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Relationship Between Socio-Economic Profile and Knowledge Level of Dairy Farmers on ICT Tools in Andhra Pradesh

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Abstract

ICT tools are gaining significance within the farming community to accelerate the dissemination of agricultural knowledge. ICT tools have significantly altered the communication arena of the 21st century. The application of ICT technologies is spreading rapidly in rural areas, touching nearly every industry, including agriculture sector. In this regard, a study was conducted to examine how socio-economic factors influence dairy farmers ICT knowledge in Chittoor district of Andhra Pradesh. Ex-post facto research design was used in present investigation. Data was gathered from 120 dairy farmers using interview schedule. After the analysis, it was revealed that majority of them are middle aged (45.80%), had high school level of education (32.50%), low family size (51.70%), high dairy farming experience (39.20%), landless dairy farmers (50.80%), annual income more than 2,00,000 rupees (49.20%), high extension participation level (45.00%), medium information seeking behaviour (47.50%), medium economic orientation (53.30%), medium scientific orientation (38.30%), medium risk orientation (44.17%), medium innovative proneness (40.80%) and medium level of achievement motivation (39.20%). Factors like education, land holding, information seeking behaviour, extension participation, economic orientation, scientific orientation, risk orientation, innovative proneness and achievement motivation significantly impact dairy farmers understanding of ICT tools. While age and dairy farming experience were negatively correlated with ICT knowledge, family size and annual income appear to have no influence. This paper also examined the social network structures of knowledge sources for low and high knowledge dairy farmers. Television and mobile phone were found to be the chief knowledge sources for the dairy farmers.

Keywords : Knowledge level of dairy farmers, ICT, Profile analysis, Social network

Agriculture and allied sectors constitute the primary occupation for Indian farmers. Dairy farmers require a supportive and motivating environment to acquire knowledge and use latest agricultural technologies. This helps them in making timely decisions that improves their living standards and financial status. Given the limited manpower and working hours, the public extension system cannot feasibly reach every farmer at the right time and place. Information and Communication Technologies (ICTs) have been instrumental in driving sustainable agricultural development since decades. ICT is emerging as a key driver of economic growth and holds immense potential for service delivery (James and Lakshminarayan, 2017). Modernisation of agriculture and dairy sector greatly depends on proper

usage of latest technologies that facilitates wider and easy dissemination of information for the farmers. The most widely utilized media among farm women was television, because of its accessibility and convenience, which support the widespread use of mass media (Nishitha *et al*., 2017).

In the current generation, ICT tools are becoming an indispensable part of daily life. Traditional media like radio, TV and newspapers along with modern tools such as mobiles are revolutionizing agriculture and related sectors (Patil *et al*., 2019). Advances in ICT have created new opportunities and challenges in agriculture sector. ICT can significantly enhance farmers livelihoods by boosting efficiency, productivity, and income (Sangeetha *et al*., 2015). Usage of ICT in dairy aids farmers in obtaining updated information and in enhancing their income by selling in right markets. ICT has the prospective for transforming the economy of agriculture, livestock and rural artisans in India (Sasidhar and Sharma, 2006).

The visible challenges that the rural farmers are facing today is shortage of feed and fodder, low productivity, animal health, inadequate infrastructure for marketing and value addition but the primary constraint that the farmers are facing today is inadequate access to information. Therefore, the current necessity for farmers is relevant, need based and timely information which can address the above concerns. Through ICT, the extension system will also be strengthened which allows the line departments to fulfil the information requirements of farmers within short time. This paper attempts to know the socio-economic profile of the dairy farmers, how it is correlated to their knowledge level on utilizing ICT tools and know the chief knowledge sources for the farmers in their network.

Methodology

Ex-post facto research methodology was adopted in the investigation. Andhra Pradesh state which is ranked third in rural tele-density was selected for the research. Through purposive sampling, three mandals have been selected in Chittoor district, as dairy animals population in these mandals was high. Two villages from each mandal and 20 dairy farmers from each village have been selected randomly, resulting to overall sample of 120 dairy farmers (who were using at least one ICT tool for knowing information regarding dairy sector) were selected randomly for the investigation. The information was gathered using schedule which consisted of knowledge test with 20 questions for assessing the knowledge level of dairy farmers. The knowledge test scores of all the respondents were arranged in decreasing order and from median value the total sample was divided into two equal halves for carrying of SNA. Social Networking Analysis (SNA) was carried to identify the chief knowledge sources in the dairy farmers information network. For all the variables selected in the study, data was collected using standardized scales developed for each one of them by the experts and categorised using mean and standard deviation. The techniques like percentage, frequency, mean, correlation etc. were followed for analysing the data.

Results and Discussion

The data depicted in Table 1 reveals the profile of the dairy farmers comprising of different personal, socio-economic and socio-psychological characteristics. This is an attempt to document the background of the selected respondents of the study. Table 1 infers that nearly half (45.80%) of participants were under middle aged category. Regarding education 32.50 per cent of them were having high school education, followed by graduate and above level (23.30%). It was also observed that more than half (51.70%) of the respondents were under low family size, which consisted up to 4 members. The study also found that nearly two-fifth (39.20%) of them had high experience in dairy farming, whereas 24.20 per cent of them had low experience. Among the respondent's majority, 50.80 per cent of them were landless and were solely dependent on dairy farming. The above findings were in line with the findings of Lohitha (2016), Akshath (2015), Naik *et al*. (2019) and Patel *et al.* (2018), respectively. Regarding income, almost half (49.20%) of them had income exceeding Rs.2,00,000.

TABLE 1

Profile of the dairy farmers selected for the study

(n=120)

Variable	Category	Frequency	Percentage
Age	Young (< 35 years)	21	17.50
	Middle (35-50 years)	55	45.80
	Old (>50 years)	44	36.70
Education	Illiterate	26	21.67
	Can read only	0	0
	Can read and write	0	0
	Primary school	8	6.67
	Middle school	19	15.83
	High school	39	32.50
	Graduate and above	28	23.33
Family size	Low (1-4 members)	62	51.70
	Medium (5-7 members)	54	45.00
	High (>7 members)	4	3.30
Experience in dairy farming	Low (<12.86)	44	36.66
Mean: 18.13SD:10.55	Medium (12.86 -23.41)	29	24.17
	High (>23.41)	47	39.17
Size of land holding	Landless	61	50.83
	Marginal (<1 ha)	44	36.67
	Small (1-2 ha)	14	11.67
	Small-medium (2-4 ha)	1	0.83
	Medium (4-10 ha)	0	0
	Large (>10 ha)	0	0
Annual income	Above ą 2,00,000	59	49.17
	Rs.1,50,001toą 2,00,000	16	13.33
	Rs.1,00,000toą 1,50,000	28	23.34
	Rs.50,000 to ą 1,00,000	16	13.33
	Upto Rs.50,000	1	0.83
Extension participation Mean:	Low (<1.88)	18	15.00
2.33SD:0.90	Medium (1.88-2.78)	48	40.00
	High (>2.78)	54	45.00
Information seeking behaviour	Low (<10.52)	25	20.80
Mean : 11.67SD:2.29	Medium (10.52-12.81)	57	47.50
	High (>12.81)	38	31.70
Economic orientation	Low (<24.91)	25	20.80
Mean : 26.48SD:3.14	Medium (24.91-28.04)	64	53.30
	High (>28.04)	31	25.80

Continued....

Table 1 Continued....

Variable	Category	Frequency	Percentage
Scientific Orientation	Low (<13.45)	39	32.50
Mean : 14.99SD:3.08	Medium (13.45-16.53)	46	38.30
	High (>16.53)	35	29.20
Risk orientation	Low (<12.26)	40	33.30
Mean : 13.18SD:1.86	Medium (12.26-14.11)	53	44.20
	High (>14.11)	27	22.50
Innovative proneness	Low (<12.38)	37	30.80
Mean : 14.10SD:3.44	Medium (12.38-15.82)	49	40.80
	High (>15.82)	34	28.30
Achievement motivation	Low (<14.64)	38	31.70
Mean : 16.05SD:2.82	Medium (14.64-17.46)	47	39.20
	High (>17.46)	35	29.20

With respect to extension participation, nearly half (45.00%) of them were having high extension participation. It was also observed that 47.50 per cent of farmers were under medium level of information seeking behaviour. The study found that, around (53.30%) of them had medium economic orientation, as far as scientific orientation is concerned nearly two-fifth (38.30%) of them were under medium scientific orientation level and more than two-fifth (44.17%) of them had medium risk orientation. The study also concluded that 40.80 per cent of respondents have medium innovativeness in trying new aspects and technologies in their dairy farming and nearly two-fifth (39.20%) of them were classified under medium achievement motivation category. The results obtained were in accordance with Shankaraiah (2011), Rathod *et al.* (2012), Vivek (2017), Naik (2018), Verma *et al*. (2016), Singh & Kameswari (2018) and Swaroop (2016), respectively.

The outcomes obtained above indicate that the majority are middle-aged dairy farmers and possess a high school level of education. Furthermore, a significant percentage of respondents have higher experience in dairy farming, which makes dairy a well-known and reliable livelihood choice for the people. High percentage of farmers being landless and associated income shows their reliance on dairy farming as a primary and major source of income. According to the results, it can be inferred that dairy farmers who are moderate in risk, scientific and economic orientation, are likely to participate actively in extension activities, which might boost their income levels. The medium levels of information-seeking, innovativeness and achievement motivation among dairy farmers generally represent a balanced strategy in which they carefully adopt new methods, while continuing traditional methods to increase productivity.

Age Vs Knowledge on ICTs

Age had negative and statistically significant (-0.485**) relation with knowledge of dairy farmers regarding ICTs. It was identified that more the person's age, he has stronger feeling towards traditional means of communication than latest tools. It's obvious that than older generation, middle and younger generation will be more enthusiastic and more attracted towards new technologies like ICTs owing to higher literacy rate than older generation.

Education Vs Knowledge on ICTs

Education had positively significant (0.641**) correlation with knowledge of dairy farmers regarding

TABLE 2

Relationship between independent variables and knowledge level of the respondents

(n=120)

Independent variables	Correlation (r) value	
Age	-0.485	**
Education	0.641	**
Family size	0.037	NS
Experience in dairy farming	-0.327	**
Land holding	0.188	*
Annual income	-0.027	NS
Extension participation	0.357	**
Information seeking behaviour	0.223	**
Economic orientation	0.507	**
Scientific orientation	0.392	**
Risk orientation	0.364	**
Innovative proneness	0.429	**
Achievement motivation	0.278	**

**Correlation is significant at 0.01 level
*Correlation is significant at 0.05 level

ICTs. Greater the education, more the knowledge regarding ICTs. The probable explanation is when a farmer is educated, he learns to understand and develop knowledge and skills in using ICT tools.

Family Size Vs Knowledge on ICTs

The results in Table 2 show that there exists no significant (0.037 NS) relationship between family size and the knowledge of dairy farmers regarding ICTs. This can be explained as size of family has no influence on knowledge of dairy farmers regarding ICT tools.

Experience in Dairy Farming Vs Knowledge on ICTs

Experience in dairy farming had negatively significant (-0.327**) correlation with knowledge of dairy farmers regarding ICTs. This can be discussed as farmers belonging to old age will have greater experience in dairy farming but are more inclined to traditional way of communication rather than ICTs because of lesser e-literacy.

Land Holding Vs Knowledge on ICTs

Land holding had positively significant (0.188*) correlation with knowledge of dairy farmers regarding ICTs. This may be because farmers practicing both agriculture and dairy farming tries to gain more knowledge about the latest ICTs which can benefit him in meeting his information requirements.

Annual Income Vs Knowledge on ICTs

Annual income had a negative but non-significant (-0.027NS) correlation with knowledge of dairy farmers regarding ICTs. This showed that the annual income has no impact on the knowledge level of dairy farmers on ICTs.

Extension Participation Vs Knowledge on ICTs

It had positively statistically significant (0.357**) correlation with knowledge of dairy farmers regarding ICTs. The participation of the dairy farmers in various extension activities enabled them to interact with the extension agents and other officers present over there, by which they gain some knowledge and technical knowhow regarding various ICT tools and also learn about the correct usage of ICTs for obtaining information.

Information Seeking Behaviour Vs Knowledge on ICTs

It had positively statistically significant (0.223**) correlation with knowledge of dairy farmers regarding ICTs. The reason is that the more person has enthusiasm to seek information from others, the more he can gain knowledge on any aspect including ICTs.

Economic Orientation Vs Knowledge on ICTs

Economic orientation had positively significant (0.507**) correlation with knowledge of dairy farmers regarding ICTs. Since farmers with more economic orientation try to earn more with minimal resources. This is possible by learning about the latest ICTs to obtain information which is cost effective and helps in increasing his economic status.

Scientific Orientation Vs Knowledge on ICTs

Scientific orientation had positively significant (0.392**) correlation with knowledge of dairy farmers regarding ICTs. This is because people with more scientific orientation will have a positive attitude towards the latest and scientific technologies like ICTs and tries to know about them, which are the modified versions of traditional extension methods.

Risk Orientation Vs Knowledge on ICTs

Risk orientation had positively significant (0.364**) correlation with knowledge of dairy farmers regarding ICTs. Since farmers with greater levels of risk-taking ability would be much ahead of other farmers in exploiting the potentiality of latest technologies like ICTs which allows them to take decision to adopt latest innovations and prosper.

Innovative Proneness Vs Knowledge on ICTs

Innovative proneness had positively significant (0.429**) correlation with knowledge of dairy farmers regarding ICTs. Innovative dairy farmers are those who accept change and take decisions to adopt innovations. They know the variation between traditional and modern technologies, rather than sticking to old traditional methods they acquire knowledge through latest ICTs for obtaining dairy related information.

Achievement Motivation Vs Knowledge on ICTs

It had positively significant (0.278**) correlation with the knowledge of dairy farmers regarding ICTs. The truth that every dairy farmer wants to achieve from his dairy farming and this is possible through timely information. The dairy farmer takes decisions that enable him to complete the task in the desired way. The reason for taking this decision would be the high need of achievement of goals which are above than all the other aspects and this motivation requires a proper channel of knowledge and awareness about ICT tools.

Social Network Structures among High and Low Knowledge Dairy Farmers

The social network analysis was carried out, which illustrates the two-mode affiliation networks between dairy farmers and their sources of knowledge. These network structures are solely based on the farmers

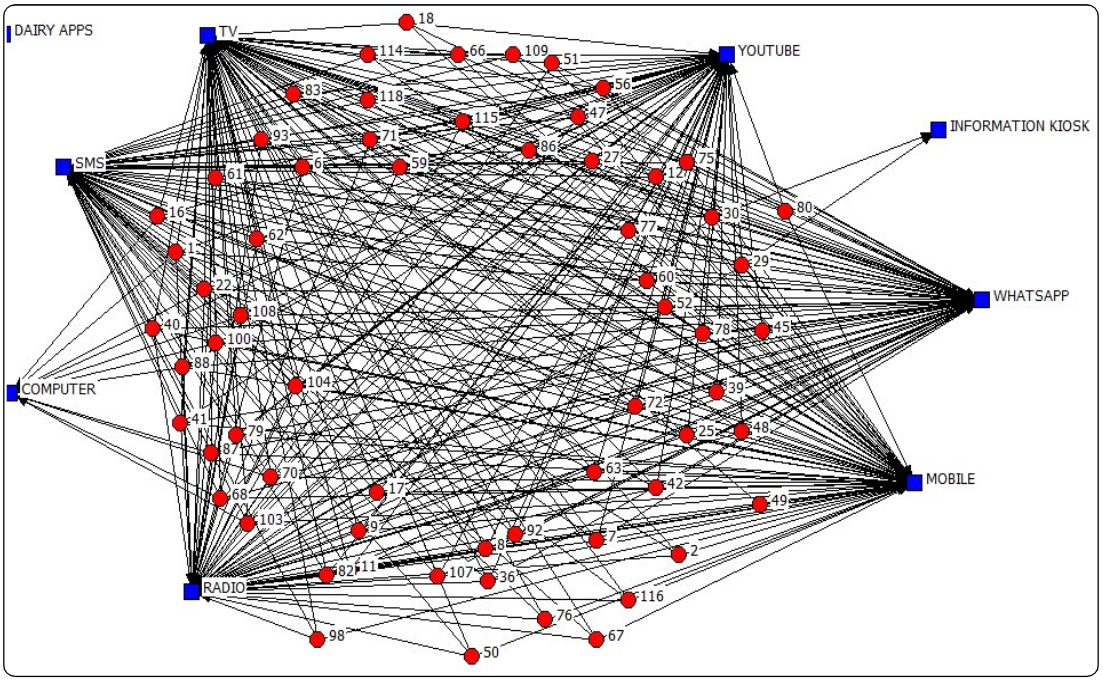

Fig. 1: High knowledge dairy farmers information network

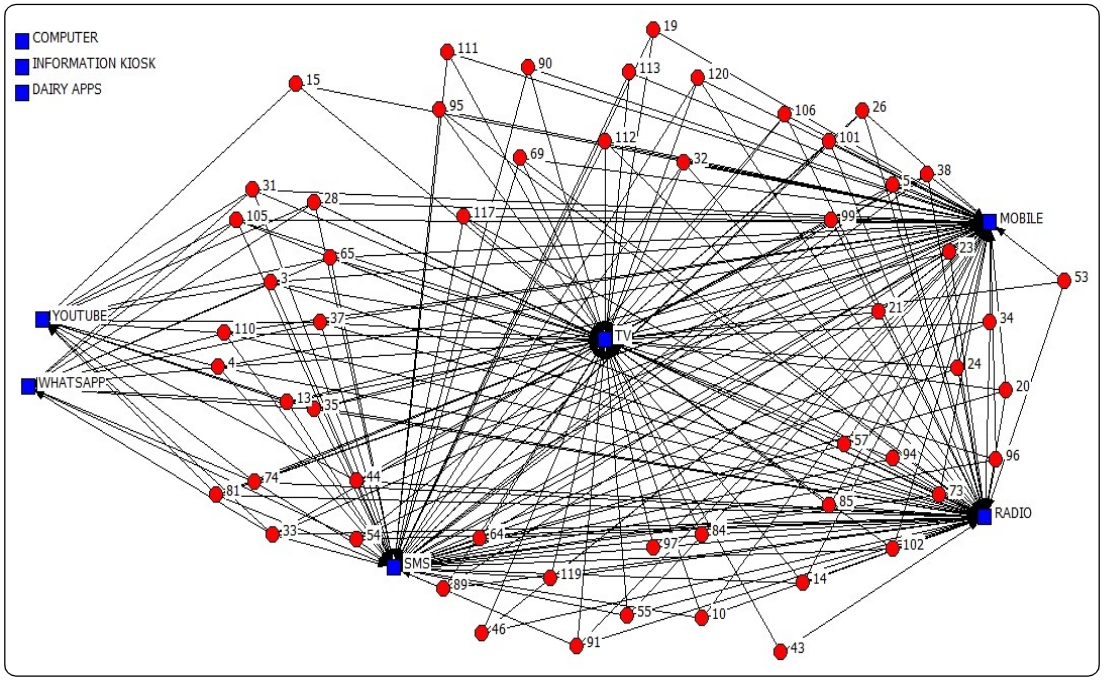

Fig. 2: Low knowledge dairy farmers information network

responses regarding their most regularly used tools for obtaining information. Nearly all respondents had multiple knowledge sources, as evidenced by the number of their social connections. The frequency of these connections with various ICT tools revealed that television and mobile phones were the primary sources of knowledge for dairy farmers.

A visual examination of the knowledge network maps of high and low knowledge farmers clearly shows that the map for low knowledge farmers (Fig. 2) is less dense. A denser network, with more social interactions, results in a greater effective learning alliance among the respondents. In both networks, television was the most utilized knowledge source, followed by mobile phones.

TABLE 3

Normality centrality measures of knowledge sources among high and low knowledge people networks

Knowledge sources	Degree Centrality (DC)		Closeness Centrality (CC)		Betweenness Centrality (BC)	
	High	Low	High	Low	High	Low
Radio	0.844	0.893	0.777	0.800	0.118	0.169
Television	1.000	1.000	0.964	0.923	0.177	0.231
Mobile phone	1.000	0.982	0.964	0.900	0.177	0.214
Computer	0.172	0.000	0.419	0.281	0.003	0.000
Information kiosk	0.031	0.000	0.383	0.281	0.000	0.000
YouTube	0.891	0.268	0.825	0.450	0.126	0.011
Dairy Apps	0.000	0.000	0.222	0.281	0.000	0.000
WhatsApp	0.875	0.232	0.808	0.439	0.118	0.007
SMS	0.891	0.929	0.825	0.837	0.130	0.182

Normality Centrality Measures of Knowledge Sources among high and Low Knowledge People Networks

The Social Network Analysis (SNA) table compares various knowledge sources between individuals with high and low knowledge levels, using three key centrality measures, namely Degree Centrality (DC), Closeness Centrality (CC) and Betweenness Centrality (BC). These give insights into the influence, accessibility and importance of different knowledge sources within the social network of individuals.

Degree Centrality (DC)

This refers to the number of direct connections a knowledge source has with individuals in the network. A higher DC value indicates that a knowledge source is more frequently accessed or referenced. Radio has a slightly higher DC for low knowledge individuals (0.893) compared to high knowledge individuals (0.844), indicating it is more central and frequently accessed by those with lower knowledge. Television and Mobile Phones show very high DC for both groups, though slightly lower for low knowledge individuals. Dairy apps, Computers and Information Kiosks have significantly lower DC for low knowledge individuals, indicating that these digital sources are much less accessed or important for them.

Closeness Centrality (CC)

This measures how close a knowledge source is to all other nodes in the network, indicating how quickly information from that source can reach others. Television and Mobile Phones again show high CC for both groups, reflecting their efficiency in disseminating information quickly. Computers, Information Kiosks, YouTube and WhatsApp have significantly higher CC for high knowledge individuals, indicating these tools are more effective for them in spreading information in comparison to low knowledge people.

Betweenness Centrality (BC)

This indicates how often a knowledge source acts as a bridge in the shortest route between other sources, indicating its role as an intermediary or connector within the network. Television and Mobile Phones have the highest BC for low knowledge individuals compared to high knowledge individuals, suggesting it plays a more crucial intermediary role for those with lower knowledge. YouTube and WhatsApp have significantly higher BC for high knowledge individuals, highlighting their importance as intermediaries that connect different parts of the knowledge network for this group. Radio and SMS show moderate BC for the two groups, with little higher values for low knowledge individuals, suggesting these sources are important connectors, especially for those with lower knowledge.

Traditional media namely radio, television, SMS etc. are more central and accessible for low knowledge individuals. Television and SMS serve as critical connectors in their network. Whereas, digital media such as computer, YouTube, WhatsApp are more central and accessible for high knowledge individuals.

High knowledge individuals rely more on digital platforms, which are more efficient and influential in their knowledge networks. In contrast, low knowledge individuals rely more on traditional media, which still plays a vital role in their information acquisition and dissemination.

It was identified that many of the participants using ICT tools belonged to middle age with education upto high school. Majority had high experience level in dairy farming and are landless to marginal land holding with high extension participation level, medium information seeking behaviour and medium achievement motivation which depicts that majority had desire for success. Further, majority had medium economic orientation and medium innovative proneness levels. Dairy farmers are using these ICT tools for variety of purposes for their dairy farming in day-to-day life, which was identified during the study. Farmers were using radio and television for daily agriculture and dairy related news, WhatsApp was being used for sharing dairy information and also for purchasing medicines by showing the pictures of symptoms, medicines etc. at veterinary medical shops

to purchase them, which were suggested by experts or fellow progressive dairy farmers. YouTube was used by some dairy farmers for knowledgegain through videos, post corona (for lesser contact) SMS app was their only way for maintaining their milk sales records, that they get while selling milk at collection center. Mobile phone was an important tool which they used for talking with experts, extension agents and for searching and getting information related to dairy farming, weather etc. for managing their milch animals. Therefore, extension personal should develop content accordingly in a manner that the information will reach farmers more effectively through these digital platforms. From Social Networking Analysis, it can be understood that efforts to increase knowledge among low knowledge individuals can be done by integrating digital platforms into their information networks and educating them. To enhance dairy farmers ICTs knowledge, interventions should target the factors that have positively correlated with knowledge levels.

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