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RESEARCH ARTICLE

REVIEW OF USABILITY AND DIGITAL DIVIDE FOR ICT IN AGRICULTURE.

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Abstract

Agriculture in the backbone of Indian economy and 70% of Indian population is mainly dependent on Agriculture for their livelihood. Since ages, lots of developments are going on in this field. Information and Communication Technologies (ICT) is a resource society which provides access and knowledge. ICT is a resource society which needs active participation along with literate participation of the user. The internet nowadays is of little use to people who are not able to make use of electronic access to digital data to improve their lives. In the past decade, farmers had access to various agricultural information provided by many information and communication technology (ICT) projects in Indian agriculture. Different services are provided by ICTs. ICTs have the potential to reach many farmers with timely ,useful and accessible content. But the content delivered has importance and relevance only if the information is content specific and localized. In India most of the population lives in rural areas and is dependent on agriculture for their living. But because of digital illiteracy, farmers are not aware of different data of agriculture available for them, in spite of numerous efforts taken by Government. The prime focus is on improving the usability of knowledge shared by different digital media. Hence minimization of digital divide in rural areas will take place. It will help to design and implement better service tools.

Introduction:-

India is an agriculture based developing country. Information dissemination to the knowledge intensive agriculture sector is upgraded by computers and mobile-enabled information services and rapid growth of mobile telephony. Mobile apps and websites in the area of agriculture can be the best option to increase countries net agriculture production. Today farmers receive diverse facts regarding farming like different types of seeds, crop diseases, crop selection, crop process weather, fertilizer, pesticides etc multiple resources are distributed on many different locations according to its origin, its producers or vendors. The data may have different format and contents, depicting heterogeneous nature in their structure and format. Therefore, developing a system from where the required information is available to the farmers directly and in localized form is needed.

This research focuses with following objectives.

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Need and Objective:-

This research focuses on following key points,

1. To know about usability and usability issues in agriculture domain
2. To identify the digital divide and the barriers to digital media among rural users especially farmers.
3. To improve the digital illiteracy among users.
4. To minimize digital divide and improve the usability of digital media by providing recommendations as solutions.
5. Help in decision making for the prediction of suitable crops with respect to climate and soil.
6. Identification of crop diagnosis by sending image through app.
7. To avoid linguistic problem solutions will be provided in local language.

Literature Survey:-

Sukhpuneet Kaur et al. [1] evaluated Educational Universities of Punjab and provides their ranks according to evaluation criteria. Usability is calculated using automated tools. Paper make use of two automated tools, **Site Analyzer**(which calculates different no of parameters such as Content, Design, Performance, SEO (Search Engines Optimization) and Page Analysis) and **Qualidator tool** (which checks Usability, Accessibility, SEO and Quality (technical quality)). Paper provides automated tool calculations for universities websites regarding the comparative importance of website assessment criteria's. From the results website designers can focus on the specific features where they are lacking and keep the website up-to-date.

Sukhpuneet Kaur et al. [2] discussed about the usability tools for testing and how they are used for determinination of effectiveness and usability of websites. Performance evaluation is done by using tools which give detailed results of that website. The aim is to perform evaluation and comparison using the automated testing tools to determine their SEO (Search Engine Optimization), load time, speed, security, page size, performance, mobile and number of requests. The different Universities of Punjab were selected and evaluation was done using automated Usability Testing tools like **Site Speed Checker Tool, GTMetrix, Pingdom** and **Website Grader**. It was concluded which university website scores the maximum against the various factors used.

Muhammad Faraz Khokhar et al.[3] discussed about the different ways to empower or improve the role of technology.Also to bridge rural digital divide with ICT solutions. In the agriculture sector of rural belt of Pakistan those solutions were applied. E-boards and mobile phones for giving access to all latest agricultural updates and news were suggested. Idea was to provide automated updates on e-boards in form of pictography and text messages on users device such as phone that too in local language. In this way ,current updates are provided to the farmers. Research focused on making information easy and understanding. Thus, more usability and effectiveness is provided to the farmers, which helps to increase the productivity of crops. This helps in bring rural community to the (standards of) international level.

Maria Tamoutsidou [4] presented that agriculture is very much important domain for developing countries. There is need such that it should change to meet todays need. Agriculture has been a part of human life since the beginning of human race. The need for agricultural information is almost same as old agriculture itself. Paper proposed that E-learning in agriculture is a tool that provides various benefits to farmers education by expanding its access. Finally it was concluded that E-learning offers benefits and gives opportunities in agriculture area. So a proper education regarding E-learning is fruitful to the farmers.

S. A. Adepoju and I. S. Shehu [5] used automated tools such as **Web Accessibility checker, HERA** and **WAVE**.Calculation of usability level via accessibility evaluation of the federal universities in Nigeria is done using these tools.Usability was checked for conformance with both WCAG 1.0 and WCAG 2.0 using three tools. Different tools gave different errors. Based on the errors the website designers should try to minimize the error for increasing the usability.

Soumalya Ghosh, A. B. Garg, Sayan Sarcar[6] proposed an iconic interface for farmers. In Indian languages it had a special feature called as speech based interaction. It is essential for farmers to take the essential agriculture information. The proposed interface removes language gap of the Indian farmers with various multiple modes of interaction techniques. It also overcomes the digital gap among farmers.

Ahmad A. Al-Ananbeh [7] focused on two concepts such as Search Engine Optimization (SEO) and Usability. They evaluated automatically eighty Websites for universities in the Arabic region. Aim was to find out whether there is relevancy between Search Engine Optimization (SEO) and Usability. Attributes selected are: HTML errors checking, load time, and browser compatibility problems. For the selected attributes, tools used are HTML ToolBox, Page Rank Checker, and SEO Page Rank. Using these three tools, 80 websites for universities in the Arabic region were evaluated .Results showed that Usability is more important in many aspects than SEO. Primary focus should be on improving the usability and certain recommendations considering SEO PageRank into consideration. are given in order to increase the usability for websites.

Sukhpal Kaur[8] used automated tool called as **Sitechecker** for evaluation for web site accessibility. The tool performs the work of HTML validator. It also evaluates other contents such as CSS, hidden files, dead links, extra comments, java scripts, in the HTML code and code to text ratio in a web site.

Fang Liu [9] presented the importance of measuring usability and how it is measured. Using different evaluation techniques,web designers can know their users better, understand them in a better way and make their works meet various users' needs. Paper describes methods to evaluate a website. Evaluation techniques are usability testing, focus group, cognitive walkthrough, heuristic evaluation, thinking aloud and questionnaires. Paper concluded that designers should be aware about the techniques and should be used to evaluate websites skillfully.

Gagandeep Kaur Grewal[10] explained the importance for need of right information to the farmers for successful farming. For farmers various web portals and agricultural sites are available but many are not aware about it. Paper reviewed about the need for good communication among farmers and portals. Handy and useful information of weather, crops pests, irrigation schedule, etc should be available to the farmers from time to time.

Ms. Ipsita Panda[11] discussed how the Indian scenario as well as the global world is influenced by the digital divide. Rural library can plays a much needed role in bridging digital divide. It will also help in literating the society and in building a well informed society.

Rajender Singh Bist [12] highlights the digital divide scenario in India. Further discusses various ICT initiatives undertaken by the government. The major challenges and key solutions in bridging the digital divide in the Indian context are provided.

Neena Singh[13] the paper informed about the role played by several programs taken by the government to bridge the digital divide.Also the initiatives taken in India towards digital access to information. Some of the projects initiated were as follows :"Grameen sanchar sevak," "Gyan Doot," the CARD and e–Seva projects, etc. It further discusses Digital Library Projects, viz. the National Science Digital Library (NSDL) and Vidya Vahini, digital mobile libraries and library networks and community information centers. These projects were initiated by the government to reach remote and rural areas. The other factors that help in bridging the digital divide in the country are good policy–making ,political support and need for strong determination.

Zhengjie Liu, Qingjun Meng[14] they proposed that the main reasons for the digital divide are socio-economic factors. This is because most people have difficulties in understanding digital products' and their usability. The usability improvement for digital products help in the endeavor to eradicate the digital divide. The design should be user-centered design. It is a good method to eliminate usability factors of the digital divide. In short, it will help to bridge the digital divide.

Tanuja R. Patil et al.[[15] discussed about making farmers available with precision agriculture information which will help them to get high crop rates and high crop yield using ICTs.SMS was the medium used to provide the information to various farmers. A software system was built to give the precise information about the crops using database. In local language automatic information delivery through website, app, as well as SMS was provided.

Review Of Research:-

The study for improving the usability in agricultural area and for eliminating the digital gap among rural people especially the farmers will be done in following stages:
Stage 1: Review of agricultural information communication tools
Stage 2: Identification of Usability problems.

Stage 3: Recommendations and solutions to improve usability.
Stage 4: Development of tool to solve and improve usability in specific area.
Stage 5: Test usability with the help of users for development tool ie, website or application.

Usability, issues of usability and evaluation of usability:-
The ISO 9241-11 standard defines usability as "the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use".

Effectiveness: It tells how users can achieve specified goals with accuracy and completeness
Efficiency: It tells with what rate users achieve goals with respect to the accuracy and completeness
Satisfaction: It tells how users accept the system, to what level they are comfortable in using it. [16]

A level of satisfaction is the highest when users find a Web site is useful with meaningful information and usable; this is can be termed an "**engaging user experience**". Usability in agriculture has an important role to play inorder to engage more and more farmers with newer digital data and technologies.

There is a limiting factor in use with many of the applications in agricultural with respect to new technology called as "User acceptance". Farmers tend to become very conservative generally while choosing the technology. So with a mindset of reducing risks they tend to choose traditional or any old methods or techniques. The farmers also needs to trust on the reliability of data and accuracy of the information available. This needs to be changed so that there can be development in agriculture field by making farmers more and more involved in new methods.

A usability evaluation method is a systematic procedure in which data gets recorded for the communication that takes place between the user and the software. Various tools are available for evaluation of websites such as Website Grader, Dareboost , Qualidator, SEOptimer ,GTMetrix , iwebchk ,SortSite etc.

Digital divide in agriculture:-
In common terms, definition of digital divide can be as the difference between those users who have access to digital data and can make effectively make use of it , and those who either lack it or don't use it effectively. Unequal access to digital content and different technologies has led to the digital divide among rural people. However, not everyone has access to this digital data or aware about how to use it. Especially the farmers are lacking behind in using the devices and the technology and the digital data available.

Methodology:-

This can be divided into four steps.
Stage 1: Review of agricultural communication tools
Table 1:- Review of websites and apps

Sr. No	Name of Website/portal/apps	Features	Observation
1	Farmer.gov.in	Farmer Portal provides solution to the farmers and stakeholders to disseminate the information regarding fertilizers, seeds, pesticides etc.	• Navigation issue. • Map is limited to district level. • No disease diagnosis system. • No proper language support.
2	Mahagri.gov.in	This is a web portal of Agriculture Department of Maharashtra State (India),which is developed to provide information related to farming.	• Limited to only two languages i.e, English and Marathi • Clumsy view of website • Navigation issues
3	Krishiworld	It provides information about agriculture and agriculture products, crops, fertilizers, floriculture vegetables and fruits	• More no. of ads • Bad UI • No diagnosis system • Registration issues
4	Kisan Suvidha	Latest information Call to kisan credit card	• Language issue • Frequent crashes are seen
5	Mkisan	Latest information	• App crashes

Stage 2: Identification of problems:-

- Less knowledge about the latest technology.
- No availability of relevant and localized content.
- Productivity is very low because they are not aware about the new methods.
- Available systems focus on only one problem.eg: disease dignosis, weather report, soil report etc.
- Language issues.
- Approach of systems are very area specific.
- Navigation issues.
- Lots of digital information but farmers are not able to make use of it.

Stage 3: Recommendations and solutions to gaps identified:-

With help of gaps identified, recommendations will be provided for designing the required framework. That will help farmers to take decision for agricultural activities with digital gadgets. Solutions to the farmers will be provided in the form of various services that will increase the usability of digital gadgets.

Stage 4: Development of tool and testing in a specific area:-

The agricultural app and website will be a tool which will help farmers to improve the productivity .Testing can be done by considering different types of users.

Conclusion:-

Therefore, a proper framework for an IT-based agricultural information dissemination system is required.Hence in this way an app and website be developed in the area of crop disease detection , decision making for the prediction of suitable crops with respect to climate and soil and pesticide recommendations which will improve the usability among farmers. The tool developed will provide multi-lingual support to user This agriculture service provider tool will bridge the gap between the farmers and technology and would prove beneficial to all the rural people related to farming sectors. Need to increase the usability of digital media tools to minimize digital divide among rural people will be satisfied.

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