Performance of Agricultural Livelihood Security of the Farmers : Tribal Sub Plan Executed by CAU, Imphal in Meghalaya

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ABSTRACT

Livelihood security is the access to adequate basic needs for sustaining life such as food, clothing, shelter. In order to improve the livelihood security and socio-economic status of the farmers, Central Agricultural University (CAU), Imphal has taken up Tribal Sub Plan (TSP) project in Meghalaya during the crop year 2016-17. The present study was taken up to evaluate the performance of TSP with respect to the livelihood security of the beneficiary farmers. The research was carried out in two districts of Meghalaya, namely, Ri-bhoi district and West Garo Hill district respectively. The Tribal Agricultural Development Index (TADI) was developed to evaluate the performance of TSP. In vehemently, the study unveiled that nearly 70% of the respondents were in the range of 0.4-0.7 apropos of TADI values which could infer that TSP had moderately benefitted the tribal beneficiary farmers.

***Key words** : Livelihood security; TSP; Socio-economic; TADI; Beneficiary farmers;*

The TSP project was executed by Central Agricultural University (CAU), Imphal during the crop year 2016-17 in two agriculturally important districts of Meghalaya namely Ri-Bhoi District and West Garo Hills District. The general objective of executing the project was to enhance the socio-economic status and livelihood security of the tribal farmers of the state through need-based agricultural technological interventions. The specific objectives of the sub-plan are: to enhance livelihood and socio-economic conditions of the tribal farmers of North East Hill (NEH) states through technology interventions, to popularize improved agricultural implements and machines for higher productivity, timely operation and reduction of drudgery, to increase farm income of tribal farmers through Integrated Farming System (IFS) by using beekeeping, optimum use of land and water resources in the tribal areas and to impart awareness by conducting training programmes on advanced agricultural technologies among rural educated unemployed tribal youth of NEH states for entrepreneurial developments. Under this project, the beneficiary farmers were provided with different kinds of agricultural inputs, including horticultural inputs, such as seeds (Rice, Ginger, Vegetable seeds), planting material (Areca nut, Assam lemon *etc*.) agricultural equipment (paddy weeder, sprayers *etc*.) livestock (dairy calf, piglets, goats, rabbits *etc*.), poultry, fingerlings, poly-house unit, mushroom unit, vermicomposting unit, *etc.* free of cost.

In previous studies, various types of outcomes were observed regarding TSP. *Rao and Reddy (2015)* assessed the implementation of TSP in Andhra Pradesh and showed that the earmarked funds under the TSP during the period 2002-2011 were less than the proportion of the STs in the area. *Makwana (2017)* examined the impact of TSP schemes on the tribal community in Gujarat and found positive changes in the thinking patterns of those who have got assistance under self-employment (25%), rural housing (17.6%), agriculture (15.6%), and DPS (15.3%). He found that the developmental programs have brought about remarkable changes in the socio-cultural life of the tribal.

Singh and Sethi (2017) in their working paper on towards a nutrition-sensitive TSP from Maharashtra, Madhya Pradesh, and Orissa, found that the TSP earmarked by the majority of Union Ministries, and state departments of Madhya Pradesh and Odisha was below the proportions recommended by the erstwhile Planning Commission. Maharashtra earmarks TSP funds at the beginning of planning exercise, and its earmarking specifically for nutrition has increased but was below the norm.

METHODOLOGY

The study was conducted in Meghalaya, which is one of the seven sister states of North East India. It stretches between a latitude of 25° 07'N to 25° 41'N, and longitude of 91°21'E to 92°09'E. The area of the state covers an area of 22429 sq.km. which constitute about 0.68 per cent of the total land surface of India with a population of 29,66,889 (*Government of Meghalaya, 2017*). A large part of the economy of Meghalaya is occupied by the agricultural and horticultural sector. It is the main source of livelihood of the people in the state, and also a traditional way of life. During the year 2014-15, the total cropped area was 343431 ha. Forest occupy about 946201ha of the total geographical area of the state (*Government of Meghalaya, 2017*). The income of the farmers is also supported by various livestock rearing activities and fisheries.

From Meghalaya, Umsning and Rongram Community and Rural Development Blocks (CRDBs) were selected from Ri-bhoi district and West Garo Hills district. Out of the 274 villages in Umsning CRDB, five villages were selected purposively for the study *viz.,* (i) Palwi, (ii) MawleinMawkhan, (iii) Liarkhla, (iv) Sumer No. 4, and (v) Khweng. Similarly, out of the 173 villages in Rongram CRDB, five villages *viz.*, (i) Rangwalkamgre, (ii) Dumitdikgre, (iii) Galwang Chidekgre, (iv) Edenbari and (v) Sanchonggre were selected. All the study areas for the research were purposively selected owing to the existence of College of Post Graduate Studies in Agricultural Sciences (CPGSAS) and College of Home Science (CoHSc) under CAU, Imphal where the TSP is being deployed. Content analysis was conducted for the selection of respondents Based on this, a complete enumeration of beneficiaries of TSP project of CAU (I) in the entire ten villages under different commodities were selected as respondents. Thus, a total of 270 and 120 beneficiary farmers were selected from Ri-bhoi district and West Garo Hills district, making a total of 390 respondents.

Tribal Agricultural Development Index (TADI) : Based on the inputs received, the beneficiary farmers were divided into 6 domains for easy of analysis *viz.,* Crop, Birds, Fishery, Livestock, Farm Equipment, and Multiple. There are a number of methodologies for the construction of a composite index. One such methodology described by *Nardo et al. (2008)* is one of the most significant. Steps such as weighting and aggregation were considered to be the most significant steps among its several steps. Therefore, based on the various methodologies used to construct composite indices (*Brahmachary, 2014, Wiréhnet al., 2015, Steinert et al., 2016, Greyling and Tregnna, 2016, and Monteiro et al. 2018*), a composite index was constructed consisting of five steps *viz.,* identification and selection of indicators, identification of sub-indicators, normalization, weighting and summarization. The identified indicatorswere based on the specific inputs received through TSP project, thorough literature review, focus group discussion with farmers and consultation of experts. The indicators were 1. Economic, 2. Technological, 3. Farming, 4. Capacity Building and 5. Climate Smart Agricultural Practices. For this a pre-tested structured questionnaire was framed to measure the respective indicators. The pretesting of the questionnaire was done to ensure that the questions to be asked were relevant to the study. Lastly, translators were engaged by the researcher for the study after thorough training on the specific data collection method was educated.

For normalization, Max-Min feature scaling was used. The method brings all the values to the range of [0,1]. It is also called unity-based normalization. The present study used equal weights assignment method, and statistical procedures *viz.,* Principal Component Analysis (PCA) to assign weights. *Nardo et al. (2008)* described the detailed procedure for the use of PCA as weights. One of the most famous rules called the Kaiser's criteria was used to determine the number of PCs to be retained. In the last step, the composite Tribal Agricultural Development Index (TADI) was developed by aggregating all the indicators. The overall index for the respective dimension was formed by simply taking

their weighted averages. This method was applied because it is transparent, easy to use, and understand, and also the most common form of aggregating. The formula representing the overall index is given by:

$$TADI_j = \frac{\sum_{i=1}^{n} |W_i| X_{ij}}{\sum_{i=1}^{n} |W_i|}$$

Where

$TADI$ is a composite index

W_i is the weight of the indicator

X_{ij} is the indicator value for the i^{th} indicator and j^{th} domain

The intermediate composite index *viz*. Economic Index (EI), Technological Index (TI), Farming Index (FI), Capacity Building Index (CBI), and Climate Smart Agricultural Practices Index (CSAPI), were calculated by giving equal weights and summarized by using the weighted averages technique. The index was then worked out for the six domains mentioned above.The respective TADI domains and overall TADI were finally categorized into three categories based on equal intervals of class between the minimum, and maximum obtainable range of index score which 0 to 1.

Category	Class intervals
Low	[0.1 – 0.4)
Medium	[0.4 – 0.7)
High	[0.7 – 1.0)

RESULTS AND DISCUSSION

The list of beneficiary farmers along with the inputs received through TSP was listed out by analyzing the written records and confirming from the individual farmers through data collection (Fig.2).These beneficiary farmers are the respondents for the present study.

Domains	No.	%
Crop	108	27.69
Birds	47	12.05
Fishery	23	5.90
Livestock	77	19.74
Farm equipment	41	10.51
Multiple inputs	94	24.11

Performance of TADI with respect to the different domains : The performance of TSP was evaluated with the help of TADI, a composite index and the reliability of the constructed composite index was tested using Chronbach's alpha whose value was 0.701. Figure 1 give the idea of how the different domains under TSP has worked out.

Crop : Figure 1 indicates that there are no respondents belonging to the index category more than 0.7. This states that there is a medium level of accomplishment made by TSP for the tribal farmers in the domain crop. Upon evaluating TSP, it was found that the maximum number of respondents were included in the domain crop but the majority had medium TADI. This indicated a good start for the TSP project. None of the farmers were seen to obtain TADI score of more than 0.7. This might be because some of the crops received under TSP were still in the growing stage*viz.*,Assam Lemon, Litchi and Arecanut and yet to give economic yield though the farmers have gained other benefits. Apart from this, during the time of field visit, some of the farmers have reported the case of ginger rhizome rot diseases due to which there was a decrease in yield.

Birds : It could be clearly stated that 85.11 per cent of respondents belong to the medium category but none of the respondents belong to high category of TADI. Since, backyard poultry rearing was an old age practice which was passed down since time immemorial, rearing of birds were quite suitable with the respondents in the study area and so, very few farmers were in a low category. Unfortunately, there were no farmers in the category above 0.7 TADI scores; this could be attributed to the fact that some farmers have reported the case of mortality of birds during their young stage. The case of birds' mortality was more in West Garo Hills district as was observed during the data collection. It could be stated that with more training on care of poultry chicks especially during their early stage, more improvement can be made through TSP.

Fishery : The visual representation of Figure 1 showed the fact that, even if a majority (86.96%) of the respondents scored TADI between the range (0.4-0.7), 8.7 per cent of the respondents have scored between (0.7-1.0) under the domain fishery. During the time of data collection, it was observed that the beneficiary fishery farmers of TSP, has generated income in two ways; by selling the fish directly and letting other people fish through angling by taking some amount (Rs.150 average/day/per). Also, angling is not a very effective method to fish and it's more like a sport so, the farmer only gets benefit from it as people who fish have to pay even if no fish was caught. In addition to this, there was no initial cost on fish fingerlings as fingerlings were

obtained from TSP free of cost, which saved their cost of expenditure.

Livestock : The visual representation of Figure 1 reflected the fact that half (51.95%) of the respondents scored TADI between the range (0.4-0.7), and the other half (48.05%) have scored between (0.1-0.4) under the domain livestock. Regarding the domain livestock, some of the farmers, during the time of investigation have reported the case of livestock mortality. For instance, the goats received under TSP were unable to conceive and they died as they give birth. They also have expressed that; they have to spend some amount for making the livestock conceive. In other cases, very few rabbit farmers were successful in rearing rabbits. Many of the farmers do not have the knowledge of scientific rearing of goats and rabbits. In contrast to all this, the piggery and dairy farmers have got a considerable benefit and have expressed their wants for more piggery and dairy inputs.

Farm equipment : The fact that more than half (63.41%) of the respondents scored TADI between the range (0.4-0.7), while 36.59 per cent has scored between (0.1-0.4) under the domain farm equipment trace to the reason that farmers have expressed their lack of proper knowledge regarding the use of some equipment due to its complexity. For instance, some the respondents leave the vermicompost pit and mushroom unit empty due to unavailability of earthworms and mushroom spawns or lack of knowledge on their operation. Some even have utilized the vermin compost pit and mushroom house for some other purpose. It was observed during the data collection that the entire low cost poly house unit was utilized properly but unfortunately due to climate vagaries such as hailstones which hit the study area in 2018, led to the destruction of all the poly house units. After which, the farmers expressed their deep loss. So, due to lack of knowledge and unavailability of supplementary inputs, the farmers were unable to extract the benefits of the inputs. Apart from this, all the other farm equipment was effectively utilized and there were farmers who were very progressive.

Multiple inputs: There was much more accomplishment in this domain as 71.28 per cent of the respondents have scored between (0.4-0.7) while about 27.66 per cent has scored between (0.1-0.4). It can also be observed that at least 1.06 per cent of respondents have scored more than average. Since the farmers under this domain have experimented with more inputs through farmers-farmers extension, the farmers have benefited more compared to other farmers under a single domain. Thus, it could be suggested that through farmers-farmers extension, and by distributing different kinds of inputs, more achievement could be made.

Overall performance of TSP through TADI : The higher the index value the better the performance of TSP. According to the index, the domain fishery has outperformed other domains. But seeing the frequency in crop domain and multiple inputs, both have outperformed other domains with majority of them being in the (0.4-0.7) index category. The domain birds also showed fairly high index values. The rest of the other domain gained moderate scores. Because of the unequal number of beneficiary farmers in each category, it is quite hard to establish which domain was performing

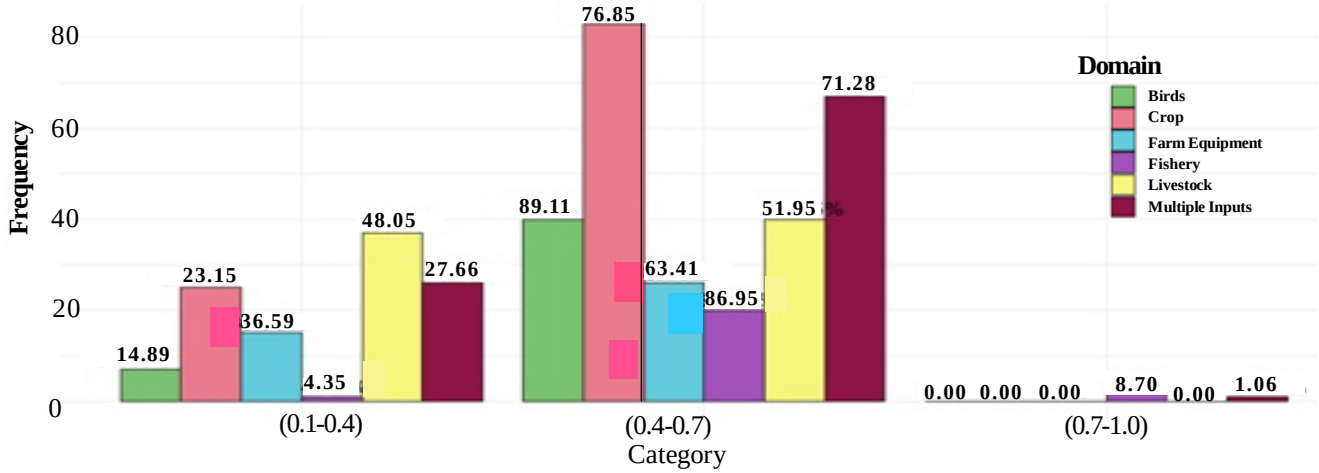

Fig. 1 Distribution of respondents based on TADI

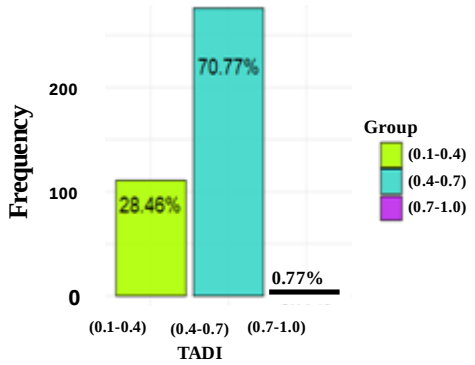

Fig. 2. Distribution of respondents on TADI scores for overall domains of TSP

well above the others. Therefore, it could be concluded that there was moderate achievement in all the domains. Overall, 70.77 per cent of respondents have scored between (0.4-0.7) and very few respondents have scored above 0.7 (figure 2 and Table 2).

Table 2. Frequency farmers falling in high, medium and low category of TADI for the respective domains (N=390)

Domain	Low(0.1-0.4) No. (%)	Medium(0.4-0.7) No. (%)	High(0.7-1.0) No. (%)
Birds	7 (14.89)	40 (85.11)	0 (0)
Crop	25 (23.15)	83 (76.85)	0 (0)
Farm equipment	15 (36.59)	26 (63.41)	0 (0)
Fishery	1 (4.34)	20 (86.96)	2 (8.7)
Livestock	37 (48.05)	40 (51.95)	0 (0)
Multiple inputs	26 (27.66)	67 (71.28)	1 (1.06)
Total	111 (28.46)	276 (70.77)	3 (0.77)

Figure in the parenthesis indicates percentage

CONCLUSION

The clearly showed that the project has been fairly going well-giving benefits to the farmers, it can be concluded that TSP project undertaken by CAU in the state of Meghalaya has provided medium initial effect on the agricultural livelihood security of the farmers. As the project is ongoing, it is a must to extend more emphasis on such a project to improve the socio-economic status of the farmers. Agricultural extension services extended to the farmers need to be explained more explicitly to strengthen farmer-farmer extension as use of multiple inputs through it increases the productivity. Importance must be given in fishery and crop production as it has shown good result.

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