

INTERNATIONAL JOURNAL OF RESEARCH IN COMPUTER APPLICATION & MANAGEMENT

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CLOUD BASED TECHNO-ECONOMY MODEL FOR RURAL SECTOR

RUCHIR SAXENA
RESEARCH SCHOLAR
GYAN VIHAR UNIVERSITY
JAIPUR

DR. RIPURANJAN SINHA
DEAN RESEARCH
GYAN VIHAR UNIVERSITY
JAIPUR

ABSTRACT

The study suggests framework for rural sectors exclusively the rural people to assist them in agro requirements. Model offered a new mode of communication using a mobile phone with camera and Internet connectivity. MCC is proposed to exploit all the advantages of cloud computing technologies on to a single mobile device. The framework helps people of rural regions in almost all the sectors of health, education, crop analysis, and demand supply related information. Rural sector plays vital role in Indian economy. Mobile Cloud Computing is actually a huge technology, which has many benefits. Indian economy needs these technologies to uplift overall economy of country.

KEYWORDS

mobile cloud computing, cloud based techno-economy model, rural sector.

INTRODUCTION

Rural and Urban economies of India are not two separate economies having merely a buyer and seller relationship. Rather, rural and urban are so intertwined and inseparably bound together that one must think of them jointly, if there is to be any sound thinking about either one or the other.

Needless to over-emphasize that, the world is preparing for incredible changes in science, technology, agriculture, commerce and industry, resulting in a 'high-tech multi-revolution' and globalization of economic activities. India can't keep itself aloof from these changes. In fact, in the initial stages of our growth, Indian industry remained highly protected and rural regions was looked at as a bargain sector. Consequently, a very large segment of rural economy remained inefficient with low levels of productivity and feels neglected. The introduction of Mobile cloud computing is one of best example of incidents. Effective implementation of mobile cloud computing in rural services can has significant impact on rural development.

It found surprise that capital formation in rural business inclined to decelerate. But today expanding forces of information communication technology are reshaping rural economy. Not only are the functions of farming, processing and distribution undergo a great physical evolution, unprecedented changes are taking place throughout rural society –economically, socially and politically.

The key to success of any rural or urban development is "information". The graphical interface of applications has simplified complex issues of technical world. The era arises to utilize this channel to its maximum limit in the interests of the rural development. Technology is constantly changing, creating advance and renovate hardware, software. The revolution in technology converges in ways that generate substantial new prospects for distributing services.

A number of new industry-specific technologies and new updated innovative applications, including the ever-widening agricultural application of E-commerce and M-commerce technologies, have been introduced for the growth of economy. According to research-developmental and application trends as well as forecasts and expectations these technologies and services are to become commonly applied tools in enhancing business innovations and supporting business management. The focus of the research paper is concept of mobile cloud computing & its effective implementation on developing the rural economy of India.

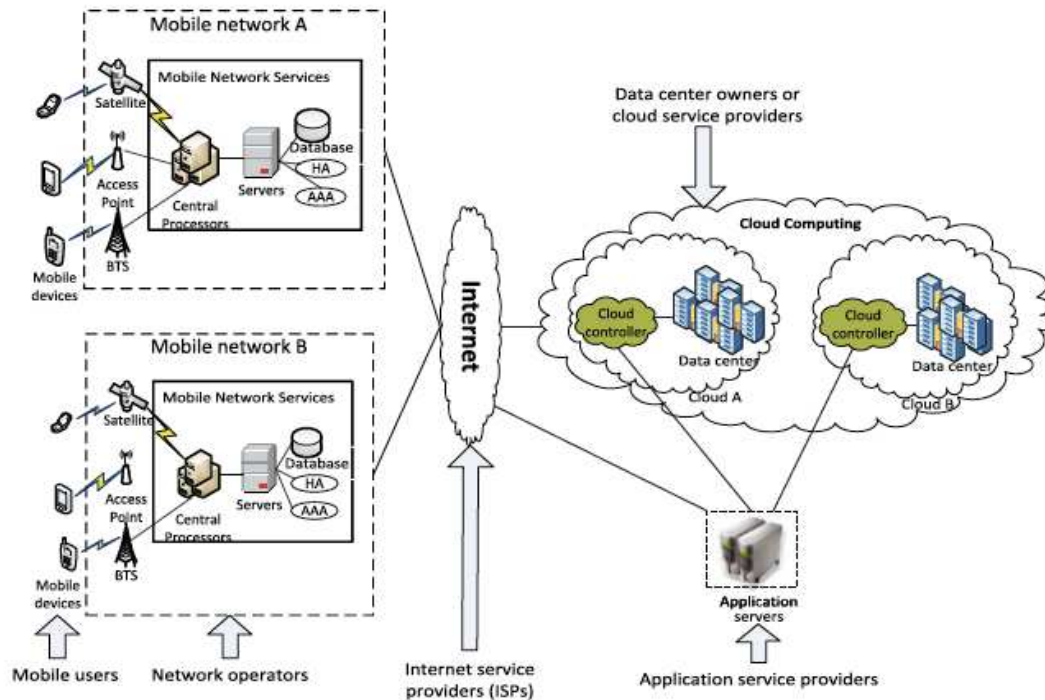
MOBILE CLOUD COMPUTING

Mobile Cloud Computing is a new architecture for mobile devices where maximum processing and data storage related to the application is transferred to the powerful, centralized computing platforms situated in the Cloud. These centralized applications are then retrieved on mobile Internet, using browser or any thin native clients on the device. However, this prototype for Mobile Cloud Computing still does not completely influence the powerful communications, and commercialization skills of the mobile network itself. Mobile Cloud Computing develops on the codes of cloud computing, carrying attributes such as no on premise software and "XaaS" (Everything as a Service) to the mobile domain, on demand access, adding Payment as a Service (Paas) and Network as a Service (NaaS) to the maximum of on demand competences and allowing applications to control the full power of mobile networking and billing without the need for high-quality application servers.

The theory of mobile cloud computing was initiated after introduction of "Cloud Computing" which was introduced in mid 2007. It has been fascinating the attention of businessperson, industrialist, entrepreneurs as a gainful business opportunity that shrinks the development and running cost of applications and achieve rich experience of a different services at low cost.

The Mobile Cloud Computing Forum defines MCC as "Mobile Cloud computing at its simplest refers to an infrastructure where both the data storage and the data processing happen outside of the mobile device. Mobile cloud applications move the computing power and data storage away from mobile phones and into the cloud, bringing applications and mobile computing to not just smart phone users but a much broader range of mobile subscribers".

FIGURE 1: MOBILE CLOUD COMPUTING (MCC) ARCHITECTURE



Source: Mobile Cloud Computing Forum

The universal architecture of Mobile Cloud Computing is presented in Fig.1 Mobile devices are coupled with mobile networks by, access point, satellite, or base transceiver station (BTS), which called base stations that control and establish the connections and working interfaces between the mobile devices and networks. Information (e.g., ID and location) and any other request from mobile users are transferred to the central processors that are connected to servers providing mobile network services. The network operators deliver services to mobile users as Authentication, Authorization, and Accounting based on the home agent and user's data stored in databases. After that, the user's requests are transmitted to cloud via the Internet. The cloud managers process the requests to provide information to mobile users with the corresponding cloud services. These facilities are evolved with the thoughts of service oriented architecture, virtualization and utility computing.

REVIEW OF LITERATURE

According to Shubham Chatterjee and Asoke Nath (2015) cloud computing technology motivate the flow of information and knowledge beyond the border of economic and social status. It improves transparency, accountability, efficiency, and speed. Cloud Computing can help to improve living standard of remote rural regions by providing education, commercials and social benefits. Cloud can handle local requirements of rural people.

According to Mitsuyoshi hori, Eiji Kawashima, Tomihiro Yamazaki (2015) rural development has huge potential that is not explored because lack of information technology implementation. Because of rural economic scenario, which is very poor in terms of monetary conditions, physical implementation hurdles, cloud technology is best suited for upliftment of rural sector. There is yet a huge space of implementing new cloud techniques.

Rakesh Patel and Mili Patel (2013) proves that cloud computing can drive down cost of rural e-services. They proved that cloud could reduce the gaps between poor rural and rich urban India and creates the same level for all Indians.

As per Kuldeep Sambrekar and V.S. Rajpurohit (2014) cloud is doing well in some sectors but difficulties still exists because of high infrastructure cost etc. Mobile cloud is a technique that can use cloud computing technology on to a simple smart phones and reduce demand of high cost infrastructure and provide complex algorithms in simple understandable form.

OBJECTIVE OF RESEARCH

The main objective of paper towards establishment of framework of mobile cloud technology, for ensuring sustainability and boost of rural economy.

RESEARCH METHODOLOGY

This study is an exploratory research. The study is on "Cloud Based Techno-Economy Model for Rural Sector" which particularly covers the rural business. Primary data was collected through survey method. Close-ended questionnaire was prepared. Respondents were involved in rural business directly or indirectly.

SAMPLING

For the study purpose primary data was collected through questionnaire from the peoples of rural regions who contribute in rural economy directly or indirectly through ITC. Sample Size of 87 was taken, out of which 50 best relevant respondents were analyzed. 11 statements were selected and included in questionnaire. The secondary data was collected from official websites, national and international journals, annual reports, books, websites etc.

CHALLENGES IN RURAL DEVELOPMENT

India is a country of villages. Villages are the units of rural society and the centre of culture. Definition of rural area (by Planning Commission, Insurance Regulatory Development Association IRDA)[2]:

"THAT WHICH IS NOT URBAN"

- Population of less than 5000.
- At least 75% of the male workforce engaged in agriculture activities.
- Absence of a municipality / corporation.
- Density of population is less than 400 per sq/km.

"Swadeshi", the heart of Gandhi's vision, doesn't mean spinning wheel and wearing khadi, it means local self reliance on the village to rejuvenate rural India and mobile cloud computing may be fuel to force this dream.

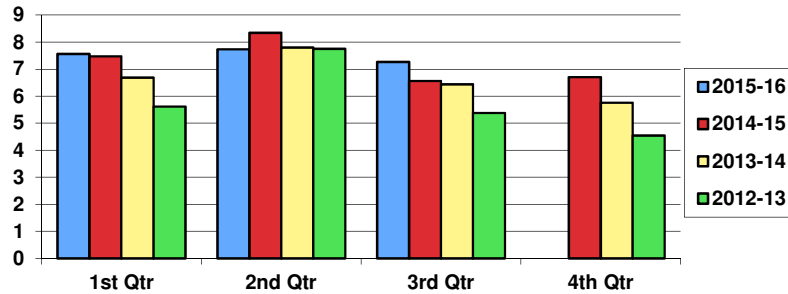
According to IMF world economic outlook India's economy grew at an annual rate of 7.336% in 2015.

TABLE 1: GDP PER QUARTER IN FY 2012-16

	Quarter 4	Quarter 3	Quarter 2	Quarter 1
FY 2015-16	-	7.26	7.73	7.56
FY 2014-15	6.71	6.56	8.34	7.47
FY 2013-14	5.76	6.44	7.80	6.68
FY 2012-13	4.54	5.38	7.75	5.61

Source: <http://statisticstimes.com/economy/quarterly-gdp-growth-of-india.php>

GRAPH 1: GDP PER QUARTER IN FY-2012-16



GDP in Quarter 3 of 2015-16 is projected at 28.52 lakh crore INR, showing growth rate of 7.26 percent over the parallel quarter of last year. The growth of Gross Value Added is 7.1% at 2011-12 prices and 7.9% at current prices. Gross Value Added growth rates in Q3 of Industry, Services, and Agriculture & allied sector are 9.0%, 9.4%, and -1.0% respectively.

The growth rate in GDP, in India, measures the change in the seasonally adjusted value of the services and goods manufactured by the Indian economy throughout the quarter. India is the second most populous and 10th largest economy of world.

GDP from rural sector in India decreased to 4235.42 IND Billion in the Q1 of 2016 from 5131.90 IND Billion in the fourth quarter of 2015. GDP from rural sectors, which include agriculture & allied services in India, averaged 3946.54 IND Billion from 2011 until 2016.

FIGURE 2: INDIA'S GDP FROM AGRICULTURE



SOURCE: WWW.TRADINGECONOMICS.COM | CENTRAL STATISTICAL ORGANISATION, INDIA

Source: Tradeconomics.com

Contributing of agriculture sector in GDP is decreasing continuously, but still a crucial part of economy. The data shows that the service & industry sector productive more than the agriculture.

So the growth of agriculture sector is an important job towards economic & social growth of India.

Therefore, strong decisions and actions required from policy builders to develop a solid structure for internationally competitive, highly productive, and diversified rural sector.

There are several challenges to rural sector discussed by World Bank site, CDRI, IFPRI [3]

1. Slow down in agriculture and Rural Non Farm Growth- Some of the factors hampering the revival of growth: -
 - a. Poor composition of public expenditure
 - b. Over regulation of domestic agriculture trade has increased cost, price, risk & uncertainty, under mining the sector's competitiveness.
 - c. Inadequate infrastructure & services in rural area.
 - d. Despite large expenditure in rural development, a highly integrated bureaucracy with low liability and inefficient use of public funds limit their impact on rural growth.
2. Difficult to engage extension agencies or private institutions in technology enhancement to increase productivity.
3. Ineffective management of rural risks factors, expansion plans slow down the growth and export.
4. Improper data and information platform.

MOBILE CLOUD COMPUTING AND RURAL INDIA

The actual India breathes in villages and therein lies the future of India. Approx. 69 percent of India's population lives in rural areas, and 86 percent earns less than 100 INR per day of total rural population. The subscriber base of mobile phones in rural India is 100 millions approx., which is, more than the radio users.

From Independence, rural India has been overlooked and growth is too slow. The mobile cloud technology will take off the revolution that is needed to bridge the gap between urban and rural India and will improve the Indian rural economy.

Under digital India Bharat Sanchar Nigam Ltd is providing high-speed Internet connectivity up to the grass root level of rural India, which makes data connectivity faster and allows rural sectors to log into the cloud. Mobile cloud technology is an advantage over any other technology because:

- Minimum initial cost makes Mobile cloud computing attractive for rural regions.
- It will reduce the costs of education, primary health care services, e-governance.
- Easy to manage. No need of creating huge infrastructure like power and air-conditioning to run the data centers and no need of keeping licenses etc.
- Scalability makes quick rural diffusion a reality; easily increase the number of users and sites at a nominal cost.
- The Mobile cloud computing will support non- English speaking literate villagers to join the information revolution and contribute to strengthen the country's economy

Mobile cloud computing will permit information communication technology to be infused into the far most level of rural India and make information accessible and available to the poorest of the poor to improve their life style by empowering them with knowledge generates from there smart phones connected to the cloud.

They can access many services like weather forecast, agriculture information, e-learning, agri-market updates, health services and many more in real time at affordable cost without going anywhere.

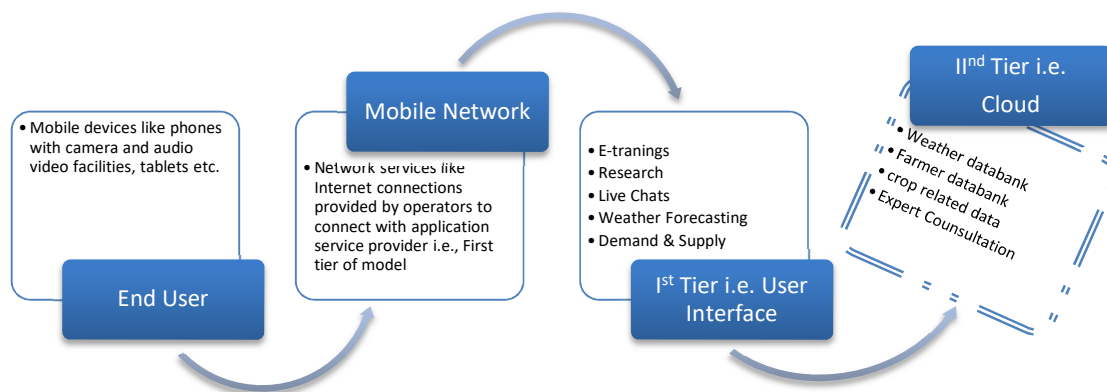
PROBLEM STATEMENT

By all the above discussion based on secondary data we proposed a model using Mobile Cloud Computing Technology which can be used in rural sectors so that information sharing globally and locally, information management, local and global communication can be attained easily and flexibly.

PROPOSED MOBILE CLOUD COMPUTING MODEL

Paper presents a model for rural India using mobile cloud computing technology. The model is divided in two-tier application model. First tier is Front end for the users with simple graphical user interface to full fill requirements of the user with ease and fast. Second tier is used to as database to store all the useful and related information on cloud.

FIGURE 3



The front end is a module, which can communicate with the end user for their requirements and provide related services any time anywhere in India. The system can provide many services like

- 1) It can provide real time information of demand and supply from all the regions of the country. Which helps to analyze returns on their products. Minimize the role of mediators between demand and supply.
- 2) Because of Mobile technology used in system it helps rural people to collect information from database through smart phone in their own local languages easily with audio video facilities as well.
- 3) Model provide live chat facilities with scientists, experts and researchers, through which people from rural business sectors can share their technical problems and take solution at the same time as well and also can take expert trainings. The system can also provide rural business related global information like new tools and technologies, new methods of farming, cattle farming etc. successfully implemented in all over the world.
- 4) It also helps in real time research. Researchers can extract data from data bank directly with ease. They can access live data from fields directly through audio-video facility and implement their suggestion without delay. Results can store in same database for future use.

The second tier or backend is a centralized database is on cloud, stores all agro business related information, which is made available to the entire user anytime anywhere in the world. The major objective to store information centrally on cloud is to spread the information to grass root level and made available with ease so users can analyze and act accordingly. For this purpose, second tier stores minimum following information in database:

- 1) Information related to all crops cultivated in the all regions so they can analyze and react easily.
- 2) It can store data related to growth of product from regular interval from different regions, which will help to compare two different products, and clears the picture. For example, farmer can check the growth of a crop region wise and compare it from past.
- 3) Weather is the major factor in rural economy; it can store weather information and also forecast region wise.
- 4) It also stores data related to local entrepreneurs, farmers, wagers so government can analyze and make policies accordingly to provide maximum benefits. Information can use to minimize unemployment, reducing farmers suicide activities, migration from rural to urban etc.
- 5) Database can store solutions for common problems of rural community which can easily accessible. There is a provision to store new questions in database experts will provide solution on it.

RESEARCH ANALYSIS & INTERPRETATION

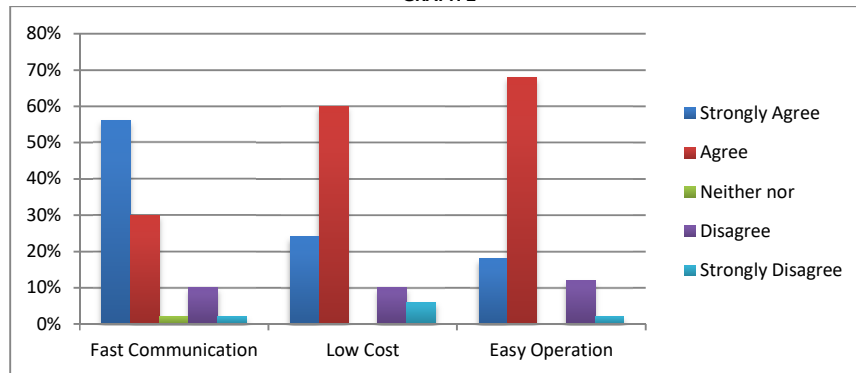
In the present part the analysis of general opinion of respondents towards the objectives of proposed Framework as explained earlier a set of 11 statements were selected and included in questionnaire. 50 Respondents were interviewed by using interview schedule and their opinions were collected and presented through tables and graphical representations.

I. FAST COMMUNICATION AT LOW COST AND EASY TO OPERATE

TABLE 2

	Provides Fast Communication	Low Cost	Easy to Operate
Strongly Agree	56%	24%	18%
Agree	30%	60%	68%
Neither nor	2%	0%	0%
Disagree	10%	10%	12%
Strongly Disagree	2%	6%	2%
Total	100%	100%	100%

GRAPH 2



The table and bar chart reveals that majority of users 56% Strongly Agree and only 2% Strongly Disagree with the objective that with Participation of mobile cloud computing will improve communication between market and users directly.

The table and bar chart reveals that majority of respondents 24% Strongly Agree, 60% Agree and only 6% Strongly Disagree with the statement that information available at low cost rather than other technology.

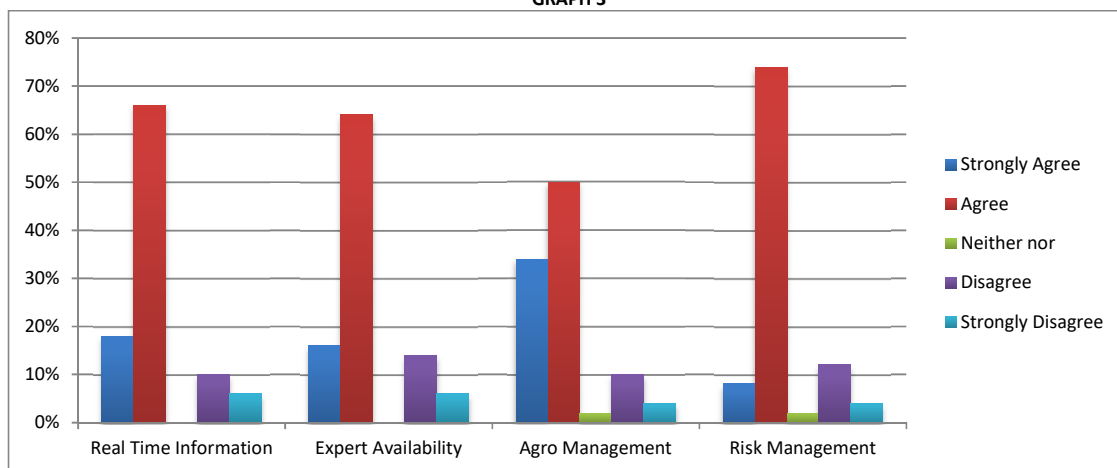
The table and bar chart reveals that majority of people 86% Agree and only 2% Strongly Disagree with the statement that getting information is an easy task in regards of operating technologies rather than other technology.

II: EXPERT ADVICE AT REAL TIME, WHICH HELPS IN FARM MANAGEMENT AND REDUCES RISK

TABLE 3

	Real Time Information	Expert Availability	Agro Management	Risk Management
Strongly Agree	18%	16%	34%	8%
Agree	66%	64%	50%	74%
Neither nor	0%	0%	2%	2%
Disagree	10%	14%	10%	12%
Strongly Disagree	6%	6%	4%	4%
Total	100%	100%	100%	100%

GRAPH 3



The table and bar chart shows that respondents feel after implementation of framework users gets proper solution from geographically far expert at real time 84% user have positive approach is compare to negative of 6% which is strongly disagree with the statement

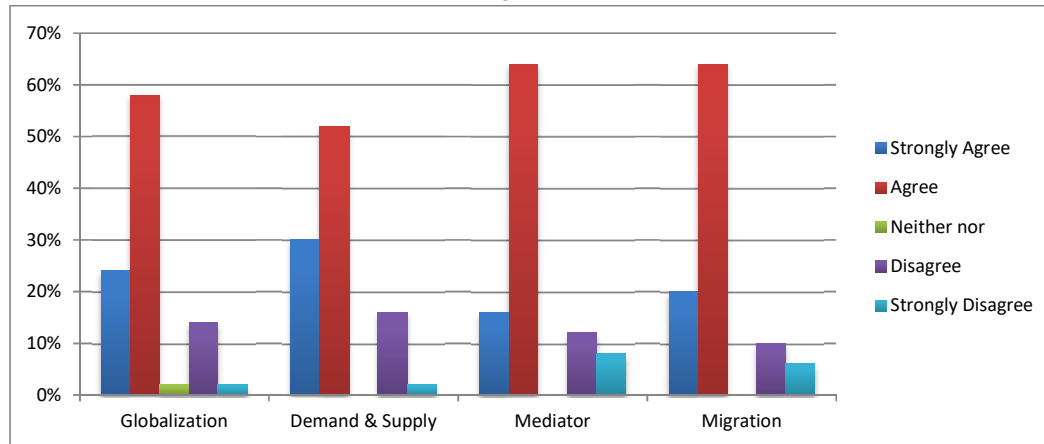
Graph and table shows that management of Agro business will improve and risk will reduce after upgrading existing system to proposed model. Majority of users 84% agreed and 4% disagreed with the statement.

III: MINIMIZES INVOLVEMENT OF MEDIATORS, WHICH HELPS TO GET ACTUAL PICTURE OF DEMAND AND SUPPLY. IT PROVIDES GLOBALIZATION AND MINIMIZES FREQUENCY OF MIGRATION FROM RURAL TO URBAN

TABLE 4

	Globalization	Demand & Supply	Mediator	Migration
Strongly Agree	24%	30%	16%	20%
Agree	58%	52%	64%	64%
Neither nor	2%	0%	0%	0%
Disagree	14%	16%	12%	10%
Strongly Disagree	2%	2%	8%	6%
Total	100%	100%	100%	100%

GRAPH 4



The table and bar chart reveals that majority of users 82%, 80% Agree and only 2% and 8% Strongly Disagree with the objective that with involvement of mobile cloud computing the image of demand and supply will improve and participation of mediators will reduce respectively. After implementation of framework 82% and 84% user agreed and 2%, 6% strongly disagreed that it would globalize the market and reduce rate of migration from rural to urban which occurs because of low-income rate.

KEY FEATURES OF THE PROPOSED MODEL

The model has the following advantages:

- 1) Model provides globalization to rural sector user can communicate locally and globally easily. It provides faster and cheaper communication in real time.
- 2) Through data storage of local people, it will help to reduce migration rate from rural to urban by solving their local problems no issues how remote they are.
- 3) It motivates farmers and researchers as well to get involve more and more in agro activities. They can communicate by each other and provide better results, which can give overall development of economy.
- 4) Farm management, risk management can perform with ease. Means experts 24*7 perform overall data management effectively and securely.

LIMITATIONS

1. Lack of promotion and awareness of cloud computing in rural sector.
2. An effective implementation and awareness of framework will encourage rural sector
3. Mobile connectivity in remote rural areas.

CONCLUSION

The suggested framework for rural sectors exclusively the rural people to assist them in agro requirements. Model offered a new mode of communication using a mobile phone with camera and Internet connectivity. MCC is proposed to exploit all the advantages of cloud computing technologies on to a single mobile device. The framework helps people of rural regions in almost all the sectors of health, education, crop analysis, and demand supply related information. Rural sector plays vital role in Indian economy. Mobile Cloud Computing is actually a huge technology, which has many benefits. Indian economy needs these technologies to uplift overall economy of country.

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