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Relative economics of farmers practicing different farming systems and their impact on livelihood security in Chikkaballapur district of Karnataka

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Abstract
The study was undertaken in Chikkaballapur district of Karnataka state to assess the livelihood security of farmers practicing different farming systems and their relative economics. From Chikkaballapur district two taluks were selected *i.e*., Gowribidanur and Sidlaghatta. Major farming systems in each taluk were identified after thorough discussion with extension professionals of line departments and interaction with farmers and two predominant farming systems were selected from each taluk*i. e*., 'maize+dairy' and 'maize+dairy+horticulture' farming systems from Gauribidanur taluk and 'sericulture+dairy' and 'sericulture+dairy+horticulture' farming systems from Sidlaghatta taluk. For each farming system 30 respondents were selected randomly, constituting the total sample size of 120. A comprehensive scale was developed to measure livelihood security of the farmers practicing different farming systems. The six dimensions were identified under livelihood security namely food and nutritional security, economic, ecological, social, psychological and physical security to assess the farmers livelihood security practicing different farming systems. In case of 'maize + dairy' farming system social security, In case of 'maize + dairy + sericulture' farming system ecological security (67.34%), in case of 'sericulture + dairy' farming system economic security (68.00%) and in case of 'sericulture + dairy + horticulture' farming system ecological security (86.66%, rank I), was ranked I. The highest benefit cost ratio was observed or found in case of 'sericulture+dairy' (1:3) followed by sericulture+dairy+horticulture' (1:2.42), 'maize+dairy+horticulture' (1:2.00) and 'maize+dairy' (1:1.69).

Keywords: Farming system, livelihood security, correlation, path analysis, and benefit cost ratio

Introduction
Indian agriculture is known for its multi-functionalities of providing employment, livelihood, food, nutrient and ecological securities. Indian agriculture employs 58 per cent of the total work force and it is the major source of poverty alleviation, empowerment of the agrarian folk and it is the corner stone of development for India. As a result of sustained efforts food grain production has increased from 50.8 million tons in 1950-51 to 241.56 million tons in 2010-2011 (Harish, 2012) [3].

Traditional farming system used by farmers in India are based on centuries of experiences characterized by mixed farming involving crop production with one or more enterprises like dairy, poultry, sericulture, piggery, sheep, goat, fisheries and bee-keeping. Their main aims were to achieve stability of production, provide subsistence for the family and guard against weather aberration and other environmental stresses.

In recent times it is advocated that farming system that are ecologically, biologically and socio-economically sound not only involve crop production but are also dependent upon their integration with other enterprises like animal production, horticulture and vegetable production etc. At its origin the farming system concept takes care of most important components like soil, water, crops, livestock, labour etc. while assessing the need of farming system approach in Indian context, Swaminathan (1990) [6] described that having attained food security for the nation; the future strategy would necessitate a change in priorities through diversification to encompass farm level horticulture, agro-forestry, animal production and fisheries into the subsistence level-farming avocation. To sustain the natural resources and farm income and also to meet the diversified demand for food, fodder and fuel of increasing population, the adoption of appropriate farming system which suits to the farmers resources are of at most importance.

In India, where majority (78%) of the farming community belongs to small and marginal farmers having only 32.5 per cent of the total operational area, specialized farming may not be viable and sustainable in the long run. The average size of the farm in India has been declining and over 80 million out of 105 million operational holdings are below the size of 1.0 ha.

(Mahapatra and Bapat, 1992) [4] and poses a serious problem in general in India and in Karnataka in particular. The farmers particularly those belonging to small and marginal category are unable to meet both the ends with the income from cropping alone. With gradual decline in farm size, it has become increasingly difficult to produce enough food and other farm produces for the family. The situation is further weakened due to repeated failure of monsoons on one side and on the other side, due to ever increasing population and decline in per capita availability of land. Further, there is hardly any scope for horizontal expansion of land and only vertical expansion is possible by integrating various farm enterprises (Behera *et al* 2001) [2].

Livelihood is the means for people use to support themselves, to survive and to prosper. It is an outcome of how and why people organize to transform the environment to meet their needs through technology, labour, power, knowledge, and social relations.

Livelihoods are also shaped by the broader economic and political systems within which they operate. In general, almost half of the world's population does not have the socio-economic and political means to realize their economic and social rights. One of the major causes of the poverty is the lack of viable livelihoods in the developing world (Mamathalakshmi, 2013) [5]. In this scenario, an attempt was made to analyse the livelihood security of farmers under different farming systems and to assess under which farming system the livelihood security was better in selected area. The present study was undertaken with following objectives:

1. To estimate the relative economics of the farmers under major farming systems.
2. To analyse dimension wise livelihood security of farmers practicing different farming systems.

Materials and Methods

The present investigation was undertaken in Chikkaballapur district of Karnataka during the year 2018-19. These districts were purposively selected due to existence of diversified farming systems that's meant for making comparison. From Chikkaballapur district, two taluks representing different agro ecological conditions were selected. From each taluk, six villages having diversified farming systems has been decided randomly. Consequently, 12 villages from two taluks had been decided for the study.

The ten respondents practicing different farming systems were randomly selected from each village. Hence, the total farmers from 12 villages was 120 ("maize+dairy"-30, "maize+dairy+horticulture"-30, "sericulture+dairy"-30 and "sericulture+dairy+horticulture" -30)

Eighteen independent variables namely, age, education, family size, farming experience, land holding, cropping intensity, irrigation potential, innovative proneness, risk orientation, achievement motivation, management orientation, scientific orientation, mass media exposure, deferred gratification, decision making ability, extension participation, economic motivation and information seeking behaviour were selected for the study. The developed and standardised livelihood security scale was used to quantify the dependent variable (livelihood security). To estimate relative economics the total cost production of each crop, yield obtained per crop, total gross income were considered. Eighteen independent variables selected for the study were quantified by using structured schedule and standardized scale developed by different authors. Personal interview method was followed to collect the data. The data was analysed using mean, standard deviation, correlation and path analysis.

Results and Discussion

The relative economics of major farming systems practiced by farmers in Chikkaballapur is presented in Table 1. The data in the table revealed that in case of 'maize+dairy' farming system, average total cost of production was Rs.17,290.90, gross income was Rs. 29,236.00 and net income was Rs. 11,945. With respect to 'maize+dairy+horticulture' farming system net income was Rs. 81,700 where total cost of production was Rs. 84,300 and gross income was Rs. 1,66,000. The total benefit cost ratio under 'maize+dairy' farming system was 1.69 where benefit cost for maize was 1.44 and for dairy it was 2.50. The total benefit cost ratio under 'maize+dairy+horticulture' farming system was 2.00 where benefit cost for maize was 1.45 for dairy it was 2.68 and for horticulture it was 2.06.

In case of 'sericulture+dairy' farming system, average total cost of production was Rs.30,050.00, gross income was Rs. 90,170.00 and net income was Rs. 60,120.00. With respect to 'sericulture+dairy+horticulture' farming system, net income was Rs. 1,30,600 where total cost of production was Rs. 91,900 and gross income was Rs. 2,22,500. The total benefit cost under 'sericulture+dairy' farming system was 3.00 where benefit cost for sericulture was 2.96 and for dairy it was 3.21. The total benefit cost ratio under 'sericulture+dairy+horticulture' farming system was 2.42 where benefit cost for sericulture was 2.70, for dairy it was 3.04 and for horticulture it was 2.25. The highest benefit cost ratio was observed or found in case of 'sericulture+dairy' (1:3) followed by sericulture+dairy+horticulture' (1:2.42), 'maize+dairy+horticulture' (1:2.00) and 'maize+dairy' (1:1.69). The findings are in accordance with the study reported by Harish (2012) [3].

The probable reason for highest benefit cost ratio in case of 'sericulture+dairy' farming system compared to other farming system was supplementary and complementary nature of dairy and sericulture enterprises results in increased cost of production. Silkworm rearing waste obtained was used to feed dairy animals which is more palatable for animals in turn results in more milk yield with reduced cost of production and higher returns. Further, dairy waste (cow dung and urine) used for preparation of compost which is used for crop production results in reduced cost of production.

Table 1: Relative economics of major farming systems practicing by farmers in Chikkaballapur district in rupees

Farming systems	Crops	Cost of production	Gross income	Net income	B:C ratio
M+D(n=30)	Maize (per acre)	13,200.00	19,000.00	5,800.00	1.44
	Dairy (per cross breed of cow per month)	4,090.90	10,236.00	6,145.00	2.50
	Total	17,290.90	29,236.00	11,945.00	1.69
M+D+H(n=30)	Maize (per acre)	17,600.00	25,400.00	7,800.00	1.44
	Dairy (per cross breed of cow per month)	4,700.00	12,600.00	7,900.00	2.68
	Horticulture (per acre)	62,000.00	1,28,000.00	66,000.00	2.06
	Total	84,300.00	1,66,000.00	81,700.0	2.00
S+D(n=30)	Sericulture (500 DFLs)	25,800.00	76,500.00	50,700.00	2.96

	Dairy (per cross breed of cow per month)	4,250.00	13,670.00	9,420.00	3.21
	Total	30,050.00	90,170.00	60,120.00	3.00
S+D+H(n=30)	Sericulture (500 DFLs)	23,600.00	65,400.00	41,800.00	2.70
	Dairy (per cross breed of cow per month)	4,300.00	13,100.00	8,800.00	3.04
	Horticulture (per ac)	64,000.00	1,44,000.00	80,000.00	2.25
	Total	91,900.00	2,22,500.00	1,30,600.0	2.42

M+D= Maize+Dairy
S+D= Sericulture+Dairy
M+D+H= Maize+Dairy + Horticulture
S+D+H= Sericulture+Dairy+Horticulture

To assess the livelihood security of farmers practicing different farming systems, six dimensions were identified *viz.* food and nutritional security, economic security, ecological security, social security, psychological security and physical security. Dimension-wise analysis of livelihood security of farmers under different farming systems in Chikkaballapur district was done and results are depicted in Table 2 and discussed in the following paragraph.

Table 2: Dimension wise level of livelihood security of the farmers practicing different farming systems in Chikkaballapur district

Sl. No.	Dimensions	Scores	Percentage of scores	Rank
A.	**Maize+dairy farming system (n_1=30)**			
1	Food and nutritional security	86	57.33	V
2	Economic security	80	53.33	VI
3	Ecological security	98	65.33	II
4	Social security	101	67.34	I
5	Psychological security	89	59.34	IV
6	Physical security	93	62.00	III
B.	**Maize+dairy+horticulture farming system (n_2=30)**			
1	Food and nutritional security	95	63.33	III
2	Economic security	98	65.33	II
3	Ecological security	102	68.00	I
4	Social security	91	60.66	IV
5	Psychological security	88	58.66	V
6	Physical security	86	57.33	VI
C.	**Sericulture+Dairy farming system (n_3=30)**			
1	Food and nutritional security	98	65.33	V
2	Economic security	120	80.00	I
3	Ecological security	110	73.33	II
4	Social security	92	61.33	VI
5	Psychological security	102	68.00	IV
6	Physical security	108	72.00	III
D.	**Sericulture+Dairy+Horticulture farming system (n_4=30)**			
1	Food and nutritional security	118	78.66	IV
2	Economic security	125	83.33	II
3	Ecological security	130	86.66	I
4	Social security	120	80.00	III
5	Psychological security	114	76.00	V
6	Physical security	110	73.33	VI

In 'maize + dairy' farming system social security (67.34%, rank I), ecological security (65.33%, rank II), physical security (62.00%, rank III) and psychological security (59.34%, rank IV) were the major dimensions of livelihood security. In case of 'maize + dairy + sericulture' farming system ecological security, (68.00%, rank I), economic security (65.33%, rank II), food and nutritional security (63.33%, rank III) and social security (60.66%, rank IV) were the prime dimensions of livelihood security.

Similarly, in case of 'sericulture + dairy' farming system economic security (80.00%, rank I), ecological security (73.330%, rank II), physical security (72.00%, rank III) and psychological security (68.00%, rank IV) were the chief dimensions of livelihood security. In case of 'sericulture + dairy + horticulture' farming system ecological security (86.66%, rank I), economic security (83.33%, rank II), social security (80.00%, rank III) were the main dimensions of livelihood security.

The probable reason for the above findings might be that ecology is the prime factor which determine the life of all creatures on this earth and ecological resources support the livelihood of living beings. The employment opportunities result in income generation thereby security to lead life. The support and recognition from the society builds confidence and security to life. Construction of new house, purchase of equipment's etc. lead to physical security. Better combination of farming systems helps in development of leadership qualities, self-confidence, trying new ideas in different enterprises.

Path analysis was done to find out a quantitative interpretation of direct and indirect effects of socio-economic characteristics of farmers on their livelihood security. For the purpose of path analysis, the independent variables which were found to be significantly correlated with livelihood security of farmers under different farming systems were selected. The results were provided in the following tables.

In case of 'maize+dairy' farming system, the path analysis of six significant independent variables with livelihood security as dependent variable was carried out. As regards the ranking of variables based on their direct effects on livelihood security is concerned from the Table 3, mass media exposure (X_4) stood first followed by economic motivation (X_6), extension participation (X_5), decision making ability (X_3), education (X_1) and achievement motivation (X_2).

Further ranking of variables based on their indirect effects on livelihood security revealed from Table 3 that, achievement motivation (X_2), mass media exposure (X_4), economic motivation (X_6), extension participation (X_5), decision making ability (X_3) in the order gained first five ranks followed by education (X_1).

Table 3: Direct and indirect effects of selected independent variables on livelihood security of farmers practicing 'Maize+dairy' farming system n_1=30

Sl. No.	Factors	Correlation coefficient (r)	Direct effect	Rank	Indirect effect	Rank
X_1	Education	0.419*	0.030	V	0.001	VI
X_2	Achievement motivation	0.560**	0.026	VI	0.561	I
X_3	Decision making ability	0.527**	0.134	IV	0.049	V
X_4	Mass media exposure	0.503**	0.562	I	0.242	II
X_5	Extension participation	0.497**	0.136	III	0.171	IV
X_6	Economic motivation	0.499**	0.525	II	0.201	III

** Significant at 1 per cent level * Significant at 5 per cent level, Residual effect= 0.407

It could be observed from the Table 3 that mass media exposure exerted higher direct effect occupying first place on livelihood security of the farmers practicing 'maize+dairy' farming system. In respect of indirect effect, achievement motivation emerged as most important variable occupying first place. This may be due to the exposure to mass media will helps in getting new agricultural information and motivate themselves regarding available new agricultural technologies.

In case of 'maize+dairy+horticulture' farming system, the path analysis of nine significant independent variables with livelihood security as dependent variable was carried out. As regards the ranking of variables based on their direct effects on livelihood security is concerned from the Table 4, achievement motivation (X_3) stood first followed by extension participation (X_7), decision making ability (X_5), risk orientation (X_2), management orientation (X_4), information seeking behaviour (X_9),economic motivation (X_8), innovative proneness (X_1) and mass media exposure (X_6).

Further, ranking of variables based on their indirect effects on livelihood security revealed that extension participation (X_7),achievement motivation (X_3), information seeking behaviour (X_9), mass media exposure (X_4), innovative proneness (X_1) in the order gained first five ranks, followed by risk orientation (X_2), management orientation (X_4), economic motivation (X_8) and decision making ability (X_5).

Table 4: Direct and indirect effects of selected independent variables on livelihood security of farmers practicing 'maize+dairy+horticulture' farming system n_2=30

Sl. No.	Factors	Correlation coefficient (r)	Direct effect	Rank	Indirect effect	Rank
X_1	Innovative proneness	0.389*	0.069	VIII	0.241	V
X_2	Risk orientation	0.508*	0.195	IV	0.153	VI
X_3	Achievement motivation	0.458*	0.624	I	0.457	II
X_4	Management orientation	0.365*	0.138	V	0.111	VII
X_5	Decision making ability	0.406*	0.229	III	0.003	IX
X_6	Mass media exposure	0.424*	0.021	IX	0.415	IV
X_7	Extension participation	0.531**	0.511	II	0.525	I
X_8	Economic motivation	0.389*	0.130	VII	0.097	VIII
X_9	Information seeking behaviour	0.430**	0.131	VI	0.438	III

** Significant at 1 per cent level * Significant at 5 per cent level, Residual effect= 0.440

It could be observed from the Table 4 that achievement motivation emerged as higher direct effect occupying first place on livelihood security of the farmers practicing 'maize+dairy+horticulture' farming system. In respect of indirect effect, extension participation emerged as most important variable occupying first place. This may be due to the fact that, since the farmers are highly motivated and have desire for excellence to drive benefits of diversified farming and that encouraged them to participate in extension activities or programmes which enhances better production and economic security of farmers.

In case of 'sericulture+dairy' farming system path analysis of eleven significant independent variables with livelihood securityas dependent variable was carried out. As regards the ranking of variables based on their direct effects on livelihood security is concerned from the Table 5, education (X_1) stood first followed by farming experience (X_2), extension participation (X_9), information seeking behaviour (X_{11}), risk orientation (X_4), management orientation (X_6), achievement motivation(X_5), mass media exposure (X_8), decision making ability (X_7), land holding (X_3) and economic motivation (X_{10}).

Table 5: Direct and indirect effects of selected independent variables on livelihood security of farmers practicing 'sericulture+dairy' farming system n_3=30

Sl. No.	Factors	Correlation coefficient (r)	Direct effect	Rank	Indirect effect	Rank
X_1	Education	0.380*	0.596	I	0.429	II
X_2	Farming experience	0.393**	0.420	II	0.346	III
X_3	Land holding	0.606**	0.075	X	0.027	X
X_4	Risk orientation	0.372**	0.199	V	0.058	IX
X_5	Achievement motivation	0.365**	0.128	VII	0.326	IV
X_6	Management orientation	0.572**	0.152	VI	0.138	VII
X_7	Decision making ability	0.431*	0.096	IX	0.442	I
X_8	Mass media exposure	0.317*	0.124	VIII	0.102	VIII
X_9	Extension participation	0.361*	0.255	III	0.185	VI
X_{10}	Economic motivation	0.438*	0.007	XI	0.005	XI
X_{11}	Information seeking behaviour	0.389**	0.210	IV	0.315	V

** Significant at 1 per cent level * Significant at 5 per cent level, Residual effect= 0.399

Further ranking of variables based on their indirect effects on livelihood security revealed that decision making ability (X_7), education (X_1), farming experience (X_2), achievement motivation (X_5), information seeking behaviour (X_{11}) in that order gained first five ranks followed by extension participation (X_9), management orientation (X_6), mass media exposure (X_8), risk orientation (X_4), land holding (X_3) and economic motivation (X_{10}). The findings are in conformity with Yashodhara, 2015 [7].

It could be observed from the Table 5that, education emerged as higher direct effect occupying first place on livelihood security of the farmers practicing 'sericulture+dairy' farming system. In respect of indirect effect, decision making ability emerged as most important variable occupying first place. This may be due to the education level of the respondents and most of them have better education that lead them to take better decisions regarding farming activities. Hence the farmers are planning more than ten batches of silkworm rearing per year with alternate rearing house to get assured and regular income and employment from their farming.That leads to better livelihood security.

In case of ''sericulture+dairy+horticulture' farming system', the path analysis of thirteen significant independent variables with livelihood security on dependent variable was carried out. As regards the ranking of variables based on their direct effects on livelihood security is concerned from the Table 6, deferred gratification (X_8), stood first followed by cropping intensity (X_2), management orientation (X_6), innovative proneness (X_3), land holding (X_1), information seeking behaviour (X_{13}), mass media exposure (X_{10}), risk orientation (X_4), scientific orientation (X_7), extension participation (X_{11}).

Table 6: Direct and indirect effects of selected independent variables on livelihood security of farmers practicing 'sericulture+dairy+horticulture' farming system n_4=30

Sl. No.	Factors	Correlation coefficient (r)	Direct effect	Rank	Indirect effect	Rank
X_1	Land holding	0.363^{**}	0.285	V	0.102	IX
X_2	Cropping intensity	0.398^{**}	0.503	II	0.108	VIII

X_3	Innovative proneness	0.318*	0.382	IV	0.033	XIII
X_4	Risk orientation	0.411*	0.228	VIII	0.192	V
X_5	Achievement motivation	0.408**	0.165	XI	0.041	XII
X_6	Management orientation	0.373*	0.417	III	0.221	II
X_7	Scientific orientation	0.377*	0.228	IX	0.154	VI
X_8	Deferred gratification	0.301*	0.721	I	0.054	XI
X_9	Decision making ability	0.425**	0.081	XIII	0.109	VII
X_{10}	Mass media exposure	0.472**	0.265	VII	0.196	IV
X_{11}	Extension participation	0.671**	0.166	X	0.252	I
X_{12}	Economic motivation	0.542*	0.100	XII	0.080	X
X_{13}	Information seeking behaviour	0.494*	0.279	VI	0.207	III

** Significant at 1 per cent level * Significant at 5 per cent level, Residual effect= 0.450

Further, ranking of variables based on their indirect effects on livelihood security revealed that extension participation (X_{11}),management orientation (X_6), information seeking behaviour (X_{13}), mass media exposure (X_{10}), risk orientation (X_4) in the order of first five ranks followed by scientific orientation (X_7), decision making ability (X_9), cropping intensity (X_2), land holding (X_1), economic motivation (X_{12}), deferred gratification (X_8), achievement motivation (X_5) and innovative proneness (X_3).

It could be observed from the Table 6 that, deferred gratification emerged as higher direct effect occupying first place on livelihood security of the farmers practicing 'sericulture+dairy+horticulture' farming system. In respect of indirect effect, extension participation emerged as most important variable occupying first place. This may be due to the farmers are good at saving the money and postponing of their present needs to future hence they are belonged to medium level of deferred gratification and comparatively better livelihood by practicing different combination of enterprises and diversified cropping which lead to better cropping intensity.

Conclusion

The different farming systems practiced by farmers have provided effective recycling of produce of one component as input to the other component. It also provided flow of cash to the farmers round the year by way of disposal of milk, vegetables and cocoons. 'Sericulture+dairy' farming system contributed higher proportion to total income with reduced cost of production. So, the economic security dimension of livelihood security ranked first. Hence, 'sericulture+dairy' farming system needs to be popularized among farmers wherever sericulture can be taken up through appropriate extension interventions of developmental departments to strengthen the livelihood security.

References

1. Anonymous. Indian economic survey 2018, Government of India, 2018.
2. Behera UK, Jha KP, Mahapatra IC. Generation of income and employment – A success story, Intensive Agriculture. 2001; 39(7, 8):9-14.
3. Harishkumar HV. Livelihood security of farm households under different farming systems in Kolar District of Karnataka– An Economic Analysis. M.Sc. (Agri.) Thesis (Unpub.), Univ. Agric. Sci., Bangalore, 2012.
4. Mahapatra IC, Bapat SR. Farming systems research: challenges and opportunities. Proceedings of the XII national symposium held at Rajasthan agricultural university, Bikaner from 1992, 382-390.
5. Mamathalakshmi N. An analysis of livelihood security among agricultural labourers in Karnataka. Ph.D. (Agri.) Thesis (Unpub.), Univ. Agric. Sci., Bangalore, 2013.
6. Swaminathan MS. From Stockholm to Riodijaneirio: The road to sustainable agriculture. Monograph No.4, M. S. Swaminathan Research Foundation, Chennai, 1990.
7. Yashodhara B. A Comparative analysis of livelihood status in irrigated and rainfed farming situations in central dry zone of Karnataka. *Ph.D. (Agri.)* Thesis (Unpub.), Univ. Agric. Sci., Bangalore, 2015.