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Socio-economic Correlation of Technology Know-how of Farm Entrepreneurs of Samastipur District of Bihar, India

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ABSTRACT

Background: In the process of agricultural development, the prime mover is considered to be the new farming technology. Technology plays a pivotal role in every aspect of the agricultural phenomenon. It enhances productivity and transparency at every step of agricultural movements. Quality and quantity are managed through this facility which improves farmers' socioeconomic status and mental health. From this perspective, technological involvement must be necessary with the human values.

Methods: The study was conducted during 2019-21 to identify the role of different socio-economic variables and their correlation to the technology know-how of farm entrepreneurs of the Samastipur district of Bihar, India. Knowledge of the improved farm technology possessed by the farmers was considered a dependent variable and 17 socioeconomic and psychological variables were considered independent variables.

Result: It was concluded from the study that variables like material possession of higher assets and more investment in irrigation were found to dominate in respect of the acquisition of knowledge about farm technology. Lack of formal education on the part of the farmers did not impede their acquisition of knowledge of the farm technology through available sources of communication. The human resources variables were found to influence the acquisition of knowledge by the respondents.

Key words: Correlation, Farm entrepreneurs, Human resource, Improved farm technology, Material resource, Socio-economic.

INTRODUCTION

Agriculture plays an important role in economic growth, enhancing food security, poverty reduction and rural development. Several studies conducted in India have conclusively shown that knowledge of farm technology has a direct relationship with farm entrepreneurial behavior as indicated by the adoption of modern technology (Muzari *et al*., 2012; Challa and Tilahun, 2013; Jain *et al*., 2009). This implies that farmers have varying amounts of knowledge of modern farm technology. Does a question then arise what does account for this variability? Variability in respect of social status, material and human resources among Indian farmers is a foregone conclusion. Do thesevariabilities, therefore, account for the variation in their technological know-how? The study under the report proposes to investigate this question. Improved agricultural technologies are a very important means of poverty alleviation and bringing assured food security in developing countries (Balisacan 1993; Dantwala 1985; Hamid 1982). Farmers cannot easily adopt agricultural improved technology due to different factors and incase the adoption level is going slowly and many aspects of adoption are not well understood (Ahmed and Sampath, 1992; Bardhan 1979).

Thus farmers' level of knowledge on improved farm technology adoption was treated as a dependent variable with three social status variables, six material resources and eight human resource variables as independents in the investigation under report.

MATERIALS AND METHODS

The study was conducted in Samastipur district of Bihar. Samastipur comes under the agroecological zone-I of the state *i.e.* North-West Alluvial plains. The district comprises four sub-divisions and 20 blocks. Two blocks namely Pusa and Tajpur of the identified district were selected for the study as the district had substantial areas under irrigation and quite a few development programs related to farm production were in operation in the block. The block had potential as well as facilities for the adoption of improved farm technology. Five villages of the block were selected randomly and from each village 30 farmers. Ten each from big, medium and small categories were randomly drawn to have a sample of 150 farmers for the collection of data. By drawing samples from three categories of farmers *i.e.* big, medium and small an attempt was made to control the size of land holding which varied so much among the farming community in Prune.

Knowledge of the improved farm technology possessed by the farmers was considered a dependent variable and 17 socioeconomic and psychological variables were considered independent variables. The dependent variable was measured with the help of a teacher-made-type

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achievement test developed for the purpose. The 17 independent variables consisted of:

1. Social status variables which included; education, materials, possession and social participation. These variables were measured with the help of some questions developed for the purpose.
2. Material resource variables which included total land holding, the proportionate area under irrigation, draft power assets excluding land (value) investment on irrigation and led income. A schedule was developed to measure these variables.
3. Human resource variables which included entrepreneurial characteristics like personal efficacy, risk-taking preference, owning responsibility, feedback, psychological modernity, personal achievements motivation, social achievements motivation and influence motivation. The variable personal efficiency was measured with the help of the "who am I" exercise, psychological modernity with the help of the TAT type semi-projective test developed by Mehta (1976) and the remaining three variables were measured with the help of suitable scales developed for the purpose (Anitha 2004; Singla and Goel, 2016).

RESULTS AND DISCUSSION

In order to test the relationship between the independent and dependent variables the data were subjected to correlational as well as path analysis, the results of which are reported in Table 1.

It was found that the independent variables except the last three human resource variables were significantly correlated with the knowledge of the pooled sample of the farmers included in the study. But correlation coefficients were not found significant when data for big, medium and small farmers were analyzed separately (Table 1). A discussion of the variable-wise relationship will be probably more revealing.

Social status variables

Education

The relationship of education of the farmers with their knowledge about what technology was found to be highly significant in the case of the total sample, significant at a 5 percent level of probability in the case of big farmers but non-significant in the case of both medium and small farmers. The regression coefficient of education was found to be non-significant (b=0.058, 0.035 and 0.101) in the case of all three categories of farmers though it was significant (b=0.054 P<0.05) in the case of the pooled sample. The path coefficients reported in (Table 1), further revealed that education has a substantial direct effect in the case of big farmers and the total sample but less substantial in the case of small farmers and quite meager in the case of medium farmers. On the basis of this result, it can be inferred that formal education of farmers in general is important for gain in knowledge about farm technology and it was more so inthe case of big farmers. Even the medium and small farmers with higher formal education were found to acquire comparable knowledge of wheat technology. It, therefore, appears that communication through printed material like farm journals and other extension literature (to which big farmers are mostly accessible) plays an important role in knowledge acquisition (Meena and Singh, 2012; Singh, Singh *et al*., 2000).

Material possession

Material possession was found to be significantly correlated with the knowledge of farm technology of the total sample and the small farmers. Even the beta coefficient of this variable was found significant in the case of small farmers (b=0.139, P<0.05). Its direct path coefficient reported in Table 1 was found to be moderately substantial even in the case of big and medium farmers though it was negative in the case of big farmers. This indicates that those big farmers who had larger material possession had lower knowledge of technology. Obviously, such farmers were bigger among the big or affluent in the community probably with much large size of holding and substantial off-farm income thus it is not astonishing that they did not care for higher per-acre productivity or far the improved farm technology is concerned on the other hand economically better off farmers (having higher material possession) from the middle and lower categories were found more knowledgeable about the farm technology, maybe because they were better off due to higher income farm farms and so had to have more knowledge about the technology. This appears to be more so in the case of small farmers (Bisaliah 1982).

Social participation

Social participation has been found to be significantly related to the farmers' knowledge of farm technology only with the exception of medium farmers. Its regression coefficient however was found to be significant only in the case of the pooled sample (b=0.054, P<0.05). Path analysis of the data indicates that its direct path coefficient was not substantial in the case of both big and small farmers but the correlation coefficient in both cases was significant due to a substantial indirect effect channeled through other variables like 'off-farm income' in the case of big farmers, personal efficacy, percentage of irrigated land and total assets excluding land, in case of small farmers having off-farm income, captured the social institutions and they were having more knowledge about the farm technology not because of their participation in social institutions but probably because of their economic base since modern farm technology required greater investment. In the case of small farmers who took part in social organizations were also having more land under irrigation and were efficient to take action. Such farmers would naturally go for modern technology to exploit the full potential of their irrigation facility and that is why these variables channeled substantial indirect effects making the correlation coefficient significant. Strangely enough,the situation was just reversed in the case of medium farmers. In this case, the correlation coefficient was non-significant

but the direct effect was quite substantial. Interestingly, it was found that most of the farmers of this category had participated in social institutions like panchayat and youthclubs which provided them the opportunity to come in contact with the block-level agriculture change agents. Perhaps this might have enhanced their technological know-how.

Material resource variables

Land: the size of land holding was found to be significantly correlated in the case of a pooled sample of the respondents but not in the case of their three categories. Since the categorization of respondents was based on the size of land holdings, the three groups were quite homogenous *i.e*., there was very little variation in respect of land holding in each group. It is quite understandable that 'r' values in these cases did not come out to be significant but in the case of big and medium farmers, the 'r' values were negative which indicates that there is a tendency on the part of big farm owners to be little apathetic toward modern farm technology.

Investment on irrigation

Contrary to the expectation,the investment in irrigation made by farmers tells altogether a different story (in comparison to the area under irrigation). In this case, significant correlation coefficients were found in the case of big, small and pooled samples and a significant regression coefficient was found only in the case of big farmers. The path coefficients in this case, however, are more revealing. It is quite interesting to note that in the case of medium farmers the direct path coefficient, in sharp contrast to that of the percentage of irrigated land, we found to be highly substantial and negative.

Farm assets

Both moveable and immovable properties of the farmers which had relevance to farm management and production were considered as farm assets. The movable property includes farm implementation and draft power only. The value of movable as well as immovable property like farmhouse, cattle shed, *etc*. were considered as total assets (excluding land). Both of these material resource variables were found to be significantly related to the farmers' knowledge of wheat technology only in the case of small farmers. But the regression coefficient was not found to be significant in the case of small farmers though they were significant in the case of medium farmers (b=0.238, P<0.05). Value of implement and draft power was found to have a moderately substantial direct effect in the case of big farmers, a very high direct effect in the case of medium farmers but quite a meager amount of direct effect in the case of small farmers. The value of farm implements and draft power possessed by big farmers was very high as compared to the other two categories. This was because many of them owned tractors which were not used only for tilling their own land but also to earn money by providing custom services to fellow farmers. Thus, such farmers were

Table 1: Correlation and path analysis of the social status, material resource and human resource variable with the respondents' knowledge of wheat technology.

Characteristics	Big farmers		Medium farmers		Small farmers	
(A) Social status variables						
1. Education	0.305*	0.024 (0.06)	0.153	-0.06 (0.21)	0.267	0.15 (0.10)
2. Material possession	0.175	-0.15 (0.32)	0.239	0.18 (0.06)	0.446**	0.19 (0.24)
3. Social participation	0.327*	0.10 (0.22)	0.160	0.57 (-0.41)	0.407**	0.08 (0.32)
(B) Material resource variables						
1. Percentage of irrigated land	0.107	0.6 (-0.05)	0.226	0.07 (0.15)	0.460**	0.19 (0.11)
2. Total land	-0.078	-0.23 (-0.31)	-0.073	-0.23 (0.16)	0.219	0.22 (0.06)
3. Value of implement and bullock	0.094	0.17 (-0.07)	0.222	0.96 (-0.74)	0.389**	0.05 (0.33)
4. Off. farm income	0.385**	0.39 (-0.01)	0.062	0.18 (-0.11)	0.073	-0.01 (0.08)
5. Total assets excluding land	0.211	-0.32 (0.53)	0.046	-0.46 (0.51)	0.350*	0.19 (0.15)
6. Investment in irrigation	0.288*	0.26 (0.02)	-0.034	-0.59 (0.56)	0.354*	-0.07 (0.43)
(C) Human resource variable						
1. Personal efficacy	-0.049	-0.13 (-0.18)	0.193	0.32 (-013)	0.304*	0.19 (0.11)
2. Risk-taking preference	0.137	0.25 (-0.12)	0.179	0.04 (0.14)	0.290*	0.22 (0.06)
3. Feedback	0.061	-0.08 (0.14)	0.292*	-0.02 (0.31)	0.288*	0.13 (0.15)
4. Owning responsibility	0.305*	0.07 (0.23)	0.048	-0.03 (0.07)	0.284*	-0.03 (0.31)
5. Psychological modernity	0.215	0.06 (0.15)	0.254	-0.07 (0.32)	0.325*	0.03 (0.29)
6. Personal achievement motivation	0.034	-0.006 (0.04)	-0.120	0.002 (-0.12)	0.110	0.03 (0.07)
7. Social achievement motivation	0.137	0.24 (0.10)	0.109	-0.04 (0.15)	-0.050	0.14 (-0.18)
8. Influence motivation	-0.083	-0.26 (-035)	-0.209	-0.33 (0.12)	-0.191	-0.11 (-0.07)

The figure in parentheses indicatesthe total indirect effect.

*Significant at a 5 per cent level of probability.

**Significant at 1 per cent level of probability.

having primary interest in earning money from custom services and only a secondary interest in improving their agriculture. Probably this was the reason that in the case of such farmers, the direct effect of this variable on the knowledge of wheat technology was not that substantial. In the case of medium farmers the implements owned by them were by and large those which they kept for use on their own farm with a view to improving their farm efficiency and increasing productivity. Such farmers naturally had more interest in modern farm technology and that is why the direct effect of this variable was so substantial. In the case of small farmers, the value of implement and draft power owned by them was quite small and probably this was the reason that it did not show any substantial direct effect (Kumar, 2012; Hamdani, 2008).

Off-farm income

The off-farm income was found to be significantly correlated with the knowledge of improved wheat technology only in the case of big farmers. This might be so because; "off-farm income" in another group of farmers was quite small. Even the regression coefficient of this variable ($b=0.167$, $P<0.05$) was found to be significant only in the case of big farmers. So was the case of the direct path coefficients of this variable. Such farmers who had off-farm income were capable of making investments in the improved farm technology which was so capital intensive and probably this was the reason that they were found to have more knowledge about the technology.

Human resource variables

Among the human resource variables personal efficacy, risk-taking willingness and psychological modernity were found to have significant correlations only in the case of big and medium farmers. The regression coefficients of these variables were, however, found to be significant even in the case of small farmers. The regression coefficients of these variables were, however, found to be significant even in the case of small farmers.

(a) Personal efficacy

The direct path coefficient of personal efficacy was found to be quite substantial in the case of medium and small farmers and quite small but negative in the case of big farmers. It is difficult to explain why it was negative in the case of big farmers. It is difficult to explain why it was negative in the case of big farmers but a mention may be made here that the average personal efficacy score of big farmers was the lowest though not significantly different from others.

(b) Risk orientation

The Direct path coefficient of risk-taking willingness was found to be quite substantial in the case of big and small farmers but quite meager in the case of medium which in fact, obtained the highest average score on this. One of the probable reasons for such a discrepancy in respect of the direct effect and non-significant correlation coefficient might be that linear correlation analysis was employed in this study whereas this variable has been found to behave in a curvilinear way in several past studies (Doss 2003; Jain *et al*., 2009; Hall and Khan, 2002).

(c) Psychological modernity

The psychological modernity of the respondents of all the 3 groups did not seem to be very important for the acquisition of knowledge about improved farm technology since their direct path coefficient in the case of all three groups of farmers was found to be quite meager. However, in the case of small farmers variables like social participation and personal efficacy *etc.* channeled its substantial indirect effect which helped the 'r' value in this case to come to a substantial level of significance.

(d) Feedback and owning responsibility

The two other human resource variables, feedback and owning responsibility showed a significant relationship with the farmers' knowledge in the case of two of three categories. Feedback was significantly related in the case of medium and small farmers whereas owning responsibility was significantly related in the case of big and small farmers. Both were, however, highly significantly related to the knowledge of the total sample of farmers. The correlation analysis indicated that the farmers in general, medium and small farmers in particular were very much conscious to evaluate their knowledge of farm technology in order to make constant improvement and so were willing to receive feedback. But it is strange that it was not found so in the case of big farmers whose knowledge level, in fact, was the highest. The direct path coefficient of feedback was found to be negligible in the case of all the categories of farmers except the small farmers where it was low but not negligible. The reason why did it indicate a significant correlation was that its substantial indirect effect was channeled through variables like social participation and possession of implement and draft power in the case of medium farmers and material possession and some other variables in the case of small farmers. Similar was in the case of pooled sample in which substantial indirect effects of these variables were channeled through variables like education, material possession and social education.

A similar state of affairs was clearly discernible in the case of the variable 'owning responsibility'. The 'r' values indicated that the big and small farmers had a willingness to own the responsibility for failure in their endeavor which is a positive trait for success in entrepreneurial activities. The path analysis revealed that the direct path coefficients were very low in the case of all the categories of respondents. Substantial indirect path coefficient was, however, found to be channeled through variables like off-farm income, investments in irrigation, *etc*., in the case of big farmers and social participation, personal efficacy and psychological modernity in the case of small farmers which made the 'r'-value significant. These variables were also responsible for making the 'r-value significant in the case of the total sample of farmers. It can thus be concluded that variables like

feedback and owning responsibility were themselves not very important but in interaction with some other variables, they played an important role in inducing the farmers to go for higher knowledge of farm technology.

(e) Personal, social and influence motivation

Among the motivational variables none of the three motives under study showed any significant relationship with the knowledge level of farmers in general or that of any of the three categories. The direct path coefficient of social achievement motivation was found to be quite substantial in the case of big farmers but it was not so in the case of the other two categories though it was only moderate in the case of small farmers. This indicates that the big farmers are probably not very much indulged in their struggle for a livelihood because of better economic status. They also had some concern for the betterment of their society and such farmers had more knowledge about the technology. Maybe they are the vocational leaders who benefit society through their knowledge of improved farm technology (Caswell 1989; Kavitha and Reddy, 2007; Lynton and Pareek, 1990).

So far influence motivation is concerned the direct path coefficient in the case of big and medium farmers was quite substantial. But in all the cases they were negative in direction. This indicates that the farmers with greater influence motivation are those having some social leadership status and their prime objective was to exert influence over others simply for the satisfaction of their ego to influence. Such farmers were also found to have a weak and even a negative correlation with personal achievement motivation which clearly indicated that they were not so much motivated to improve their farming and so naturally had a smaller amount of technological know-how.

Implication

It was concluded that variables like material possession higher assets and more investment in irrigation were found to dominate in respect of the acquisition of knowledge about farm technology. This brings to light that dissemination of farm technology has been more efficient among the "have-a-lots" and quite scanty among "have-nots". This calls for the transfer of farm technology from a heavy orientation toward "have-a-lots" to a proportionate orientation toward both "have-a-lots" and "have-nots."

The human resources variables like personal efficacy, owning responsibility and feedback were found to influence the acquisition of knowledge by the respondents. This calls for attention that appropriate training may be organized to heighten the psychological makeup of the respondents in order to make them thirsty for the acquisition of recent know-how of the technology (Shrivastava *et al*., 1996).

CONCLUSION

The finding clearly indicated that lack of formal education on the part of the farmers did not impede their acquisition of knowledge of the farm technology through available sources of communication. Thus it implies that education although is a boon, the lack of it does not pose a serious problem before the extension agencies in effectively disseminating improved farm technology and developing entrepreneurship in the farming community (Nagaraj e*t al*., 2017).

Conflict of interest

There are no conflicts of interest.

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