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RESEARCH ARTICLE

Constraints impeding livelihood diversification of farmers in aspirational districts of Bihar

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Abstract: Farmers are facing a major problem of managing livelihood security because of changing environmental condition, globalization, changing economy, and soil fertility that ultimately threatens our food, economic, infrastructure and social security in the long term. Thus, this study attempted to assess the constraints in achieving the livelihood security of farmers using the Garrett ranking method. The research was conducted by interviewing 320 dairy farmers from selected districts Gaya, Khagaria, Sitamarhi and Sheikhpura. In this study different constraints have been identified under sub-headings of economic constraints, infrastructure constraints, marketing constraints, technical constraints and communication constraints. ─The study revealed that the top most economic constraint as reported by the respondent was 'high cost for balanced and nutritious food items' with Garrett mean score of 61.29. Out of seven infrastructure constraints perceived by them, first rank was assigned to the "Poor or underdeveloped marketing infrastructure (mean score 63.80)". "Malpractices by traders" was ranked as first rank by respondents among the various marketing constraints. Whereas "Lack of knowledge for fodder conservation practices during natural calamities" was reported rank one with Garrett mean score of 61.75. Asymptotic significance ($p<0.01$) was obtained from the Friedman test with chi-square value of 22.803 and degrees of freedom of value 4. These limiting constraints are global, comprehensive, integrated, and holistic and beyond the ability of farmers to manage them, thus there is a need for proactive problems-solving by the governmental intervention to overcome them.

Keywords: Livelihood security, Farmers, Diversification, Garrett score, Constraints, Sustainable

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Introduction

In developing countries like India, land-based livelihoods for small and marginalized farmers are becoming increasingly unsustainable as land is no longer able to meet the food and fodder needs of their families (Hiremath, 2007). Because of this poverty rate, the national poverty rate remained at 29.5 percent from 2011 to 2012 (Planning Commission, 2014). The small and marginal holdings constituted 86.21 per cent in 2015-16 while their share in the operated area stood 47.34 per cent in the current census as against 44.31 per cent in 2010-11 (Agriculture Census 2015-16). So, a farmers need to engage in different activities and earn enough to sustain themselves. Livelihood diversification occurs in both agricultural and non-agricultural activities. That is, Production of multiple crops or high value crops. Non-agricultural activities like starting small businesses or choosing non-agricultural livelihoods such as temporary work or migration (Khatun and Roy,2012). The different categories of activities people live for include farming, off-farm, and non-farm sources of income (Saith, 1992). The livestock sector has emerged as a key segment of distended and diversified agricultural sector in the Indian economy. Farmer's dependence on livestock besides farming as an alternative source of income is very high according to (Malathesh et al., 2009). Livestock production provides opportunities for risk coping, farm diversification and intensification as well as providing livelihood benefits to the people and society (Bossio, 2009). Forty percent of the people living below the poverty line are largely dependent on livestock (Rao, 2004). Dey et al. (2012) observed that goat rearing is still to be accepted by all classes of people in Bihar. The vast variety of livelihood diversification tactics employed by rural people underscores the fact that they operate in variety of different environments which are complex and risk prone (Chambers et al.,

1989) are often not able to develop effective strategies to diversify their sources of income due to whelming odds. This part analyzed the odds that needed immediate attention from planners as well as policy makers to secure livelihood of farmers. The odds vary from households to households and region to region. In order to streamline it, a sound strategy needs to be planned to promote large scale livelihood diversification in rural areas. In order to secure people's livelihood, it is imperative to determine the inhibiting factors so that necessary interventions may accordingly be made to create a conducive climate. Having this assumption in view, an attempt was made in this paper to identify the constraints that impede the farmers to diversify their livelihood in selected districts of Bihar.

Methodology

The study was carried out in aspirational districts of Bihar. The set of four districts Gaya, Khagaria, Sitamarhi and Sheikhpura representing different types of agro-climatic, socio-economic conditions, and having lowest per capita agricultural income of the state were selected ~~from all the zones~~ from different agro-climatic zones. Two blocks from each district and two villages from each block were selected randomly. Twenty households of dairy farmers in each village were randomly selected to constitute a total sample size of 320. The constraints in this study refer to economic, communication, infrastructural, technical, and all other factors or forces that may enable, individually or in combination, to prevent farmers from diversifying their livelihoods. Based on the available literature, surveys, and discussions with various stakeholders, a complete list of barriers to diversification was developed and grouped into broad groups based on their nature. These limitations can be broadly classified into: (i) infrastructural, (ii) economical (iii) marketing(iv) technical and(v) communication constraints. A semi-structured questionnaire was developed based upon the information acquired during the explorative research phase, and pre-tested prior to the survey. Garrett's ranking method was used to identify constraints that impede the farmers to diversify their livelihood. Garrett's formula for converting ranks into percent used was:

$$\text{Percent position} = \frac{100 * (Rij - 0.5)}{Nj}$$

Where, Rij = Rank given for i^{th} constraint by j^{th} individual;

Nj = Number of constraints ranked by j^{th} individual.

The per cent position of each rank was converted into scores referring to the table given by Garrett and Woodworth (1969). For each factor, the scores of individual respondents were added together and divided by the total number of the respondents for whom scores were added. Relevant constraints were selected on the basis of secondary and primary data. Alternatively, Kendall's W (Coefficient of Concordance) test was used to examine agreement between subjects and gives a value between 0 and 1. A nonparametric test i.e., Friedman two-way ANOVA by ranks test, as elucidated by Tripathi (2014) was also used to identify the most severe constraints among the five broad constraints faced by dairy farmers by using the following formula of difference between conditions:

$$x^2r1 = \frac{12}{Nn(n+1)} \times \sum R1^2 - 3N(n+1)atdf = n-1$$

N= number of respondents

n= number of broad constraints

$\sum R1^2$= row ranks summed up in each column, squared and then added

Results and Discussion

Economic constraints

The data presented in Table 1, revealed that under economic constraints, the top most constraint as reported by the respondent was 'high cost for balance and ~~nutricious~~ nutritious food items' with Garrett mean score of 61.29 and the second most important constraint reported by the farmers was 'low income from agricultural activities' with Garrett mean score of 60.24. It was mostly due to the problem of water scarcity and lack of irrigation sources in the study area, agricultural production was not up to mark and was responsible for affecting the livelihoods of farmers engaged in agricultural activities which affected the income and diet of respondents. As agriculture is totally dependent on seasonal phenomenon, farmers were facing many natural and unexpected calamities, which they were not expecting, thereby causing heavy losses to them.

Lack of employment opportunity at locality level, low and seasonal agro animal produce that restrict the producer-consumer direct linkage, high charges by veterinarians for treatment of animals, high premiers for livestock insurances as compared to benefits and low prices for the produce in the market was ranked as III, IV, V, VI and VII with Garrett mean score of 59.52, 55.56, 50.48, 46.09 and 42.01 respectively. The cost of agricultural inputs has risen dramatically over time, significantly raising the overall cost of farming and raising livestock; however, prices for various agricultural and livestock products have not increased proportionately, leaving farmers with significant losses in agricultural production. However, the constraint like, high interest rates paid for taking a loan from institutions that lend money was ranked last i.e., VIII with mean score of 39.23.

Infrastructure constraints

Infrastructure is a source of positive externalities in the development process. In fact, the absence of infrastructure is positively related to incidence of poverty. Many studies have found a positive relationship between the level of economic development and the quality of housing, access to basic amenities like electricity, safe drinking water, roads, etc. (Kundu 2009). The data presented in Table 2 depicts the infrastructure constraints and the rank pattern given by the respondents. Out of seven constraints perceived by them, first rank was assigned to the 'poor or underdeveloped marketing infrastructure' (mean score=63.80). Lack of animal vaccination and deworming facilities in the study area was ranked second by the respondents with the mean score of 60.55. There was a lack of proper infrastructural facilities in terms of improper market facilities, due to which farmers were facing problems; and hence, there is a need to improve them in the study area.

Distance of veterinary hospitals and non availability of VO at required time, poor or slow internet connection, poor availability of sources of irrigation facilities, and insufficient power supply was ranked as III, IV, V and VI with Garrett mean scores of 53.15, 48.27, 45.39 and 40.93, respectively. A study concluded that essential infrastructure amenities, such as irrigation supply and, employment possibilities, and market, etc, need to be improved to overcome the constraints faced by small and marginal farmers for improving the overall livelihood security of the farmers. While, Poor infrastructural facilities such as proper road, transportation facilities etc. was ranked VII with mean score of 36.98. These findings were found to be in line with the findings of Brar et. al. (2020). From the given data, it can be inferred that the absence of a good infrastructure creates problem for local dairy farmers to operate their dairy business efficiently and effectively, hence it is necessary to provide them with the basic infrastructural facilities such as training centers, facilities for dairy equipment, facilities for testing milk, facilities for milk storage and preservation, and facilities for disease diagnostics.

Marketing constraints

Marketing is one of the important aspects of running any enterprise nowadays. Organized markets are not yet developed in developing countries like India to sell the farm products, there is no market to supply neither agricultural products to customers, nor agricultural inputs to the farmers. Data in Table 3 depicts that 'malpractices by traders' with Garrett mean score of 63.53 was perceived as most serious marketing constraint and ranked I by the dairy farmers. Delayed payment of the produce to the

Table 1: Distribution of respondents according to Economic Constraints

S. No.	Statements	GMS	Rank
1	Low income from agricultural activities	60.24	II
2	Low prices for the produce in the market	42.01	VII
3	High charges by veterinarians for treatment of animals	50.48	V
4	High premiums for livestock insurances as compared to benefits	46.09	VI
5	High interest rates paid for taking a loan from institutions that lend money	39.23	VIII
6	Low and seasonal agro animal produce that restrict the producer-consumer direct linkage	55.56	IV
7	Lack of employment opportunity at locality level	59.52	III
8	High cost for balanced and nutritious food items	61.29	I

Note- *GMS- Garrett mean score

Table 2: Distribution of respondents according to Infrastructure Constraints

S.No.	Statements	GMS	Rank
1	Poor availability of sources of irrigation facilities	45.39	V
2	Distance of veterinary hospitals & non availability of VO at required time	53.15	III
3	Lack of animal vaccination & deworming facilities in the study area	60.55	II
4	Poor or underdeveloped marketing infrastructure	63.80	I
5	Poor or slow internet connection	48.27	IV
6	Insufficient power supply	40.93	VI
7	Poor infrastructural facilities such as proper roads, transportation facilities etc.	36.98	VII

Note-*GMS- Garrett mean score

producers was ranked II with Garrett mean score of 60.80. The reasons are commission agent exploitation, low prices, lack of transparency in the trading process, collusion among traders, delayed payments, and poor quality of mandi infrastructure. Late payments also forced the respondents to rely on credit and savings from their commission agent and local money lender for their daily expenses.

Distant markets from the rural areas, Lack of market information, Lack of stability in market price of farm produce was ranked as III, IV and V with Garrett mean score of 56.55, 53.48 and 42.47, respectively. Lack of market for selling of milk and live animals was ranked VI by the respondents with Garett mean score of (37.93) as perceived by the dairy farmers. Respondents in the study region were having these constraints since there were no standardized and graded quality of the produce, lack of proper information transfer, malpractices of adulteration of standard and inferior quality of goods and inadequate infrastructure amenities. Thus in order to improve market accessibility embracing new marketing strategies is required, that will help to overcome the constraints faced by the respondents. However according to Lal et al. (2015) the third major constraint was reported to be 'low price for milk in the market' as after calamity many farmers moved their focus towards dairy farming but market did not grow in that proportion.

Technical constraints

The data presented in Table 4 indicates six technical constraints and the rank pattern experienced by the respondents. Out of six constraints perceived by respondents, first rank was assigned to the 'lack of knowledge for fodder conservation practices during natural calamities" (Garrett mean score=61.75). It might be due to many reasons like lack of proper information from extension functionaries/KVKs regarding management of feed and fodder during the natural calamities and respondents were not much aware about the new technologies and techniques in the agricultural and livestock production. The other constraints perceived by the respondents in order of their importance are represented in the table in descending order.

The second rank under technical constraints was assigned to the 'lack of need based non-formal trainings and demonstrations' (mean score=55.61). Lack of knowledge about scientific livestock management practices such as health care, breed improvement and housing, with the mean score of (55.12) was ranked III by the respondents. Lack of visits by EO/VO, distance of veterinary hospitals/KVKs from village, and lack of awareness towards new practices are some of the reasons for poor knowledge of scientific management practices among the respondents. Likewise, lack of training facilities for dairy farming in the locality, lack of extension functionaries and advisory services in the locality, were ranked as IV and V with Garrett mean score of 48.38 and 42.86 respectively. Thus, there should be more organized and frequent trainings for farmers, demonstrations, and visits by the experts and veterinarian in the study area. 'Inadequate awareness on preparing balanced ration feed' was ranked VI with mean score of (38.71). Similarly, a study in Gujarat was conducted by Kathiriya et al. (2014) reported that, more than 70 percent of the respondents had difficulties in getting medical aids, lack of technical knowledge about feed,

Table 3: Distribution of respondents according to Marketing Constraints

S.No.	Statements	GMS	Rank
1	Lack of market information	53.48	IV
2	Malpractices by traders	63.53	I
3	Lack of stability in market price of farm produce	42.47	V
4	Delayed payment of the produce to the producers	60.80	II
5	Distant markets from the rural areas	56.55	III
6	Lack of market for selling of milk and live animals	37.93	VI

Note-*GMS- Garrett mean score

Table 4: Distribution of respondents according to Technical Constraints

S.No.	Statements	GMS	Rank
1	Lack of knowledge for fodder conservation practices during natural calamities	61.75	I
2.	Lack of need based non-formal trainings and demonstrations	55.61	II
3	Lack of knowledge about scientific Livestock management practices such as health care, breed improvement and housing	51.12	III
4	Lack of training facilities for dairy farming in the locality	48.38	IV
5	Lack of extension functionaries and advisory services in the locality	42.86	V
6	Inadequate awareness on preparing balanced ration feed	38.71	VI

Note- *GMS- Garrett mean score

Fig. 1- Mean Rank by Friedman test

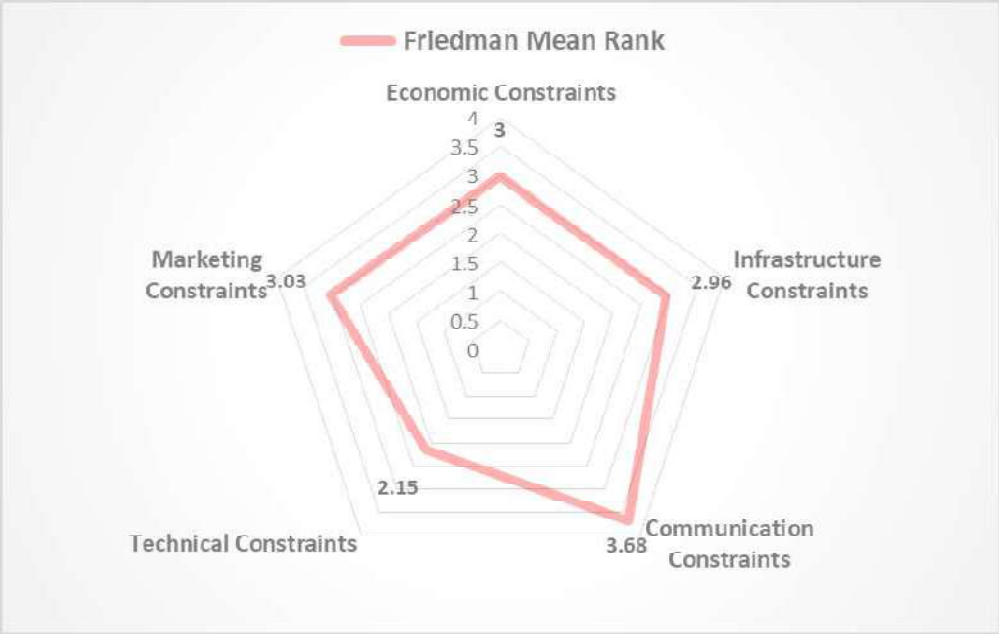

Table 5: Distribution of respondents according to Communication Constraints

S.No.	Statements	GMS	Rank
1	Poor commitment of Govt. functionaries in proper implementation of any schemes in the study area	62.34	I
2	Reluctant interest to learn any new activity of livelihood generation	53.69	III
3	Difficulty to learn term and conditions of credit agency while taking loan	40.55	VII
4	High cost of internet service provider	46.89	V
5	Lack of farmers participation in making various plans and policies	45.12	VI
6	Lack of research-extension linkage among farmers, universities and scientists	51.19	IV
7	Lack of monitoring by extension /KVK personnel in the study area	58.09	II

Table 6: Test Statistics of Friedman test

N	320
Kendall's W[a]	.049
Chi-Square	22.803
Df	4
Asymp. Sig.	.000

a. Kendall's Coefficient of Concordance

fodder and health management, lack of artificial insemination facilities at village level, lack of quality fodder and lack of medicinal facilities in the villages as major constraints in dairy farming.

Communication constraints

Sending a message from a sender to a recipient can be affected in many ways- like emotions, our cultural context, ~~our~~ medium of communication, and even ~~our~~ location. The data presented in Table 5 depicts seven communication constraints experienced and ranked by the respondents. The first rank was assigned to the 'poor commitment of government functionaries in proper implementation of any schemes in the study area' (Garrett mean score=62.34). Some government functionaries were not fair in their implementation while doing some kind of demarcation between the dairy farmers when providing some kind of government facility to them. It was also found that dairy farmers were unaware of recent advances indifferent aspects of dairy. Moreover, there was acute unawareness of government support and subsidies.

Lack of monitoring by extension /KVK personnel in the study area, reluctant interest to learn any new activity of livelihood generation, lack of research-extension linkage among farmer, universities and scientist, high cost of internet service providers and lack of farmers participation in making various plans and policies were ranked as II, III, IV, V and VI with Garrett mean scores of 58.09, 53.69, 51.19, 46.89 and 45.12, respectively. For the improvement of the general living conditions of farmers, the first and most important thing is the "economic motivation" or the "interest to learn" of the farmers themselves to improve their

own living conditions. However, many farmers in the study area lacked this motivation and wanted to continue making a living in the same conditions as before. Therefore, to overcome this limitation, farmers need external motivation and guidance to improve their overall living conditions. While, difficulty to learn term and conditions of credit agency while taking loan was ranked least important constraints VII with Garrett mean score of (40.55) by the respondents.

Result in Table 6 depicts that asymptotic significance ($p<0.01$) was obtained from the Friedman test with chi-square value of 22.803 and 4 degrees of freedom. A value of Kendall's W indicates that all subjects ranked the four methods in the same way and therefore they were in complete agreement. The Kendall's W was 0.049, which signifies a good effect size as well as moderate agreement between subjects on the preferable ordering of the methods, Hence, it can be interpreted that there was significant difference in between the different constraints faced by the dairy farmers.

The Friedman test also identified the most severe broad constraints perceived by dairy farmers. Hence, Figure 1 further revealed that the mean ranks obtained by the use of Friedman test was highest for communication constraints (3.68) which means that it was most severe constraint among all the five constraints. The mean rank of technical constraints was 2.15 which implied that it was the least severe constraints found among all the broad constraints.

Conclusion

The focus of the study was to find out the perceived constraints among dairy farmers in aspirational districts of Bihar, India. The five broad constraints with different numbers of statements under each constraint have been investigated. Friedman test and Garrett ranking were used to identify the most severe constraints and to provide ranking to the identified constraints, while appropriateness of the test was confirmed with the asymptotic significance level. It could be concluded from the above research findings that major constraints as expressed by the dairy farmers which affected their development were poor commitment of government functionaries in proper implementation of any schemes ,Poor or underdeveloped marketing infrastructure, lack of market information and lack of training to improve technical know-how. This pointed out the fact that capacity building of the dairy farmers with respect to sustainable livelihood, it is crucial to have an appropriate policy that gradually encourages and strengthens the relationship between farmers and research institutions. This research recommends the establishment of dairy cooperatives to achieve favorable prices for dairy products and the development of alternative non-farm income sources, as dairy farming alone cannot bring much social recognition to dairy farmers. To further accelerate and sustain the productivity growth in the area, infrastructure development and the growth of rural institutions are crucial.

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