very easily to the agricultural community in need instantly. Mass Media is one of the most popular medium of stemming information as almost

20 percent of farming community get information from them (NSSO, 2014). WhatsApp as an extension tool already has a huge user base globally as well as in developing countries. Within few seconds, one can disseminate information to a large number of intended and unintended recipients beyond limitations of time and geographical boundaries. Opportunities for further feedback and clarifications are high through this tool. Similarly, office hours of work are limited to extension educators. WhatsApp offers a communication approach that can be quite flexible and hence~~, which is~~ rapid and prompt. Sufficient snippets of information dissemination can also be delivered through WhatsApp. This is possible through WhatsApp web version in which one can use desktop/laptop keyboard to type faster and with greater ease. Further, it's now quite easy to send a message through WhatsApp in most of the Indian and foreign languages. Thus, WhatsApp has the potential to enhance the coverage and scope of extension citation as evidence is a must.

4. Proper I~~i~~nformation D~~d~~elivery

In other methods of information delivery such as verbal methods, including mobile call centre services; chances of loss of vital information are high. Information may be incompletely understood, retained, forgotten during face to face and mass media (Television, Radio) extension methods. In WhatsApp, the information storage, archival and transfer to hard data-storage devices such as a computer is also possible. Further, information can be delivered in multiple ways such as audios, texts, visuals, and audio-visuals. The understanding of the message would, therefore, would be relatively high, through this medium.

5. Highly P~~p~~articipative and U~~u~~ser F~~f~~riendly

Current extension education activities are largely one way of information delivery. Training lectures, mobile based agro advisory services offer fewer opportunities to farmers to respond and ask queries. The farmers may remain hesitant to clarify his doubts, and many of his queries may remain unanswered. WhatsApp has the potential to reduce these limitations. Even hesitant and shy farmers can participate through encouragement and support. User feedback is easier to receive, and it is prompt. One can communicate instantaneously through multiple ways in one to one, one to many and many to many ways.

6. Encourages P~~p~~eer L~~l~~earning

Learning is amplified~~,~~ and knowledge becomes more widely available as the network of people, tools and connections strengthen. WhatsApp groups fulfil requirements of this kind of learning as it can promote farmer networking and interaction. It is easier for farmers to communicate with peers, extension professionals and experts in real good/record time. Many

times, fellow farmers answer the queries of other farmers. This has the potential to build networking and trust among each other.

7. WhatsApp is Mmore Aadvantageous than Kisan Call Centers

The government of India uses mKisan portal in which farmer queries are addressed through the inflow of calls in Kisan Call centres. These centres along with SMS based services offer a good piece of information to the farmers. However, there are certain limitations of this mechanism. Many of the farmers report that the information offered through these centres is sometimes very general in nature. Diagnosing the problem in detail and delivering prompt need-based answers is lacking. These limitations can be overcome through the use of WhatsApp. The queries can be posted in type of pictures and audio-visual format. This arrangement can improve diagnosis and advice to the farmers (Mittal *et al.*, 2010). Further, farmers can post a query at any time and at any place irrespective of background ambient noises and other disturbances. The resource person has ample time to think and refers to the query in detail. The assessment of farmer's query is better through this platform. Thus, the possibility of relevant and accurate information delivery remains much higher through this platform. Furthermore, there are greater chances of peer discussions and learning, which are impossible through mobile advisory services. Furthermore, important answered queries and discussions can be archived for future reference provide more citatios to back up this information.

Applications of WhatsApp in Aagricultural Eextension

1. Plant-based Ddiagnostic Ssupport

Information on how to diagnose and treat plant disease and pest attack is important for farmers. Plant diseases and pests that could wipe out the entire crop is one of the biggest risks that farmers face in India (Mittal *et al.*, 2010). Lack of awareness, distant locations and long hours of diligence and work makes farmer's reluctant to visit plant clinics to seek timely plant diagnostic support. Even with the toll-free calls due to longer call waiting for services, noise disturbances, poor voice quality due to network problems, use of more technical language, lack of audio-visual backup may affect the quality of information delivered. WhatsApp has certain unique advantages in this regard. First is that it does not suffer from geographical and time limitations. At an instant, farmers can post his/her query without visiting the agriculture centre. This can save a considerable amount of time and, money as well as the worry of the farmers. They can post pictures of different parts (leaves, stem, fruits, and roots) of infected crops. This can be supplemented through text or even a short-duration

video. WhatsApp provides a good medium in which farmers can receive crop diagnostic support services. Besides, the resource person has greater freedom to think and even discuss the plant health problem and is more able to diagnose the problem due to a visual examination which is impossible in case of many existing mobiles-based agricultural information services. Furthermore, during answering query the other farmers facing a similar type of problem are as well likely to find answers and solutions to their problems. Thus, WhatsApp offers a better alternative than toll-free Kisan Call centre which farmers have reported to be more general in nature.

2. Livestock Bbased Ddiagnostic Ssupport.

The occurrence of new diseases poses as an unforeseen problem to farmer leaving him clueless and in a confused state. This along with another labour demanding routines in agricultural chores delay timely intervention needed to the ailing animals. As a result, due to negligence the owner faces several animal production losses. WhatsApp can provide timely information and advice and can significantly reduce major complications likely to emerge in case the animal remains unattended by the basic veterinary aids. Basic first aid support for a number of animal health problems such as seasonal diarrhoea, heat stress, worm load, mineral deficiency diseases, minor digestive disorders, wounds, reduced feed intake and decreased milk production can be offered through this platform. Furthermore, receiving feedback about/on recovered animal is easier through this platform. This can definitely improve the quality of disease diagnosis and timely veterinary aids. After receiving the queries from different experts, the mediator can share the pooled advice in an easily understandable form to the farmer clienteles (Thakur, 2016).

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Challenges of Uusing WhatsApp in Aagriculture

1. **Diversity among the groups:** The group members were randomly selected and as a result, there are variations in terms of age, education, cultural background as well as the type of agricultural enterprise. The group members of varied and mixed enterprises carrying out activities in cereal production, vegetable production, dairy production, goat entrepreneurship, poultry, horticulturealism and floricultureism etc. Further, they undertake agriculture as either a full-time or as a subsidiary activity. The only commonality among them is that they are WhatsApp users. Due to their different backgrounds, information delivery suited to their needs remains a challenge.

2. **Requires regular attention:** Use of social media requires regular and frequent attention. Sometimes members may post impertinent contents in form of promotional messages, jokes, etc. Hence; the members may be reminded not to post such type of irrelevant messages in the group. Repeated offenders may be removed from the group. Furthermore, the quality of images received through farmer participants of the group may sometimes be poor in offering diagnostic information and advice to them.
3. **Commitment of Administrators:** WhatsApp usage in agricultural extension requires committed time and effort of administrators and to a certain extent, from the members as well. One has to keep on posting something new~~,~~ which must be pertinent to the farmers (Yadav *et al.* 2015). Similarly, information received through mobile phones have also been criticised by farmers as generic, old and of routine nature surprising as locally contextual content has productivity (Mittal *et al.*, 2010). Content curation, as well as content management, can, therefore, be the biggest challenge of using WhatsApp for the farmers. Often farmers in developing countries have limited internet data pack availability. So, care should be taken about posting excessive updates, which may create unnecessary information overload as well lost of internet data to them. Instead, periodic short snippets of information can be offered.

Success S~~s~~tories of Farmers WhatsApp G~~g~~roups

There were a lot of success stories of WhatsApp groups as a farming solution. Few are discussed below:

Punjab WhatsApp group "Young innovative farmers" is a recent success of this technology dissemination. Farmers in Punjab can now get immediate advice via a WhatsApp group "Young Innovative Farmers", about soil health, use of fertilisers and pesticides and from crop health to seed procurement. The group was set up by Gurdaspur Agriculture Development Officer, Dr Amrik Singh. "Moreover, the farmers in the group have set up their own groups with local farmers to disseminate the information," citation required here.

WhatsApp groups connects farmers with each other. One particular WhatsApp group, 'Baliraja', allows farmers from various villages to seek and share agricultural~~e~~ advice as well as connect with experts in various fields and learn new practices. This group has now been active for over two years and was founded by Anil Bandawane, a farmer from Junnar close to Pune. Bandawane said that he began the group "to discuss exotic vegetables like broccoli, zucchini which are in demand in urban markets. But the most valuable~~biggest~~ discussion is

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always about soil and the rain. The group's membership grew from 100 to more than 400.citatation required to support this information.

In a novel initiative to promote organic farming, Neeleshwaram municipality of Kerala state has embarked on an ambitious project by forming a 'WhatsApp' group of stake holders to streamline cultivation making use of available barren land. The group coordinated by the municipal Secretary has councillors, aspiring group farmers, Kerala Agriculture University experts, Agriculture officials, Community Development Society (CDS) members, and vegetable vendors.

In a distant, dusty village in India with no motorable road and poor electrical connectivity, a cow owned by a farm woman is sick and there is no veterinarian around. Normally, she would have lost her cow but with her recently purchased mobile phone, she could connect with the veterinary doctor in WhatsApp and got the needed advice on time. Yet another farmer in a remote, mountainous terrain in the north-eastern part of India finds the leaves of his chilies curling. Fearing crop failure, he takes photos of the affected plants sends them via WhatsApp to the expert in the nearest agricultural university seeking advice so he could save his crop (Kamal, 2016).

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In the Indian state of Karnataka, the Department of Agriculture made it mandatory for agricultural development officials to have smartphones so that they could share information, messages, and circulars through WhatsApp, even before hard copies could reach them. This helped officials to take quick action and improve their interactions with farmers in distress.

. Farmers are even using WhatsApp to connect with consumers and to sell vegetables via WhatsApp groups. In India, WhatsApp is even changing the way people grow and buy food. Some agripreneurs have turned WhatsApp into a classified marketplace helping farmers to trade grains, vegetables, seeds, irrigation equipment and tractors, and more.

At the Indian Veterinary Research Institute, the Krishi Vigyan Kendra (KVK) manages a WhatsApp group consisting of 256 farmers and agricultural scientists. On average, 10 to 12 queries are posted daily in this group~~,~~ which is considered by the participating farmers as very beneficial.

The WhatsApp groups which have been shared are indicated below in Table 1: (Kamal, 2016; Vora, 2015)

Table 1. Examples of P~~p~~opular WhatsApp G~~g~~roups for F~~f~~arming S~~s~~olution in India

Name of the	Information about	Administrator	Type of content shared

group	members	of the group	
Krishi Jagran group	Farmers of states of Rajastan, Uttar Pradesh, Madya Pradesh, Maharastra	Farmer Entrepreneur	Information about crop varieties, soil management, irrigation practices, agricultural machinery, input companies, marketing prices of various commodities
Pasupalan group	Farmers of states of Rajasthan, Maharashtra, Madhya Pradesh, Rajasthan Uttar Pradesh Haryana and Gujarat	Veterinarian	Information about livestock breeds, feeding and health management.
Balirajja	Farmers of states of Maharashtra	Farmer Entrepreneur	1.Pictures of agricultural Produce 2. General information on agriculture problems.
Young Progressive farmers group	Farmers of state of Punjab,	Agricultural officer, Punjab	1.Information about seed treatment of wheat and paddy 2.Information about soil testing based application of phosphate fertilizers in the cultivation of paddy 3. Awareness regarding management of yellow rust disease in addition to information about training camps to beorganized.
5.Goat	Farmers of Pune and Mumbai	Managed by Farmer Entrepreneur	1.Photos of Live animals 2.Negotiations of selling and buying

CONCLUSION

Social media platforms are continuously evolving. Online communities tend to be more fickle and fragile as visual cues and body languages are generally lacking (Andres &~~and~~ Woodard, 2013). This can also be a challenge while using social media platforms to communicate with farmer clientele. This is a technology that depends on upon the human interface. Unless the users are enthusiastic about its use, this platform would not succeed. WhatsApp is actually transforming agriculture value chain actors such as agro dealers, agribusiness SMEs, and agriculture extension workers creating value for smallholder farmers. Rather than travelling long distances to farmers' fields, extension agents are increasingly using either mobiles or a combination of phone calls, text, videos, and the Internet. This

reduces transaction costs and interacting with farmers becomes more frequent. As youngsters are the back bone of our country attracting youth with latest technologies like 'WhatApp" groups will encourage their involvement in agriculture. WhatsApp is an easy and cost effective way to establish and maintain linkages with smartphone farmer clientele. As researchers, it does let us know more about agricultural problems at the grassroots level. As an extensionist, it helps build trust and credibility among the farmers. Overall, it is a wonderful tool to promote and support networking, encouragement and enthusiasm among the farmers. Extension-based organisations should encourage and support this innovative outreach tool.

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