Research Article

Indian Journal of Extension Education
Vol. 59, No. 2 (April–June), 2023, (10-15)

ISSN 0537-1996 (Print)
ISSN 2454-552X (Online)

Economic Performance of Enterprises Promoted under ARYA and Relationship with Entrepreneurial Competencies

M. J. Chandre Gowda[1]*, Rajesh Kumar Rana[2], Partha Prathim Pal[3], Shantanu Kumar Dubey[4], Amrendra Kumar[5], M. S. Meena[6], Randhir Singh[7], R. Bordoloi[8], A. Bhaskaran[9], A. A. Raut[10], T. Rajesh[11], Bagish Kumar[12] and K. Thimmappa[13]

[1]Principal Scientist (Agricultural Extension), ICAR-ATARI, Bengaluru-560024, Karnataka, India; [2]Principal Scientist (Agricultural Economics), ICAR-ATARI, Ludhiana, Punjab, India; [3]Principal Scientist (Agricultural Extension), ICAR-ATARI, Kolkata, West Bengal, India; [4]Director, ICAR-ATARI, Kanpur, Uttar Pradesh, India; [5]Principal Scientist (Horticulture), ICAR-ATARI, Patna, Bihar, India; [6]Principal Scientist (Agricultural Extension), ICAR-ATARI, Jodhpur, Rajasthan, India; [7]Former ADG (AE), Principal Scientist (Agricultural Extension), ICAR-IIWBR, Karnal, Haryana, India; [8]Principal Scientist (Agricultural Extension), ICAR-ATARI, Umiam, Meghalaya, India; [9]Principal Scientist (Soil Science), ICAR-ATARI, Hyderabad, Telangana, India; [10]Scientist (Agricultural Extension), ICAR-ATARI, Jabalpur, Madhya Pradesh, India; [11]Scientist (Agricultural Economics), ICAR-ATARI, Pune, Maharashtra, India; [12]Scientist (Agricultural Extension), ICAR-ATARI, Guwahati, Madhya Pradesh, India; [13]Principal Scientist (Agricultural Economics), ICAR-ATARI, Bengaluru, Karnataka, India
*Corresponding author email id: MJC.Gowda1@icar.gov.in; maravalalu@yahoo.com

ARTICLE INFO

Keywords: Agribusiness, Entrepreneurship, Entrepreneurial competencies, Rural youth, Extension education

http://doi.org/10.48165/IJEE.2023.59203

Conflict of Interest: None

ABSTRACT

Attracting and retaining youth in agriculture (ARYA) is a national programme of Indian Council of Agricultural Research implemented through Krishi Vigyan Kendras (KVKs) since 2016-17. The present investigation was carried out in 2021-22 with a total of 684 rural youth, randomly identified from among the functional units under various enterprises. Among the nine major enterprises promoted under ARYA, performance of poultry units were better in terms of operational duration and total turnover per enterprise despite incurring higher expenditure. Nursery enterprises showed the highest net income per unit and also created maximum assets. On the other hand, benefit-cost ratio was higher in piggery enterprises and per day net income was highest in processing and value addition units. More employment generation was recorded in fish and goat farming enterprises. The results indicated that each of the agri business areas have strengths on different parameters. Besides the choice of enterprises that are locally viable, the entrepreneurial competency of the entrepreneurs was essential to sustain the enterprises. Successful entrepreneurship promotion has the possibilities for attracting and retaining youth in rural areas through technology-supported agribusiness development.

INTRODUCTION

Agriculture, with its allied sectors, is the largest source of livelihoods in India. About 70 percent of its rural households still depend primarily on agriculture for their livelihood (FAO, 2022). Youth involvement is strongly realized for agricultural reform so that it can keep pace with changing global economy. About half of the Indians are under the age of 25, and 65 per cent are under the age of 35 (Census of India, 2011). India's massive youth resource has much to offer to agriculture sector but survey indicates the declining youth participation and preferences in agriculture (NSS, 2021). Channelizing the youth workforce of the country into agriculture sector require strong strategies for attracting and retaining youth in agro-based rural enterprises (Som et al., 2018). Since large number of unemployed rural youth are migrating to cities in search of work, agriculture-based entrepreneurship

Received 24-01-2023; Accepted 13-02-2023

development is an important approach to minimize the outward migration (Singh et al., 2014; Singh et al, 2016; Nain et al., 2019; Ray et al., 2022). Creating and sustaining livelihood opportunities in rural areas is fundamental to retain the youth in agriculture. Scientifically managed and business-oriented farms provide household wellbeing, food security and livelihoods for many millions of people (Proctor & Lucchesi, 2012). Mobilizing the youth for national development is a common phenomenon amongst the western and developing countries (Afande et al., 2015). In India too, several programmes and schemes were launched to mobilize youth to contribute to nation-building and at the same time develop themselves.

The Indian Council of Agricultural Research (ICAR) through its flagship programme of Attracting and Retaining Youth in Agriculture (ARYA) has envisioned a technology-centric and opportunities-driven entrepreneurship promotion. The programme was implemented through 25 Krishi Vigyan Kendras (KVK), spread across 25 States, in the first phase from 2016-17 onwards. The programme strategized to support the existing rural enterprises as well as the potential entrepreneurs through capacity development and technological hand-holding. KVKs considered major agro-based enterprises preferred by rural youth for skill development, extended technical back-stopping for setting up the enterprises and further facilitated with forward/backward linkages to make the enterprises functional. Preliminary pooling of the progress achieved through these programmatic efforts till 2018 (Singh et al., 2019) revealed that large number of youth were trained/oriented towards agri business opportunities and many of them established the enterprises with a reasonable degree of success. Considering the importance of these outcomes on the national goal-setting and policy making, the Division of Agricultural Extension of ICAR thought it apt to take up national level network mode research project to analyse the multi-dimensional implications of ARYA programme. Accordingly, assessment of the impact of ARYA on agri entrepreneurship and alternative livelihoods has been taken up, which also attempts to assess the performance and identify the factors contributing towards establishing and sustainably managing the agri enterprises.

METHODOLOGY

The ARYA project of ICAR was implemented in its first phase across 25 states, covering one district per state. One ARYA Nodal Scientist in each Agricultural Technology Application Research Institute planned the budget, guided KVKs and monitored the implementation. A total of 62 scientists (CCPIs in the research project) in 25 KVKs organized capacity development and extended support for establishing and managing the enterprises by the trained youth. Mushroom, poultry, processing & value addition, nursery and protected cultivation, bee keeping, piggery, goat farming, duck & fisheries, and vermicompost enterprises promoted by at least three KVKs each were considered for the impact assessment. A total of 1366 units, operational for a minimum of one year during research project formulation, were shortlisted for sampling. At the rate of 50 per cent sampling, 684 respondents were randomly identified for the study. These enterprises were initiated at different points of time during 2016-17 to 2019-20 and hence the operational duration varied. There were 176 units functional since 2016-17 (four years), 201 units functional since 2017-18 (three years), 221 units functional since 2018-19 (two years) and 252 units functional for one year. Hence, the data on performance indicators is presented for the entire operational duration per enterprise unit, rather than the usual practice of annual performance. In order to assess the performance of enterprises, the research variables/included are; (i) gross turnover (Rs./enterprise); (ii) gross value of inputs used (Rs./enterprise); (iii) net income (Rs./enterprise); (iv) employment generated (man-days/enterprise); (v) operational duration (days/ enterprise); (vi) benefit-cost ratio; (vii) per day income (Rs./day); and (viii) value of assets created/possessed (Rs./enterprise as on 31.03.2021).

The Basic Scale of Entrepreneurial Competencies (BSEC) developed by Cardenas-Gutierrez et al., (2021) with 14 statements was pre-tested and adapted with minor modifications for assessing the entrepreneurial competencies of the entrepreneurs. Age of the entrepreneurs was taken in terms of completed years. Education level was quantified as illiterate (0), primary (1), higher primary (2), secondary (3), intermediate (4), graduate (5) and post graduate (6). Gender was quantified as men (1) and women (2). From the identified respondents, data were collected on real time basis using the google form by the CCPIs by personally visiting each enterprise. Analysis of variance (ANOVA) was used to compare mean values on each economic performance indicator among the nine enterprises, using the F-distribution. Significant result meant that the nine enterprises on a particular parameter are unequal.

RESULTS AND DISCUSSION

Total number of functional enterprise units year-wise during 2017 to 2020 and the average operational duration during each year are depicted in Figure 1. The cumulative number of functional units increased over the years from 267 during 2017-18 to 684 during 2020-21. The average operational duration of these units increased gradually from 176 days during 2017-18 to 252 days during 2020-21. The slow and steady progress indicates that the agri entrepreneurship promotion is an arduous and time-taking process. Most of these enterprises were taken up by the youth as an additional source of livelihood, besides their regular activities in farming and daily-wage activities.

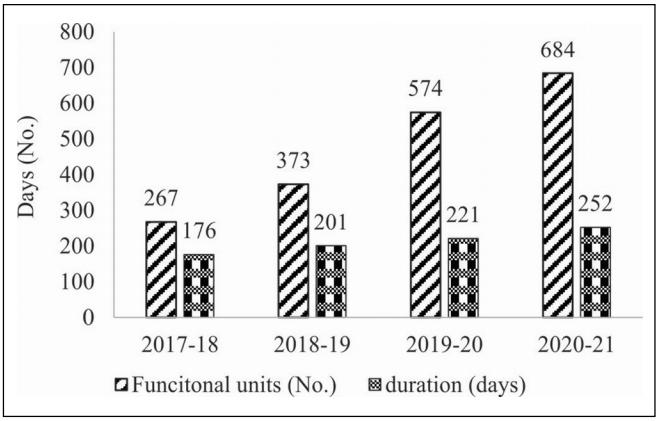

Figure 1. Functional enterprise units (No.) and the average operational duration (days)

The data pertaining to selected performance indicators of the enterprises promoted under ARYA is presented in Table 1. Operational duration varied highly significantly as indicated by F value of 23.63. The enterprise units with the longest operational duration were found in poultry enterprises, closely followed by goat farming enterprises. Nursery/protected cultivation and piggery enterprises were also operational for longer duration than the overall average (616 days). Fish and duck farming, processing and value addition, beekeeping, mushroom and vermicompost functioned for shorter period of time than the overall average operational duration.

Highest turnover per unit was recorded in poultry enterprises with a turnover of Rs. 957459/unit during the period 2017-2020. Among the livestock enterprises, poultry farming has proved to be remunerative business in rural areas. Besides quick turnover, it has the potential to generate large profit (Rath et al., 2015). Poultry enterprises that produce broiler chicken for meat purpose have the capacity to generate income every six weeks. Efficient production units produce 6-7 batches per year, thus ensuring higher turnover compared to other enterprises. Similarly the poultry layer units earn regular income after about six months of establishment period. Poultry farming has been a successful alternative livelihood for smallholder, landless and vulnerable section of people in the countryside (Vetrivel and Chandrakumaramangalam, 2013). The total turnover recorded by nursery (Rs. 911198/unit) and processing and value addition (Rs. 881053/unit) enterprises were on par with poultry. Bee keeping (Rs. 634341/unit) and piggery (Rs. 594044/ unit) enterprises also recorded more than overall average (Rs. 566826/unit) turnover. Mushroom (Rs. 508586/unit), goat (Rs. 372479/unit) and fisheries (Rs. 267683/unit) enterprises had below average turnover. Vermicompost enterprises had the least turnover (Rs. 72163/unit) among all the enterprises. Mean values of gross turnover differed significantly at 1 per cent level with F value of 11.35.

The poultry enterprise units also had the highest expenditure per unit of Rs. 431740. Statistics show that the expenditure made by processing and value addition units (Rs. 395281/unit) was on par with the poultry enterprise. Poultry units not only require initial investment in the form of rearing shed and equipment but also involve expenditure for buying chicks for each batch, feed, medicine and labour. Running the poultry enterprises demand the farmers to spend constantly and the results of the present study reiterate this fact. Small units incur high feed cost and transport cost besides regular expenditure for vaccines and veterinary care services. Nursery and protected cultivation, mushroom and bee-keeping (Rs. 234700/unit) enterprises also recorded higher than the overall average expenditure (Rs. 223800/unit). Least expenditure was incurred by vermicompost (Rs. 19578/unit) and goat farming (Rs. 78157/unit) enterprises. F value of 9.79 confirmed that the mean value of inputs differed significantly at 1 per cent.

Nursery and protected cultivation enterprises (Rs. 607824/ unit) earned highest net income per unit. Nursery enterprises have the potential to generate income every day to nursery entrepreneurs. Production cycle of most of the fruits and vegetable seedlings is very short and hence provide the opportunity for regular income generation. Maintenance of mother-plants block, sourcing of quality seeds and presence of skilled manpower for multiplication/propagation are the major factors of a successful nursery of perennial planting material. The ARYA promoted nursery business units which could spend about Rs. 3 lakh earned a gross income of about Rs. 9 lakh and a net income of Rs. 6 lakh/unit. With a moderate recurring cost, nursery business in rural areas has been able to generate higher net income compared to other enterprises. The demand for quality planting material is on the rise and hence the nursery businesses have developed rapidly in recent years. Nursery business has given way for sustainable income especially to the new entrepreneurs (Singh et al., 2022). Net income recorded by poultry, piggery, processing and value addition and bee keeping enterprises were also significantly higher than the overall average net income (Rs. 343026/unit). Net income from goat farming and mushroom was moderate as the income levels were closer to the mean value. Fish and duck farming and vermicompost enterprises recorded much below the average net income. The performance of nine enterprises on net income was significantly different at 1 per cent level (F value 11.13).

Benefit cost analysis, per day income, employment generation and value of assets created are presented in Table 2. Piggery enterprises with a benefit-cost ratio of 6.37 was the most efficient ARYA enterprise in terms of gross return to gross value of inputs used. Goat farming also proved to be a very economical rural

Table 1. Gross turnover, value of inputs and net income of enterprises under ARYA

Agri Enterprises Promoted under ARYA	Functional units (No.)	Operational duration (days)	Turnover (Rs./ per unit)	Value of inputs used (Rs./ unit)	Net income (Rs./ unit)
Bee keeping	59	479	634341	234700	399641
Fish & duck farming	25	573	267683	188292	79392
Goat farming	93	810	372479	78157	294322
Mushroom	147	474	508586	260561	248025
Nursery & protected cultivation	66	717	911198	303374	607824
Piggery	47	628	594044	93239	500805
Poultry	123	835	957459	431740	525720
Processing & value addition	24	517	881053	395281	485772
Vermicompost	100	416	72163	19578	52585
Total/Average	684	616	566826	223800	343026
F-value		23.63	11.35	9.79	11.13
Sig.		.000	0.00	.00	.00

Table 2. Benefit-cost ratio, per day income, employment generation and assets-worth of the enterprises

Agri Enterprises Promoted under ARYA	BC ratio per enterprise unit	Per Day Income (Rs./day/ enterprise unit)	Employment (man-days) per enterprise unit	Assets value (Rs./ enterprise unit)
Bee Keeping	2.70	834	728	203053
Fish & Duck farming	1.42	139	3211	160296
Goat farming	4.77	363	1299	341781
Mushroom	1.95	523	532	167609
Nursery & Protected cultivation	3.00	848	1068	541001
Piggery	6.37	797	912	494189
Poultry	2.22	630	689	444434
Processing & Value Addition	2.23	940	599	160906
Vermicompost	3.69	126	355	83339
Total/Average	2.53	558	834	289774
F-value	18.17	10.26	24.06	9.77
Sign	.00	.00	.000	.00

enterprise with a benefit-cost ratio of 4.77. Both these enterprises were managed with minimum expenditure (less than Rs. 1.00 lakh/ unit) and hence their profitability was very high. Benefit cost ratio for other enterprises differed significantly at 1 per cent level as indicated by F value of 18.17. Piggery units are found to be profitable as feed resource was better-utilized making it more input-use efficient. Efficiency in pig production could be achieved through scientific management practices for optimum utilization of resources (Raja et al., 2022). Piglet marketing adds to the regularity of fund flow, higher turnover and greater returns to per rupee invested. Operational efficiency could be the key factor for successful pig production (Agri. Farming, 2022). Pig rearing households are staying in close proximity (Sahu & Gupta, 2022) and hence are better managed with feed and veterinary care (Raja et al., 2022). Educated youth have started scientific and commercial pig farming business (RF Roys Farm, 2022) and is compatible and viable with small and marginal farming systems as it can be fed with by-products from crops and household (Gupta et al, 2013; Bharati et al., 2022).

The highest income per day in functional units was observed in processing and value addition (Rs. 940/day) enterprises. Food processing sector is known for its high growth potential. Food processing sector in India is one of the largest in the world with an expected output of $535 billion by 2025-26. India is processing only a fraction of its agricultural output, thus presenting immense opportunities. Annual Survey of Industries 2019-20 estimated that food processing sector contributed 12.22% of total persons engaged in the registered manufacturing sector. Unregistered food processing sector supports employment to 5.1 Mn workers as per the NSSO 73rd Round report. Per day income was also high in nursery, beekeeping and piggery enterprises. Poultry and mushroom enterprises also recorded per day income closer to the overall average income (Rs. 558/day). Per day returns were low in goat farming, fish farming and was least in vermicompost (Rs. 126/day) enterprises and the difference was significant at 1 per cent level (F value 10.26). In some cases, goat, fish and vermicompost enterprises were found to be practiced less intensively, more as subsidiary activities along with regular farming, which was the reason for lower income per day.

Employment generation was the highest for fish and duck farming enterprises followed by goat farming, nursery and piggery enterprises. These enterprises generated greater than the overall average employment generation (834 man-days) among the enterprises promoted under ARYA. Fish farming has the potential to generate employment for self as well as hired manpower in a commercial enterprise unit. The employment generation spreads across its supply chain, value-chain and management activities. Goat farming can generate employment in open grazing as well as semi-intensive and intensive rearing systems. Goat rearing can be practiced in any weather conditions and by all category of landholders including landless farmers. It is particularly profitable in arid/semi-arid and mountainous areas where crop and dairy are not economical (Shivakumara et al., 2017). Goat farming plays an important role in providing self-employment to people (Khillare & Kaushik, 2021; Randhave et al., 2022). Trained unemployed youth could practice scientific farming of sheep and goats for livelihood security (Verma et al., 2021). Crop-based rural enterprises can also support rural livelihoods of tribal women when promoted with adequate planning and participation (Pal et al., 2017; Dagar & Upadhyay, 2022). Below average employment generation was recorded in bee keeping, poultry, processing and value addition, mushroom enterprises and least employment generation in vermicompost (355 man-days) enterprises. Highly significant difference in the employment generation was evident from F value of 24.06.

Nursery and protected cultivation enterprise resulted in creation of more assets (Rs. 541001/unit) per unit. Those enterprises which require proper infrastructure for day to day functioning ought to have higher assets creation. Nurseries can be better managed with quality shade net house, poly house, land to keep the plants at growing stage, for display and selling purpose. The capital investment on nursery was found to be economically viable in terms of net present worth, benefit-cost ratio and Internal Rate of Return (Ashoka et al., 2020). Piggery (Rs. 494189/unit) and goat farming (Rs. 341781/unit) enterprises also accumulated higher assets than the overall average value (Rs. 289774/unit). Livestock enterprises also must have good housing infrastructure to protect animals and birds from environment as well as from

Table 3. Correlation (r) between economic performance and entrepreneurial competencies and personal profile

Economic Performance	Entrepreneurial competencies			Total	Personal profile		
Indicators	Operations and marketing competencies	Socio-business and legal organization competencies	Economic financial competencies	Entrepreneurial competencies	Age	Education	Gender
Operational duration	0.055	0.098	-0.023	0.062	0.036	-0.03	-0.078
Gross Turnover	0.155**	0.146**	0.105	0.169**	0.107*	-0.024	-0.087
Gross value of inputs used	0.159**	0.147**	0.151**	0.185**	0.093	0.018	-0.049
Net Income	0.120*	0.116*	0.046	0.122**	0.097	-0.055	-0.101
BC ratio	-0.065	-0.015	-0.183**	-0.091	0.017	-0.314***	0.027
Employment generation	0.096	0.048	-0.099	0.039	0.02	-0.142**	0.014
Per Day Income	0.132**	0.124**	0.052	0.133**	0.037	-0.071	-0.078
Assets Worth	0.138**	0.133**	0.045	0.137**	0.032	-0.037	-0.120**

*significant at 0.05 level, ** significant at 0.01 level, *** significant at 0.001 level

poaching and preying. Lower level of assets created among mushroom, processing and value addition and vermicomposting units indicate that these enterprises are still implemented at a lower scale of operation. Assets worth differed significantly among the enterprises as reflected by F values (9.77).

Entrepreneurial competencies are the key to the economic performance of enterprises promoted under ARYA (Table 3). Five of the eight performance indicators were positively and significantly correlated with overall entrepreneurial competencies of the entrepreneurs. Operational and marketing competencies and competencies in socio-business and legal organization were positively and significantly correlated with gross turnover, value of inputs used, net income, per day income and assets created. Economic-financial competencies were positively related to gross value of inputs used due to higher investment made on technology and automation in day-to-day functioning of the enterprises. This was the underlying reason for its negative correlation with benefit cost ratio. However this may be the case in the short run, but over the years, entrepreneurs with higher financial competencies hope to perform economically better.

Among the personal factors, age of the entrepreneurs was positively correlated with gross turnover. Education level was negatively correlated with benefit cost ratio and employment generation. More educated entrepreneurs were found to have opted for higher investment on technology, automation, and mechanization in the functioning of the enterprises. Education level of entrepreneurs and their entrepreneurial competencies exhibited similar pattern of association with economic performance indicators indicating strong relationship between the two. Women entrepreneurs had lesser assets creation as indicated by the negative and significant correlation.

CONCLUSION

The results are confirmative of the success of ARYA project in attracting rural youth towards agri entrepreneurship. Planned capacity development both on technological aspects as well on entrepreneurial competencies by KVKs were crucial in establishing and sustaining the enterprises. Nursery, poultry, piggery, processing and value addition have better economic performance potential, and hence could be promoted in a big way. Mushroom, vermicompost and bee-keeping enterprises were established in large numbers, have many advantages, but could not provide substantial economic gains. Future entrepreneurship promotion on these areas has to be planned with lot of care. Individuals with higher entrepreneurial competencies have performed better across the enterprises which are crucial to attract and retain rural youth in agri entrepreneurship. Identifying the potential entrepreneurs on the basis of their entrepreneurial competencies holds the key for greater success of ARYA.

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