Plantation-based Jhumias rehabilitation in Tripura: Exploring the challenges and traditional practices in overcoming crises

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ABSTRACT: *Plantation crop cultivation is becoming a significant occupation in Tripura among the Scheduled Tribes owing to its potential economic viability. The state government adopted a plantation model to rehabilitate the jhumias through various agencies while working with the Tribal Welfare Department and the Tripura Tribal Areas Autonomous District Council. However, the cultivation has threats. The beneficiaries met different challenges during plantation development under various models. The present study revealed that the low quality of saplings was considered the foremost challenge during rehabilitation. Besides, strong wind, poor management, insect menace, lack of storage facilities, infrastructure and institutional challenges are other potential risks and difficulties leading to losses. The most common response strategies adopted by the beneficiaries are marketing-based response and production-related mechanisms. They are also using traditional knowledge to avoid economic and farms related problems.*

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1. INTRODUCTION

Rehabilitation of tribal jhumias takes place at the behest of the state government through the joint efforts of various departments. The intention was to provide multiple forms of livelihood assets and infrastructural facilities that could yield a continuous flow of income to the households and thereby improve their standard of living. The focus of jhumias rehabilitation schemes has been through integrating different social and economic development strategies, such as the promotion and revolution of agriculture and allied activities alongside the transformation of local jhuming systems with a push on horticulture and plantation crop promotions. The plantation crops include coffee, tea and rubber, cashew nut, coconut, jackfruit, areca nut, oil palm, and spices. In contrast, horticultural crops consist of pineapple, citrus, orange, banana, mango, litchi, musambi, and guava (Viswanathan and Bhowmik, 2014). The plantation economy occupies a vital position in India's agricultural business and economy and, of course, becomes one of the primary sources of foreign exchange contributors and a support base for resource-based industrial growth (Viswanathan and Shah, 2013). In Southeast Asia, plantation crop cultivation occurs on a large scale, generally through the State plantation model whereby small growers' settlement programmes are promoted. The owners are attached to central processing conveniences facilitated by the state agencies (FAO, 1999), thereby enabling competition with subsistence agriculture and other local agricultural practices (Pichler, 2015).

The scope of expansion of tea and rubber plantations had an additional employment linkage as it needs a large labour force for production activities and garden management process (Viswanathan and Shah, 2013). The general practice of the government transferring plantations to the beneficiaries after maturity, along with property rights as well as tenurial security over land, has formed the primary source of income for the growers, and the business turnover has attracted many small growers to pursue rubber cultivation instead of pineapple though it was easy to cultivate (Krishna, 2012). The rubber-based agro-management project was found profitable and feasible in the hilly tracts of Chittagong, Bangladesh, wherein traditional jhum cultivators had reduced their reliance on forest and other non-timber forest products in their livelihood efforts (Viswanathan and Shivakoti, 2006). Hence, rubber acted as a wheel of development all over Tripura, providing economic benefits to the masses. Rubber also attracted many private individuals from all tribes, castes and communities. Tribal jhumias were getting employment all around the year, and the regular flow of income made it comparatively more lucrative than other farming systems. The returns were almost three to fourfold than from jhum (Reddy, 1999;

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Bhowmik and Chattopadhyay, 2018). Moreover, in northeast India, the development of plantation cultivation, mainly rubber, has been considered a successful strategy to replace traditional jhum cultivation as apart from the regular flow of income, it helped the tribal households overcome the 'distress sale of paddy' and enabled them to follow family-based livestock farming like piggery, poultry and fishery to meet their both ends (Krishnakumar and Meenattoor, 1999). It should also be noted that crop diversification has also played a vital role in reducing uncertainties in plantation operations practised among the small growers' communities (FAO, 1999). Many former jhumias have also started introducing some commercial crops like pineapple, banana and areca nut into the fold, and this mixed cropping system allowed the cultivators to escape from crop failures and a high chance of hunger due to the uncertainty of earning a livelihood from a single source (Sharma, 2018).

Further, to address the plantation sector uncertainties, the government has promoted different innovative ideas, including diversification of cultivation patterns, mixed farming, watershed development, and extension of irrigation facilities in order to minimise production failures and also arranged a price support system as well as credit facilities like Kissan Credit Card (Swain and Patnaik, 2016). The social outcomes from the developmental interventions were seen in the improvement of the education levels and standard of the beneficiary; also, the use of family labour saved the hired labour cost and provided them with higher business turnover (Penot and Trouillard, 2002). The prevalence of diversification of cropping patterns alongside creative ideas of modern rubber cultivation patterns has been beneficial and supportive. However, it has been found that the natives were still dependent upon forest products for subsistence as well as for diversifying livelihood risks, thereby reiterating the necessity to promote better combinations of agro-forestry and pertinent rain-fed farming systems with appropriate technical supports, including consumption of chemical fertilisers, pest control measures and crops protection measures (Molnar *et al.*, 1995). Therefore, the problems of agricultural development in the region, the arrangement of alternative vocations for the jhumias, and their settlement and development were among the stark and core ills that need to be attempted by the state through its various development efforts (Ray, 2014).

The threats here refer to the challenges the cultivators confronted in their daily chores. Traditional wet-land agriculture is plagued with the absence of timely agricultural loans, exploitation of brokers, high dependency on monsoon and lack of good quality agrarian seeds (Reddy and Kumar, 2010). Flaws in agricultural marketing, lack of proper storage and genuine buyers also threaten small growers (Lama and Bordoloi, 2017; Sharma, 2018). Again, most of the jhumia rehabilitation schemes in Tripura being mono-crop models caused a lack of satisfaction among many jhumias (Devvarman, 1999). Further, frequent fluctuation of output prices, shortages of quality seed, absence of irrigation facilities in rural areas and the loss incurred because of insects and pests were the other important factors for low productivity and challenge for the agriculturists of the region (Kalita and Bhuyan, 2017). Moreover, though not a large issue to date, another challenge for the plantation sector- the labour crisis, has been brewing in Tripura. Many growers adopt the share tenancy model in plantations (Chouhan et al., 2019).

However, challenges speed up the search for solutions. The adoption of an agro-animal husbandry model for more reliable food security and accessible income-earning opportunities is also a recommendation (Viswanathan, 2008). Involvement of females from the family as a supplement to the household male labourer helps in reducing hired labour as well as reduces the cost of production, and such situations were rightly visible in northeast India with females being engaged in collecting rubber latex and assisting the males in processing rubber sheet (Viswanathan and Shah, 2013).

The numerous development schemes launched for developing tribal jhumias in Tripura become handy tools in the changing social and economic appearance of the jhumias, showing outstanding results (Reang, 1999). There is a dynamic variation among the cultivators wherein the young generation were more interested in off-farm activities while the old folks were keener on crop-based events (Watete et al., 2016). Moreover, to reduce market volatility, the plantation crop cultivators emphasised on farm size enlargement, use of chemical fertilisers, and adoption of a wide yielding variety of seeds. At the same time, they reclaimed degraded cultivable land, started having supplementary livelihood sources and began domesticating animals as promising options to counter any future risks (Ayantunde et al., 2015). Skilling the untrained tribal labour by introducing innovative ideas through effective coordination of various extension agencies (Nigam et al., 2014) and including smallholders has become vital in developing oil palm plantations (Pichler, 2015). The social transformation that occurred among the educated rubber beneficiaries, who used to check online the prevailing current price of rubber sheets before deciding to sell to local traders at Kakraban under Gomati district

(erstwhile South Tripura), was an encouraging experience (Bhowmik, 2013). The people's educational attainment boosted the development process as they emerged capable of handling advanced farm technology and were empowered to apply economic choices more effectively and have more excellent knowledge in selecting a viable livelihood source (Kuki and Bhowmik, 2022).

Objective

Against this backdrop, the current study examines the basic problems and remedial solutions adopted by the beneficiaries of the plantation-based rehabilitation programmes in Tripura.

The specific objectives of the study are-

i) To explore the threats and crises perceived by the jhumia beneficiaries and

ii) To examine their responses and measures undertaken to overcome challenges.

2. MATERIAL AND METHODS

Study Area

The area of the study is Tripura, India. A tentative list of villages where such schemes were implemented was made by searching the records. Plantation-based rehabilitation of jhumias were found to be implemented mostly in 5 districts of the state, and we have selected 10% of such villages from each district in the first stage of the multi-staged sampling procedure. Thirty-six (36) villages were selected, and all were from the TTAADC jurisdiction. In the second stage, from each village, 20% of the rehabilitated beneficiary households were selected for the survey, maintaining a minimum of 5 respondents from each village.

Sampling framework and data

The respondents of the present study, the representative sample, were drawn through stratified random sampling. The various economic models of rehabilitation were considered as a stratum. The universe of the study was the total number of rehabilitated shifting cultivators in Tripura. In order to draw the samples, Rudra's (1989) technique of 'randomising the population rather than randomising the sample' has been used. The technique has helped find jhumias beneficiary families rehabilitated through plantation-based schemes. The respondents were beneficiaries of various plantation-based rehabilitation models for shifting cultivators. The sample respondents included rubber, tea and horticulture (including fruits) cultivators and information was collected through a structured schedule. Further, personal interviews and case studies were also undertaken whenever required. Among the 252 sample respondents, 162 were rubber cultivators, 39 were tea planters, 41 were horticulturists and 10 pursued multiple cropping. Multiple cropping refers to a system where the beneficiary pursues two types of plantation cropping following the grant of schemes twice, albeit for different crops each time.

Methods for analysis

The present study uses the following methods for analysing the results-

Beneficiary opinion- Each respondent is asked to share the problems they face in the course of plantation development as well as in its marketing outputs. Their opinions based on experience are taken as a primary source of information to highlight some negative externalities (Viswanathan & Bhowmik, 2014).

Factor analysis- Hassan *et al.* (2012) suggested that factor analysis is the system that the researchers have often employed to sort out, identify and decrease large items sharing a familiar variance from the questionnaire to certain constructs under one dependent variable in a study. It is useful for studies that engage a few or many variables items from questionnaires that can be decreased to a smaller set and make possible explanations, which is useful for putting variables into important categories (Rummel, 1970).

Principal component analysis- This method extracts maximum variance from the data set with each component, thus minimising a large set of variables into smaller components. Hence, it is a data reduction method that combines highly associated variables together to make a smaller group with the intention of retaining as much information as possible (Yong & Pearce, 2013).

Barlett's test of sphericity and Kaiser-Meyer-Olkin (KMO) is a measure of sampling adequacy; both tests are used to check the factor reliability of the matrix as a whole. Moreover, if Barlett's sphericity test is significant and the KMO value is greater than 0.6, factorability is considered (Hassan *et al.*, 2009).

3. RESULTS

The sample respondents: Basic characteristics

It should be noted that the samples were classified into four strata based on the crops assigned for rehabilitation. Table 1 provides us with the basic characteristics of the respondent households.

We find that 88.49% were headed by males among the sample households, and the incidence of female-headed households was marginally higher among rubber growers and tea growers. Hinduism is the most prominent religion, followed by Christianity and Buddhism. The incidence of Christianity is relatively

higher among horticulture beneficiaries, and all the Buddhist respondents were rubber growers. 39.28% of respondent households were BPL ration cardholders, and 37.7% of respondents were APL cardholders. Antodyaya card was in possession of 21.03% respondents, and such cardholders were in sizeable numbers (41%) among the tea beneficiaries. The incidence of BPL cardholders is more among horti-croppers, whereas APL were relatively more rubber beneficiaries.

Threats and problems perceived by the respondents

Table 2 indicates the most severe challenges or difficulties the beneficiary households faced during the entire rehabilitation process and its aftermath. Each respondent was asked to identify the most formidable challenge, and interestingly, 120 of the 252 respondents (47.62 %) opined that even though they had faced several challenges or hurdles during the rehabilitation process, none could be considered unconquerable. This group included 57.41% rubber growers and, 24.39% horti-cultivators, 35.90% tea-growers and 30% multi-croppers. This category of respondents is represented in the last row of the table. On the other hand, 52.38% of respondents believed they had faced tough challenges during their rehabilitation process. It appears from Table 2 that for rubber planters, primary issues were low quality (16.67%) as well as untimely damaged plantations (13.58%); such problem was also found among horti-cultivators, as reported by 21.95% and 26.83% the sub-group respectively. Animals like monkeys, wild pigs, and squirrels, etc., offer severe challenges to a few rubber growers, horti-cultivators and multi-croppers. In the case of tea cultivation, bad marketing is the central issue faced by 41.03% of households,

Table 1: Basic statistics of the respondents

Parameters	Rubber [162]	Horticulture [41]	Tea [39]	Multiple Crops [10]	Total [252]
Head of the household					
Male	141(87.04)	38(92.68)	34(87.18)	10(100)	223(88.49)
Female	21(12.96)	3(7.32)	5(12.82)	-	29(11.51)
Religion					
Christianity	33(20.37)	20(48.78)	14(35.9)	2(20)	69(27.38)
Hinduism	90(55.56)	21(51.22)	25(64.1)	8(80)	144(57.14)
Buddhism	39(24.07)	-	-	-	39(15.48)
Ration card					
Annapurna	3(1.85)	1(2.44)	-	-	4(1.59)
Antyodaya	25(15.43)	12(29.27)	16(41.03)	-	53(21.03)
BPL	62(38.27)	19(46.34)	10(25.64)	8(80)	99(39.28)
APL	71(43.83)	9(21.95)	13(33.33)	2(20)	95(37.7)
No card	1(0.62)	-	-	-	1(0.4)

Source: Field survey, 2018; Note: Figures in parentheses indicate the percentage

Table 2: Difficulties faced by the households (in %)

Issue	Rubber	Horticulture	Tea	Multiple crops	Total
Financial	5.56	4.88	5.13	10	4.76
Wild Animals	4.94	17.07	-	30	7.14
Inheritance	1.85	-	-	-	1.19
Damaged plantations	13.58	26.83	2.56	-	13.49
Low quality of planting material	16.67	21.95	12.82	-	16.27
Theft	-	4.88	-	-	0.79
Shortage of Fertiliser	-	-	2.56	10	0.79
Marketing of output	-	-	41.03	20	7.14
Tough troubles	42.59	75.61	64.10	70	52.38
Relatively Trouble-free	57.41	24.39	35.90	30	47.62

Source: Field survey, 2018

followed by degraded quality of planting materials (12.82%). Some beneficiaries had also mentioned serious financial challenges, including late payment of subsidies. There have been challenges from theft and input (fertiliser) shortages.

Table 3 depicts that the main reason for plant loss in the rubber plantation sector is nature's fury. 77.16% opines that strong winds resulted in the fall of standing trees. The second major problem is poor management (19.75) in the form of animal forays, forest fires, and the absence of cleaning bushes and pruning; non-scientific tapping often leads to rubber tree cancer, thereby resulting in a quick breakdown. The problem of plant loss for horticulture cultivation is from insects (51.22) and poor management (26.83). In the case of tea and multiple crops cultivators, poor management of the plantation is the prime cause of plant loss. Some respondents believed that the water problem leads to plant loss.

Fig.1 lists out the major infrastructural challenges faced by the beneficiaries. The respondents, particularly of rubber (81.5%), horticulture (73.2%) and tea (66.7%), believe that there are lacunas in terms of dissemination of proper information regarding the schemes as well as cropping and plantation management. Almost 61% of rubber beneficiaries, 49% of horticulturists, and 72% of tea growers have opined about the non-receipt of timely technical advice and capacity-building mechanisms. The non-existence of a cold-chain system, absence of agro-processing industry, inadequate packaging material as well as limited storage facility are significant challenges for rubber growers as well as multiple croppers as these are factors which restrict their

Table 3: Causes of Plant losses (in %)

Reason	Rubber	Horticulture	Tea	Multiple crops
Natural act	77.16	4.88	17.95	10
Poor management	19.75	26.83	53.84	60
Insect	1.85	51.22	10.26	20
Water problem	1.24	2.44	7.69	10
No response	-	14.63	10.26	-
Total	100	100	100	100

Source: Field survey, 2018

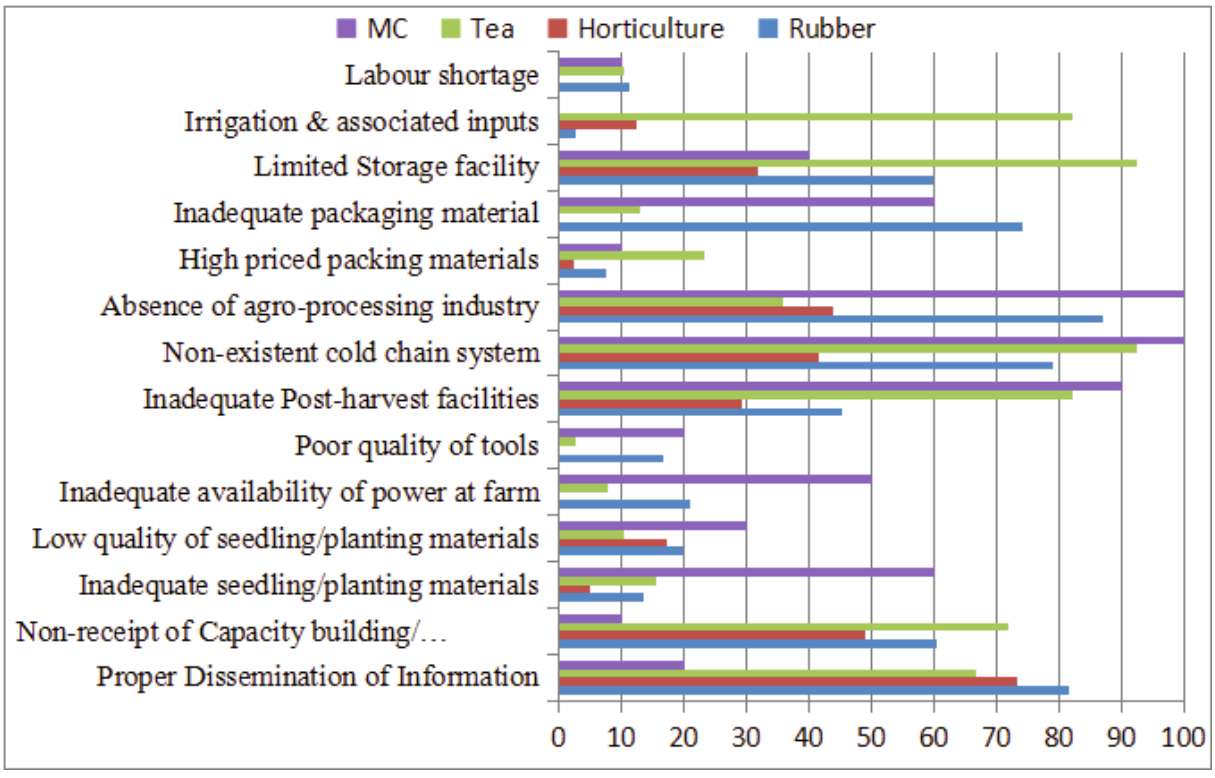

Fig 1: Infrastructural and institutional challenges faced by the beneficiaries (in %)

Source: Field survey, 2018

livelihood diversification efforts. Inadequate post-harvest facilities and limited irrigation systems are major concerns for tea growers. The beneficiaries seemed to be less worried about the seedling and planting materials, quality of tools and availability of power at farms. Further, labour shortage is not a major issue for these households.

Regarding the financial issues, the respondents' major problem was a lack of awareness about the eligibility criteria for subsidies. Fig. 2 shows that almost 70% of tea growers, 60% of horti-cultivators, 40% of multi-croppers and 35% of rubber planters have considered this as a concern. Around 30-35% of rubber planters and 25% of tea growers consider interest rates, amount of support/credit and mortgage specification are not favourable to them. The horticulturists are more content on these issues of financial involvement as their extent of grievance or threat perception is the least. However, most of them appear to be content regarding availing of subsidy even though there are variations in the time lag, and the process is somewhat tedious and requires specific documentation, which is often obtained through a lot of cajoling of officials.

Table 4 provides us with the various problems and its extent faced by the beneficiaries. Price and its various manifestations were the most significant concerns regarding the marketing and selling of the product by rubber growers and tea planters. The beneficiaries are mostly price takers and have to accept the price offered to them. Almost 70% of the rubber plantation respondents and 80% of the tea growers have such a belief, while more than 75% of rubber beneficiaries and 90% of tea beneficiaries, along with 70% of multiple croppers, feel they have to accept a lower price. The lack of minimum support price is a concern for almost all of them, including the horti-cultivators. The absence of competitive prices and lack of transparency in determining the market transactions, including the price fixation, is again a concern for the majority of the tea, rubber and multiple croppers. The lack of an online trading facility has been identified as a hurdle by many respondents.

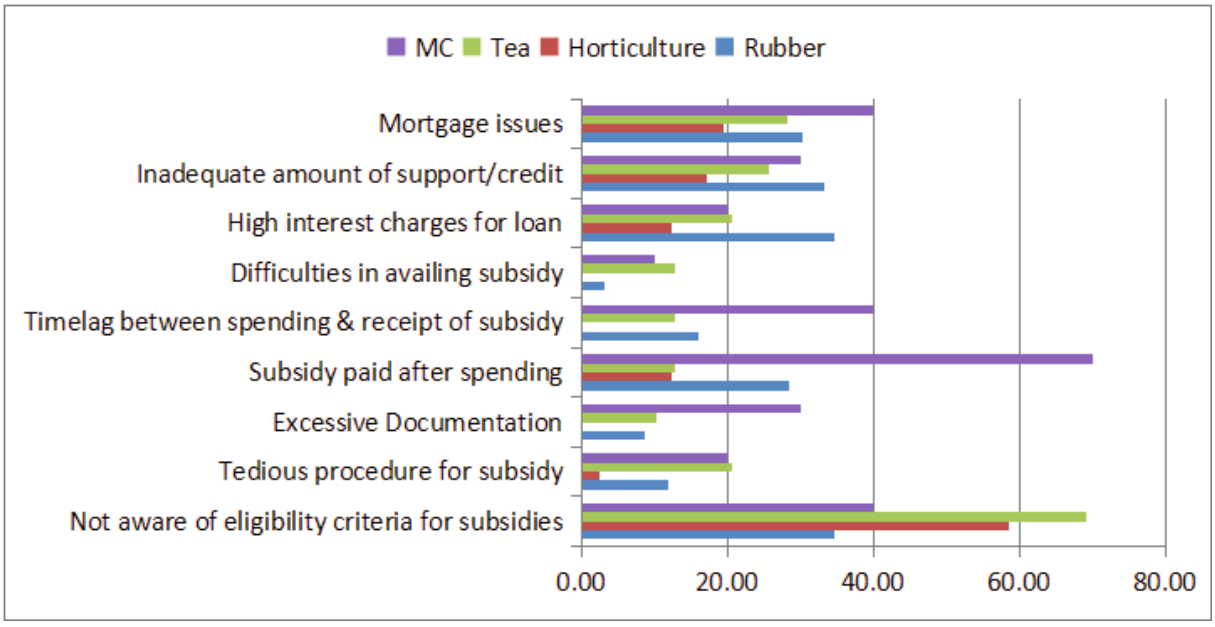

Fig 2: Financial Constraints faced by beneficiaries (in %)

Source: Field survey, 2018

Table 3: Causes of Plant losses (in %)

Reason	Rubber	Horticulture	Tea	Multiple crops
Natural act	77.16	4.88	17.95	10
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Insect	1.85	51.22	10.26	20
Water problem	1.24	2.44	7.69	10
No response	-	14.63	10.26	-
Total	100	100	100	100

Source: Field survey, 2018

On the other hand, the condition of the road and the absence of transport vehicles (including refrigerated vans) resulting in increased transport costs are cause of concern by some respondents. Lack of market information, high commission charged by intermediaries, and high brokerage interventions are challenges to a few, but are of minor concern. Surprisingly, delay in payment is not much faced by the sample beneficiaries, and sadly, limited measures for quality check and standardisation process is not a botheration for them.

Factor Analysis

Based on the several challenges perceived by the respondent beneficiaries, a factor analysis was attempted using the principal component method of extraction. Table 5 shows that the KMO specification is 0.747, which is acceptable, while Bartlett's test of sphericity is significant at 1% levels.

Further, from Fig. 3 and Table 6, we find that the 45 components indicated 14 factor loadings with an Eigen value of 1 and above. From the 15th factor onwards, the Eigen value is less than 1. In other words, the 45 components of threat could be clubbed into 14 factors, and these 14 factors explained 67.78% of the variations. In other words, the various problems and threats the beneficiaries perceive have different dimensions and can be broadly categorised into 14 factors. Factor 1 is the most prominent, has an Eigen value of 7.229 and explains 16.064% of the variations. Factor 2 explains 8.023% of the variation based on an Eigen value of 3.610, while three more factors have an Eigen Value greater than 2. These first five factors cumulatively explain almost 41% of the variation while 9 more factors are identified with Eigen value above 1; as a result, almost 68% of the variation in the threat perspectives gets explained.

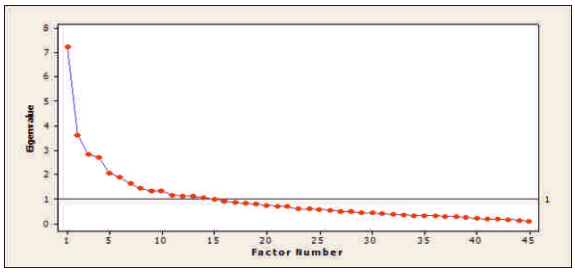

Fig 3: Scree Plot

Source: Computed from field survey, 2018

Table 4: Problems faced by beneficiaries relating to the marketing of the crop (in %)

Nature	Rubber	Horticulture	Tea	MC
Poor rural roads	9.3	9.8	17.9	0
Lack of transport vehicles	13	9.8	20.5	40
High transport cost	17.3	14.6	10.3	20
No refrigerated vans	27.8	22	10.3	60
Lack of market information	26.5	41.5	38.5	20
High Commission	40.1	7.3	20.5	60
Brokers	12.3	-	12.8	40
High marketing cost	50	7.3	28.2	40
Payment delay	6.8	2.4	33.3	0
Price taker	68.5	17.1	79.5	20
Lower price	75.3	31.7	89.7	70
Lack of MSP	72.2	97.6	100	100
Lack of competitive prices	56.8	36.6	84.6	60
Lack of transparency in market transactions	67.9	26.8	82.1	60
Lack of online trading facility	75.3	51.2	94.9	100
No standardisation process for quality check	13.6	19.5	23.1	20

Source: Field survey, 2018

Table 5: Factor Analysis: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.747
Bartlett's Test of Sphericity	Approx. Chi-Square	4725.588
	df	990
	Sig.	.000

Source: Computed from field survey, 2018

The first factor, which explains almost 16% of the variations in the threat perception, has a prominent contribution from components like lack of power, inadequate post-harvest facility, non-existence of cold chain provisions, high price of packing materials, limited storage facility, post payment of subsidy, delays in subsidy payment, high marketing cost, low price, lack of online trading facilities and can be termed as infrastructural (1) factor. The most prominent component of the second factor is the problem related to the need of excessive documentation for financial subsidy, which can termed as a legal (2) factor. For the third factor, irrigation issues are prominent, and the factor itself can be considered as issues relating to irrigation (3). Regarding the fourth factor, inadequate financial facilities and mortgage issues are important positive contributors, which can be considered as monetary (4) factor. For the fifth factor, a high interest rate is the most prominent contributor; therefore, the factor is a rate of interest (5). The sixth factor includes the role of brokers and commissions; therefore, the factor is named as intermediary issues (6). The seventh factor includes delay in payment (7), while lack of awareness (8) about subsidy is the eighth factor and is part of the broader financial factor. Labour (9) issues emerge as the ninth factor, and the tenth factor is related to lack of market information, thus can be termed as the marketing (10) factor. The eleventh factor combines unforeseen household issues, distress sale of property, family challenges, etc. and can be considered as familial (11) factor. The beneficiaries being price takers and having very little control in the market is a challenge, and price (12) can be considered as the twelfth factor. The thirteenth factor emerges from accidents (13), while the final factor arises due to limited awareness and lack of capacity building of the beneficiaries; thus, the fourteenth factor can be called the skill deficiency (14) factor. However, several of these factors, like- irrigation, rate of interest, skill deficiency, and labour, can be considered as part of a broad category of institutional factors.

Further, looking into the commonalties of components, we observe that the top five highest scores are for inadequate amount of support/credit (0.864), mortgage issues (0.843), drought (0.811), water crisis (0.785) and non-existence of cold chain (0.783); whereas, the least commonalities score were for limited modern packing materials (0.522), lack of standardisation (0.530), labour crisis (0.534), accidents (0.540) and low quality of planting materials (0.560). Nonetheless, it can be understood from the above analysis that there are several threat perceptions among the respondents, but they are of varied dimensions. The factor analysis helps us to reduce the listed 45 threats to 14 major groups.

Response Mechanism

Table 7 shows the most prominent response mechanism of the rubber beneficiaries in case of threats and problems that crop up. Even though there have been several dimensions of threats and problems,

Table 6: Identification of Factors

Factors	Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %
1	7.229	16.064	16.064
2	3.610	8.023	24.087
3	2.852	6.337	30.425
4	2.689	5.976	36.400
5	2.050	4.557	40.957
6	1.899	4.219	45.176
7	1.640	3.644	48.820
8	1.439	3.198	52.017
9	1.339	2.975	54.992
10	1.317	2.926	57.919
11	1.162	2.582	60.501
12	1.145	2.545	63.046
13	1.093	2.428	65.474
14	1.036	2.303	67.776
15	0.989	2.199	69.975

Source: Computed from field survey, 2018

the respondents are mostly bothered with problems relating to their economic condition, which increases their livelihood threats, and their responses can be clubbed into four types of strategies.

The first strategy is related to cost saving mechanism based on a conservative approach. Reusing old input material (3.1%), sunlight drying of sheet rubber (1.9%), replacement of hired labour by family labour (4.3%), delaying procurement of new equipment/ implements (0.6%) along with judicious and prudent use of resources (0.6%) constitute the conservative approach and accounts for the survival strategy for 10.5% of the rubber-based rehabilitated beneficiaries. Cost cutting helps in increasing household surplus and helps in their livelihood strategy. The second set of response strategy is related to the production process based on technological and innovation measures. The most prominent response in this regard is to stop the self-processing of rubber sheets (21.6%) and collaborate with other processors to enjoy the benefits of scale. Depositing the rubber latex at the rubber processing centres appeared promising toward minimising the cost and burden of the respondents while being ensured of getting a premium on the first week of the month according to the dried rubber content (DRC) of the deposited latex. On the other hand, there are opinions about initiating self-sheet processing as a strategy by having it at home/farm (4.3%) and purchasing new processing machinery (3.7%). It will supplement as an income source as processing for other private individual cultivators can be done at a rental charge (fee) of Rs. 2 per sheet. The use of fertiliser is, again, an essential strategy. Some (1.3%) believe increased use will enhance production, whereas a few (0.6%) thinks that lesser use will ascertain higher grading of sheets, thereby better prices. There are views that increased production will help in reducing threats; therefore, 1.9% of rubber

Table 7: Strategies adopted by Rubber beneficiaries (in %)

Strategy	Measure	Share	
Conservation	Reuse of old material	3.1	
	Drying in sunlight	1.9	
	Judicious use of resources	0.6	10.5
	Use of Family Labour	4.3	
	Delaying new procurement	0.6	
Production	Purchase of processing machinery	3.7	
	Sheet resize	0.6	
	Sheet at home	4.3	
	Stop Self –processing	21.6	
	More tapping on Sunny days	0.6	35.8
	Increase fertiliser use	1.3	
	Decrease fertiliser use	0.6	
	Lease more area	1.2	
	Replanting	1.9	
Marketing	At Market	20.4	
	In bulk	2.5	
	Selling at home	9.3	
	Weekly selling	1.8	
	Monthly selling	1.2	46.9
	Selling at a stable price	2.5	
	To a particular buyer	0.6	
	Need-based approach	5.5	
	Enquire prevailing prices	3.1	
Financial	Loans & Advances	2.5	
	Supplementary wage work	3.1	6.8
	Alternative Vocations	1.2	

Source: Field Survey 2018

beneficiaries are of the opinion of replanting the lost and ageing trees, while 1.2% would like to lease in more areas for scale efficiency. There are also innovative response strategy suggestions in the form of more intensive tapping during sunny days (0.6%) and altering the thickness of sheet rubber (0.6%). In all, production-based strategy accounts for 35.8% of the rubber beneficiaries.

Marketing-related issues form the third set of response strategies for the rubber beneficiaries. 20.4% of the respondents believe that selling their product at the market directly would fetch them better prices as well as higher returns. Contrary to them, 9.3% believe selling at the farm gate is a better strategy as it reduces transaction costs. Different forms of selling- bulk (2.5%), regular intervals- weekly (1.8%) & monthly (1.2%) also stand as a response against threats by a few. Stability in marketing forms like- particular buyer (0.6%), normal price (2.5%), needs-based approach (5.5%), and market information-based approaches (3.1%) are also strategies against threats. The marketing-based response strategy for survival is the most prominent and accounts for 46.9% of the rubber respondents. 6.8% of the rubber beneficiaries believed in financial strategies to ward off threats and problems, and it includes responses like- loans and advances (2.5%), supplementary wage work (3.1%) and alternative vocations (1.2%). These three measures provide additional current funds, enhancing their financial situations to cover up the crisis.

Similarly, for the horti-cultivators, tea-planters and multi-croppers, we find that the strategies adopted can be subdivided into four similar types for rubber beneficiaries. Table 8 shows that marketing strategies are overwhelmingly dominant for the horti-cultivators (78%) and tea-planters (87%). Selling at the local market is the preferred measure for almost 49% of horticulture beneficiaries, while 29.3% prefer avoiding intermediaries and pursuing direct sales to consumers. Conservative strategies for cutting down costs include using family labour (14.7%) and using bicycles (4.9%) to reduce transportation costs. Among the tea planters, selling leaf to the tea factory directly is preferred by 41% of respondents, while 28.1% prefer selling at the farm gate. 15.3% prefer selling their leaf at the local market. Alternative vocations, use of family labour, use of bicycles, cease production (stop plucking leaves), better maintenance and waiting for a stable price are also response strategies for a few tea planters. Among the multi-croppers, selling the product at the market is the best response mechanism, followed by crop diversification, which is an attempt to boost finances through alternative income. Use of family labour, better maintenance, leasing more area and waiting for price stability are also part of the response strategy of some multi-croppers.

4. DISCUSSION

The indigenous tribes of Tripura were practising shifting cultivation in the past; however, with time, the opportunity to do jhuming is no longer conducive owing to the state's development, lands and forests crisis. The need for jhumias rehabilitation was realised

Table 8: Strategies adopted by horti-cultivators, tea-planters and multi-croppers (in %)

Strategy	Measure	Horticulture	Tea	MC
Conservation	Use of Family Labour	14.7	2.6	10.0
	Using Bicycle	4.9	2.6	-
	TOTAL	19.6	5.2	10.0
Production	Stop Production	-	2.6	-
	Proper Maintenance	-	2.6	10.0
	Leasing more area	-	-	10.0
	TOTAL	-	5.2	20.0
Marketing	Selling at the Market	43.9	15.3	40.0
	Avoiding intermediaries	29.3	-	-
	Selling at Farm gate	2.4	28.1	-
	Waiting for Stable Price	2.4	2.6	10.0
	Selling to the Factory	-	41.0	-
	TOTAL	78.0	87.0	50.0
Financial	Alternative Vocations	-	2.6	-
	Crop Diversification	2.4	-	20.0
	Total	2.4	2.6	20

Source: Field Survey 2018

even during the princely state. Maharaja Bir Bikram prepared the first rehabilitation effort during 1930-1931 by keeping a land area of 28490 hectares at Kalyanpur Reserve to rehabilitate jhumias. After Independence, the state government also began rehabilitating the jhumias through various plantation programmes in collaboration with different departments. The efforts to rehabilitate jhumias were initiated, planned and implemented by the Department of Tribal Welfare, Autonomous District Council, Forest Department, District Administration, Rubber Board and similar agencies, Horticulture Department, Tea Board and the Panchayat. In a nutshell, the rehabilitation programme started during 1953-54 in the southern part of Tripura, focusing on agriculture and other primary sector activities to solve the adverse effects of shifting cultivation. Besides plain land agriculture cultivation, the state government introduced plantation-based rehabilitation through tea, rubber and various horticulture crops; the programmes were more successful than traditional agriculture in the late 1990s.

The plantation sector in Tripura occupies an essential issue in the state's economic growth and development process, which is accentuated by both the public agents and private households. Apart from the government-implemented programme, the jhumias rehabilitation schemes play a crucial role in jhumia tribals' development in the state. The socio-economic characteristics of the respondents show that male household heads were more than female heads; this indicates a patriarchal society. Still, most of them were holding BPL ration cards, showing the family's poor economic condition. Now, their life and standard of living has improved in a significant way.

The study reveals that the degree of difficulties faced by the beneficiaries differed from one plantation to another plantation. However, the common challenges were nearly similar, such as damaged plantations, low quality and tough troubles during plantation development, while some beneficiaries could manage without much difficulty. These beneficiaries were financially secure and always notable individuals at the village level. The leading cause of plant loss at the earlier stage was poor management and insects, which could have been avoided had they been financially better off. Lack of infrastructure and institutional support affects plantation growers' ability to enhance production and income, thereby affecting cultivators' livelihood strategies. Though climatic threats are minimal across rural areas, massive cash cropping may alter the situation soon. Rehabilitated jhumias were entitled to receive financial support and subsidies from the implementing agencies. However, the process of availing money appeared difficult, while information on subsidy eligibility criteria was not known to them. In this regard, the process should have been people-friendly so that everyone could approach it, considering that the rehabilitated jhumias were mostly illiterate or less literate. The assurance of market and transparency in price information determined the financial feasibility of the plantation's crop cultivation. In this case, the growers were the price takers. At the same time, the buyers were the price makers, one-sided information with an imperfect competition market system operating all over the rural markets in the state. Besides, the lack of minimum support prices in crop production was another hindrance.

To address various difficulties, the rehabilitated jhumias adopted different mechanisms differing from crop to crop. The four major strategies adopted by the jhumia beneficiaries include conservation, production, marketing and financial. The conservation approach aims to preserve and properly utilise the resources available to them, and it is a strategy to minimise the cost of production using self-physical resources. A production strategy is a mixed approach that tries to decrease expenditure items related to production in times of lower price while increasing spending in times of rising prices to earn more profit. The marketing system depends on the prevailing local market prices. Furthermore, the selling frequency indicates the financial status of the plantation growers. The final strategy is the financial approach, in which the ambitious beneficiaries diversify crops to earn more income and as a counter-measure of crop failure and market uncertainty. Moreover, many were looking for alternative employment to supplement their income. In a nutshell, these approaches were the survival strategies adopted by the rehabilitated jhumias of Tripura across all the plantation models in the rural areas.

5. CONCLUSION

From the above analysis, there are certain unavoidable difficulties experienced by the respondents, though some feel that none are unconquerable. Often, low quality of planting materials was considered the most prominent problem during the entire rehabilitation process. However, the main factor leading to damage to rubber plantations is a natural act, mainly the strong wind causing rubber trees to break down. The issue of poor management is the primary reason leading to losses for multiple croppers and tea planters. This problem can be reduced by enhancing the technical knowledge of the beneficiaries. For horticulturists, the insect is the most detrimental reason causing plant losses, which can be prevented through timely

monitoring. Infrastructural and institutional challenges are often the major drawbacks of plantation activities, but the degree of impediment varies across the different rehabilitation models. Various factors like proper dissemination of information, inadequate post-harvest facilities, non-existent cold chain system, absence of agro-processing industry, limited storage facility and irrigation emerge as obstructions conceived by the respondents. However, the response to climatic threats appears to be comparatively insignificant, except for increased rainfall, which sometimes affects the regular production process of rubber growers, horticulturists and multi-croppers.

On the other hand, the financial problems are related to mortgage issues and limited knowledge about amount and subsidy. In contrast, common marketing problems related to lack of minimum support price, lack of transparency in transactions, lack of online trading facility, lack of competitive price, and lower price are the concerning issues for the beneficiaries. The various problems and threats considered by the respondents, 45 in number, could be categorised into 14 factors. Of these, factors relating to infrastructure, legal, marketing, monetary and institutional are the prominent ones. The most common response mechanism among the four types of beneficiaries during threats and problems can be clubbed into four strategies. The marketing-based response strategy for sustainability and survival is the most prominent for all the respondents, irrespective of the plantations; it is followed by a production-related strategy. Besides, respondents also get involved in various social organisations as a way out for economic and similar problems.

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