# THE AWARENESS LEVEL OF E-FARMING AND ITS IMPACT ON SOCIO ECONOMIC DEVELOPMENT

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In order to achieve the overall improvement of nation, knowledge with respect to IT and ICT tools were the essential key element for the country masses. Because of absence of essential and appropriate training, rural masses lacks employment in different divisions of progression. For accomplishing rural improvement, creating awareness on to Information Technology usage, training on Information Technology can be assumed as a key compent. The different innovative improvements found in our country are result of focussed training and knowledge updation on selected domain. Hence creating awarness to the rural people on ICT adaption is found to be critical for socioecnomic development. By raising the rural business and financial developnment of individual farmers, the overall improvement of our country can be achieved. Information Technology and its awareness enhance people's perception of themselves and of the world. It improves their livelihood and prompts far reaching social preferences. The prensent study concentrated on measuring the awareness level of e-farming and assessed the influence of efarming practices on socio-economic development. The study was conducted in the villages of Katpadi Panchayat Union, Tamil Nadu. The findings of the study reveals that e-Farming usage in rural areas have positive influence on Socio economic development of the rural masses.

**Keywords:** Information Technology, Information Communication Technology, Technological Advancement, e-Farming, e-Agriculture.

#### INTRODUCTION

Dutta and Das (32011) states that rural development is considered to be national Importance. So India's development relay on improving rural India. Along these lines IT training and its awareness among the rural masses is the crucial variable to kill the predominant urban and rural division. In this way there is a genuine need to create Information Technology (IT) and Information Communication Technology (ICT) at awareness in rural India to develop the country with a specific end goal to make India a developed country in all forms. Joseph and Andrew (2009) states in their research studies that rural development is a national necessity and has significant significance in India on account of these reasons. Around three-fourth of India's populace live in rural regions, subsequently rural advancement is expected to create country as entire and almost 50 per cent of the nation's income is obtained from agricultural services, which is real power of rural India. According to Chandra and Malaya (2011) around 70 per cent of Indian populace gets livelihoods through agricultural services and main part of raw materials for various industries originate from agriculture and from rural area. Increase in industrial population can be defended just in rural populace's inspiration and increasing power in to purchase modern merchandise at long last. Growing divergence between the urban and the rural can prompt to political imbalance.

#### **RURAL DEVELOPMENT – A** NATIONAL NECESSITY

Rural development is a national necessity for the development of a nation. It is dynamic process for improving the conditions both and qualitatively quantitatively. Pandey et al.(2007) studies states that Government of India is assisting with various initiatives for economical. social and cultural development of rural masses by improving the production of crops and animals living conditions. Promotion, awareness and usage of new technology will play a vital role in rural development.

#### INFORMATION TECHNOLOGY AND **RURAL DEVELOPMENT**

ICT usage by means of various e-initiatives in rural masses improves socio economic status of the rural people and improves rural livelihood. Information is power and power is information. Without information there can be no growth. information is entering into rural India as well, because without Information development in rural India, we cannot think about improvement of the whole Indian nation. In Tamil Nadu, around 80 per cent of Tamil Nadu population resides in rural areas. The infrastructure development in urban areas and its lacking in rural areas leads to digital divide in Indian nation. Various research studies states that only 3.5 households per 1,000 families, had internet access in rural regions. The Internet And Mobile Association of India (IAMAI) and IMRB International have provided various research studies regarding web penetration in rural India. The various

research studies shows that internet usage in rural areas is keep on arising. Increased internet awareness rural regions was keep on increasing. Indian Government had taken various development initiatives to provide internet networks and rural internet kiosks. As urban India is concerned. internet access had a massive progress 2009-10. As 59.5 families out of every 1000 urban families had web access at their residence. ICT play a predominant role in Rural Development in state of Tamil Nadu. IT's major contribution in rural development is to provide rural masses with various information that they need as information is the major criterion for development. ICT usage among rural farmers leads more crop produce results increase in income. ICT can help rural masses to consult doctors living in urban regions, which leads to reducing issues related to health. ICT helps leaning among rural masses by means of distant education method. During January, 2004, the Government of India had launched Department of Electronics Information Technology (DeITY), to ensure the process of improving Information Technology nation. The Department motivates IT sector industries investments in the nation. Which results in launching IT industries and developing the education quality in the nation. Every individual resides in India needs clear. faster and seeped services from the various departments of the government. This can be attained by using ICT tools and services. Indian Government has to provide possible web access easily without any complexity. Many Government information of several as to be made available in web for the easy access of Indian masses.

#### E-FARMING AND ITS IMPORTANCE

ICT tools give systems administration of Agriculture Sector internationally, the Central State Government Departments will have store of information bases. Furthermore brings agriculturalist, analyst, scientists and administrators together. Extension and consultative administrations utilizing IT would be accessible to the agriculturalist on round the clock premise. ICT assumes a vital part in upgrading the effect and execution of agribusiness generation and in direct poverty alleviation by improving exercises of poor and expanding their profitability method for new credit and budgetary administrations, new chances to plan, make and market items through the Internet or intranet systems, and so on. ICT as an development tool making awareness among agriculturalist and rural artisans for their advancement, geographical information system (GIS) is opening new ways to deal with provincial arranging and to administration of normal assets Development and fortifying of the cultivating group. It can start new agricultural and rural business, for example, e-trade, land business for satelliteworkplaces, provincial tourism, and virtual enterprise of small scale agriculturalist. It can support policymaking and assessment on ideal farm production, disaster administration, agro natural asset administration and so on., utilizing tools, for example, geographic information systems (GIS). It can enhance agro administration and cultivating advances by proficient home farm administration, risk hazard administration, successful information or Knowledge transfer and so forth.,

acknowledging focused and feasible cultivating with safe items. For instance, agriculturist needs to settle on basic choices, for example, what to plant? At the point when to plant?, how to oversee pests?, while considering off farm elements, for example, natural effects, market access, and industry measures. IT-based choice Decision Support system (DSS) can definitely help their choices. It can give systems and devices to secure nourishment traceability and dependability that has been a developing issue concerning agro items since severe contamination, for example, chicken influenza was recognized. It can encourage rural exercises and give more agreeable and safe provincial existence with equal administrations to those in the urban territories, for example, arrangement of distance instruction, telemedicine, remote services for public, remote amusement and so forth. E-agriculture conceptualization, includes the outline, advancement, assessment and use of creative approaches to utilize ICT in the rural regions with an essential spotlight on horticulture. E-agriculture includes use of information and correspondence advances (lCTs) in inventive approaches to use with an essential spotlight on agriculture in the rural improvement area; Agriculture remains the key activity in a large portion of the developed and developing nations. Rural development can happen just if individuals to individuals' communication are moved forward. Rural development process uses different methods for information extraction from agriculturists by method for participatory techniques. is important for ICT worldwide empowering exchange, the society, empowering competitiveness,

participatory correspondence removing out imbalances between the information rich and the information poor. Albeit different difficulties will be confronted by scientists while utilizing participatory methodologies as a part of agricultural exploration, but that can be overcome these to deliver alluring results. Inspite of all the facts the utilization of ICTs in agriculture is not new. Numerous agriculturalists in rural zones of Africa and Asia may take some time in utilizing ICTs like web and mobile phones by providing ICT awareness sessions and training programs in their door step to handle the ICT devices for the uneducated and under privileged rural masses. So providing easy ways to utilize information systems will persuade computer unskilled agriculturalist to make utilization of ICT in agrarian exercises. The honor winning rural sites were created in with the suggestions of the agriculturalist and later by participatory approach for innovation improvement. determination and The part of e-Agriculture is to Ensure the efficient spread of information utilizing ICTs on farming, agricultural cultivation, fisheries, forestry and nourishment, with a specific end goal to give prepared access to extensive, up to date in depth knowledge and information, especially in rural regions. Public private organizations have to look to amplify the utilization of ICTs as a tool to enhance production (quantity and quality).

#### SIGNIFICANCE OF THE STUDY

The present study helps in understanding the rural masses perception on the awareness and impact of E-Farming usage towards rural development. The outcome of study will help in understanding the problem regarding the reach and the awareness of E-Farming usage towards rural masses of Katpadi Panchayat union.

#### STATEMENT OF THE PROBLEM

- There were very few research studies, which were focused on e-Farming usage and awareness towards villages of Katpadi Panchayat union, Vellore, Tamil Nadu.
- There were very least research studies, which were focused on E-Farming awareness and usage among the rural masses resides in villages of Katpadi Panchayat Union, Vellore District of Tamil Nadu.

#### NEED FOR THE STUDY

- There were few research studies on e-Farming usage under rural domain focusing on villages of Katpadi Panchayat Union of Vellore District, Tamil Nadu. Therefore it is clear from the previous research studies that, e-Farming usage in villages of Katpadi Panchayat Union of Vellore District, Tamil Nadu were not much highlighted.
- There is a serious need for representing the reach, usage and awareness of E-Farming in Tamil Nadu.

#### CONCEPTUAL FRAMEWORK



Figure 1 : e-Farming Usage and Socio Economic Development

#### **RESEARCH QUESTIONS**

The research attempts to answer the following questions:

- What is the perception of rural population on e-Farming usage?
- What is the perception of rural population on the e-Farming usage impact on Socio-economic development?

#### RESEARCH OBJECTIVES

- To study the perception of rural population on E-Farming usage.
- To understand the rural population perception on e-Farming usage impact on socio-economic development.

#### RESEARCH HYPOTHESES

H<sub>1</sub>: e-Farming usage has positive influence on socio economic life of rural masses.

#### II. LITERATURE REVIEW

(2012)identified that Gupta information technology usage agricultural sector leads to higher profit and revenue generation. IT usage in agriculture leads in higher agricultural produce and higher marketability of produced goods. Subrahmanyam et al (2012) examined that Kiosk for Rural India Agricultural Development (K-RAID) facilitates e-agriculture among rural farmers in rural areas by updating knowledge about market strategy, expert advice and consultation, Aqua and poultry information, Irrigation and weather updates, agricultural information and other information like bank loans and subsidies. Chandra and Malaya (2011)

identified that e-Agriculture facilitates farmers regarding information about the world in finger tips. E-Agriculture is an emerging field focused on enhancement of agricultural development and rural development by means of improved ICT usage.ICT plays a vital role in socio economic development of developing nation in particular and it leads to empowerment of rural masses.ICT tools usage leads to economic development of a nation. E-agriculture uses ICT tools for sharing information about agriculture, animal husbandry, fisheries, forestry and food. E-Agriculture leads to improved yields; distance education helps rural farmers regarding usage of ICT tools. Joseph and Andrew (2008) revealed that wide range of usage of ICT in agriculture can improve the livelihood of farmers in rural areas and help in socio economic growth. Rural farmers participatory approach leads to enhancement of knowledge in agricultural domain adopting ICT tools usage. E-agriculture builds the prevailing digital divide and it leads to poverty elevation and helps in rural development. Singhal et al (2011) identified that ICT tools like smart mobile applications is used for updating farmers regarding different agricultural commodities, weather forecast updates, agricultural new updates, bank loan updates etc.60 per cent of the population is engaged in agricultural sector as a whole and it contributes 20 per cent of nation

GDP. ICT tools usage reduces existing digital divide and it plays a vital role in social, economical and educational improvement among rural masses. ICT tools usage helps in farm management to profitable income leads through high yielding. Rural farmers gets knowledge updates regarding crop choice, seed variety, weather, plant protection, cultivation practice, market prices, market demands and logistics. Bhalekar et al (2015) in this study various ICT projects launched in rural India for the welfare of rural masses had been discussed and this study states that ICT plays a major role in successive growth in agricultural to sector which leads raised livelihood of rural masses socially and economically. Chauhan (2015) revealed that e-Agriculture focused on the enhancement of agricultural and rural development through improved information and communication processes. e-Agriculture makes use of ICT for higher yielding and Knowledge updates regarding agricultural information in the rural domain. Dwivedi et al (2013) examined that e-Farming by means of latest ICT technologies makes farming easy and helps rural farmers to make profitable and safe agriculture growth. ICT as the potential to improve agricultural sector by updating rural farmers regarding the knowledge of ICT tools usage in farming.

#### III. UNIVERSE OF THE STUDY

Table 1 - Population Distribution after Performing Convenience Sampling

S. No.	Name of the Panchayat	Total Male Sample	Total Female Sample	Total Sample Population
1.	Ammundi	10	10	20
2.	Arimuthumottur	14	14	28
3.	Arumparuthi	11	12	23
4.	Bramapuram	20	21	41
5.	Eranthangal	10	11	21
6.	Gugaiyanallur	12	13	25
7.	Jabbarapet	17	17	34
8.	Kandipedu	15	15	30
9.	Karasamangalam	15	15	30
10.	Karigiri	18	19	37
11.	Karnampattu	12	13	25
12.	Kuppathamottur	11	12	23
13.	Mettukulam	13	13	26
14.	Puttoor	10	11	21
15.	Saynur	22	23	45
16.	Seerkaadu	13	13	26
17.	Seevur	14	14	28
18.	Sembarayanellore	11	11	22
19.	Thandalamkrishapuram	12	13	25
20.	Vandranthangal	19	20	39
21.	Vanjur	16	15	31
	Grand Total	295	305	600

Source: Block Development Office, Katpadi Panchyat Union, Vellore District.

#### IV. RESEARCH METHODOLOGY

The framed structured questionnaire of 600 numbers was distributed to 600 rural masses resides in 21 villages of Katpadi Panchayat union and direct field interview was conducted from 600 rural masses and the responses were obtained from the rural masses and the same had been filled in the

structured questionnaire manually. In this study 170 rural masses were provided with their responses towards e-Farming usage were collected and gathered by means of Interview schedule. Convenience Sampling was carried out as it was time saving technique and it is easy way to gather the responses from the rural masses resides in village of Katpadi Panchayat

union in their door steps based on their availability. This comprises the final study. After the data collection, the collected raw data were feed into SPSS data file, then cleaned, labeled and thoroughly verified for finding the missing values. The processed and the refined data were taken for consideration of analysis.

#### DEMOGRAPHIC DETAILS OF THE RESPONDENTS

Table 2 - Socio Demographic Profile of the respondents

D	lf.tl Dlt-	Number of Participants (600)			
Demographic Detail	ls of the Respondents	Frequency	Percent		
	18-30	178	29.6		
Age	31-40	192	32.0		
(In Years)	41-50	149	24.9		
	51 and Above	81	13.5		
Caradan	Male	295	49.2		
Gender	Female	305	50.8		
Marital Status	Married	463	77.2		
Marital Status	Unmarried	137	22.8		
Employment Status	Agriculturalist	443	73.8		
Employment Status	Non Agriculturalist	157	26.2		
	No Education	170	28.3		
Education	School Education	225	37.5		
Luucation	Higher Secondary Education/Diploma/ ITI	130	21.7		
	Graduate Education	75	12.5		

#### LEVEL OF AGREEMENT ON E-FARMING

The perceptions of rural respondents on the usage and impact of e-Farming were been provided in the table given below.

Table 3 - Level of Agreement on e-Farming

Overall Perception on E-Farming

Items under the Construct of e-Farming	Strongly Agree (1)	Agree (2)	Neutral (3)	Disagree (4)	Strongly Disagree (5)
ICT enabled e-Farming techniques and practices leads to higher yields and makes more profits that leads	120	224	156	61	39
to improved agricultural productivity.(Median = 2, Mode = 2)	(20)	(37.3)	(26)	(10.2)	(6.5)
Current market demands and					
current market sales prices updates of the commodities can be obtained easily by	78	208	176	80	58
farmers through e-Farming services and portals. (Median = 3, Mode = 2)	(13)	(34.7)	(29.3)	(13.3)	(9.7)
Various cultivation methods and practices, soil pattern and crop cultivation information					
can be obtained easily by the rural masses through	114	171	175	44	96
e-Farming services and portals, which improves agricultural productivity. (Median = 3, Mode = 3)	(19)	(28.5)	(29.2)	(7.3)	(16)
e-markets to sell the agricultural produce can be	69	215	178	96	42
facilitated through e-Farming services and portals.(Median = 3, Mode = 2)	(11.5)	(35.8)	(29.7)	(16)	(7)
Weather updates can be					
obtained by means of e-Farming services, which	123	223	135	56	63
improves agricultural productivity.(Median = 2, Mode = 2)	(20.5)	(37.2)	(22.5)	(9.3)	(10.5)
Information regarding fertilizers, pesticides and					
insecticides and the varieties of high quality seeds for	143	145	174	69	69
agricultural productivity can be easily obtained through e-Farming services. (Median = 3, Mode = 3)	(23.8)	(24.2)	(29)	(11.5)	(11.5)

Note: Figures in parenthesis represents percentage

Table 3 shows the overall perception of rural respondents on e-Farming, its impact and uses. Maximum number of the rural respondents were found to be agrees with the statement (Strongly Agree: 20 percent and Agree: 37.3 percent), other few respondents were found to be neutral (Neutral: 26 percent) and very few respondents were found to be disagree with the statement (Disagree: 10.2 percent and Strongly Disagree: 6.5 percent) ,the median value of two and the mode value of two finds it as good and agree to the statement, ICT enabled e-Farming techniques and practices leads to higher yields and makes more profits that leads to improved agricultural productivity. Maximum number of the rural respondents were found to be agrees with the statement (Strongly Agree: 13 percent and Agree: 34.7 percent), other few respondents were found to be neutral (Neutral: 29.3 percent) and very few respondents were found to be disagree with the statement (Disagree: 13.3 percent and Strongly Disagree: 9.7 percent) ,the median value of three and the mode value of two finds it as good and agree to the statement, Current market demands and current market sales prices updates of the commodities can be obtained easily by farmers through e-Farming services portals. Maximum number of the rural respondents were found to be agrees with the statement (Strongly Agree: 19 percent and Agree: 28.5 percent), other few respondents were found to be neutral (Neutral: 29.2 percent) and very few respondents were found to be disagree with the statement (Disagree: 7.3 percent and Strongly Disagree: 16 percent), the median value of three and the mode value of three finds it as good

and agree to the statement, Various cultivation methods and practices, soil pattern and crop cultivation information can be obtained easily by the rural masses through e-Farming services and portals, which improves agricultural productivity and median value of three and the mode value of three finds it as good and agree to the statement. Maximum number of the rural respondents were found to be agrees with the statement (Strongly Agree: 11.5 percent and Agree: 35.8 percent), other few respondents were found to be neutral (Neutral: 29.7 percent) and very few respondents were found to be disagree with the statement (Disagree: 16 percent and Strongly Disagree: 7 percent), the median value of three and the mode value of two finds it as good and agree to the statement, e-markets to sell the agricultural produce can be facilitated through e-Farming services and portals and the median value of three and the mode value of three finds it as good and agree to the statement. Maximum number of the rural respondents were found to be agrees with the statement (Strongly Agree: 20.5 percent and Agree: 37.2 percent), other respondents were found to be neutral (Neutral: 22.5 percent) and very few respondents were found to be disagree with the statement (Disagree: 9.3 percent and Strongly Disagree: 10.5 percent), the median value of two anvd the mode value of two finds it as good and agree to the statement, Weather updates can be obtained by means of e-Farming services, which improves agricultural productivity. The median value of three and the mode value of three finds it as good and agree to the statement. Maximum number of the rural respondents were found to be agrees with the statement (Strongly Agree: 23.8 percent and Agree: 24.2 percent), other few respondents were found to be neutral (Neutral: 29 percent) and very few respondents were found to be disagree with the statement (Disagree: 11.5 percent and Strongly Disagree: 11.5 percent), the median value of three and the mode

value of three finds it as good and agree to the statement, Information regarding fertilizers, pesticides and insecticides and the varieties of high quality seeds for agricultural productivity can be easily obtained through e-Farming services and the median value of three and the mode value of three finds it as good and agree to the statement.

#### V. DATA ANALYSIS

Table 4 - Regression Analysis

Predictor Variable	Dependent Variable	F value	Beta Value	R² value	Significance	Hypothesis	Hypothetical Relationship
e-Farming	Socio Economic Development	1825.883	0.868	.753	$.000^{ m b}$	H1	Positive

Level of Significance - 5 Percent

The regression table shows the influence of e-Farming usage on socio economic status of rural area. The result reveals that e-Farming usage ( $\beta$ =0.868, p<0.05) which is one of the components in e-Farming usage positively impacts socio economic status of rural area and also it is significant at 0.05 level. Hence the hypothesis H1 is accepted. It has been inferred that probability value of ANOVA at 5 per cent level establishes good relationship between the variables tested. Therefore the hypothesis farmed stands accepted and it has been concluded that e-Farming usage has positive influence towards Socio economic development.

#### MEASUREMENT MODEL FOR DETERMINING E-FARMING USAGE POSITIVELY EFFECTS SOCIO ECONOMIC DEVELOPMENT

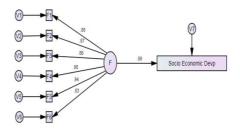


Fig 2- Standardized Estimates of the Measurement Model: e-Farming Usage and Socio Economic Development Note: SD = Socio Economic Development, F = e-Farming, (F1, F2, F3, F4, F5, F6) = Items under e-Farming

Here in this model deployed, the 7 items namely Socio economic development (SD), F1, F2, F3, F4, F5 and F6 were observed or endogenous variables. The variable e-Farming (F) and the error variables V1, V2, V3, V4, V5, V6 and V7 were unobserved development (SD) is considered to be dependent variables.

e-Farming (F) = (0.88 \* F1 + 0.87 \* F2)+ 0.86 \* F3 + 0.90 \* F4 + 0.94 \* F5 + 0.83 \* F6)

It is also inferred that from the measurement model, the respondents perceive that the usage of e-Farming significant practices has positive effect on socio economic development of rural areas. which in other words states that when the practice of e-Farming is increasing in rural areas then the level of socio economic condition of rural areas are also increasing (With the effect size of 0.89). The measure of coefficient of variance .891 reveals that the e-Farming practices in the rural areas has positive impact in improving socio economic status of rural area are observed to be significant. Therefore the hypotheses (H1) framed stand accepted and it is concluded that the respondents perceive usage of e-Farming practices in rural areas positively impacts socio economic development.

#### VI. RESULTS AND CONCLUSION

The generated F value is 1825.883. It has been inferred that probability value of ANOVA at 5 per cent level establishes good relationship between the variables tested. Therefore the hypothesis farmed stands accepted and it has been concluded that e-Farming usage has positive influence towards Socio economic development. The R<sup>2</sup> value is 0.753: it shows that 75.3% of contribution to socio economic

development of rural area is achieved by usage of e-Farming practices among rural masses. Hence the hypothesis H1 is accepted.

The following major conclusions in the course of the research on people's perception:

- There exists a positive relation between e-Farming usage and socio economic development and rural development.
- There exists a positive relation among ICT tools usage and rural development.
- There exists a positive relationship among e-Farming usage and rural development.
- Information Communication Technology programmes adaptation in rural areas leads to sustainable development.
- Most of the uneducated rural masses resides in villages of Katpadi panchyat union were not aware about Information Technology and it various uses.
- Most of the rural masses lack awareness about e-Farming usage.
- e-Farming adaptation were less consuming time and reduces complexity.
- e-Farming adaptation provides accuracy in day to day information delivery about market prices and climatic factors..
- The outcome of study clearly states that e-Farming usage were seen among the educated rural masses of Katpadi Panchayat union.
- The study outcome states that the uneducated rural masses and the rural masses with school level

- education of Katpadi Panchayat union lacks awareness on e-Farming usage and their various benefits.
- This study makes us to understand that there is a severe need of creating awareness and knowledge updation regarding usage of new technology and trends in the modern era by the masses of rural regions of Tamil Nadu.
- It is clear from the results obtained from the research study that there is a severe need to formulate better policies and strategies on this specific area of rural development in form creating awareness of usage of Internet and its various uses by GoTN and Central government in upcoming days.

#### **SUGGESTIONS**

Modern technology applications and its maintenance were considered vital factors leading to success, while implementing ICT based e-Farming mechanism to make the project fruitful. Various adaptable systems for the active participation of all the rural masses to improve the efficient functioning of the ICT platforms. Proper accurate vision at the initial stage ICT project is a critical success phenomenon that in turn contributes to the success of ICT projects of Government sector.

#### MANAGERIAL IMPLICATIONS

In the rural context, mutual bonding among the rural people and government schemes and programmes plays basic predominant role in maintaining sustainable relationship. The use of communication channel for distribution is considered to be important factor for the success of ICT intervention. Proper training programs

and development programs enhance the chances of success for various ICT projects. Therefore government has to take additional effort for delivering the same.

#### LIMITATIONS

Moreover the present research work is limited to only the villages under Katpadi Panchayat Union, Vellore district in state of Tamil Nadu. This is cannot be a generalized to entire Tamil Nadu.

#### **FUTURE RESEARCH**

This research study is limited to only the villages under Katpadi Panchayat Union, Vellore district in state of Tamil Nadu. Therefore, a further study at the state level or national level, with similar or broader objectives and with the inputs and finding of this study, will definitely be a desirable step.

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