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Assessment of Agricultural Technology Information Centre of Assam Agricultural University on Personal and Economic Empowerment of Farmers in Jorhat, Assam

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

The present study was carried out with the objective to assess Agricultural Technology Information Centre (ATIC) of Assam Agricultural University (AAU) on personal and economic empowerment of farmers in Jorhat district of Assam. A random, purposive cum snowball sampling technique was followed to conduct the study. 8 villages of Jorhat district which are located within the radius of 50 kilometre from ATIC were selected on random basis. From the 8 villages, 120 respondents were selected purposively by using snowball sampling technique. The collected data were systematically arranged, classified, tabulated and analyzed with the help of different statistical techniques and tests namely frequency distribution, percentage, mean, standard deviation, weighted mean score, Pearson product-moment correlation coefficient, test of significance of correlation coefficient and chi-square test. The findings of the study revealed that 17.50 per cent respondents had low, 60.83 per cent respondents had medium and 21.67 per cent respondents had high level of overall

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personal and economic empowerment. The study indicated that age had negative and significant relationship, whereas operational land holding and annual family income of the respondents had positive and significant relationship with personal and economic empowerment of the respondents. It was found from the study that caste, education, occupation and social participation of the respondents had significant association with personal and economic empowerment of the respondents. From the study it can be concluded and recommended that various extension strategies like market led extension, Information and Communication Technology (ICT) led extension and agrepreneurship led extension should be implemented in integrated approach to enhance the empowerment of farmers.

Keywords: Agricultural technology information centre; Assam Agricultural University; Jorhat; personal and economic empowerment of farmers.

1. INTRODUCTION

The ATIC was introduced under the Innovations in Technology Dissemination (ITD) component of National Agricultural Technology project (NATP) in India. The NATP was implemented by the Indian Council of Agricultural Research (ICAR) and the Department of Agriculture and Co-operation (DAC) [1]. ATIC was introduced as an institutional reform in the front-line extension system of ICAR institutes and State Agricultural Universities (SAUs) for delivery of information and technology products to farmers, and to get feedback from them on use of new technology [2].

Sathiadhas and Immanuel [3] stated that, the NATP attaches paramount importance in enhancing sustainability of production systems, development of institutional partnerships, introduction of new approaches to technology dissemination including decentralized management and strengthening the linkages among research, extension and farmers. The establishment of ATIC in different regions of the country takes care of this important aspect of location specific technology dissemination to farmers which helps to address the constraints within the existing technology transfer system.

ATIC acts as a bridge between the farmers and scientists and thereby enhancing the linkage between the research and client system [4].

ATIC plays a significant role in the dissemination of relevant information and transfer of technology to the farmers as well as addressing their grievances through various ways. The ATIC acts as a 'single window delivery system', which is located at the entrance of the ICAR Institutes or SAUs of the country. The ATIC helps the farmers and other stake holders by providing solutions to location-specific problems and making all technological information, along with technology inputs, available [5]. ATIC contributes towards the betterment of the farming situation by empowering the farming community in different personal and economic aspects of their life.

The mandate and functions of ATIC are to provide a single-window supporting delivery system for agricultural products and services like sale of farm implements, bio-fertilizers, soil and water testing, seed quality testing, sale of nursery plants to the farmers, to facilitate direct access of farmers to technology advice and other services and to provide mechanism for feedback from the users to the Institute [6]. The objectives, rationale for establishment as well as important criteria of ATIC are stated below.

1.1 Objectives of ATIC

- To provide a 'Single Window' delivery system for the products and species available from an institution to the farmers and other interested groups.
- To facilitate direct farmers' access to the institutional resources available in terms of technology, advice, products and other similar things for reducing technology dissemination loss.
- To provide mechanism for feedback from the users to the institute.

1.2 Rationale for Establishment of ATIC

- To provide diagnostic services for soil and water testing, plant and livestock health.
- To supply research products such as seeds and other planning materials, poultry strains, livestock breeds, fish seed, processed products and other similar

things emerging from the institution for testing and adaptation by various clientele.
- Providing information through published literature and communication materials as well as audio-visual aids.
- Providing an opportunity to the institutes/SAUs to generate some resource through the sale of their technologies.

1.3 Important Criteria of ATIC

- Availability (or accessibility) of new technologies.
- Relevance of new technologies.
- Responsiveness of new technologies to the needs of different categories of farmers.
- Sustainability of such unit within the overall institutional system.

1.4 Statement of the Research Problem

Farmers face new challenges everyday due to lack of recent information on how to solve problems of market uncertainty, climatic variability and new technology [7]. Therefore, up-to-date information regarding various practices in agriculture and allied sectors is of utmost importance for the farmers to increase the profitability of their farms. Information makes farmers more confident to effectively deal with different categories of issues like competition, market incentives and risk [8].

Dutta [9] stated that the availability and access to relevant source of information as well as required research products and other resources are critical factors in improving productivity and profitability in agriculture and allied sectors. Information generated in the research stations need to be disseminated to the end users at the right moment, right place and in a right form for effective utilization. The information should be accurate, clear and easily understandable by the farmers. India being an agriculture based country, the holistic development of the farming sector is the most needed aspect to enhance the cultivation scenario of the country in global perspective. With the continuous development of new agricultural technologies and innovations, production of the farms have quite increased, but often the farmers are not able to have access to timely and accurate information and products. It is observed that average farmers are deprived of accessible and cost effective means to get the required information and products in time. They are not much aware about where and whom to contact to get up-to-date information about latest technologies in agriculture as well as for various problems arising in their farms. Therefore, ATICs were introduced to coordinate the linkage between researchers, scientists and department in-charges of different disciplines and technology users or the farmers. The coordination needs to be direct, integrated and which includes timely availability of sufficient information and resources.

The ATIC of AAU, Jorhat, Assam was established on 22 January, 2003. The ATIC is under the administrative control of Directorate of Extension Education (DEE), AAU, Jorhat. As the ATIC has been functioning since 2003, therefore, it is high time to critically evaluate whether the farmers are getting desirable benefits from the services and facilities offered by it well enough or not. Until and unless the farmers are not empowered in their personal and economic aspects of life, they will not be able to realize their full potential in improving their livelihood. The personal empowerment denotes to the empowerment in terms of ability to enhance the opportunity, autonomy and control over their life. Whereas, economic empowerment is the ability to make and act on decisions that involve the control over and allocation of financial resources [10].

A researchable question arising in the present context is whether the farmers are empowered in various personal and economic aspects due to ATIC and if yes, then up to what extent. Therefore, the present study was carried out with the objective to assess ATIC of AAU on personal and economic empowerment of farmers in Jorhat district of Assam.

1.5 Scope and Importance of the Study

- The findings from the study will provide feedback of farmers about the functioning of ATIC. The outcome of the study can give insight to the role of ATIC on personal and economic empowerment of farmers of the district. These information will also provide new scope for continuous improvement, modification and development of ATIC.
- The study will be helpful for improving the overall performance, management and in adopting better methodologies and techniques in providing services for the benefit of the farmers.

- The study will generate information for extension agencies, policy makers, planners and administrators to develop future strategies for empowering the farmers through efficient transfer of technology.
- The findings can serve as a background information for further studies in different locations. Further studies can be conducted by considering different research methodologies and variables.

2. METHODOLOGY

2.1 Description of the Study Area

The study was conducted in Assam, a north-eastern state of India. As the ATIC is located at Jorhat district of Assam, therefore Jorhat was selected purposively to determine the impact of ATIC in empowering farmers of the district.

According to Directorate of Census Operations Assam [11] Jorhat district of Assam lies between 26.20" and 27 10.30" north latitude, 93.39" and 94 36.30" east longitude. The district has an average elevation of 116 metres (381 feet). Jorhat district has an area of 2851 square kilometre. The arable soil of Jorhat district may be grouped into three categories, namely old alluvial soil, new alluvial soil of riverine tracts and hilly soil. The district is bounded on the north by Lakhimpur district; on the south by Nagaland state; on the east by Sivasagar district and on the West by Golaghat district. On the North of the district, the river Brahmaputra forms the largest riverine island of the world named Majuli. The total population of Jorhat district is 10,92,256. The number of male population in the district is 5,56,805 and female population is 5,35,451. The population density of the district is 383 per square kilometre. Total number of cultivators in the district is 1,45,885, among which 94,435 are males and 51,450 are females. About 70 per cent population of the district are cultivators. Total number of agricultural labourers in the district is 53,153 among which 24,882 are males and 28,271 are females. The literacy rate of Jorhat district is 82.15 per cent, from which male literacy rate is 87.63 per cent and female literacy rate is 76.45 per cent.

The economy of Assam is agrarian in nature and Jorhat district is no exception to this. The net area sown in the district is 1,20,240 hectare and total cropped area is 1,77,377 hectare. Paddy is the principal cultivated crop in the district. Jorhat district has a large number of tea gardens with factories for tea processing. A major proportion of tea in Assam is produced in Jorhat district. Sugarcane, vegetables and fruits are extensively grown and marketed here. In fruits banana, mango, pineapple, citrus, jackfruit, guava and litchi occupy important places. Coconut and areca nut are predominant plantation crops of Jorhat district. Crops like pulses, mustard are grown in plenty in Jorhat district. In case of animal husbandry, cattle and goats are commonly reared in most of the households. Besides, buffaloes, sheep, pigs, horses, fowls and ducks are found in the district in large numbers. Pisciculture is becoming popular among all sections of the society and fisheries are found in large numbers in the district [11].

2.2 Sampling Techniques and Sample Size Determination

A random, purposive cum snowball sampling technique was followed to conduct the study. Two villages from each direction, for example; North, East, West and South; which are located within the radius of 50 kilometre from the ATIC were selected by following the selection method of Pandey [12]. Thus, a total of 8 villages of Jorhat namely Tulsijan Pahumara Village, Ujani Majkuri Village, Charingia Village, Khangia Village, Napamua Village, Potiagaon Village, Mohimabari Village, Raidangjuri Village were selected on random basis following the location of registered villagers from the ATIC register of AAU, Jorhat. The map of the study area has been presented in Fig. 1.

A list of farmers from the 8 villages having regular visits to ATIC was prepared with the help of records available in ATIC register of AAU. According to the prepared list of farmers, 15 farmers from each village were selected purposively by using snowball sampling technique. Thus, the sample size of the present study was 120.

2.3 Method of Data Collection

The data from the respondents were collected through personal interview method by using a pre-tested structured research schedule in their own residence or farm.

2.4 Selection of Variables

The dependent variable selected for the present study was: personal and economic

empowerment of the respondents. Ten numbers of independent variables were considered for determining the relationship and association with the dependent variable. The selected independent variables were: age, caste, education, marital status, type of family, size of family, operational land holding, occupation, annual family income and social participation.

2.5 Measurement of Personal and Economic Empowerment of the Respondents

The personal and economic empowerment of the respondents was determined in terms of two main categories namely personal empowerment and economic empowerment; with slide modification of scale developed by Songara [13]. The two main categories were further divided into different subheadings. The empowerment of the respondents was measured on a five point continuum, which are: Highly Empowered (HE), Quite Empowered (QE), Empowered (E), Somewhat Empowered (SE) and Not at all Empowered (NE). The scoring was done in the order of 5, 4, 3, 2 and 1 respectively. Based on the mean ($\overline{X}$) and Standard Deviation (SD) of the obtained scores, the respondents were classified into three categories namely low, medium and high, by using the procedure followed by Dasgupta [14].

2.6 Methods of Data Analysis

The collected data were coded, classified, tabulated, analyzed and interpreted by using different standard statistical procedures like frequency distribution (*f*), percentage (%), mean ($\overline{X}$), SD, Weighted Mean Score (WMS), Pearson product-moment correlation co-efficient (r value), test of significance of correlation coefficient (t value) and chi-square (χ^2) test.

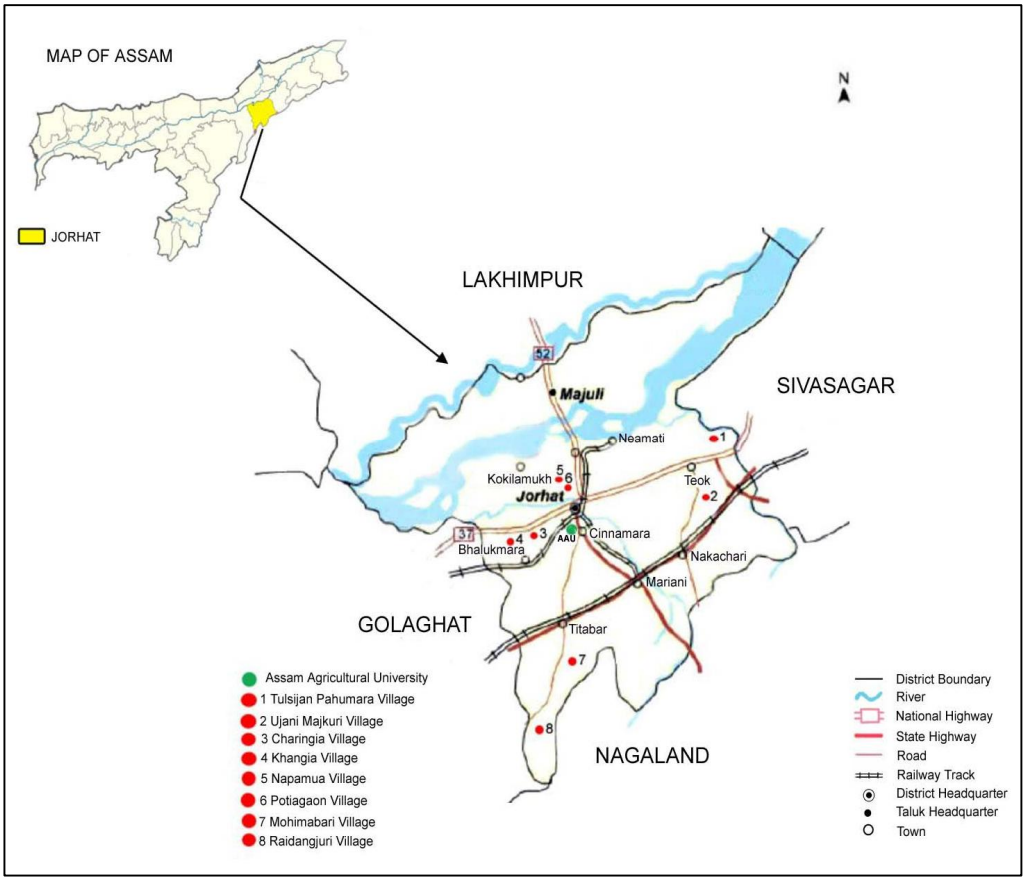

Fig. 1. Map of Assam showing the location of Jorhat district and the study area within the district

3. LITERATURE REVIEW, RESULTS AND DISCUSSIONS

In the present study, the findings will provide information on personal and economic empowerment of the farmers. The study will also indicate the influence of selected independent variables on personal and economic empowerment of farmers. Information on functioning of ATIC in empowering the farmers and whether the objectives of its establishment are being fulfilled, is essential for continuous improvement process. In addition to that, a critically performed scientific study may provide new insights or information which were not anticipated. A developmental evaluation provides information which were unknown, filling gaps in knowledge and making sure that the existing working methods can be improved in the best possible ways. The ATIC is a platform for quick transfer of technologies to the end users or the farmers. Assessment of ATIC on personal and economic empowerment of farmers can act as a resource for understanding the strengths, weaknesses, opportunities of ATIC as well as it will help to find out the areas in which it is not very successful in reaching the farming community. Thus, the logically arranged reasoning may provide a new prospect for improvement in quality service and facilities.

This section comprises the findings of the present study along with relevant literature review and discussions thereon. The results and discussions of the study are presented under the following subheadings:

3.1 Personal and Economic Empowerment of the Respondents

The results presented in Table 1 reveal the personal and economic empowerment of the respondents, which was measured in frequency (*f*) and percentage (%) according to their response. The WMS was given on each aspect to rank them accordingly. Overall personal and economic empowerment of the respondents was calculated with the help of mean ($\overline{X}$) and SD of the obtained scores as presented in the Table 2.

It is evident from the Table 1 that respondent's empowerment in case of "total production" ranked 1st with WMS (4.03), "marketable surplus" ranked 2nd with WMS (3.80), "productivity" ranked 3rd with WMS (3.74), "communication and networking skills" ranked 4th with WMS (3.69), "profitability" ranked 5th with WMS (3.64), "decision making ability" ranked 6th with WMS (3.63), "self-reliance" ranked 7th with WMS (3.61), "motivation and confidence for improved and changing agricultural practices" ranked 8th with WMS (3.44), "social position, contact and cosmopoliteness" ranked 9th with WMS (3.37), "leadership skills" ranked 10th with WMS (3.16), "managerial skills" ranked 11th with WMS (3.09), "knowledge and application of mass communication media, ICT tools" ranked 12th with WMS (3.06), "access to agricultural inputs at reasonable price" ranked 13th with WMS (2.88), "information about credit facilities" ranked 14th with WMS (2.86), "cost efficiency due to the use of improved practices" ranked 15th with WMS (2.74), "information about marketing channels" ranked 16th with WMS (2.66), "market intelligence" ranked 17th with WMS (2.58), "access to marketing channels" ranked 18th with WMS (2.56), "awareness about Government programmes and schemes" ranked 19th with WMS (2.33), "entrepreneurial attitude" ranked 20th with WMS (1.84).

The findings from the Table 2 reveal the frequency and percentage distribution of the respondents according to their overall personal and economic empowerment. It was found that 17.50 per cent respondents had low, 60.83 per cent respondents had medium and 21.67 per cent respondents had high overall personal and economic empowerment. These findings are in conformity with the findings of Babu [15], Meetei et al. [16].

3.2 Relationship between Independent Variables and Personal and Economic Empowerment of the Respondents

The data from Table 3, show the relationship of four quantitative independent variables having interval and ratio scale namely age, size of family, operational land holding, annual family income with the dependent variable, which is: personal and economic empowerment of the respondents. The correlation of the selected quantitative independent variables with the dependent variable was analyzed by using Pearson product-moment correlation coefficient (r). The test of significance of correlation coefficient was used to determine whether the correlation between two variables is significant or not. The calculated t-value from test of significance of correlation coefficient was

Table 1. Frequency and percentage distribution of the respondents according to their personal and economic empowerment (sample size: 120)

Serial Number	Empowerment	HE	QE	E	SE	NE	WMS	RANK
		f (%)	*f* (%)	*f* (%)	*f* (%)	*f* (%)		
1	**Personal empowerment.**							
	a. Motivation and confidence for improved and changing agricultural practices.	27 (22.50)	27 (22.50)	43 (35.83)	18 (15.00)	5(4.17)	3.44	VIII
	b. Awareness about Government programmes and schemes.	8 (6.67)	15 (12.50)	23 (19.17)	36 (30.00)	38 (31.67)	2.33	XIX
	c. Leadership skills.	22 (18.33)	16 (13.33)	47 (39.17)	29 (24.17)	6 (5.00)	3.16	X
	d. Communication and networking skills.	38 (31.67)	23 (19.17)	42 (35.00)	17 (14.17)	0 (0.00)	3.69	IV
	e. Knowledge and application of mass communication media, ICT tools.	27 (22.50)	18 (15.00)	31 (25.83)	23 (19.17)	21 (17.50)	3.06	XII
	f. Managerial skills.	23 (19.17)	22 (18.33)	27 (22.50)	39 (32.50)	9 (7.50)	3.09	XI
	g. Social position, contact and cosmopoliteness.	19 (15.83)	31 (25.83)	45 (37.50)	25 (20.83)	0 (0.00)	3.37	IX
	h. Decision making ability.	27 (22.50)	34 (28.33)	47 (39.17)	12 (10.00)	0 (0.00)	3.63	VI
	i. Self-reliance.	24 (20.00)	37 (30.83)	47 (39.17)	12 (10.00)	0 (0.00)	3.61	VII
	j. Entrepreneurial attitude.	10 (8.33)	7 (5.83)	11 (9.17)	18 (15.00)	74 (61.67)	1.84	XX
2	**Economic empowerment.**							
	a. Total production.	40	43	37	0	0	4.03	I

Serial Number	Empowerment	HE	QE	E	SE	NE	WMS	RANK
		f (%)	*f* (%)	*f* (%)	*f* (%)	*f* (%)		
		(33.33)	(35.83)	(30.83)	(0.00)	(0.00)		
	b. Productivity.	35	36	35	11	3	3.74	III
		(29.17)	(30.00)	(29.17)	(9.17)	(2.50)		
	c. Marketable surplus.	36	38	32	14	0	3.80	II
		(30.00)	(31.67)	(26.67)	(11.67)	(0.00)		
	d. Access to agricultural inputs at reasonable price.	13	24	37	28	18	2.88	XIII
		(10.83)	(20.00)	(30.83)	(23.33)	(15.00)		
	e. Information about credit facilities.	16	21	33	30	20	2.86	XIV
		(13.33)	(17.50)	(27.50)	(25.00)	(16.67)		
	f. Cost efficiency due to the use of improved practices.	9	17	50	22	22	2.74	XV
		(7.50)	(14.17)	(41.67)	(18.33)	(18.33)		
	g. Market intelligence.	13	11	33	38	25	2.58	XVII
		(10.83)	(9.17)	(27.50)	(31.67)	(20.83)		
	h. Information about marketing channels.	11	17	37	30	25	2.66	XVI
		(9.17)	(14.17)	(30.83)	(25.00)	(20.83)		
	i. Access to marketing channels.	10	15	29	44	22	2.56	XVIII
		(8.33)	(12.50)	(24.17)	(36.67)	(18.33)		
	j. Profitability.	22	40	51	7	0	3.64	V
		(18.33)	(33.33)	(42.50)	(5.83)	(0.00)		

Keys: HE: Highly Empowered, QE: Quite Empowered, E: Empowered, SE: Somewhat Empowered, NE: Not at all Empowered. Source: Own survey results (2020)

compared with table value of t for 118 degree of freedom at 0.05 and 0.01 level of significance. The findings along with the interpretations are discussed below:

- Age of the respondents had negative and significant correlation with their personal and economic empowerment at 0.01 level of significance. The reason may be is that in case of respondents with higher age, the empowerment was found to be less than the young respondents, indicating that empowerment is low with increase in age of the respondents. The respondents who are younger in age are more aware to have access to the required information, technologies along with products and services related to improved farming techniques of ATIC. They are more equipped with use of ICT tools, mass media and other sources of information. The young respondents are more empowered than elderly respondents in various aspects. This finding is in conformity with the findings of Tayde and Chole [17], Jain [18], Meti and Sathish [19], Sharma [20].
- Operational land holding of the respondents had positive and significant correlation with their personal and economic empowerment at 0.05 level of significance. This may be because the farmers with more operational land holding, use to grow more crops with more availability of land. Due to that, total production and income from their farm increases. Besides, increase in size of operational land holding enhances the extent of utilization of improved practices, self-confidence and marketable surplus. Most of them also become market oriented and as a result, they keep themselves up-to-date with the latest information, government schemes and programmes. Similar finding was reported by Meetei et al. [16], Tayde and Chole [17], Meti and Sathish [19].
- Annual family income of the respondents had positive and significant correlation with their personal and economic empowerment at 0.05 level of significance. This may be because with increase in annual family income several factors such as access to agricultural inputs, credit facilities and asset holding increases. The farmers can also participate in different social events and economic activities like meetings, volunteer works in villages, festivals, trainings, interaction with various market traders and business organizations; which increase their confidence, decision making ability and autonomy over their life. They feel less pressure in spending money for using improved cultivation techniques and other basic requirements. This finding is similar to the findings of Tayde and Chole [17], Jain [18], Kaushal and Singh [21].

Table 2. Frequency and percentage distribution of the respondents according to their overall personal and economic empowerment (sample size: 120)

Category	Score Range	*f*	%	$\bar{X}$	SD
Low	Below 57.89	21	17.50		
Medium	57.89 to 67.49	73	60.83	62.69	4.80
High	Above 67.49	26	21.67		
		120	100.00		

Source: Own survey results (2020)

Table 3. Relationship between independent variables and personal and economic empowerment of the respondents (sample size: 120)

Serial Number	Independent variables	r value	t value
1	Age	-0.3033**	-3.4570
2	Size of family	0.0730	0.7948
3	Operational land holding	0.1822*	2.0128
4	Annual family income	0.1950*	2.1601

** significant at 0.05 level, ** significant at 0.01 level. Source: Own survey results (2020)*

Table 4. Association between independent variables and personal and economic empowerment of the respondents (Sample size: 120)

Serial Number	Independent variables	χ^2 value	Degree of freedom (d.f.)
1	Caste	27.1483**	8
2	Education	33.2454*	18
3	Marital status	3.4496	6
4	Type of family	3.3029	2
5	Occupation	5.6909	8
6	Social participation	17.8492*	8

** significant at 0.05 level, ** significant at 0.01 level. Source: Own survey results (2020)*

3.3 Association between Independent Variables and Personal and Economic Empowerment of the Respondents

The findings from Table 4, reveal the association of six qualitative independent variables having nominal and ordinal scale namely caste, education, marital status, type of family, occupation, social participation with the dependent variable, which is: personal and economic empowerment of the respondents. The association between the selected qualitative independent variables and the dependent variable was analyzed with the help of chi-square (χ^2) test. The calculated χ^2 value was compared with table value at 0.05 and 0.01 level of significance. The findings along with the interpretations are discussed below:

- Caste of the respondents had significant association with their personal and economic empowerment at 0.01 level of significance. It may be because large number of respondents empowered in terms of various personal and economic aspects, are from General caste followed by Other Backward Class (OBC). This finding is in accordance with the findings of Kaushal and Singh [21].
- Education of the respondents had significant association with their personal and economic empowerment at 0.05 level of significance. The reason may be is that with increase in education, desirable changes occur in the knowledge, skill and attitude of a person. In the present study, it was found that the respondents with higher education had more personal and economic empowerment than the respondents with less educational qualifications. The farmers who have higher educational qualification are in more contact with the ATIC. Hence, they are more aware about utilization of latest information, ICT tools, mass media and other sources to have access to the improved farming techniques. Due to that, their skills are enhanced and subsequently they get more benefits in their farms. Thus, they become empowered in various personal and economic aspects. This finding is in line with the findings of Meetei et al. [16], Tayde and Chole [17], Jain [18], Sharma [20], Kaushal and Singh [21].
- Social participation of the respondents had significant association with their personal and economic empowerment at 0.05 level of significance. This may be because the respondents with higher social participation are more involved in various social activities, meetings, demonstrations and training programmes of ATIC, Krishi Vigyan Kendra (KVK) and other organizations. They become more aware about various schemes and programmes launched by government, their social networking skills are enhanced and subsequently they become more confident. Therefore, they are more able to use the best practices in farming, which leads to increase in profitability from their farm. Similar finding was reported by Tayde and Chole [17], Jain [18], Upreti and Bhardwaj [22].
- It was observed from the study that marital status, type of family, occupation had no significant association with personal and economic empowerment of the respondents at 0.05 and 0.01 level of significance.

4. CONCLUSIONS AND RECOMMENDATIONS

The findings of the present study revealed that majority of the respondents had medium level of overall personal and economic empowerment due to ATIC of AAU in Jorhat district of Assam.

The findings from the study indicated that age had negative and significant, whereas operational land holding and annual family income of the respondents had positive and significant relationship with their personal and economic empowerment. It was also observed from the study that caste, education, occupation and social participation of the respondents had significant association with their personal and economic empowerment. These factors should be taken into consideration while implementing any strategies in enhancing the effectiveness of the ATIC as these factors have major role in the personal and economic empowerment of the farmers.

To increase the empowerment of farmers in various personal and economic aspects, different information sources should be used along with organizing training programmes so that the farmers become more aware about the improved and changing agricultural practices, government programmes and schemes and credit facilities. More awareness need to be created among farmers about utilization of marketing channels for increasing their profitability. Information about real-time marketing scenario should be offered to the farmers so that they can make better decisions and enhance the profitability. It was observed from the study that most of the respondents lacked the entrepreneurial attitude. Therefore, Entrepreneurship Development Programmes (EDPs) can be organized through ATIC to improve the entrepreneurial behaviour and characteristics of the farmers as well as to develop necessary vocational and entrepreneurial skills required for setting up and operating new enterprise.

Therefore, it is recommended that various extension strategies like market led extension, ICT led extension and agrepreneurship led extension should be implemented in integrated approach to enhance the empowerment of farmers. Special importance should be given in increasing the income as well as profitability of the farmers by improving productivity and lowering of costs.

Small and marginal farmers need to be encouraged to form Farmer Producer Organizations (FPOs) to improve their competitive position in the market. It will enable them to have economies of scale in procurement of the inputs, processing, marketing as well as export of the produces. It will also help them to have easy access to credit facilities. In collaboration with various organizations and funding agencies, ATIC can play an important role to act as a facilitator in training the farmers to form FPOs.

Farmers should be motivated for adopting improved practices of integrated natural resource management, integrated pest management and integrated plant nutrient management in their farms. They should be trained about post-harvest management and value addition of the produces as well as meeting the product quality standard necessary for export. Crop diversification and Integrated Farming System (IFS) will also contribute immensely to increase profitability and also to mitigate various risks arising in farms.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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