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**Impact of ARYA on Promotion
of Agri-preneurship and
Alternative Livelihoods**

Principal Investigator

Dr. M. J. Chandre Gowda

**ICAR-Agricultural Technology
Application Research Institute**

Zone-XI, Hebbal, Bengaluru-560 024



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Principal Investigator

Dr. M.J. Chandre Gowda

ICAR - Agricultural Technology Application Research Institute (ATARI), Bengaluru

Co-Principal Investigators

Dr. P. Adhiguru

Agricultural Extension Division, ICAR, New Delhi

Dr. S.K. Dubey

ICAR - ATARI Kanpur

Dr. Lakhan Singh and Dr. T.Rajesh

ICAR - ATARI Pune

Dr. Amrendra Kumar

ICAR - ATARI Patna

Dr. P.P. Pal

ICAR - ATARI Kolkata

Dr. A. Bhaskaran

ICAR - ATARI Hyderabad

Dr. Rajesh Kumar Rana

ICAR - ATARI Ludhiana

Dr. K. Thimmappa

ICAR - ATARI Bengaluru

Dr. M.S. Meena

ICAR - ATARI Jodhpur

Dr. A.A. Raut

ICAR - ATARI, Jabalpur

Dr. R. Bordoloi

ICAR - ATARI Umiam

Dr. Bagish Kumar

ICAR - ATARI Guwahati



भाकअनुप - कृषि प्रौद्योगिकी अनुप्रयोग अनुसंधान संस्थान
ICAR - Agricultural Technology Application Research Institute
Zone-XI, Hebbal, Bengaluru-560 024

List of CCPIs from 25 KVKs

KVK Bhatinda	Dr. Sarvapriya Singh, Dr. Vinay Singh, Dr. APS Dhaliwal, Dr. (Mrs) Jaswinder Kaur Brar
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KVK Kannur	Dr. Manju K. P
KVK Bengaluru Rural	Dr. A.P. Mallikarjuna Gowda

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IMPACT OF ARYA ON PROMOTION OF AGRI-PRENEURSHIP AND ALTERNATIVE LIVELIHOODS

INTRODUCTION

Entrepreneurship has been recognized as a critical driver of economic growth, job creation, and overall social development. About 42% of youth in India between the age of 14 to 18 years were working, despite most of them were enrolled as students in schools and colleges (ASER, 2018). Out of these, 79% were working in agriculture, mostly on their own family farms, although only 1.2% of them want to continue as farmers.

More inclusive rural transformation is the only possible way to address unemployment and under-employment of youth in rural areas (FAO, 2017). Inclusive agribusiness (Nicky *et al.*, 2019) could contribute to social sustainability through reduced inequalities (Robert *et al.*, 2019). Agribusiness encompasses all operations of farming and related commercial activities (James and Somer, 2021). Small enterprises have proved their relevance to the developing nations (Anil and Ronald, 2005; Ahmad and Zaffer, 2015), particularly to involve bottom of the pyramid producers and consumers (Krishnarao and Stuart, 2008). Small-scale farmers are adapting themselves and have become market-oriented to make their farm activities more profitable (Sharma and Anil, 2022). Entrepreneurship education is considered as a feasible mechanism to reengage rural youth in agriculture (Seth and Grady, 2016). Agriculture has to be made attractive and profitable for attracting youth in agriculture (Santiago *et al.*, 2017). Agricultural entrepreneurship is the key to link on-farm and off-farm activities, for generating non-farm employment and incomes (Dalwai, 2018). India has been pursuing entrepreneurship promotion rigorously, particularly through the “Self-reliant India” drive. National Rural Livelihoods Mission, Make in India, Skill India, Startup India and Mudra Yojana are some of the government-supported programmes for the rural youth to take up the self-employment and entrepreneurial activities.

Agriculture, with its allied sectors, is the largest source of livelihoods in India. About 70 per cent 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 (Anonymous, 2020). India’s massive youth resource has much to offer to agriculture sector but survey indicates the declining youth participation and preferences in agriculture (NSO, 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 development is an important approach to minimize the outward migration (Singh *et al.*, 2014; 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 and 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 100 districts across India 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. The goal was to reach youth who are already in agribusiness or willing to take up new agribusiness ventures. Realizing that functional skills are fundamental for managing successful entrepreneurship (Anil and Ronald, 2005), capacity development of identified rural youth on selected agri-business activities was provided under the project. 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 analyze 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.

Under this scheme, special efforts are being taken up to attract the rural youth under the age of 35 years in agriculture to provide income generating opportunities and engage them in agriculture. The

oriented youth groups may function as role model for other youths by demonstrating the potentiality of the agri-based enterprises and also by imparting training to others. Skill development of rural youth is helping in regaining their confidence levels to pursue farming as a profession, besides generating additional employment opportunities to absorb under employed and unemployed rural youth in secondary agriculture and service related activities in rural areas.

Brief progress of the scheme as per DARE reports (2017-18 to 2022-23) reveal that a total of 2727 skill oriented training programmes were organized on various agro-based industries like mushroom production, fruits and vegetable processing units, horticulture nursery, protected cultivation, fish farming, poultry, goat farming, piggery, duck farming, bee keeping and vermicomposting units etc., under ARYA, benefiting 65661 youth. Among those trained under the project, a total of 14983 entrepreneurial units were established. The rural youth could earn a net income up to Rs. 2,38,000/unit/annum in 2020 which was increased to Rs. 5,39,699/unit/annum in 2022-23. (Source: DARE Reports 2017-18 to 2022-23).

Table I: Progress of ARYA Project from 2017-18 to 2022-23

Year	No. of Programmes Organized (No.)	No. of Youth Trained	No. of Established Units	No. of KVKs
2017-18	92	3897	930	25
2018-19	220	3474	1022	100
2019-20	NA	6487	1949	100
2020-21	783	15796	3350	100
2021-22	775	16812	3387	100
2022-23	857	19213	4340	100
Total	2727	65661	14983	-

Source: DARE Reports 2017-18 to 2022-23

Enterprise areas promoted under ARYA

- ◆ Bee keeping
- ◆ Duck farming
- ◆ Fish hatcheries
- ◆ Goat farming
- ◆ Mushroom production
- ◆ Poultry
- ◆ Piggery
- ◆ Fruits and vegetable nursery
- ◆ Fruits and vegetable processing
- ◆ Vermicomposting
- ◆ Horticulture
- ◆ Commercial floriculture
- ◆ Broiler farming
- ◆ Betel vine cultivation
- ◆ Protected cultivation
- ◆ Turkey farming
- ◆ Large cardamom
- ◆ Pineapple
- ◆ Lac cultivation
- ◆ Value added products of banana and coconut

It is necessary to document the processes that have contributed to sustainable running of agri entrepreneurship under ARYA. The project support in building entrepreneurial, managerial and technical competencies among rural youth and its contribution to the successful management of rural enterprises will form the basis for capacity building of potential entrepreneurs has to be studied. It is important to assess the impact of ARYA trained/supported enterprises on the Livelihood status of youth engaged in agribusiness enterprises across socio-cultural situations in India. Vulnerabilities that prevented the rural youth in acquiring assets reflected in terms of human /financial /physical/ natural and social capital, which in turn affected their livelihood, will be ascertained. The study of socio-economic, situational and institutional factors that contributed for the successful enterprises and indirectly on the livelihood improvement will be useful for replicating the success elsewhere. The development agencies can plan for strengthening such contributing factors so that entrepreneurship among rural youth is facilitated with higher degree of success.

ARYA interventions have enabled large number of youth to take up agri-business opportunities (Singh *et. al.*, 2019). Considering the importance of these interventions and possible outcomes on the national goal-setting and policy making, assessment of the “Impact assessment of ARYA on agri entrepreneurship and alternative livelihood” was designed with major aims of studying the performance of enterprises promoted under the programme during 2017-2020.

Many enterprises fail to follow the desired path and may not have achieved the expected level of progress for various socio-economic, situational and institutional constraints. These detrimental factors need to be studied in great depth to ensure that these are removed from the path of enterprise promotion. The ongoing enterprises and the upcoming entrepreneurs could be educated on the mechanisms in managing such hindering factors. Extent of influence of successful agri-entrepreneurship on others in the social system will provide concrete evidence to show the worth of investment in rural entrepreneurship activities. The cases will serve as the motivating and inspirational material for the future young aspirants in rural entrepreneurship. This study was undertaken with following objectives;

- To assess the performance and identify the factors contributing towards establishing and sustainably managing the agri enterprises under ARYA
- To assess the livelihood status of youth attracted to/engaged in agribusiness enterprises across socio-cultural situations in India
- To ascertain the socio-economic, situational and institutional determinants of the success and failure of enterprises across the value chain segments
- To analyze the influence of successful agri-entrepreneurship on other enterprises/entrepreneurs
- To undertake process documentation of the sustainability of selected enterprises using cross case study approach

REVIEW OF LITERATURE

Agribusiness encompasses all operations of farming and related commercial activities (James and Somer, 2021). Agriculture has to be made attractive and profitable for attracting youth in agriculture (Santiago *et al.*, 2017). Entrepreneurship education is considered as a feasible mechanism to reengage rural youth in agriculture (Seth and Grady, 2016). More inclusive rural transformation is the only possible way to address unemployment and under-employment of youth in rural areas (FAO, 2017). Agricultural entrepreneurship is the key to link on-farm and off-farm activities, for generating non-farm employment and incomes (Dalwai, 2018). 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). About 70 per cent of its rural households still depend primarily on agriculture for their livelihood (FAO, 2022).

The absolute number of farm families in India has been continuously increasing and marginal farmers were the only farm category where proportion of farmers consistently increased (Rajesh *et al.*, 2022).

Small enterprises have proved their relevance to the developing nations (Anil and Ronald, 2005; Ahmad and Zaffer, 2015), particularly to involve bottom of the pyramid producers and consumers (Krishnarao and Stuart, 2008). 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 and Lucchesi, 2012). Mobilizing the youth for national development is a common phenomenon amongst the western and developing countries (Afande *et al.*, 2015). About half of the Indians are under the age of 25, and 65 per cent are under the age of 35 (Anonymous, 2020). India's massive youth resource has much to offer to agriculture sector but survey indicates the declining youth participation and preferences in agriculture (NSO, 2021).

Small-scale farmers are adapting themselves and have become market-oriented to make their farm activities more profitable (Sharma and Anil, 2022). Since large number of unemployed rural youth is migrating to cities in search of work, agriculture-based entrepreneurship development is an important approach to minimize the outward migration (Singh *et al.*, 2014; Ray *et al.*, 2022).

Enterprise-wise performance

Poultry farming has been a successful alternative livelihood for smallholder, landless and vulnerable section of people in the countryside. (Vetrivel and Chandrakumaramangalam, 2013; Rath *et al.*, 2015)

found that 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.

Goat rearing can be practiced in any weather conditions and by all categories 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 and 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 (Dagar and Upadhyay, 2022).

Pig rearing households are staying in close proximity (Sahu and 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 (Bharati *et al.*, 2022).

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). Nursery business has given way for sustainable income especially to the new entrepreneurs (Singh *et al.*, 2022). Nursery enterprises have the potential to generate income every day as production cycle of most of the fruits and vegetable seedlings is very short and hence providing an opportunity for regular income generation (Chandre Gowda *et al.*, 2023).

Rural entrepreneurs need constant support with information on technical, regulatory and financing aspects of their enterprises (Beriya, 2022).

Socio-economic factors

More than the technical features, socio-economic factors were the major reasons for discontinuation of protected agriculture enterprises in Sri Lanka (Madhavi *et al.*, 2014).

Formal education is an integral part of human capital and strengthens an individual's ability to venture into other livelihood options (Asmah, 2011; Eneyew, 2012). Higher education level of entrepreneurs contributed to business growth by increasing the labour force employed and annual turnover (Ricardo and Pradeep, 2011). Formal education adds to entrepreneurs' self-confidence, human capital and thereby enhances entrepreneurship success (Alfredo *et al.*, 2015).

Holding size of the families of the rural entrepreneurs was also an influencing factor. Although strong evidence of the effect of farm size on livelihood diversification have been reported by many (Eneyew, 2012; John *et al.*, 2014), empirical evidences on entrepreneurship among smallholder agriculturists is limited (Edilegnaw *et al.*, 2021).

Women could attain psychological, social, economic and political empowerment through entrepreneurship (Sangeetha *et al.*, 2013; Afaq, 2019) as they perceived it as an opportunity to attain autonomy and reduce dependence (Okpodu *et al.*, 2020). Women entrepreneurship not only alleviate present poverty levels, but also provide a basis for stronger future generation as the income is more likely invested on children's health and education (Blain and Company, 2019).

Inclusive agribusiness (Nicky *et al.*, 2019) could contribute to social sustainability through reduced inequalities (Robert *et al.*, 2019).

Business performance is determined by entrepreneurial competencies of the entrepreneurs (Thomas *et al.*, 2012; Jamie and Oliver, 2020), more so through their ability to harness the opportunities (Mohammad, 2021). Evidences suggest strong relationship between performance of small enterprises and entrepreneurial competencies (Musa *et al.*, 2021) and hence entrepreneurship education (Grace and Rebecca, 2020) that target skill and competency development can be part of the formal education programmes in schools and universities. Considering the constraints under which the rural enterprises operated particularly during COVID related restrictions, economic performance was mainly determined by the entrepreneurial competencies (Kisame *et al.*, 2022). Entrepreneurial competencies are considered as strong predictors of business performance (Marissa and Iydelle, 2022).

The use of smart phones to access digital content on pest and disease management has been found to be critical for the effective management of small-scale enterprises (Yi *et al.*, 2022). Keeping track of technological advancements (Oussama, 2018) is a crucial survival strategy for the entrepreneurs. In particular, young agri-entrepreneurs require information and technical services to establish and expand agri businesses (Yannick, 2020). Access and utilization of information have long-term implications in improving the livelihood through multiple avenues (Wathmanel, 2022).

Human capital is vital for sustainability of small and medium enterprises (Vibha and Saloni 2022).

Reasons for Discontinuation

Small-scale entrepreneurial units run and managed by entrepreneurs themselves as source of family livelihood rather than providing jobs (Kumar and Amandeep, 2023) could be the reason for fewer jobs created.

High mortality of young fishes, slow growth, low yields (Adobor, 2020), and lack of market for poor-sized fishes demotivated the budding aquaculture entrepreneurs. The association of the Wuhan wet market with the COVID-19 pandemic probably had a psychological barrier to fish demand (Bondad-Reantaso *et al.*, 2020). The COVID-19 outbreak severely affected the small-scale fishery enterprises due to low consumer demand, limited market access, and restricted transportation (FAO, 2020). Its effect could be seen on seed- and feed-supply disruptions up to the village level (Bhendarkar *et al.*, 2021).

The discontinued goat-rearing units had the highest difference (87.15%) in income, which demand additional impetus, may be through integration of ongoing government schemes for scaling up the goat farming as profitable venture (Singh *et al.*, 2022).

Processing and value-addition of agricultural produce requires higher initial investment to establish and scale-up. Besides, it becomes difficult for small scale rural agro processing units to produce high-quality products that could meet market standards and compete with established brands (Chandre Gowda *et al.*, 2024)

The discontinued entrepreneurs' lack of knowledge and competencies were among the reasons for business discontinuation (David, 2002; Iuliia *et al.*, 2020). Poor economic conditions and the inability of the entrepreneurs to obtain sufficient quantities of economic resources could precipitate closure of businesses (Osmond, 2023). The discontinued entrepreneurs had smaller landholdings, could not make adequate investment and to meet operational expenditure (Shailaditya and Piyush, 2023). Cost-ineffectiveness and lack of resources are the common reasons for business discontinuation (Terrel and Ivy, 2023). The discontinued entrepreneurs' families were constrained by lower human capital, with a score of 6.85 compared to the functional entrepreneurs' 7.15. Reviews suggest a strong relationship between human capital and entrepreneurship (Fernando *et al.*, 2018).

METHODOLGY

Locale: The following KVKs implementing ARYA project of ICAR in 25 States and Districts constituted the location of the research project:

Zone I:	Punjab - Bhatinda; Himachal Pradesh - Hamirpur; Uttarakhand - Haridwara; J&K - Kathua
Zone II:	Haryana – Gurugram; Rajasthan – Banswara
Zone III:	Uttar Pradesh – Muzaffarnagar
Zone IV:	Bihar - East Champaran; Jharkhand – Gumla
Zone V:	West Bengal – South 24 Parganas; Odisha – Nayagarh
Zone VI:	Assam - Karbi Anglong; Sikkim - North Sikkim
Zone VII:	Manipur – Senapati; Nagaland – Wokha; Mizoram – Lunglei
Zone VIII:	Maharashtra – Nagpur; Gujarat – Rajkot
Zone IX:	Chhattisgarh – Dantewada; Madhya Pradesh – Gwalior
Zone X:	Andhra Pradesh – Nellore; Telangana – Nalgonda; Tamil Nadu – Kanyakumari
Zone XI:	Kerala – Kannur; Karnataka - Bengaluru Rural

Data were elicited from 2773 respondents (both individual and groups) under four categories viz., functional, discontinued, not-started and control (841+406+454+1072). The entrepreneurial units, which were operational for a minimum of one year and were functioning when the research project was formulated during 2021, were the “functional” units (Table 2).

Table 2: Sample details of respondents under “Functional” enterprises

Sl. No.	Enterprise	Individual	Group	Total
1	Bee Keeping	59	16	75
2	Fisheries	25	8	33
3	Goat Farming	93	4	97
4	Mushroom	147	41	188
5	Nursery	66	7	73
6	Piggery	47	22	69
7	Poultry	123	21	144
8	Processing and Value addition	24	38	62
9	Vermicomposting	100	0	100
Total		684	157	841

Those that had functioned for at least one year during 2017-2020, but non-functional at the time of sampling were categorized as “discontinued” units. Responses were collected from 406 **discontinued units**, including 349 individual and 57 group units (Table 3).

Table 3: Sample details of respondents under “Discontinued” enterprises

Sl. No.	Enterprise	Individual	Group	Total
1	Bee Keeping	31	3	34
2	Fisheries	22	3	25
3	Goat Farming	28	1	29
4	Mushroom	71	21	92
5	Nursery	37	1	38
6	Piggery	8	9	17
7	Poultry	95	14	109
8	Processing and Value addition	28	5	33
9	Vermicomposting	29	0	29
Total		349	57	406

Those individuals/groups who got trained but could not start the enterprise were targeted as ‘not-started’. Responses were collected from 454 **Not-started** units, including 433 individuals and 21 groups (Table 4).

Table 4: Sample details of respondents under “Not started” category

Sl. No.	Enterprise	Individual	Group	Data collected
1	Bee Keeping	37	0	37
2	Fisheries	8	2	10
3	Goat Farming	58	0	58
4	Mushroom	73	3	76
5	Nursery	33	0	33
6	Piggery	24	4	28
7	Poultry	87	0	87
8	Processing and Value addition	65	12	77
9	Vermicomposting	40	0	40
10	Others	8	0	8
Total		433	21	454

Those who were not involved in ARYA activities in the same villages where ARYA functional units existed were randomly considered for sampling under ‘control’ category. A total of 1072 individuals served as control. The centre-wise break up of sample size under all the four categories of respondents is given below:

Table 5: Summary of sample details of respondents under all categories

Sl. No.	State	District	Functional	Dis-continued	Not-started	Control	Total
1	AP	Nellore	62	19	0	49	130
2	Assam	Karbi Anglong	10	6	10	18	44
3	Bihar	East Champaran	71	46	21	50	188
4	Chhattisgarh	Dantewada	28	6	7	11	52
5	Gujarat	Rajkot	4	0	10	50	64
6	Haryana	Gurugram	25	27	20	48	120
7	HP	Hamirpur	33	24	0	50	107
8	J&K	Kathua	3	12	25	51	91
9	Jharkhand	Gumla	60	9	15	52	136
10	Karnataka	Bengaluru Rural	35	14	15	50	114
11	Kerala	Kannur	40	15	18	44	117
12	MP	Gwalior	34	6	20	52	112

13	Maharashtra	Nagpur	13	3	27	47	90
14	Manipur	Senapati	48	10	14	50	122
15	Mizoram	Lunglei	32	20	8	46	106
16	Nagaland	Wokha	69	25	36	45	175
17	Odisha	Nayagarh	69	29	16	49	163
18	Punjab	Bhatinda	40	37	39	50	166
19	Rajasthan	Banswara	42	44	26	50	162
20	Sikkim	North Sikkim	12	1	9	44	66
21	Tamil Nadu	Kanyakumari	33	2	25	50	110
22	Telangana	Nalgonda	41	14	60	17	132
23	UP	Muzaffarnagar	3	12	0	3	18
24	Uttarakhand	Haridwara	17	5	15	46	83
25	West Bengal	South 24 Parganas	17	20	18	50	105
Total			841	406	454	1072	2773

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 who planned the budget, guided KVKs and monitored the implementation are considered as Co-PI in the research project. Sixty-two scientists in 25 KVKs organized capacity development and extended support for establishing and managing the enterprises by the trained youth. They were considered as CCPs in the research project. Mushroom, poultry, processing and value addition, nursery, bee keeping, piggery, goat farming, fisheries and vermicomposting enterprises promoted by at least three KVKs each were considered for the impact assessment.

Performance Indicators

Enterprise performance. Each enterprise performance was quantified using the data collected on following parameters:

- (i) Gross turnover (Rs/annum) – year-wise for 2017-18, 2018-19, 2019-20, 2020-21
- (ii) Gross value of inputs used (Rs/annum) – year-wise for 4 years
- (iii) Net income (Rs/annum) - year-wise for 4 years
- (iv) Employment generated (person days/annum) - year-wise for 4 years
- (v) Operational duration (days/annum) - year-wise for 4 years
- (vi) Value of assets created/possessed (Rs.) - year-wise for 4 years
- (vii) Value of loan/debt outstanding at the end of each year (Rs.) - year-wise for 4 years
- (viii) Innovations/ Technologies/ Modern Processes used/adopted
- (ix) Institutional support received (Scheme benefits in kind, cash subsidy, grants etc.)
- (x) Expansion of the enterprise in terms of scale, activities and processes

Data collection Tools:

Besides the secondary sources of data maintained at KVK and by the individual entrepreneurs, memory recall method was used to collect data.

The project team met frequently through virtual meetings to guide each other and ensure progress as per the committed timeline. Project team held 11 meeting during 13 months (12.01.2021, 06.02.2021, 06.03.2021, 29.06.2021, 26.07.2021, 04.08.2021, 27.08.2021, 08.09.2021, 22.11.2021, 15.12.2021 and 09.02.2022) to ensure that progress happened in a network mode. It was decided to develop different set of questionnaires for different respondent categories viz., functional units, discontinued units, not-started and control group and to take up data collection one after the other.

Each CoPI took up the responsibility of developing enterprise-wise questionnaire for eliciting data on 10 parameters to assess the performance of nine enterprises promoted through ARYA. The lead ATARI for each enterprise indicated in the table below, with the help of scientists involved in ARYA project implementation at the ATARI level and KVK level, developed the enterprise-specific questionnaires.

Table 6: Lead ATARI Centres for development of enterprise-specific questionnaire

Sl. No.	Enterprise	Lead ATARI
1	Bee Keeping	Kanpur and Patna
2	Fisheries	Kolkata
3	Goat Farming	Jodhpur
4	Mushroom	Ludhiana
5	Nursery	Pune
6	Piggery	Guwahati and Umiam
7	Poultry	Jabalpur
8	Processing and Value addition	Bengaluru
9	Vermicomposting	Hyderabad

Complete set of questionnaire was adapted for GOOGLE FORMS, using the free online data collection tool by the PI and was circulated among CoPIs for checking and corrections. Several modifications were carried out to simplify the form. The form was pre-tested in all the locations with non-sample units during July 2021.

The final version was used to train the project team members during August 2021. Zone-wise meeting of CCPIs and data enumerators were held on 06.08.2021 (Patna), 10.08.2021 (Jabalpur), 13.08.2021 (Hyderabad and Bengaluru), 16.08.2021 (Pune), and 17.08.2021 (other zones) to sensitize on the newly developed GOOGLE FORMS.

The full team meeting of PI, CoPIs and all the CCPIs was held on 27th August 2021 which approved the questionnaires (attached in Annexures I, II, III and IV) and launched data collection soon after.

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. The scale assessed the operations and marketing (OM) competencies, socio-business and legal organization (SBLO) competencies, and economic and financial (EF) competencies. Overall entrepreneurial-competencies index (ECI) was computed as the percentage of the sum of the actual score under the three components divided by the total possible entrepreneurial-competency score (14).

$$ECI = \sum_{t=1}^n \frac{[(OM) + (SBLO) + (EF)]}{14} \times 100$$

The household-livelihood assessment tool consisting of 28 statements developed by Minh *et al.*, (2019) was used for five-capital based livelihood assessment. There were 10 statements under human capital, eight statements under natural capital, five statements under social capital, three under physical capital and two under financial capital.

The entrepreneurs' age was expressed in terms of completed years. Education level was quantified as illiterate (0), primary (1), higher primary (2), secondary (3), intermediate (4), graduate (5) and postgraduate (6). Gender was expressed as either male (1) or female (2). Information-source use was quantified by assigning a score of 6 for daily contact, 5 for weekly contact, 4 for contact once in a fortnight, 3 for monthly contact, 2 for once in a season, and 1 for contact once in a year. There were 20 information sources, which included local sources, cosmopolitan sources, mass media, ICT and social-media platforms, and the maximum possible score was 120.

Statistical analysis

The t-test was used to ascertain the significance of the differences in the means between functional and discontinued units. The ANOVA was used to assess the differences if any among the enterprises within a response category. Confirmatory Factor analysis was performed to examine the theory that age, education, family size, entrepreneurial competencies and capital determines entrepreneurial ability of the respondents.

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.

Compound Annual Growth Rates (CAGRs) were estimated to compare the rate of growth on different performance indicators in both functional and discontinued units using the following mathematical expression:

$$\begin{aligned}
 Y_t &= Y_0(1+r)^t \\
 \text{or } \ln Y_t &= \ln Y_0 + \ln(1+r)t \\
 \text{or } Y_t &= A + B * t \quad [A = \ln Y_0 \text{ and } B = \ln(1+r)] \\
 r &= \exp(B) - 1
 \end{aligned}$$

Here, r = CAGR; \exp = Exponential value; \ln = Natural log; t = Time period in years for which CAGRs are calculated (Rana *et al.*, 2014).

Confirmatory Factor Analysis was performed using *r* software considering 20 variables. Later on, exploratory factor analysis was performed using principal component analysis with varimax rotation. Factor analysis is a dimension reduction tool used for reducing the large number of highly correlated variables into small number of uncorrelated latent variables. The obtained principal components called as latent variables aptly explain the theory or phenomenon under consideration. The extracted factors and the variables possessing factor loadings of more than 0.5 were used to construct Composite entrepreneurial index. In the construction of index, the variables present in the extracted variables were normalized using the measures “more is better” or “less is better”. Some of the variables if they are relatively higher than it is desirable and converse is true. For instance, education if it is higher, then respondents are assumed to have better entrepreneurial ability. Accordingly, normalization of all the selected variables was performed. The normalized variables were given suitable weights for the construction of composite index. The weights were estimated by dividing the variance explained by the respective factor to the total variance explained by all the extracted factors. The composite entrepreneurial index was considered as a measure of entrepreneurial ability.

The composite entrepreneurial index (CEI) was measured for all the enterprises taken up by the functional and discontinued entrepreneurs. It was hypothesized that CEI varies across enterprises and sample respondents. The influence of entrepreneurial ability on the economic performance indicator like gross returns was assessed by fitting revenue function. No doubt, that revenue being realized varies with the type of enterprise being followed by the respondents. Accordingly, revenue function was estimated considering rural enterprises captured in the form of dummy variables, CEI and total

expenditure incurred on the enterprise. To capture the influence of CEI on enterprise performance of nine categories of rural enterprises, eight dummy variables were employed.

Multiple linear Ordinary Least Squares was followed to examine the influence of independent variables on the desired dependent variable with the following mathematical expression:

$$Y = a + b_1 X_1 + b_2 X_2 + b_3 d_1 + b_4 d_2 + b_5 d_3 + b_6 d_4 + b_7 d_5 + b_8 d_6 + b_9 d_7 + b_{10} d_8$$

Where,

Y is net income of the respondents

X₁ is composite entrepreneurial index

X₂ is expenditure

D₁ is the dummy variable to capture bee keeping

D₂ is the dummy variable to capture fisheries

D₃ is the dummy variable to capture goat farming

D₄ is the dummy variable to capture mushroom farming

D₅ is the dummy variable to capture nursery

D₆ is the dummy variable to capture piggery

D₇ is the dummy variable to capture poultry

D₈ is the dummy variable to capture processing and value addition

Besides the above, following non-parametric tests were applied:

Chi-square test

Kruskal Wallis Test

Mann Whitney U test

PSM technique was employed to analyze the impact of ARYA training on farm income of the sample farmers in the study area. Propensity Score Matching was used to estimate the impact of ARYA on the income of the rural youths. The farmers under functional groups were compared with the farmers in discontinued, not started and control groups.

Propensity score is defined as the probability of treatment assignment conditional on observed baseline characteristics (Rosenbaum et al., 1983). In this technique, each farmer of treated category is matched with the farmer of control category based on the observable covariates. This will facilitate to assign the treatment randomly across the two categories to analyze the average differences in farm income. The covariates include age, education, gender, family size, family members involved in agriculture and cultivated area. Thus, the PSM can be expressed as below.

$$e_i = \Pr(D_i = 1 | X_i)$$

Where, e_i is a propensity score and Pr is the probability of being trained (treated farmer (functional) will receive the value for D_i is equal to '1' and '0' otherwise (discontinued, not-started, control))

conditional on the vector of covariates X_i . Probit model was employed to estimate the predicted probabilities (propensity scores) (Greene, 2003).

$$\Pr(D = 1|X) = G(z) = \int_{-\infty}^{X'\beta} \phi(z) dz = \Phi(X'\beta)$$

Where, $G(z)$ is a function taking values between 0 and 1, ϕ is the standard normal probability density function, z is the vector of covariates and Φ is the standard normal cumulative distribution function.

Balance of covariates

To test the covariate balance of our three propensity score matched samples, we first analyzed kernel density plots of the propensity score and whether the overlap assumption held to assess whether there is balance after matching. A balancing test is normally required after matching to ascertain whether the differences in covariates in the two groups in the matched samples have been eliminated, in which case the matched comparison group can be considered a plausible counterfactual (Ali and Abdulai, 2010). Among the several balancing tests, the most widely used is the standardized mean differences (bias) between treatment and control groups suggested by Rosenbaum and Rubin (1985). In principle, after matching there should be no systematic differences in the distribution of covariates between the groups.

Estimating the causal effect

The computed probabilities are used for matching treated and control categories of farmers by employing four matching algorithms (Mossie, 2022) viz., Nearest Neighbour Matching (NNM), Kernel-Based Matching, Radius Matching (RM) and Stratification matching. From these matching methods, Average Treatment Effect on the Treated (ATT) was computed. ATT represents the effect of the treatment just inside the treatment group. Here ATT is estimated in order to know the impact of ARYA training using the following equation:

ATT is,

$$\alpha = E[Y_i(1)] - E[Y_i(0)]$$

Where,

α = treatment effect (ARYA training)

$E(Y)$ = Expected income

1 = treated (functional), 0 = untreated (discontinued/not-started/control)

i = i^{th} farmer

The difference between Y_i , a randomly allocated member of the treatment group and Y_i , a randomly assigned member of the control group, shows the treatment effect.

RESULTS AND DISCUSSION

I. ENTERPRISES PERFORMANCE

I.I. Functional Enterprises

I.I.1 Functional enterprise units established– year-wise

Total number of functional enterprise units, year-wise during 2017 to 2020 is depicted in Figure I. The cumulative number of functional units increased over the years from 322 during 2017-18 to 841 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 I: Functional enterprise units (No.) established during each year

I.I.2. Operational Duration:

On an average, each functional unit functioned for 179 days during 2017-18, 206 days during 2018-19, 226 days during 2019-20 and 253 days during 2021.

Table 7: Operational duration of the enterprises set up during different years

Year of start	Operational duration (days)			
	2017-18	2018-19	2019-20	2020-21
2017-18	179	202	218	238
2018-19		214	276	282
2019-20			205	258
2020-21				248
Overall	179	206	226	253

Among the various enterprises prompted under ARYA, functional nursery and goat units were operational for longer period than other enterprise in 2017-18 and 2020-21 respectively (Figure 2).

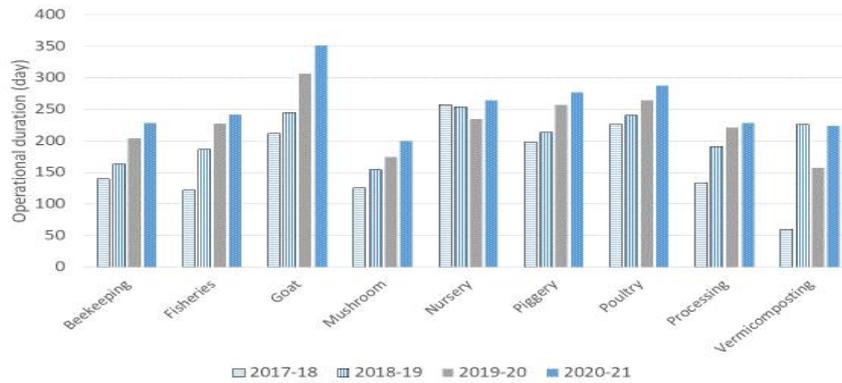


Figure 2: Operational duration (days) of different enterprises

I.1.3. Gross Turnover

It is evident from Figure 3 that, the average gross turnover increased from Rs. 197163 (2017-18) to Rs. 328499 (2020-21). The performance gathered momentum every year as evident from the fact that enterprises which started during 2017-18 progressed to reach a gross turnover of Rs. 430040 during 2020-21 (four years), whereas the enterprises which started during 2018-19 progressed from Rs. 111592 to Rs. 361765 (three years).

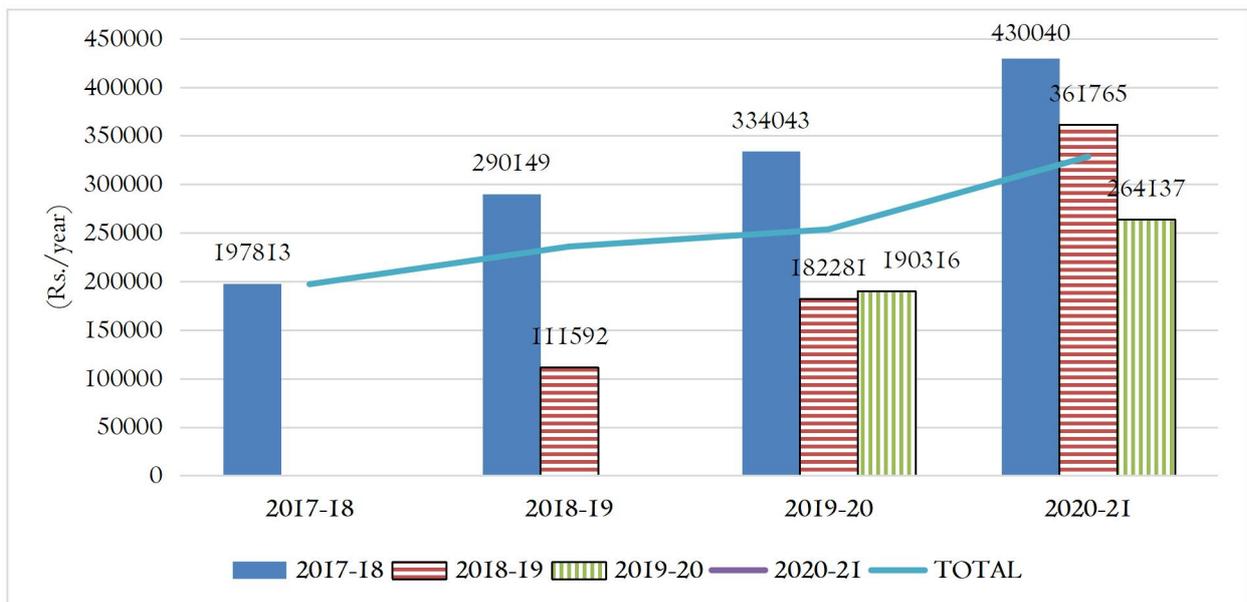


Figure 3: Gross turnover of the functional enterprises

There was huge variation in the gross returns among enterprises (Figure 4). Among the different enterprises, least gross returns were noticed in vermicomposting units.

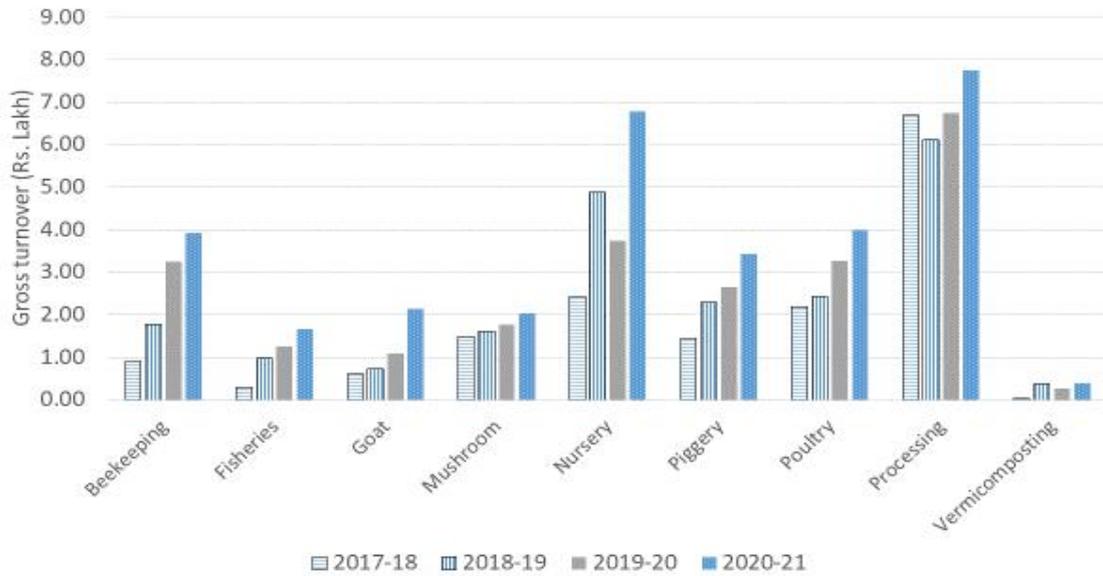


Figure 4: Gross turnover of different category of enterprises

1.1.4. Net Income

Average net income increased from Rs. 0.93 lakh/year during 2017-18 to Rs. 2.3 lakh/year during 2020-21 (Fig 5). The BC ratio values were 1.89, 2.73, 2.91 and 3.28 for 2017-18, 2018-19, 2019-20 and 2020-21, respectively.

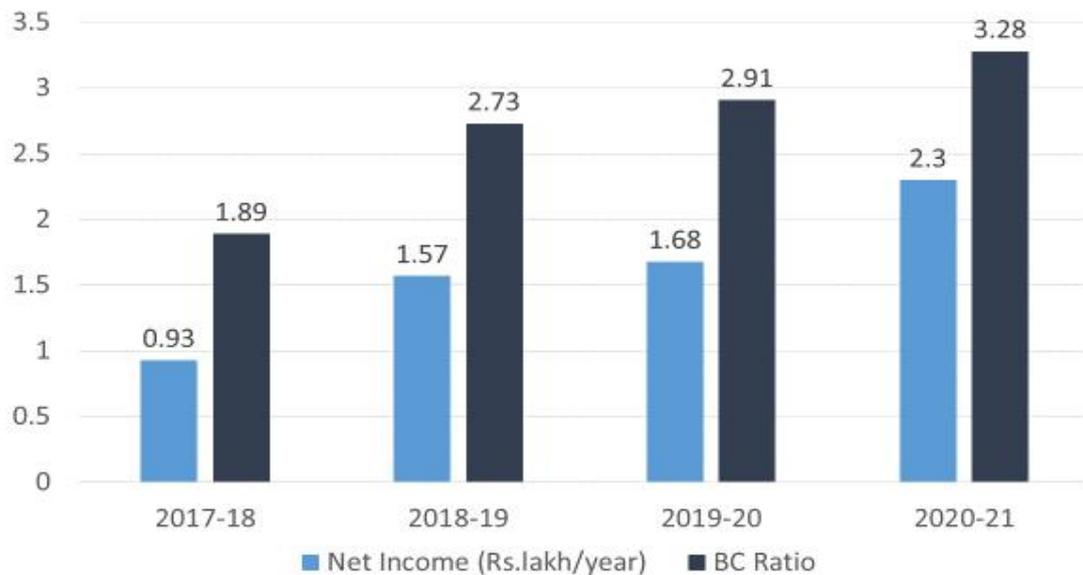


Figure 5: Performance of enterprises on net income and BC ratio over the years

Among the different enterprises promoted under ARYA, processing and value addition units generated highest net income in 2017-18. During 2020-21, nursery units generated higher net income than other enterprises promoted under ARYA (Figure 6).

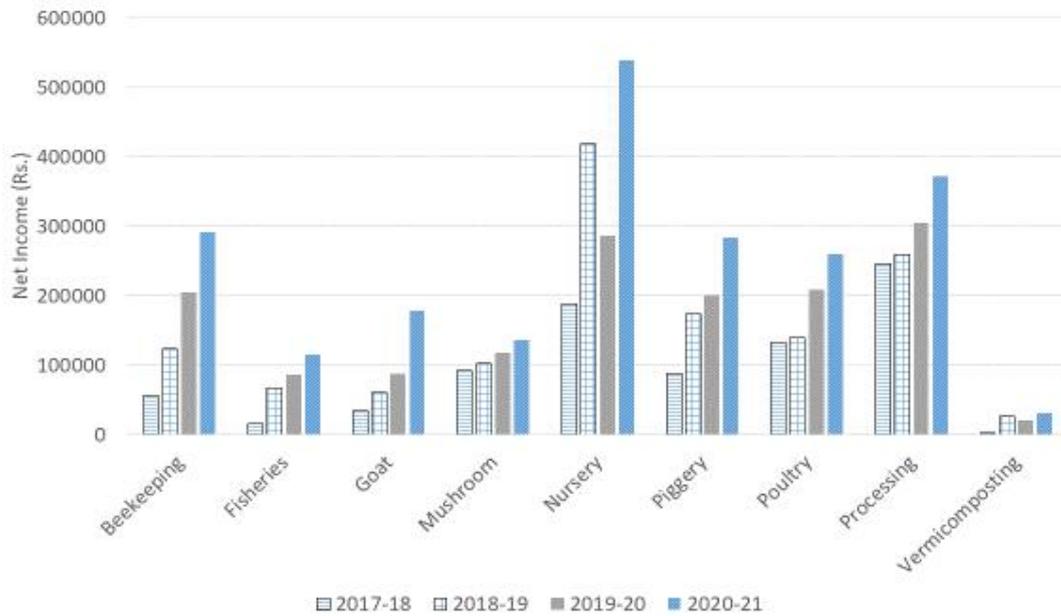


Figure 6: Net Income among different category of enterprises

1.1.5. Employment Generation

Employment generation (person days) increased from 272 during 2017-18 to 352 during 2020-21 (Figure 7). There was an increasing trend over the years. On an average, each enterprise generated about 1.5 days of employment for every operational day of the enterprise.

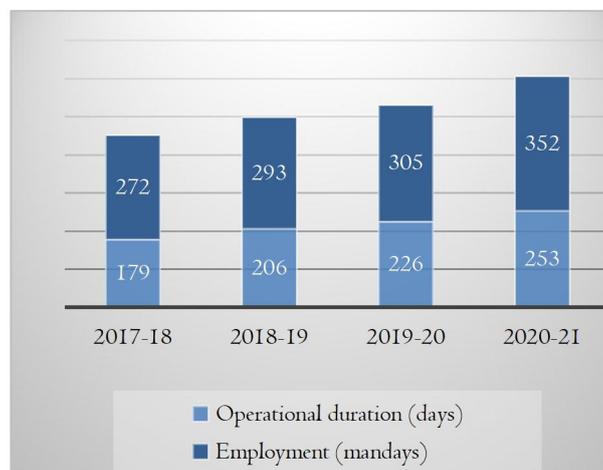


Figure 7: Operational duration (days) and Employment (person days)

1.1.6. External support received by the functional enterprises

About one third of the units received credit support from banks and cooperatives. About 21 per cent of the units received subsidy support available under ongoing schemes of the central/state governments. About 63 per cent of the enterprises received grants in kind under ARYA project. Almost every unit (96.6 %) invested from their own sources to establish and run the enterprises. The value of support

received under ARYA was to the tune of Rs.52030, whereas the amount of subsidy availed was Rs. 113383 and the credit support was to the extent of Rs.146061.

1.1.7. Comparison of Group and Individual enterprises

The group units were functional for longer duration and generated higher average gross turn over than individual units (Figure 8 & 9). In 2020-21, group and individual enterprises were operational for 361 and 251 days respectively. Further, the average gross turnover of group units has increased from Rs. 420986 (2017-18) to Rs. 652364 (2020-21). In 2020-21, the average gross turnover of individual functional units was Rs. 25, 42,053. Group units generated more employment 268 to 423 person days during 2017-18 to 2020-21 as compared to 276 to 336 person days for individual units. Employment generation was highest with fisheries (868 person days) and goat farming (525 person days) during 2020-21 compared to other enterprises.

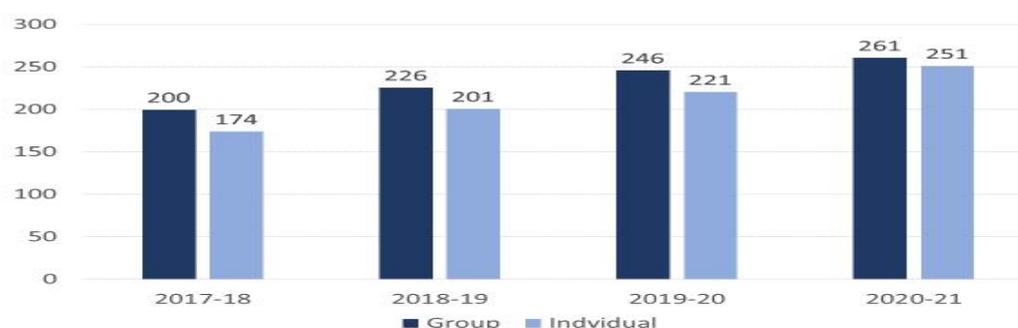


Figure 8: Operational duration (days) of group and individual enterprises

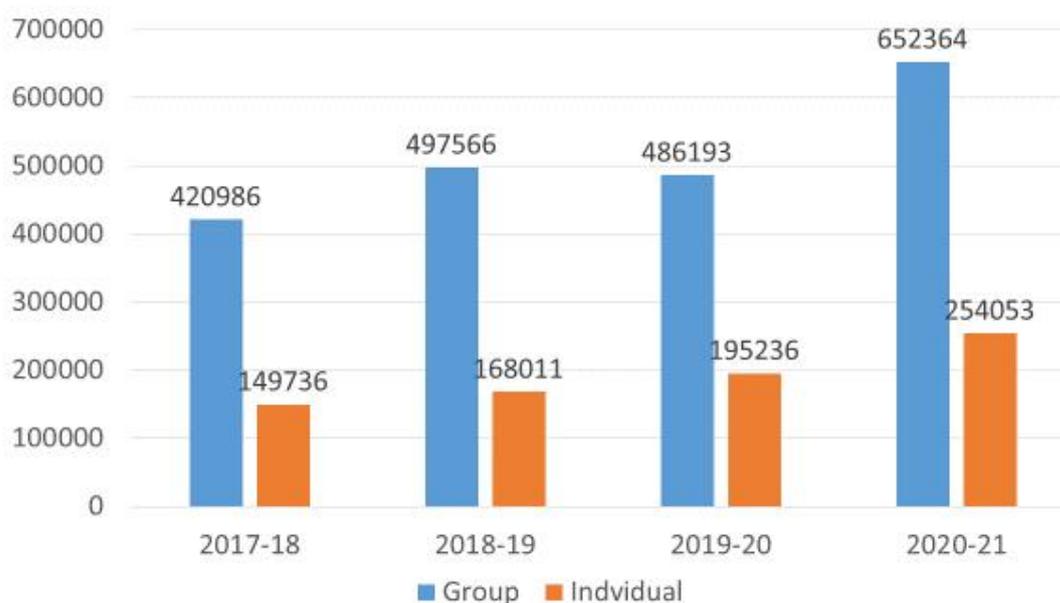


Figure 9: Differences in gross turnover (Rs./year) of group and individual functional enterprises

The performance matrix given below highlights the fact that Processing and value addition enterprises were better off as group activity, as group processing and value addition units performed consistently better than individual units on all performance indicators on all years. Fisheries and piggery activities can also perform better as group enterprise. On the other extreme, mushroom enterprise was successful more as individual activity rather than a group activity (Table 8).

Table 8: Performance matrix of group and individual units across enterprises and regions

Performance of group vis-à-vis individual units	Performance indicators			
	Operational duration	Gross turnover	Expenditure	Employment generation
More than individual enterprises all years	Fisheries Piggery Processing and value addition	Fisheries Piggery Nursery Processing and value addition	Bee Keeping Fisheries Nursery Piggery Processing and value addition	Processing and value addition
Less than individual enterprises all years	Mushroom Poultry	Mushroom	Mushroom	Fisheries Nursery Piggery
Initially lower than individual units but increased later years	Bee Keeping Nursery	Bee Keeping Poultry	Poultry	Bee keeping Mushroom Poultry

As depicted in Table 9, group activities were functional for more duration (maximum of 948 operational days per unit by fisheries enterprises), compared to a maximum of 835 days/unit for individual enterprises (poultry). The difference in gross turnover between group and individual units was highest for nursery units (Rs. 5030802/unit), but it was contrary for goat farming where individual enterprises were more income generating (Rs. 224678/unit) compared to group activity. Despite higher total expenses of Rs. 431752, individual poultry units generated higher gross returns (Rs. 957459/unit), and among group units, greater total expenses were noticed in processing and value addition units (Rs. 1914033/unit).

Table 9: Comparison of performance of individual and group enterprises

Enterprise	Total operational duration (days/unit)		Difference	Total gross turnover (Rs./unit)		Difference	Total expenses (Rs./unit)		Difference
	I	G		I	G		I	G	
Bee Keeping	479	684	205	634349	1292588	658247	234801	583194	348393
Fisheries	573	948	374	267683	716376	448693	188292	238565	50274
Goat farming	810	651	-159	372479	147800	-224678	78157	69375	-8782
Mushroom	474	495	21	508586	449259	-59327	260561	82898	-177663
Nursery	717	874	157	911198	5942000	5030802	303374	1583107	1279733
Piggery	628	931	303	594044	1131295	537251	97580	450746	353167
Poultry	835	742	-93	957459	1148381	190922	431752	622413	190660
Processing and Value addition	517	680	163	881053	2820787	1939735	395281	1914033	1518752

Note: I-Individual, G-Group

Data in Table 10 on total investment revealed that nursery units had to invest more (Rs. 496936/unit) and beekeeping (Rs. 610625/unit) among the individual and group enterprises respectively. Group mushroom enterprises were operational for shorter duration (495days/unit) (Table 9), but generated more employment (1276 man days/unit) among the functional group enterprises.

Table 10: Comparison of performance of individual and group enterprises

Enterprise	Total investment (Rs./unit)		Difference	Total employment (man days/unit)		Difference
	Individual	Group		Individual	Group	
Bee Keeping	116609	610625	494016	728	1254	526
Fisheries	127087	47988	-79099	3211	794	-2417
Goat farming	114605	99500	-15106	1299	437	-863
Mushroom	164214	101144	-63070	532	1276	744
Nursery	496936	344643	-152293	1068	828	-240
Piggery	77069	166795	89726	912	751	-161
Poultry	255875	212238	-43637	689	801	113
Processing and Value addition	189844	418000	228156	599	1230	631

1.2. Discontinued Enterprises

When enterprise-wise discontinuation was examined, 34% overall discontinuation rate was found on the basis of total business units started under the ARYA project (Table II). Piggery enterprises were the least discontinued (14.55%), followed by vermicomposting (22.48%) and goat-farming (23.14%) units. The highest proportion of discontinued business units was in processing and value addition (53.85%), followed by fisheries (46.81%). Among the primary reasons for discontinuing the processing and value-addition enterprises was the lack of market for the products. Many enterprise units could not sell their quality products against the cheaper products available in the markets. COVID was a factor for many enterprises to close temporarily and some of them were willing to start again later.

Table II: Distribution of respondents under discontinued enterprises

Enterprises	Discontinued units (No.)	Discontinuation Level (%)
Processing and Value addition	28	53.85
Fisheries	22	46.81
Poultry	95	43.58
Nursery	37	35.92
Bee Keeping	31	34.44
Mushroom	71	32.57
Goat farming	28	23.14
Vermicomposting	29	22.48
Piggery	8	14.55
Total	349	33.79

1.2.1. Comparative difference in performance indicators between functional and discontinued enterprise

Performance in terms of operational duration and employment generation (Table 12) indicated wide variation both within the group and between the two groups. Within the functional group, poultry, goat farming, nursery and piggery activities showed sustained performance through longer operational duration and higher employment generation. The longer an enterprise operated, the more it could establish its market presence, built a customer base and generated greater revenue. A longer operational duration also allowed an enterprise to gain experience, expedite operations, and adapt to changing market conditions. Sustaining the operations by successfully passing through the COVID disturbances was the key differentiating indicator between the functional and discontinued units. Functional units (616 days per unit) functioned almost double the duration compared to discontinued units (313 days per unit) during the period 2017 to 2021. Except for the piggery enterprises (511 days per unit), all the discontinued enterprises were in operation for less duration than the shortest period of operation among functional enterprises (vermicomposting, 416 days per unit). The discontinuation level for the

operational duration was highest between the fisheries enterprises (75.92%), followed by processing and value addition (62.86%).

Table 12: Differences in performance indicators within the enterprises and between the groups

Enterprises	Operational duration (days/unit)		Employment generation (person-days/unit)		Gross turnover (Rs./unit)		Net income (Rs./unit)	
	F	D	F	D	F	D	F	D
Poultry	835	403	689	377	957459	179147	525720	91616
Goat farming	810	399	1299	375	372479	62627	294322	37824
Nursery	717	348	1068	472	911198	250419	607824	182692
Piggery	628	511	912	507	594044	148438	500805	98300
Fisheries	573	138	3211	387	267683	60227	79392	23543
Processing and Value addition	517	192	599	143	881053	156323	485772	105686
Beekeeping	479	295	728	272	634341	119438	399641	52995
Mushroom	474	243	532	181	508586	137915	248025	78730
Vermicomposting	416	276	355	225	72163	41741	52585	26992
Average	616	313	834	310	566826	142214	343026	82525
t value	16.95**		10.05**		12.28**		10.23**	
F value	92.54**		54.00**		113.74**		98.68**	

Note: F-Functional, D-Discontinued; ** Significant at one per cent level

The functional units performed significantly better in employment generation also, as indicated by the large difference of nearly three times compared to discontinued units. The functional units could generate 834 person-days of employment per unit as compared to only 310 person-days of employment per unit among discontinued units (Table 12). The discontinued enterprises in piggery could do better to generate 507 person-days of employment/unit, and thus performed more comparably (with just a loss of 44.41% person-days of employment) to the functional piggery enterprises. Poultry enterprises also showed a smaller difference (45.28%) due to better performance in both functional (689 person-days/unit) and discontinued units (377 person-days/unit). The highest difference in employment generation was recorded in fisheries (87.95%) enterprises. Small-scale entrepreneurial units run and managed by entrepreneurs themselves as source of family livelihood rather than providing jobs (Kumar and Amandeep, 2023) could be the reason for fewer jobs created. Mushroom enterprises also showed wider differences in employment generation between the discontinued (181 person-days/unit) and functional units (532 person-days/unit). The sub-optimal size of the discontinued mushroom units could be a key indicator of low performance (Shirur *et al.*, 2018).

Functional units performed the best on economic parameters, with average gross turnover (Rs. 566826/unit) being four times greater than the discontinued units (Rs. 142214/unit) and the average net income being 4.15 times more than the discontinued units. Sound economic performance is critical

for the survival of agribusiness enterprises. The poultry units generated the highest gross turnover (Rs. 957459/unit) among the functional units. In case of the discontinued units, nursery enterprises generated the highest average gross turnover (Rs. 250419/unit), although it was 72.52% lower than that of the functional units. The difference in average gross turnover between the functional and discontinued groups was the highest in goat farming (83.19%). In the study district of Banswara (Rajasthan state), the discontinued goat-farming enterprises depended mainly on pastureland grazing, which led to a slower growth rate, reduced body-weight gain and lower turnover.

The extent of the difference in gross turnover between the discontinued and functional enterprises was also high in processing and value addition (82.26%). Processing and value-addition enterprises required capital to establish and scale up. It was challenging the small-scale enterprises to produce high-quality value-added products that could meet market standards and compete with established brands. Small businesses face difficulty in achieving sufficient market share (Osmond, 2023) where the number of companies in the economic market for consumers is high.

The difference between functional and discontinued units was least among vermicomposting enterprises due to the extremely low performance by both functional and discontinued units. Vermicomposting enterprise units were smaller in scale of operation than other enterprises, resulting in the least employment generation and revenue among all other studied enterprises.

After discounting the gross value of inputs used to arrive at net income per unit, the differences were further widened in favour of functional units (Rs. 343026/unit) as discontinued units could only earn net income of less than one hundred thousand rupees (Rs. 82525/unit). Nursery enterprises generated the highest net income per unit both in the functional (Rs. 607824/unit) and in discontinued (Rs. 182692/unit) groups, and hence the net difference was less (69.94%). The discontinued goat-rearing units had the highest difference (87.15%) in income, which demand additional impetus, may be through integration of ongoing government schemes for scaling up the goat farming as profitable venture (Singh *et al.*, 2022). The discontinued bee-keeping units also generated lower net income and reported wider difference (86.74%) compared to functional units. Beekeeping units suffered from variety of reasons such as migration of colonies and destruction due to heavy rains in Kerala state and destruction by wild rock-bee in Jharkhand state. Cost-ineffectiveness and lack of resources are the common reasons for business discontinuation (Hanna and Wigmore, 2023). Poor economic conditions and the inability of the entrepreneurs to obtain sufficient quantities of economic resources could precipitate closure of businesses (Osmond, 2023). This reiterates the importance of sustained economic performance for the survival of agribusiness enterprises.

1.2.2. Differences in growth rate:

The year-on-year comparison of the performance of functional and discontinued enterprises reveals crucial insights into the progressive growth or decline of the entrepreneurial activities (Figure 10). The Compound Annual Growth Rate (CAGR) for the functional units was positive, while the growth rate for the discontinued units was negative on all parameters. The functional units survived and sustained themselves slowly but steadily in the first three years, survived the COVID testing times and showed the signs of take-off in the fourth year. In contrast, the discontinued enterprises exhibited signs of failure from the very beginning, as the difference was visible right from the first year. The discontinued enterprises struggled to survive during second and third years and succumbed under the COVID influence.

The Compound Annual Growth Rates (CAGRs) of different attributes of functional and discontinued enterprise units is presented in Table 13. The difference in operational duration widened from 84 days in the first year to 229 days in the fourth year, as the average operational duration among the functional units rose gradually. The operational duration of functional units increased at a 12.43% CAGR during 2017-18 and 2020-21. This is a true reflection on the tenacity of successful agri-entrepreneurship despite COVID induced turbulences. Small-scale enterprises play an important role in generating employment at a comparatively lower capital cost (Ahmad and Zaffer, 2015). However, the corresponding CAGR of discontinued units was (-) 34.69%.

The employment-generation gap widened from 190 person-days in the first year to 310 person-days in the fourth year. The difference was three times in the first year but more than 12 times in the fourth year. The CAGRs of employment generation in terms of human days was 6.58% while the corresponding CAGR for discontinued units was (-) 30.13%.

Gross turnover among the functional units increased from Rs. 149736/unit during the first year to Rs. 255341/unit in the fourth year, showing a CAGR of 19.21%, whereas the discontinued units performed poorly and the gross turnover declined from Rs. 40044/unit to Rs. 11433/unit over the period of four years. The average gross income of the discontinued units fell at a CAGR of (-) 30.88%.

The difference in the average expenditure between the functional and discontinued units grew from approximately four times in the first year to more than 20 times in the fourth year. The discontinued enterprises tried to sustain their businesses through stable expenditure during the first three years; however, the expenses fell drastically in the fourth year. The CAGR of per unit expenditure during

2017-18 and 2020-21 was 12.95% of functional units, while this estimate for discontinued business units was (-) 30.01%.

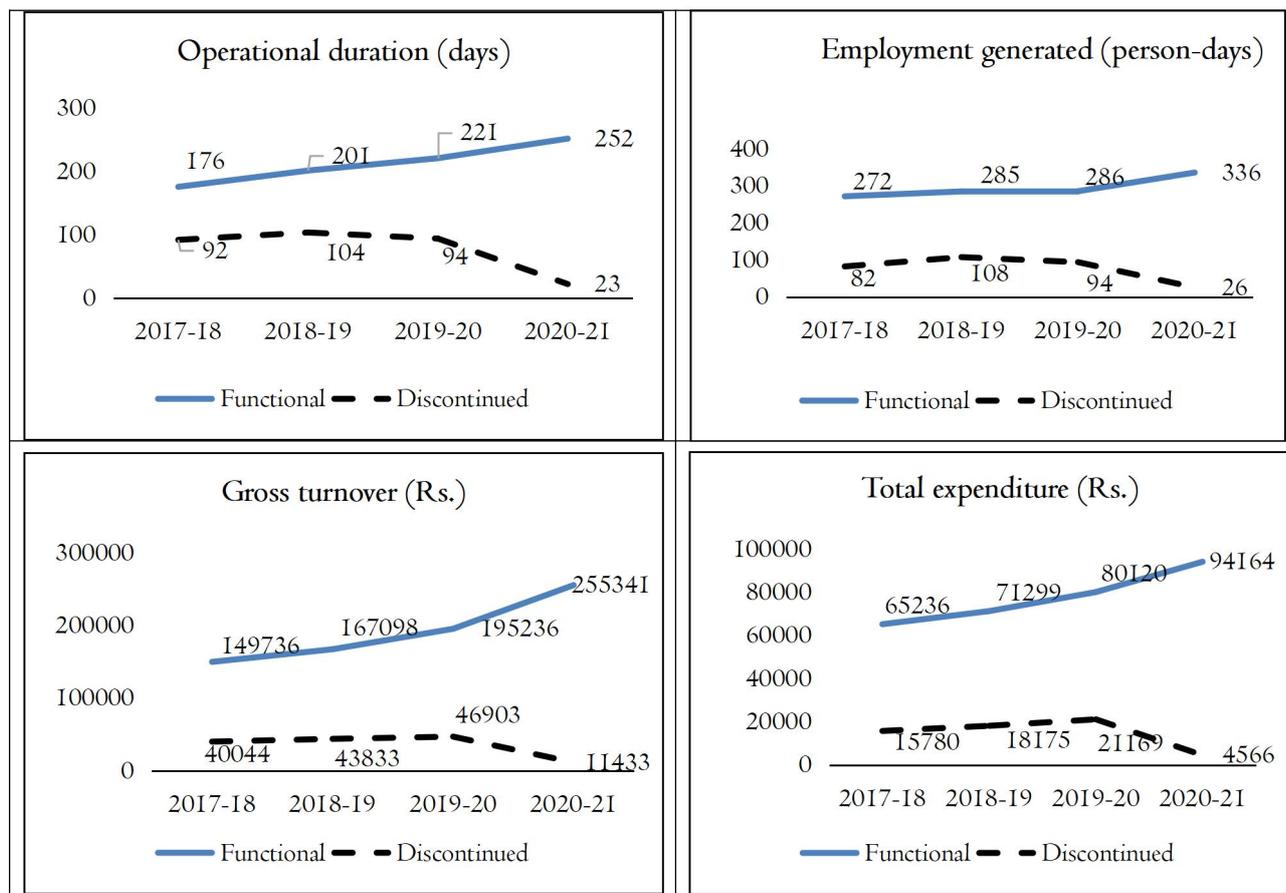


Figure 10: Progressive and year-wise gap in the performance of functional and discontinued units

Table 13: Compound Annual Growth Rates (CAGRs) of different attributes of functional and discontinued enterprise units

Year	Functional units				Discontinued units			
	Operational duration (days/ unit)	Employment generation (person days/ unit)	Gross income (Rs./ unit)	Total expenditure (Rs./ unit)	Operational duration (days/ unit)	Employment generation (person days/ unit)	Gross income (Rs./ unit)	Total expenditure (Rs./ unit)
2017-18	176	272	149736	65236	92	82	40044	15780
2018-19	201	285	167098	71299	104	108	43833	18175
2019-20	221	286	195236	80120	94	94	46903	21169
2020-21	252	336	255341	94164	23	26	11433	4566
CAGR	12.43***	6.58***	19.21***	12.95***	-34.69*	-30.13*	-30.88*	-30.01*

Note: ***, ** & * represent significance of the CAGRs at one, five and ten per cent level of significance, respectively

1.2.3. Differences between functional (F) and discontinued (D) Group activities

Similar to individually managed enterprise activities, there were significant differences between functional and discontinued group enterprises on all the performance indicators (Table 14). In terms of operational duration, the discontinued groups survived for 87 days as against 261 days by functional groups, which was just one-third (33.33%) of functional groups. Employment generation in discontinued groups was about 25% of functional groups. The worst part was gross turnover, as the discontinued groups could generate turnover of just about 6.11% of functional groups as the discontinued groups could only spend just about 4.60% of the expenditure of group units.

Table 14: Difference in performance of functional and discontinued GROUP enterprises

Enterprise	Operational duration (days)		Gross turnover (Rs.)		Total expenditure (Rs.)		Employment generation (person days)	
	F	D	F	D	F	D	F	D
Bee Keeping	288	NA	667313	NA	278988	NA	599	NA
Fisheries	342	NA	304594	NA	103095	NA	332	NA
Goat farming	365	NA	94425	NA	46830	NA	265	NA
Mushroom	184	71	179609	22524	31939	7238	514	101
Nursery	321	NA	3176286	NA	663071	NA	321	NA
Piggery	311	156	444318	31667	147678	14444	262	155
Poultry	291	134	513024	65357	280471	27821	323	127
Processing and Value addition	247	NA	1020609	120000	664813	16400	453	175
Total	261	87	652364	39877	291902	13442	423	107

Note: F-Functional, D-Discontinued; NA-Not Applicable

1.2.4. Reasons for discontinuation

- Discontinued entrepreneurs (31.80%) could not plan for enterprise diversification and could not sustain revenue required to meet the operational costs.
- Could not establish required contacts / linkages to expand the enterprise (29.80%).
- Raw material non-availability, high cost of the raw material and poor quality of the inputs were the reasons for 25.50% of the discontinued enterprises.
- Non-profitability of the enterprises was a strong reason for discontinuation in about 20 per cent of the discontinued enterprises.
- Less than desired level of performance of technologies and practices adopted was the reason for about 20 per cent of the enterprises.
- Inability to adopt the suggested technologies or practices was also a reason for about 20 per cent of the enterprises.

Table 15: Reasons for discontinuation

Sl. No.	Reasons	No.	%
1.	Could not plan for enterprise diversification and could not sustain revenue	111	31.80
2.	Could not establish required contacts / linkages to expand the enterprise	104	29.80
3.	Raw material not available / costly / poor quality	89	25.50
4.	Enterprise not profitable	70	20.05
5.	Production Process / Method failed to perform	69	20.00
6.	Suggested technologies could not be adopted or did not give good results	69	20.00
7.	Could not market the products not accepted in market / by consumers	31	8.88
8.	By-product not accepted in market / by consumers	11	3.15

1.2.5. Propensity Score Matching (PSM) analysis

Propensity Score Matching is generally used to estimate the impact of an intervention between two groups usually treated and control groups. Here, it was used to estimate the impact of ARYA on the income of the rural youths wherein, functional group was considered as treated group and other three groups (discontinued, not started and control groups) were considered as control.

Functional vs. Discontinued

Table 16: Descriptive statistics of the key variables (Functional vs. Discontinued)

Particulars	Functional (n=684)	Discontinued (n=349)	Overall (N=1,033)
Age (years)	32.20	33.36	32.59
Education (I=0, P=1, HP=2, S=3, PU=4, G=5, PG=6)	3.73	3.5128	3.65
Gender (M=1, F=2)	1.28	1.20	1.25
Family Size (No.)	5.19	5.36	5.24
Family members engaged in agriculture (No.)	2.11	1.92	2.04
Cultivated area (acres)	3.33	2.68	3.11
ARYA & ARYA income	5,27,200.10	6867.34	109134.80

The estimates of the probit regression (Table 17) revealed that the factors such as age and family size have negative and significant influence on the treatment groups, whereas education, gender, family members engaged in agriculture and cultivated area have positive influence on treatment groups.

Table 17: Estimates of the probit regression (Functional vs. Discontinued)

Particulars	Coefficients	S.E.	p value
Constant	0.267	0.345	0.439
Age	-0.015	0.007	0.032**
Education	0.077	0.034	0.025**
Gender	0.342	0.099	0.001***
Family Size	-0.055	0.023	0.019**
Family members engaged in agriculture	0.072	0.041	0.080*
Cultivated area	0.037	0.014	0.010**
Log likelihood	-619.22		

Note: ***, ** & * indicates significance at one, five and ten per cent level of probability

Before carrying out PSM, it is important to ensure there is balance of covariates. T test carried out for equality of means before and after matching, given in Table 18, showed that there was decrease in standardized differences (bias) significantly after matching. The value of Pseudo R² in Table 19 shows the substantial reduction in bias, indicating the matching quality and balance of distribution between two groups. The kernel density plot is depicted in the Figure II shows the distribution of estimated propensity scores in the treated and control groups before and after matching. The distribution was much similar after matching. This indicates that there is little difference in the pre-existing covariates after matching. Thus, there is balance of covariates.

Table 18: T- test for equality of means before and after matching (Functional vs. Discontinued)

Variable	Unmatched /Matched	Mean		% bias	% reduction in bias	t test	p>t
		Treated	Control				
Age	U	32.20	33.27	-17.50	39.2	-2.64	0.008
	M	32.30	31.64	10.60		2.01	0.045
Education	U	3.73	3.51	18.30	92.6	2.69	0.007
	M	3.71	3.73	-1.40		-0.25	0.799
Gender	U	1.28	1.19	21.30	75.1	3.1	0.002
	M	1.27	1.25	5.30		0.93	0.351
Family size	U	5.19	5.43	-13.60	93.8	-1.97	0.049
	M	5.19	5.21	-0.90		-0.16	0.873
Family members involved in agriculture	U	2.11	1.99	11.50	57.7	1.68	0.093
	M	2.10	2.04	4.90		0.89	0.374
Cultivated area	U	3.33	2.69	19.40	94.8	2.71	0.007
	M	2.97	3.01	-1.00		-0.2	0.841

Table 19: Indicators of matching quality (Functional vs. Discontinued)

Sample	Pseudo R ²	LR Chi ²	p>Chi ²	Mean bias	Median bias
Unmatched	0.03	38.62	0.000	16.90	17.90
Matched	0.003	6.00	0.423	4.00	3.10

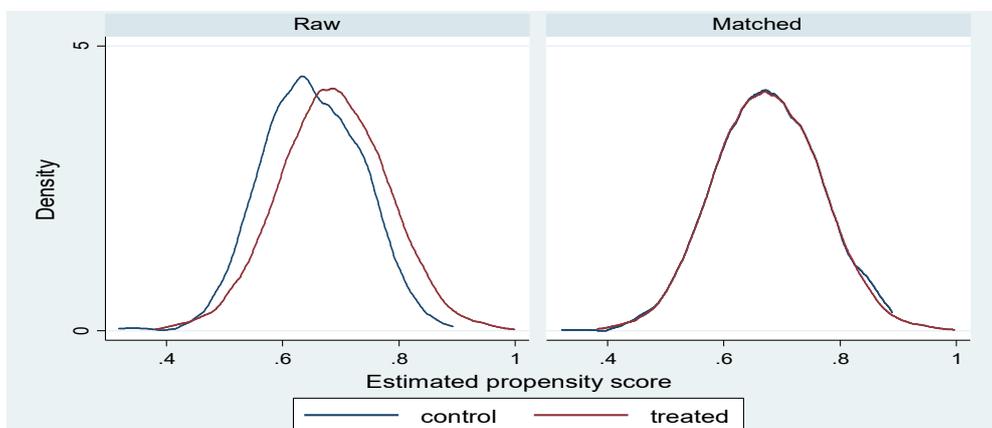


Figure II: Kernel density plot (functional and discontinued)

ATT estimates were obtained from the analysis which indicates the difference between the average income of the ARYA functional group and the average income of the discontinued category (Table 20). The results of PSM showed that the rural youths under functional groups received higher income compared to discontinued group. The average treatment effect on treated (ATT) was found to be significant in all the methods. It was observed that the farmers under functional groups received an additional income ranging from Rs. 1,49,133 to Rs. 1,57,801. The impact of training is clearly observed for the treatment group, which has higher income by Rs. 1,57,801 (RM).). Thus, it can be clearly stated that out of the average income (Rs. 5,27,200) obtained by functional enterprises, an amount of Rs. 1,57,801 can be purely attributed to the impact of ARYA.

Table 20: Impact estimates of ARYA on total income of farm households (Functional vs. Discontinued)

Matching methods	ATT	S.E	t value
Nearest neighborhood matching (NNM)	149133.20	10469.34	14.25*
Kernel matching (KM)	153901.00	16254.53	9.47*
Radius matching (RM)	157801.30	15843.37	9.96*
Stratification matching	154419.10	14185.84	10.89*

Note: * indicates significance at ten per cent level of probability

1.3. Not-Started Category

Some of the trained youth under ARYA could not start the enterprise for various reasons as listed below.

Table 21: Reasons for Not Starting

Sl. No.	Reasons	No.	%
1	Waiting for suitable programs and schemes for assistance	161	37.20
2	Continuing the activity that was being done prior to ARYA training	150	34.65
3	Lacked confidence in the new enterprise / business	142	32.80
4	Needed more time to mobilize resources for the new enterprise	142	32.80
5	Could not establish required contacts for the new enterprise	90	20.79
6	Lacked confidence in the new Production Process	85	19.63
7	Need more training and handholding for the new enterprise	80	18.48
8	Lack money to start a new enterprise	25	5.77
9	Unable to avail subsidy as land owners are parent/grand parent	10	2.31
10	Guideline for funding for Purchase of Equipment not available	9	2.08
11	Damage by wild animals	8	1.85
12	Migration problem of bee colony	6	1.39

1.3.1. Propensity Score Matching Analysis:

Functional vs. Not Started

The estimates of the probit regression revealed that the factors such as education and family members engaged in agriculture have significant and positive influence on treatment groups (Table 23). The T test carried out for equality of means before and after matching indicated that there was decrease in bias significantly after matching (Table 24). Pseudo R² in Table 25 revealed that there is bias reduction.

Thus, distribution between two groups is balanced. The kernel density plot in the figure I2 indicates that the distribution was much similar after matching. This indicates that there is little difference in the pre-existing covariates after matching. Thus there is balance of covariates after matching.

Table 22: Descriptive statistics of the key variables (Functional vs. Not started)

Particulars	Functional (n=684)	Not started (n=443)	Overall (N=1,117)
Age (years)	32.20	37.12	34.10
Education (I=0, P=1, HP=2, S=3, PU=4, G=5, PG=6)	3.73	3.61	3.68
Gender (M=1, F=2)	1.28	1.25	1.27
Family Size (No.)	5.19	5.34	5.25
Family members engaged in agriculture (No.)	2.11	1.99	2.06
Cultivated area (acres)	3.33	2.92	3.17
ARYA & AL income	161315.2	57882.26	121219.9

Table 23: Estimates of the probit regression (Functional vs. Not started)

Particulars	Coefficients	S.E.	p value
Constant	-0.103	0.219	0.638
Age	-0.001	0.002	0.601
Education	0.053	0.031	0.092*
Gender	0.142	0.088	0.105
Family Size	-0.026	0.020	0.211
Family members engaged in agriculture	0.063	0.036	0.083*
Cultivated area	0.017	0.011	0.136
Log likelihood	-738.78		

Note: * indicates significance at ten per cent level of probability

Table 24: T- test for equality of means before and after matching (Functional vs. Not started)

Variable	Unmatched /Matched	Mean		%bias	% reduction in bias	t test	p>t
		Treated	Control				
Age	U	32.20	37.12	-6.90	97.70	-1.27	0.205
	M	32.21	32.10	0.20		0.36	0.719
Education	U	3.73	3.61	10.30	20.00	1.67	0.095
	M	3.73	3.63	8.20		1.55	0.122
Gender	U	1.28	1.25	7.90	37.30	1.29	0.198
	M	1.28	1.31	-5.00		-0.89	0.373
Family size	U	5.19	5.34	-6.90	67.10	-1.15	0.252
	M	5.19	5.24	-2.30		-0.49	0.626
Family members involved in agriculture	U	2.11	1.99	10.60	90.40	1.75	0.081
	M	2.11	2.12	-1.00		-0.19	0.851
Cultivated area	U	3.33	2.92	11.40	65.90	1.82	0.069
	M	3.24	3.38	-3.90		-0.70	0.485

Table 25: Indicators of matching quality (Functional vs. Not started)

Sample	Pseudo R ²	LR Chi ²	p>Chi ²	Mean bias	Median bias
Unmatched	0.009	14.04	0.029	9.0	9.1
Matched	0.002	4.47	0.613	3.4	3.1

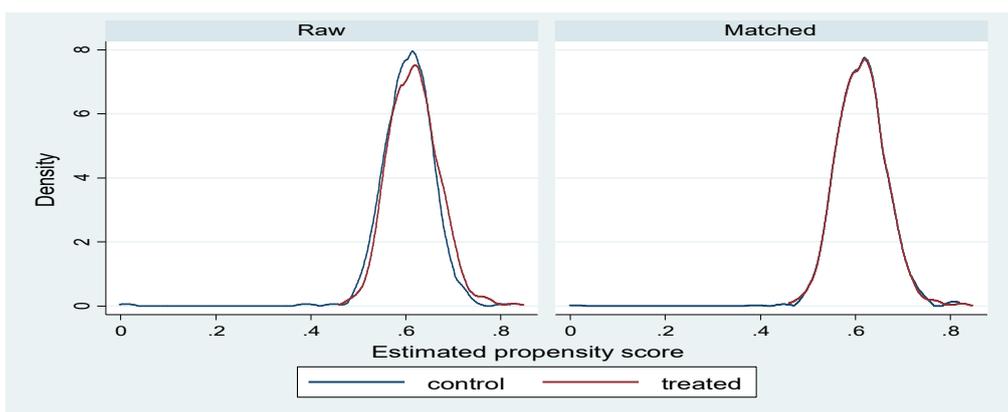


Figure 12: Kernel density plot (functional and not-started)

The results of PSM shows that the rural youths under functional category received higher income compared to not started category. The average treatment effect on treated (ATT) was found to be significant in all the methods. It was observed that the farmers under functional categories received an additional income ranging from Rs. 102264 to Rs. 109081 (Table 26). The impact of training is clearly observed for the treatment category, which has higher income by Rs. 109081 (NNM).

Table 26: Impact estimates of ARYA on total income of farm households (Functional vs. Not started)

Matching methods	ATT	SE	t value
Nearest neighborhood matching (NNM)	109081.70	13833.87	7.885*
Kernel matching (KM)	102264.70	18532.87	5.518*
Radius matching (RM)	102827.70	10592.29	9.708*
Stratification matching	103000.50	19879.84	5.185*

Note: * indicates significance at ten per cent level of probability

1.4. Control Category

1.4.1. Propensity Score Matching Analysis:

Functional vs. Control

Table 27: Descriptive statistics of the key variables (Functional vs. Control)

Particulars	Functional (n=684)	Control (n=1,072)	Overall (N=1,756)
Age (years)	32.20	32.75	32.53
Education (I=0, P=1, HP=2, S=3, PU=4, G=5, PG=6)	3.73	3.57	3.64
Gender (M=1, F=2)	1.28	1.25	1.26
Family Size (No.)	5.19	5.13	5.15
Family members engaged in agriculture (No.)	2.11	1.84	1.94
Cultivated area (acres)	3.33	2.93	3.08
ARYA & AL	161315.20	82486.35	113191.90

The estimates of the probit regression revealed that the factors such as education, gender and family members engaged in agriculture have significant and positive influence on treatment groups (Table 28). The kernel density plot in the Figure 13 indicates that the distribution was much similar after matching, indicating little difference in the pre-existing covariates after matching. Thus, there is balance of

covariates. Equality of means before and after matching was analysed using t test revealed significant reduction in bias after matching (Table 29) and Pseudo R² revealed that there is decrease in bias (Table 30) and the distribution is balanced.

Table 28: Estimates of the probit regression (Functional vs. Control)

Particulars	Coefficients	S.E.	p value
Constant	-0.812	0.253	0.001***
Age	-0.004	0.005	0.469
Education	0.063	0.026	0.018**
Gender	0.135	0.070	0.052*
Family Size	-0.004	0.016	0.825
Family members engaged in agriculture	0.123	0.028	0.001***
Cultivated area	0.008	0.008	0.288
Log likelihood	-1156.16		

Note: ***, ** & * indicates significance at one, five and ten per cent level of probability

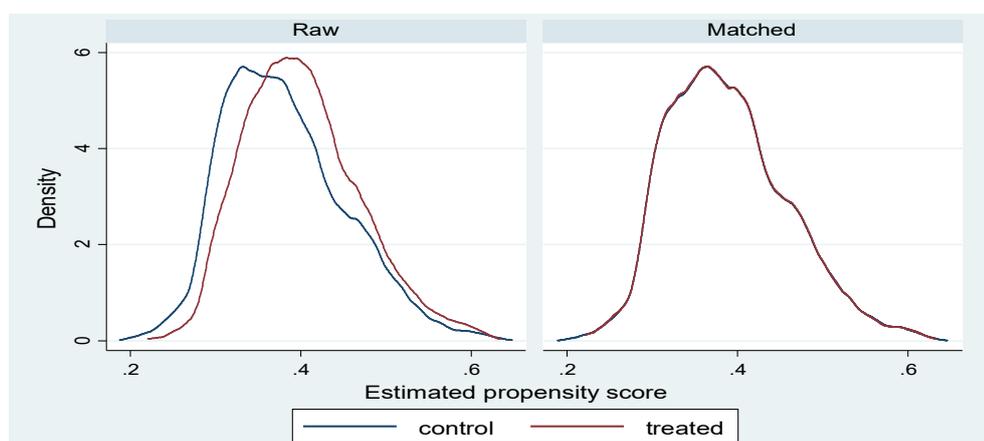


Figure 13: Kernel density plot (functional and control)

Table 29: T- test for equality of means before and after matching (Functional vs. Control)

Variable	Unmatched /Matched	Mean		%bias	% reduction in bias	t test	p>t
		Treated	Control				
Age	U	32.20	32.75	-8.80	57.40	-1.78	0.076
	M	32.20	31.96	3.80		0.74	0.458
Education	U	3.73	3.57	13.40	61.90	2.77	0.006
	M	3.73	3.80	-5.10		-0.96	0.339
Gender	U	1.28	1.25	7.10	62.60	1.45	0.147
	M	1.28	1.29	-2.60		-0.48	0.633
Family size	U	5.19	5.13	3.20	-125.00	0.66	0.512
	M	5.19	5.33	-7.20		-1.30	0.194
Family members involved in agriculture	U	2.11	1.84	23.90	84.50	4.84	0
	M	2.11	2.07	3.70		0.69	0.493
Cultivated area	U	3.33	2.93	10.30	82.80	2.11	0.035
	M	3.33	3.26	1.80		0.31	0.756

Table 30: Indicators of matching quality (Functional vs. Control)

Sample	Pseudo R ²	LR Chi ²	p>Chi ²	Mean bias	Median bias
Unmatched	0.015	35.56	0	11.10	9.60
Matched	0.002	4.47	0.613	4.00	3.70

The results of PSM depicted in Table 31 shows that the rural youths under functional groups received higher income compared to control group. The average treatment effect on treated (ATT) was found to be significant in all the methods. It was observed that the farmers under functional groups received an additional income ranging from Rs. 79647 to Rs. 80544. The impact of training is clearly observed for the treatment group, which has higher income by Rs. 80544 (NNM).

Table 31: Impact estimates of ARYA on total income of farm households (Functional vs. Control)

Matching methods	ATT	S.E.	t value
Nearest neighborhood matching	80544.07	6607.02	12.19*
Kernel matching	79647.27	7842.04	10.16*
Radius matching	80525.76	8809.04	9.14*
Stratification matching	80219.42	13186.20	6.08*

Note: * indicates significance at ten per cent level of probability

1.5. Income attributed to ARYA Impact

The additional income attributable to ARYA project derived through Propensity Score Matching analysis is given in Figure 14. The average treatment effect on treated (ATT) values were higher for discontinued category (Rs. 157801), indicating that by discontinuing the enterprises started under ARYA, the discontinued respondents stood to lose more than the other category of respondents. The ATT value for not-started category was Rs. 109081 and Rs. 80544 for control category of respondents. So by any means of livelihood, ARYA functional enterprises earned Rs. 80544 to Rs. 157801/annum more during the year 2021, which is solely attributed as the impact of ARYA.

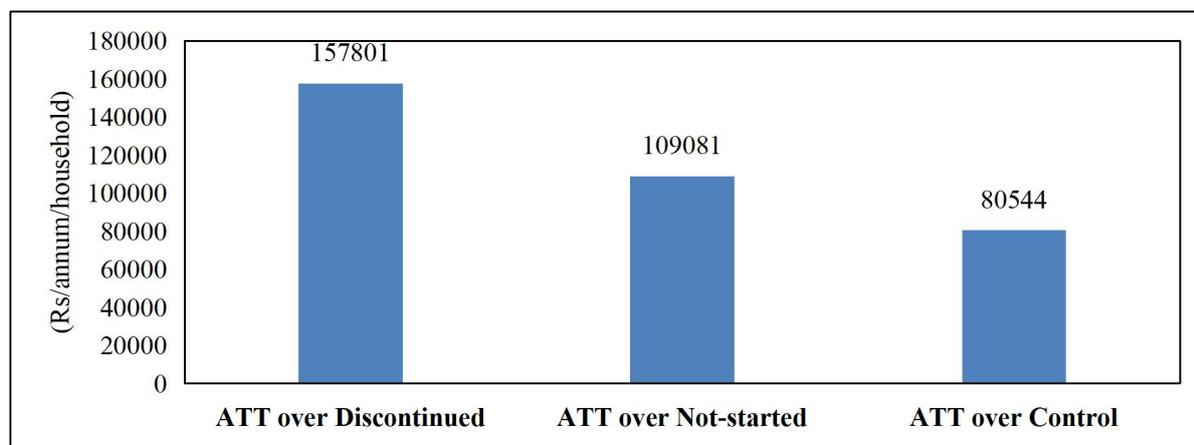


Figure 14: Additional income attributed to ARYA confirmed through PSM's Average Treatment Effect on Treated (ATT) during 2020-21

1.6. Impact Pathway Analysis of the ARYA Project

Using the result framework approach, impact pathway analysis was carried out for the project as a whole based on the data for 14 KVKs.

- (i) **Input:** Expenditure made by 14 KVKs out of the budget released under ARYA was Rs. 1071.14 lakh during 2017-18 to 2020-21. This included the entire amount spent by the KVK under ARYA for capacity development, inputs/material provided to the trained youth, visits made, office contingencies, emoluments paid to contractual staff (SRF/YP) etc. In addition, the salary component of regular staff who were involved in ARYA (at the rate of one day per week for each enterprise promoted) was estimated (Rs. 310.61 lakh) and added to the project cost. Thus, the total project input cost was Rs. 1381.75 lakh for four years.
- (ii) **Process:** Under the project a total of 13625 youth were trained through 68125 trainee days. The trained youth were supported with handholding and on-site technical and technological support to facilitate establishment and management of the enterprises.
- (iii) **Output:** Out of 13625 trained, 2352 functional units were recorded at the time of research study. Thus, the physical effectiveness of the project was 17.26%. This included 576 mushroom units, 347 nursery units, 329 poultry units, 230 bee keeping units, 204 processing and value addition units, 180 vermicomposting units, 165 goat farming units, 103 piggery units, 45 fisheries units, and 142 other enterprises.
- (iv) **Outcome:** On an average, each functional unit generated a gross turnover of Rs. 560440 and a net income of Rs. 333381/unit during four years. Thus, the total value of gross income generated by 2352 functional units in 14 centres was Rs. 13182 lakh and the total net income generated was Rs. 7841 lakh. In addition, each project had created enterprise assets worth Rs. 297752, which is added to net income and arrived at the total net worth of 2352 units as Rs. 14844 lakh. The return on investment (ROI) is calculated to be 10.74, which means, every rupee spent under ARYA project has generated Rs. 10.74 rupees benefit to the entrepreneurs. Each unit under the ARYA project generated 878 person-days of employment during the four years' period. When extrapolated to 2352 units, the total employment generated works out to 20.38 lakh employment days.
- (v) **Impact:** On an average, each ARYA entrepreneur added Rs. 1.52 lakh/annum to the family income of Rs. 3.75 lakh/annum during 2020-21, adding 40.53% income to the family of ARYA entrepreneurs. The discontinued entrepreneurs' livelihood vulnerability index (LVI) was 32.23, compared to 30.00 LVI for functional units, a reduction of 2.23

index points in vulnerability. About 46 % of the functional enterprises were able to create household assets out of income generated from the enterprise, which was worth Rs. 186239/unit. Access to resources required for livelihood has increased substantially.

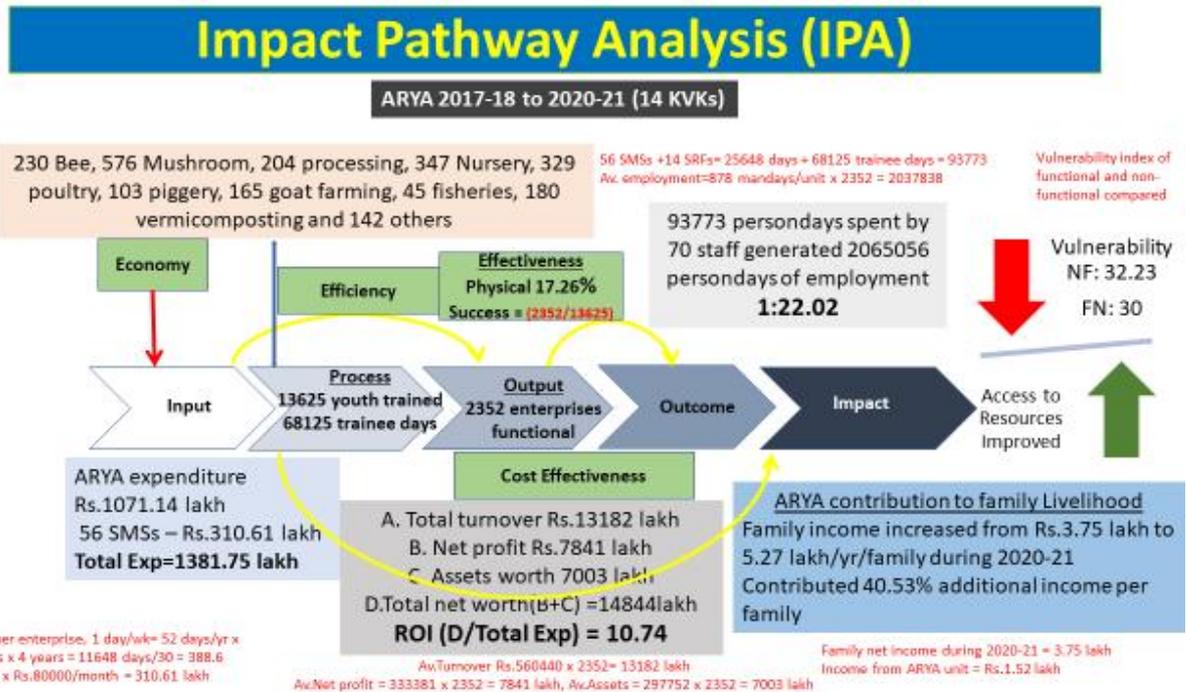


Figure 15: Impact pathway analysis of ARYA project on livelihood

2. LIVELIHOOD STATUS

2.1. ARYA 'Functional' entrepreneurs' income vs. 'Discontinued' respondents' income during 2020-21

The discontinued ARYA entrepreneurs pursued various alternative options for livelihood as depicted in Figure 16. In 2020-21, the average income from all these alternate livelihood activities was Rs. 115406/annum which was almost 40 per cent less than the average income earned by ARYA functional entrepreneurs (Rs. 161315/annum). Only exception was those who engaged in family enterprises after discontinuing ARYA, earned a slightly higher level of income (Rs. 189145/annum). The discontinued entrepreneurs who got a job/employment, or joined an activity started by friends /relatives or started a new enterprise earned 29%, 39% and 110% less than average income of ARYA functional enterprises, respectively. The majority (115 out of 345) of the discontinued entrepreneurs who were engaged in miscellaneous livelihood activities earned the least income (Rs. 73270/annum) which was 120 % less than the ARYA income.

The ARYA enterprises like nursery (Rs. 276343/annum), piggery (Rs. 257529/annum), poultry (Rs. 213936/annum), bee keeping (Rs. 205636/annum) and processing and value addition units (Rs. 196742/annum) performed better than all the alternate livelihoods pursued by discontinued entrepreneurs.

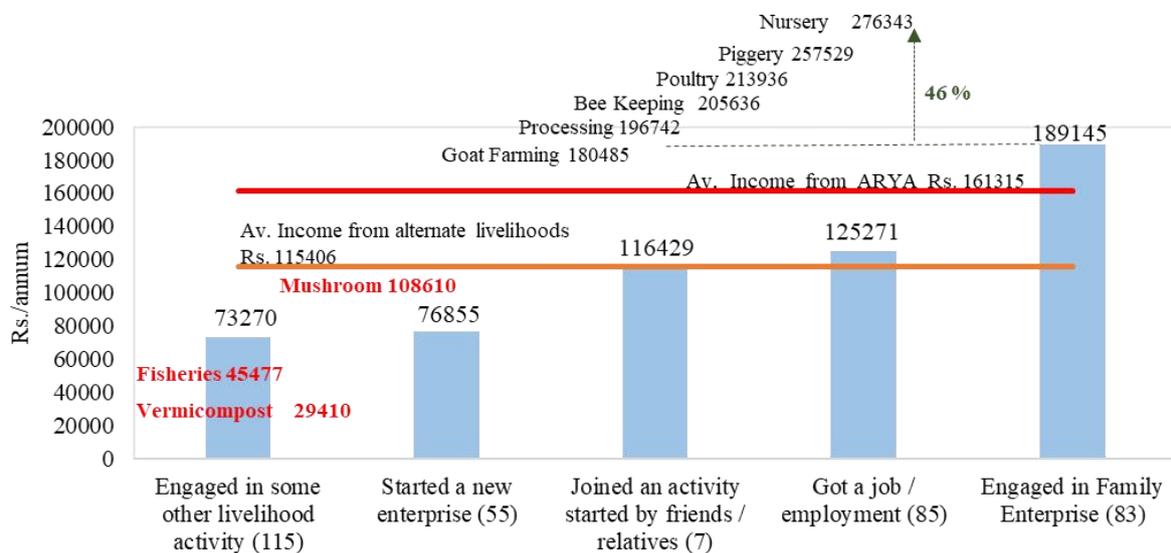


Figure 16: Performance of functional ARYA enterprises in comparison to the alternative livelihoods pursued by discontinued entrepreneurs

2.2. ARYA 'Functional' entrepreneurs' income vs. 'Not started' respondents' income during 2020-21

Not-started respondents pursued various options for livelihood ranging from being unemployed to employed in a secured job (Figure 17). However, income from all these options (average Rs. 57882/annum) was less than the income earned by ARYA entrepreneurs (Rs. 161315 during 2020-21). The income per annum earned by alternative livelihoods was highest for those who were employed (Rs. 154127/annum), but even this income was less than the income earned by ARYA entrepreneurs.

Majority (40.6%, out of 433) were jobless and did not show any income. There were 37 (8.5%) trained youth who tried to start an enterprise of their own, but earned 250% less than the income earned by ARYA entrepreneurs. Those who were engaged with farming and family enterprises earned about Rs. 1.23 lakh/annum, 31.2% less than income earned by ARYA entrepreneurs.

Not all enterprises yielded higher income than the best of the alternative livelihoods pursued by the 'non-starters'. The ARYA enterprises like nursery, piggery, poultry, bee keeping, processing and value addition, and goat farming generated a higher income than all the alternative livelihoods pursued by non-starters. Whereas, income from mushroom enterprise (Rs. 1,08,610/annum) was lesser than the alternative livelihood earned by joining farming and family enterprises (Rs. 122981/annum), combination of enterprises (Rs. 136160/annum) and job/employment (Rs. 154127/annum). Further, fisheries (Rs. 45477/annum) and vermicomposting (Rs. 29410/annum) enterprises earned far lesser income than the income earned by non-starters through daily wages and petty works (Rs. 78417/annum) and who tried to start own enterprises (Rs. 46127/annum).

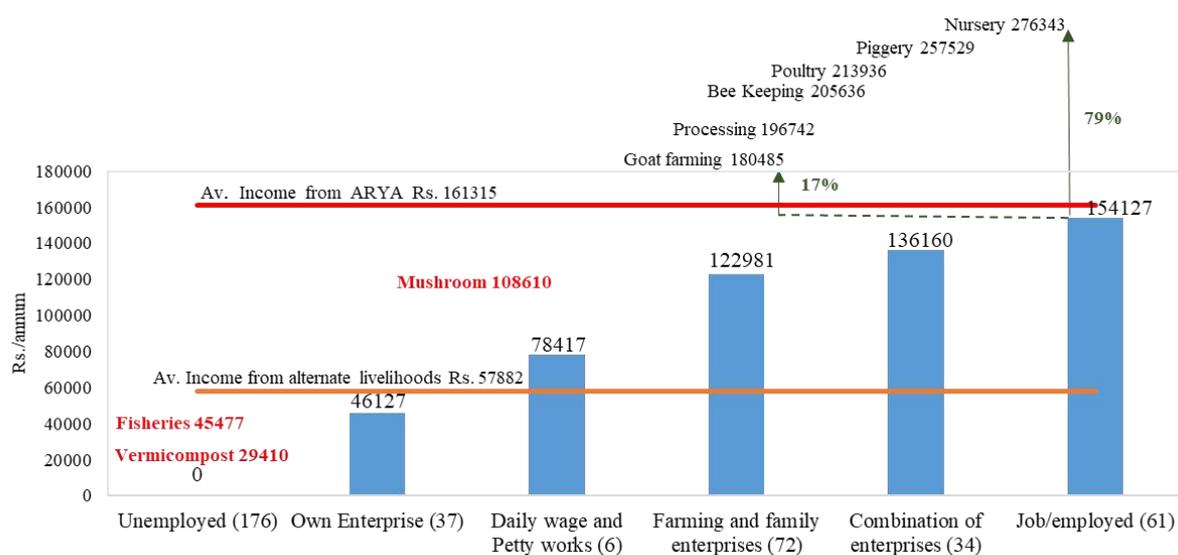


Figure 17: Performance of functional ARYA enterprises in comparison to the alternative livelihoods pursued by Non-starters

2.3. ARYA 'Functional' entrepreneurs' vs. 'Control' respondents' income during 2020-21

Comparison of ARYA enterprises as a source of livelihood over control group revealed that ARYA entrepreneurs earned more income than all alternative livelihood options pursued by control respondents (average Rs. 82486/annum). ARYA entrepreneurs earned at least about 7% more than the highest income earning option of pursuing combination of enterprises (Rs. 150797/year) by the control group. Even the 'employed' control group respondents earned Rs. 145813/year, which was 10.6 % less than the income earned by ARYA entrepreneurs. Other options generated less than half of the income (103% to 106% less) compared to ARYA entrepreneurs.

As observed the average income obtained from all the functional ARYA enterprises was Rs. 1,61,315/annum. Among the functional ARYA enterprises, nursery (Rs. 2, 76, 343/annum) units generated highest income, whereas, the combination of enterprises (Rs. 1,50,797/annum) generated highest income among the alternative livelihoods pursued by the control group, which was even higher than the income generated by functional ARYA enterprises like Mushroom, fisheries and vermicomposting (Figure 18). The fisheries and vermicomposting units managed to produce income just higher than unemployed (Rs. 3,143/annum) but lesser income than all other alternative livelihoods pursued by control groups.

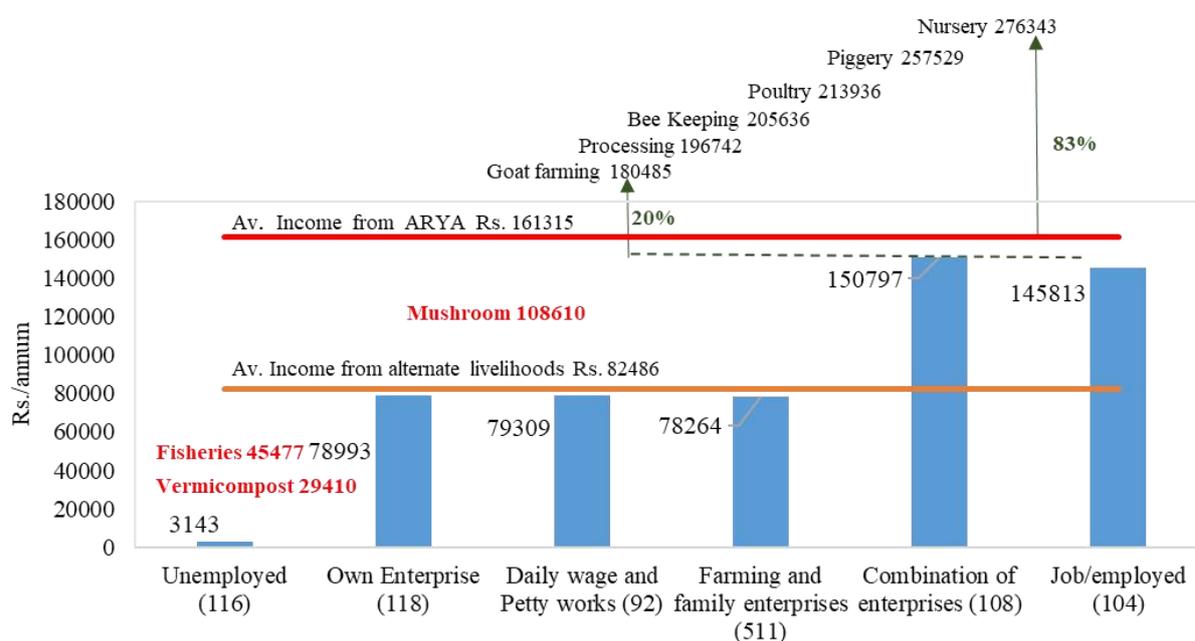


Figure 18: Performance of functional ARYA enterprises in comparison to the alternative livelihoods pursued by Control group

3. SOCIO-ECONOMIC, SITUATIONAL AND INSTITUTIONAL DETERMINANTS

3.1. Descriptive profile of the individual respondents

3.1.1. Age

Age of the participants classified in Table 32 shows that, more than half (overall 51.5 %) of the respondents were in the 31-40 years' category, which was evident for all the four categories of respondents. The second most represented age group was 20-30 years (overall 38.5 %), which was true for all the four categories of respondents with the highest being not-started category with 40.9% and least for discontinued category (32.1%). All other age groups accounted for the remaining 10 per cent.

Table 32: Age distribution of individual respondents

Age in years	Functional	Discontinued	Not started	Control	Total
<20	2(0.3%)	2(0.6%)	2(0.5%)	14(1.3%)	20(0.8%)
20-30	271(39.6%)	112(32.1%)	177(40.9%)	417(38.9%)	977(38.5%)
31-40	345(50.4%)	194(55.6%)	226(52.2%)	542(50.6%)	1307(51.5%)
41-50	66(9.6%)	35(10%)	26(6%)	79(7.4%)	206(8.1%)
>50	0(0%)	6(1.7%)	2(0.5%)	20(1.9%)	28(1.1%)
Total	684(100%)	349(100%)	433(100%)	1072(100%)	2538(100%)

P=0.018*, significant Chi-Square Test

3.1.2. Education

An overview of Table 33 shows that, out of 2358 individual respondents, more than two-sixth (overall 38.2 %) had secondary education followed by graduation (24.3 %) and pre-university (23.0 %). Among the rest, higher primary (6.4 %) and primary (4.0 %) level education was more compared to post-graduation (2.7 %) and 1.3 per cent of the respondents were illiterates.

Table 33: Education level of individual respondents

Education	Functional	Discontinued	Not started	Control	Total
Illiterate	11(1.6%)	2(0.6%)	4(0.9%)	17(1.6%)	34(1.3%)
Primary	36(5.3%)	18(5.2%)	20(4.6%)	28(2.6%)	102(4%)
Higher Primary	23(3.4%)	32(9.2%)	33(7.6%)	74(6.9%)	162(6.4%)
Secondary	231(33.8%)	136(39%)	157(36.3%)	445(41.5%)	969(38.2%)
Pre-University	162(23.7%)	74(21.2%)	103(23.8%)	246(22.9%)	585(23%)
Graduate	195(28.5%)	82(23.5%)	103(23.8%)	237(22.1%)	617(24.3%)
Post Graduate	26(3.8%)	5(1.4%)	13(3%)	25(2.3%)	69(2.7%)
Total	684(100%)	349(100%)	433(100%)	1072(100%)	2538(100%)

P<0.001**, significant Chi-Square Test

3.1.3. Gender

It is clear from the Table 34 that, a little more than one-fourth of the respondents were female (25.3%), which was highest for functional enterprises (28.2%) and least for the discontinued (20.6 %) category of respondents.

Table 34: Gender distribution of individual respondents

Gender	Functional	Discontinued	Not started	Control	Total
Male	491(71.8%)	277(79.4%)	326(75.3%)	803(74.9%)	1897(74.7%)
Female	193(28.2%)	72(20.6%)	107(24.7%)	269(25.1%)	641(25.3%)
Total	684(100%)	349(100%)	433(100%)	1072(100%)	2538(100%)

P=0.065+, significant Chi-Square Test

3.2. Kruskal Wallis test

Kruskal-Wallis test was carried out to assess the differences in the profile and intervening variables of the four categories of respondents. The results of which are indicated in Table 35.

The findings of the Kruskal-Wallis test to ascertain the differences in family details among the four categories of respondents (Table 35) indicates that there was significant difference for all the variables among all the four categories except for cultivated area during 2016-17, income from cultivated area during 2020-21 and family total net income during 2016-17. There was highly significant ($p < 0.01$) difference in family size, no. of family members engaged in agriculture, income from allied activities during both the years and family net income during 2020-21. It can be observed that the average income from allied activities was highest for discontinued group in 2016-17, whereas in 2020-21 functional units earned more income from allied activities than other groups. Also, there was improvement in the income from allied activities during 2020-21 for all the groups compared with 2016-17 except for discontinued group, which might be accounted as the impact of discontinuation. It can also be noticed that more number of family members are involved in agriculture than non-farm activities. The income from non-farm activities and family total net income also increased during 2020-21 across all the groups and it was highest in functional group for both the years.

Except for financial capital, there was highly significant difference among groups for all the intervening variables. The functional enterprise units could utilize the information and communication sources in a better way as indicated by significantly higher communication source use score of 59.08, compared to an average communication use score of 38.72 among discontinued units out of a possible score of 120. Total livelihood capital was better for functional group but natural capital was more for control group and social capital was highest for not started group. The functional group exhibited better entrepreneurial competency (ECI) compared to other groups and also has higher operational marketing, socio business, financial and entrepreneurial competencies. The operational duration of functional group (616 days) was almost twice that of the discontinued group (313 days). The functional groups were able to create the enterprise assets (Rs. 289993/unit) more than five times higher than the assets created by discontinued units (Rs. 57534/unit).

Table 35: Kruskal Wallis test to assess the differences in family details and intervening variables among the four categories of respondents

Variables	Functional	Discontinued	Not started	Control	P value
Family size (No.)	5.19	5.37	5.34	5.13	0.003**
Family members engaged in agriculture and allied activities	2.11	1.92	1.99	1.84	<0.001**
Cultivated area (acres) _ 2016-17	3.27	3.23	2.79	2.85	0.377
Income (Rs.) from cultivated area _ 2016-17	85442	98910	97638	86097	0.068+
Cultivated area (acres) _ 2020-21	3.33	2.52	2.92	2.93	0.061+
Income (Rs.) from cultivated area _ 2020-21	140270	138370	128658	130451	0.110
Income (Rs.) from allied Activities _ 2016-17	31389	36567	13947	25234	<0.001**
Income (Rs.) from allied Activities_ 2020-21	116351	21879	25843	41066	<0.001**
Family members engaged in non-farm activities _ 2016-17	0.56	0.48	0.52	0.61	0.033*
Income from non-farm activities_2016-17	60095	51936	45570	55988	0.045*
Family members engaged in non-farm activities_ 2020-21	0.64	0.68	0.58	0.66	0.016*
Income from non-farm activities_ 2020-21	109262	91279	73121	80336	0.046*
Family total net income (Rs.) _ 2016-17	176927	171799	157156	160473	0.958
Family total net income (Rs.) 2020-21	365884	259769	227623	241789	<0.001**
Communication score	59.08	38.72	45.91	53.38	<0.001**
Human capital	7.15	6.85	6.44	6.43	<0.001**
Natural capital	5.49	5.64	5.69	5.74	0.002**
Social capital	3.42	3.39	3.50	3.29	0.019*
Physical capital	2.77	2.74	2.67	2.50	<0.001**
Financial capital	0.92	0.84	0.82	0.87	0.066+
Livelihood total capital	19.74	19.46	19.12	18.83	<0.001**
Operational marketing competency	3.76	2.35	1.90	2.05	<0.001**
Socio business competency	3.22	1.98	1.45	1.61	<0.001**
Financial competency	1.32	1.08	1.02	0.99	<0.001**
Entrepreneurial competency	8.30	5.41	4.38	4.65	<0.001**
Entrepreneurial competency index	59.32	38.64	31.26	33.24	<0.001**
Operational duration (days)	615.51	313.19			<0.001**
Family members (No.) employed	1.75	1.38			<0.001**
Hired employees (No.)	0.43	0.18			<0.001**
Enterprise Assets created (Rs.)	289993	57534			<0.001**
Gross value of inputs used (Rs.)	224109	59689			<0.001**
Total investment (Rs.)	181493	55379			<0.001**

Note: ** & * indicates significance at one and five per cent level

3.3. Relationship between economic performance and entrepreneurial competencies and personal profile

Entrepreneurial competencies are the key to the economic performance of enterprises promoted under ARYA. 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 (Table 36). 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. Entrepreneurs that are more educated 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.

Table 36: Correlation (r) between economic performance and entrepreneurial competencies and personal profile of functional entrepreneurs

Economic performance indicators	Entrepreneurial competencies			Total entrepreneurial competencies	Personal profile		
	Operations and marketing competencies	Socio-business and legal organization competencies	Economic financial 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**

Note: ** & * indicates significance at one and five per cent level

3.4. Confirmatory Factor Analysis (CFA)

Confirmatory Factor Analysis (CFA) was attempted to confirm the theory that age, literacy, gender (FI variables), information sources use (CI variables), livelihood capital status (LI variables), and entrepreneurial competency (EI variables) determines the entrepreneurial ability of agri-entrepreneurs. The CFA was performed using R software separately for functional and discontinued groups. The CFA analysis demonstrates the direct and indirect relation and magnitude of causal relation between latent variables and observed variables. The model adequacy was examined considering the minimum value of RMSE, significant chi square statistics and significance of coefficients indicating causal relation. The diagrammatic representation of causal relation enables readers to testify the theory with empirical values. Figure 19 captures the strong influence of operational and marketing competencies (EI) and WhatsApp as information source (C8) for functional entrepreneurs. Figure 20 captures the influence of personal information sources (C1, C2, C3) and socio-business competencies (E2) among the discontinued entrepreneurs. On confirmation of theory empirically, the results of factor analysis were used to identify the factors influencing entrepreneurial ability.

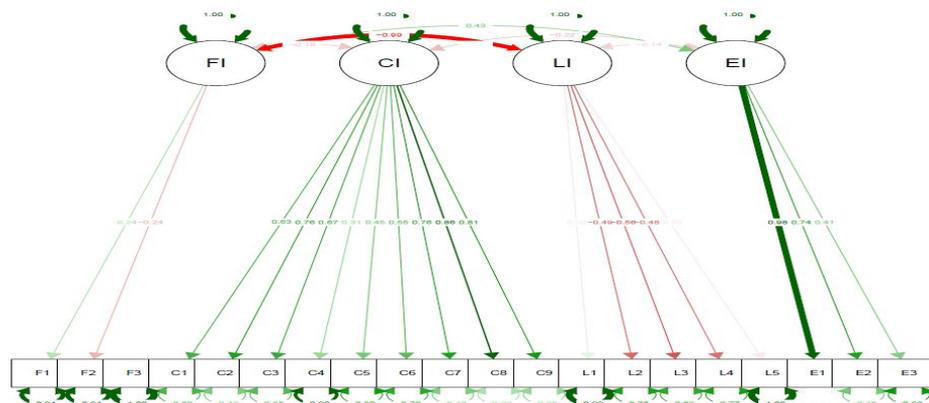


Figure 19: Causal relationship between latent and observed variables for 'functional' entrepreneurs

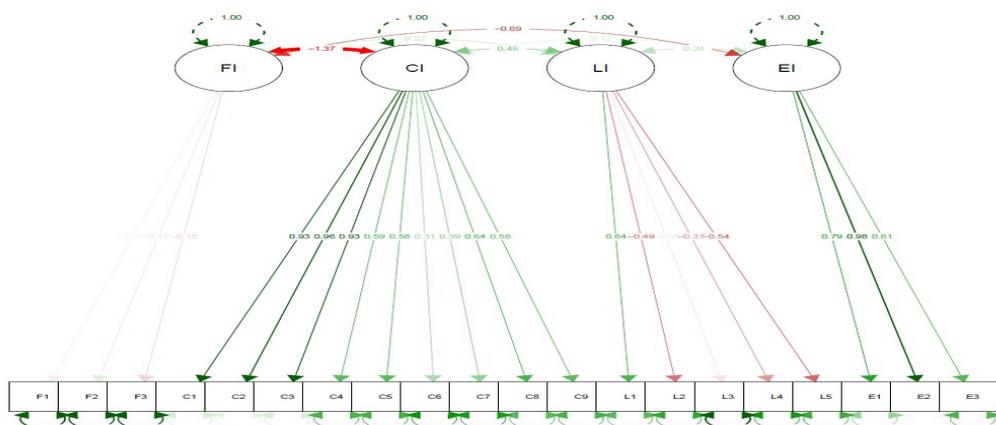


Figure 20: Causal relationship between latent and observed variables for 'discontinued' entrepreneurs

3.5. Factors influencing composite entrepreneurial index of functional and discontinued enterprises

To identify the influencing factors, factor analysis was performed with twenty independent variables viz., age, education, gender, sources of information from progressive farmers, neighbors, family members, KVK, TV, WhatsApp, you tube, department officials, mobile SMS, capital related variables such as human capital, social capital, physical capital, natural capital and financial capital, variables capturing entrepreneurial competency viz., operational marketing competency, socio business and legal competency and financial competency. Factor analysis, performed using principal component analysis with varimax rotation, extracted six principal components capable of explaining 63 per cent of variation for functional enterprises (Table 37). The extracted principal components were called as latent variables and the naming of the latent variable was done based on those variables, which have appeared in that principal component with highest loading. Accordingly, first latent variable or principal component was named as 'information sources', second PC was named as 'entrepreneurial competency', third was named as 'natural and social capital', fourth was 'literacy', fifth was 'financial capital' and sixth was 'imputed labour force'. The first principal component consisted of 'information sources' having an intermixed combination of social media (WhatsApp, YouTube, and mobile SMS) informal sources (family members, neighbors, progressive farmers) and mass media (TV channels). The second PC consisted of formal information sources and entrepreneurial competencies. The third PC consists only two (natural and social) of the five livelihood capitals, followed by literacy as PC4, financial capital as PC5 and family size as PC 6.

Similar factor analysis was performed for the discontinued enterprises with distinct results wherein the informal and formal information sources emerged as the PCI (Table 38), entrepreneurial competency factors as PC2, and social media information sources emerged separately as the third principal component. An important differentiator is the emergence of all five livelihood capitals as PC 4 and PC 5 for discontinued enterprises. The six principal components explained almost 71.86 per cent of variation among discontinued enterprises. The emergence of literacy as a separate PC among the functional enterprises and its absence among discontinued enterprises is a notable phenomenon.

Table 37: Factors influencing composite entrepreneurial index of functional enterprises

Observed variables /Latent variable	Communication sources (PCI)	Entrepreneurial competency (PC2)	Natural and social capital (PC3)	Literacy (PC4)	Financial capital (PC5)	Imputed labour force (PC6)
Information from WhatsApp	0.825					
Information from family members	0.817					
Information from neighbour	0.783					
Information from progressive farmer	0.746					
Information from TV	0.726					
Information from YouTube	0.716					
Information on mobile SMS	0.610					
Information from department officials		0.752				
Information from KVK		0.717				
Operational marketing competency		0.625				
Social and business competency		0.543				
Natural capital			0.617			
Social capital			0.616			
Education				0.569		
Financial capital					0.641	
Size of the farm family						0.550
Total variance explained	24.03	11.86	9.72	6.24	5.89	5.34

Table 38: Factors influencing composite entrepreneurial index of discontinued enterprises

Observed /Latent variables	Information from formal sources	Entrepreneurial competency	Information from social media	Business capital	Human capital	Imputed labour force
Information through progressive farmers	0.902					
Information from family members	0.893					
Information from neighbours	0.882					
Information from KVK	0.722					
Information from department officials	0.698					
Socio-business competency		0.911				
Operational competency		0.873				
Financial competency		0.766				
Information from YouTube			0.876			
Information from TV			0.675			
Information from SMS			0.624			
Information from WhatsApp			0.563			
Physical capital				0.761		
Social capital				0.669		
Financial capital				0.524		
Human capital					-0.802	
Natural capital					0.537	
Family size						0.766
Total variation explained	27.20	12.94	9.94	8.81	6.91	6.06

3.6. Composite Entrepreneurial Index (CEI)

The extracted factors and encompassing variables within the factors were given suitable weights for estimation of composite entrepreneurial index across rural enterprises. The CEI across rural enterprises is depicted in Table 39 for functional and discontinued agri entrepreneurs. The CEI is expected to be of higher magnitude to reflect more entrepreneurial ability. CEI of discontinued ARYA respondents was more in case of respondents practicing Goat farming followed by Nursery. The magnitude of CEI ranged from 0.1 in case of fisheries respondents to 0.71 in case of goat farming. Comparatively, functioning ARYA respondents had higher magnitude of CEI. CEI ranged from 0.33 in fisheries to 0.73 in case of goat farming.

Table 39: Composite Entrepreneurial Index (CEI) for 'functional' and 'discontinued' ARYA enterprises

Rural enterprise	Functional entrepreneurs		Discontinued entrepreneurs	
	CEI	Gross turnover (Rs./unit)	CEI	Gross turnover (Rs./unit)
Fisheries	0.33	267052	0.10	60227
Processing and Value addition	0.51	881420	0.52	229223
Vermicomposting	0.54	71874	0.49	41741
Mushroom	0.64	508058	0.55	137916
Bee keeping	0.66	633936	0.55	119438
Piggery	0.66	594017	0.52	185359
Nursery	0.67	910558	0.58	250419
Poultry	0.68	957453	0.54	105559
Goat farming	0.73	372052	0.71	62627

The influence of enterprises, entrepreneurial ability and expenditure on gross returns across rural enterprises was examined through estimation of linear revenue function (Table 40). The regression was found to be statistically significant at 1% level of significance. The regression coefficients for most of the variables were found to be statistically significant at 1 per cent level of significance in case of functioning ARYA respondents. The entrepreneurial ability had synergistic influence across enterprises which farmer wishes to follow. The estimated gross returns across rural enterprises depicted in Table 39 clearly indicates that functioning ARYA farmers practicing poultry reaped maximum returns followed by nursery, processing and value addition etc. vermicomposting has resulted in lower gross returns and hence cannot be considered as an effective enterprise rather it is treated as a subsidiary in the main occupation of agriculture.

The revenue function in case of discontinued ARYA respondents was also statistically significant but most of the independent variables were found to have non-significant influence. The probable reason would be the least significant difference across discontinued sample

respondents practicing different rural enterprises. The estimated gross returns in comparison to that of functioning ARYA respondents across rural enterprises was far lower. The estimated gross returns across enterprises presented in Table 39 clearly indicate that vermicomposting resulted in lower gross returns followed by fisheries and goat farming, respectively.

Table 40: Influence of entrepreneurial ability on gross revenue of the functioning enterprises

Functional entrepreneurs			Discontinued entrepreneurs		
	Coefficients	t Stat		Coefficients	t Stat
Intercept	297.27	3.0412	Intercept	-8690.11	-0.296
CEI	-304.78	-2.4106	EDI	44588.00	1.347
Expenditure	0.00	9.7474	Expenditure	1.95	18.373
d1	476.41	4.0696	d1	-25741.20	-0.741
d2	-150.79	-0.9494	d2	-6824.34	-0.171
d3	239.19	2.3034	d3	-8529.32	-0.237
d4	225.29	2.4144	d4	7063.54	0.238
d5	579.64	5.0767	d5	101305.80	3.027
d6	789.66	6.3200	d6	36245.54	0.681
d7	359.82	3.5773	d7	-6632.65	-0.227
d8	528.32	3.2831	d8	43443.52	1.227

4. INFLUENCE OF SUCCESSFUL ENTREPRENEURS ON OTHERS

About 32.31 per cent of the secondary entrepreneurs were influenced by successful ARYA entrepreneurs. Out of which, 18.86 per cent, 14.04 per cent and 11.26 per cent of them were friends, family members and relatives of the successful ARYA entrepreneurs (Table 41). Among the functional enterprises promoted under ARYA, successful goat farming entrepreneurs had higher level of influence on others to start similar enterprises (88.04%). Piggery was the next most influential enterprise (43.48%) with about 24 per cent family members, 41 per cent friends and 22 per cent relatives influenced to take up similar entrepreneurship. Mushroom (10.96%), fisheries (15.38%) and vermicomposting (17.00%) enterprises had least influence on others.

Table 41: Extent of influence of successful entrepreneurs on others

Enterprise	Family members influenced (%)	Friends influenced (%)	Relatives influenced (%)	Total influenced (%)
Bee keeping	12.07	12.07	12.07	27.59
Fisheries	15.38	7.69	3.85	15.38
Goat farming	51.09	45.65	27.17	88.04
Mushroom	1.37	5.48	4.11	10.96
Nursery	4.55	22.73	12.12	27.27
Piggery	23.91	41.30	21.74	43.48
Poultry	9.84	16.39	9.84	30.33
Processing and Value addition	17.39	21.74	17.39	26.09
Vermicomposting	6.00	11.00	4.00	17.00
Overall	14.04	18.86	11.26	32.31

In terms of income earned by the secondary entrepreneurs (Table 42), relatives of the successful ARYA entrepreneurs earned Rs. 161393/unit, followed by friends (Rs. 13482/unit) and family members (Rs. 57,367/unit). Among all the secondary entrepreneurs, higher income was generated by nursery enterprises started by friends (Rs. 521667/unit) and relatives (Rs. 867500/unit) of the successful entrepreneurs promoted under ARYA.

Table 42: Income earned by influenced entrepreneurs

Enterprise	Income earned by family members (Rs./unit)	Income earned by friends (Rs./unit)	Income earned by relatives (Rs./unit)
Bee keeping	58829	39714	60714
Fisheries	76250	122500	65000
Goat farming	55919	67296	77760
Mushroom	14650	40438	31850
Nursery	26667	521667	867500
Piggery	92557	65975	74064
Poultry	77150	222910	154375
Processing and Value addition	3000	5700	6500
Vermicomposting	16167	14045	60750
Average	57367	134827	161393
		227069	

4.1. Household Assets created

Majority of the poultry entrepreneurs (57.38%) created household assets, followed by processing and value addition (56.52%), nursery entrepreneurs (54.55%), goat farming entrepreneurs (53.26%) and piggery entrepreneurs (50.00%). The average worth of the assets was highest with poultry (Rs. 312780 per entrepreneur) followed by nursery (Rs. 246694) and processing and value addition (Rs. 244615). On the whole, ARYA enterprises created household assets worth an average of Rs. 186239/household.

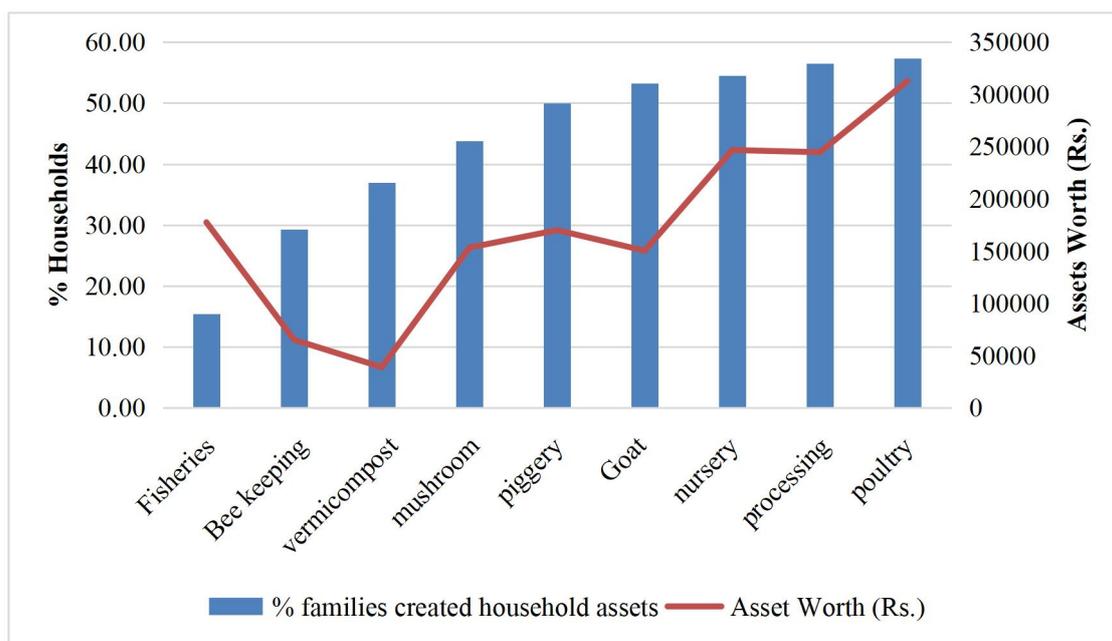


Figure 21: Influence of ARYA functional enterprises on household assets creation

5. DOCUMENTATION OF THE SUSTAINABILITY OF SELECTED ENTERPRISES :

CASE STUDY APPROACH

5.1. Summary of cross-case analysis

- Mushroom production was most profitable in Punjab followed by Himachal Pradesh and Odisha among the 12 locations.
- Poultry farming was profitable in Punjab followed by Odisha and Uttarakhand, among 12 locations.
- Nursery enterprises were most profitable in Maharashtra followed by Kerala and Haryana among 10 states.
- Bee keeping was most profitable in Punjab among six locations.
- Goat farming was most profitable in Madhya Pradesh among the six locations.
- Processing and value addition enterprises were most profitable in Himachal Pradesh, among four locations.
- Piggery was most profitable in Jharkhand whereas fisheries was most profitable in Bihar among three locations each.
- Vermicomposting was least profitable among all enterprises, but was better in Telengana, compared to other three locations.



Mr. Renben Murray, Wokha, Nagaland

5.2. Mushroom

Performance of mushroom enterprises across 12 ARYA centres is given in Table 43. Mushroom enterprises in Punjab recorded the highest average income (Rs. 504784/unit) followed by Himachal Pradesh (Rs. 441100/unit) from mushroom enterprises. During the period 2017 to 2021, mushroom units functioned for longer duration (755 days) in Himachal Pradesh followed by Manipur and Odisha. Supported by higher investment (Rs. 942561), mushroom enterprises in Haryana created more household assets, worth Rs. 351875. Mushroom enterprises in Odisha had to spend more (Rs. 583281), but were successful in creating more employment (1027 person days).

Table 43: Performance of mushroom enterprises across the states

Sl. No.	State	Total operational duration (days)	Total Household assets created (Rs./unit)	Total exp. (All Years) (Rs. /unit)	Total net income (Rs. /unit)	Total employment (Person days)	Total investment (Rs. /unit)
1.	Andhra Pradesh	325	13173	27920	90647	238	44466
2.	Bihar	401	0	10960	83935	589	40965
3.	Chhattisgarh	301	48500	21210	107494	292	132560
4.	Haryana	370	351875	238498	412614	413	942561
5.	Himachal Pradesh	755	15300	292900	441100	307	117500
6.	Kerala	221	263	17424	117589	193	80512
7.	Madhya Pradesh	364	96500	300131	248891	439	144072
8.	Manipur	675	20000	61805	284695	627	113700
9.	Nagaland	600	0	47611	97889	601	40000
10.	Odisha	658	122906	583281	413671	1027	171438
11	Punjab	420	0	832060	504784	543	141975
12	Uttarakhand	566	8333	348083	152750	431	433333
F value		7.271	3.256	3.951	3.215	1.831	4.165
Sig.		0.000**	0.001*	0.000**	0.001*	0.061	0.000**

Note: * & ** indicates significance at five and one per cent level of probability

Some case studies presented here highlight the factors contributing to success or discontinuation of mushroom enterprises

Success stories and the contributing factors for continuing MUSHROOM enterprises

Kerala –Mr. Rahul Govind: Mr. Rahul quit his job and with the help of KVK, Kannur started mushroom production in 2018. Currently, in addition to fresh mushroom, he produces and sells mushroom pickle, mushroom soup powder, mushroom powder, cutlet and dry mushroom under the brand name “**Monsoon mushrooms**”. The net income obtained in the year 2022 was Rs. 4,48,450. The unit is serving as **One stop shop for all types of mushrooms. Family support, sustaining the unit during covid by maintaining 100bags to minimize loss, wider product range, value addition of unsold mushroom and marketing with the help of Women SHG’s** has helped Mr. Rahul to thrive and sustain in the mushroom production successfully.



Odisha –Ms. Janaki Sahoo: Ms. Janaki Sahoo is a homemaker and her husband was working as security guard in Bhubaneswar. In 2016, she took ARYA training from KVK, Nayagarh and started the unit with 100 beds and earned gross turnover of Rs. 17980 in 2017-18 and increased the turnover gradually to Rs. 24,00,000 (from 8,500 beds) during 2022-23. **The family support and passion towards mushroom production, care towards sanitation and congenial temperature/moisture, daily seeding and efficient paddy straw cutting technique and year round production with the technical support of KVK** has led to successful mushroom production in the locality.



Andhra Pradesh –Mr. E. V. Bhaskar Reddy: Mr. Bhaskar was working as a cab transporter in Hyderabad but with the guidance from KVK, Nellore started a new business (Milky and Oyster Mushroom production) during 2018-19 in an unutilized cinema theatre (due to COVID) in his native place. Initially he sold the mushroom to villagers, nearby friends and family members. Later the **demand from surrounding hotel sector** increased and sold the **mushrooms directly to nearby hotels and restaurants**. In 2021-2022, he earned net income of Rs. 3,43,000 by selling 1,200 kg raw mushroom. From the income generated, he **opened the Retail Textile Shop** (income of Rs. 2,500-3,000/day) next to mushroom unit.



Nagaland –Mr. Renben Murray: Mr. Renben was working as a daily labour from which he was earning Rs. 30,000 annually. He started the mushroom unit of capacity 15x30 sq. ft., with the support of KVK, Wokha. Currently he is actively engaged in mushroom production and rearing 3 batches per year with an average production of 350-400 kg and earned a net income of Rs. 85,600 in 2022. **Demand for mushroom in the locality and timely supply of spawn and advice in management of contamination from KVK, Wokha** has motivated Mr. Murray to manage the unit successfully.



Kerala –Ms. Molly Dominica: Ms. Molly is a homemaker and her husband was working as Auto-driver. She received ARYA training on Mushroom production from KVK, Kannur in 2018. In 2022, she produced 940-1,080 kg of mushroom which is sold under the brand name “**Omega Mushroom**” and earned net income of Rs. 4,47,974. The factors like use of **good quality spawn, technical guidance from KVK at every stage, separate mushroom sheds, direct marketing in nearby panchayath office and primary health centres, processing of unsold produce and maintaining appropriate temperature and humidity by low cost own designed foggers** helped Ms. Molly to run the unit successfully.



Discontinued cases and the reasons for discontinuation of MUSHROOM enterprises

Andhra Pradesh – Ms. K. Sumathi: Ms. Sumathi, a homemaker started a mushroom enterprise in 2017-18 with



assistance from KVK, Nellore. In 2021-22, she earned a net income of Rs. 3.36 lakh. Due to unavailability of raw materials such as spawn, paddy straw and contamination problem, she discontinued the enterprise in December 2022. Now she is a resource person to provide mushroom training and is willing to



start the enterprise.

Nagaland – Mr. Abenthung Ezung: Mr. Abenthung obtained ARYA training from KVK, Wokha in 2019 and started enterprise in 2020. He **struggled to maintain sanitation** that often led to **contamination**. He discontinued the mushroom production **as he got government job**.



Kerala- Ms. Limna T. C: Ms. Limna got training from KVK Kannur and started a mushroom production unit in a shed in 2020. As the entire family was affected with Corona and had post **Corona health issues**, she **was not able to continue or restart the production**. Later, she **joined a company as microbiologist**. But still she is continuing production of mushroom as a hobby.



Haryana – Mr. Hansraj: Mr. Hansraj obtained ARYA training in Mushroom production from KVK, Gurugram in 2020 and started the mushroom unit in the same year. **Poor family support; lack of investment; production only during winter due to disturbed electricity supply** to the unit which is most essential to the mushroom production unit to maintain the temperature and moisture and **lack of assured marketing tie ups** has led to the shutdown of the unit.

Odisha- Ms. Gayithri: Ms. Gayithri took ARYA training from KVK, Nayagarh in 2018 and started the unit in the same year. During Covid pandemic in 2020, due to **lack of timely availability of spawn** and **lack of marketing facility** as the unit was located in remote village the unit was shut down. In 2021, restarted the production but due to **poor quality of paddy straw and spawn**, the unit was closed again.

Madhya Pradesh: Mr. Mahesh Singh Kushwah: Mr. Kushwah obtained ARYA training from KVK, Gwalior in 2016-17 and started oyster mushroom production in 2017. In 2019, he earned a net income of Rs. 11,920. Due to many issues viz., **lack of consumer preference for oyster mushroom in the locality, delay in payments for dry mushroom by middlemen/local agents; low market price due to physical damage during transport, and lack of time to manage both vegetable cultivation and mushroom production**, he discontinued the unit in 2020-21.



Ms. Mhalo Yanthan's husband, Wokha, Nagaland



Ms. Jigisa Samantaray, Nayagarh, Odisha

5.3. Poultry

Poultry enterprise was promoted by 12 ARYA centres during the period 2017-2021. Poultry enterprises in the state of Punjab were most profitable as evident from data in Table 44. Net income generated by poultry units of Punjab was very high (Rs. 1426383/unit), although the expenditure was also the highest (Rs. 1285019/unit) and investment was also high (Rs. 1250300/unit). The next best performance was reported in Odisha with a net income of Rs. 766273/unit with half the expenditure compared to Punjab, but created lesser employment as most of these units were managed by family members. Poultry enterprises in Madhya Pradesh functioned for shorter duration (441 days during the period), but were able to generate reasonably good income (Rs. 489607/unit).

Table 44: Performance of poultry enterprises across the states

Sl. No.	State	Total operational duration (days)	Total Household assets created (Rs./unit)	Total exp. (All Years) (Rs. /unit)	Total net income (Rs. /unit)	Total employment (Person days)	Total investment (Rs. /unit)
1.	Assam	746	81000	166022	330443	370	141006
2.	Bihar	888	283333	833383	53394	579	134100
3.	Chhattisgarh	878	94500	115485	510453	795	148000
4.	Madhya Pradesh	441	184928	159964	489607	457	83886
5.	Manipur	1177	14547	410377	444273	598	121190
6.	Nagaland	682	0	77824	187471	676	46765
7.	Odisha	666	190000	645316	766273	330	456222
8.	Punjab	930	1070000	1285019	1426383	1079	1250300
9.	Rajasthan	1356	20174	107179	158193	1356	50000
10.	Sikkim	750	95000	102500	328750	791	323000
11.	Uttarakhand	753	134166	819617	547217	738	263500
12.	West Bengal	569	0	127775	145225	1858	81994
	F value	11.402	1.177	8.601	4.874	17.027	40.826
	Sig.	0.000**	0.311	0.000**	0.000**	0.000**	0.000**

Note: ** indicates significance at one per cent level of probability

The case of Ms. Mhalo in a remote village in Wokha district of Nagaland is an example of how technology and dedication could contribute to successful poultry enterprise.

Success stories and the contributing factors for continuing POULTRY enterprises

Nagaland –Ms. Mhalo Yanthan: Ms. Mhalo lives in Mhakarong village in Wokha, Nagaland. In 2021, she attended poultry training and started the enterprise in the same year. Initially she reared 400 Vanaraja chicks for meat purpose and sold 5 months old bird at the rate of Rs. 350/kg of live weight and earned net income of Rs. 1,59,720. In 2022, she earned net income of Rs. 2,59,650 from 500 birds. **Tapping the potential market area, consistency in production, good rapport and technical guidance from KVK on every aspect of production has helped Ms. Mhalo to run her poultry unit successfully.**



Odisha- Ms. Jigisa Samantaray: Ms. Jigisa, a house wife was forced to take up an alternative livelihood as her husband had to quit his job in 2019. She joined ARYA training programme at KVK, Nayagarh in 2020 and started the poultry unit in the same year. In 2022, she earned a net income of Rs. 2,66,800 from the unit. The factors like rearing of local breeds (Aseel, Kadaknath and Vanaraja) as per the **preference of scavengers over broilers by localities, year-round production, variations in production depending on seasons, efficient utilization of various marketing channels, restart of the unit after taking necessary sanitation and disease control measures and timely vaccination, location of unit near to district headquarters, 6ft fencing to protect from natural predators, and constant demand for meat, and technical guidance from KVK Nayagarh & Veterinary Department** have enabled the unit to thrive successfully.



Discontinued cases and the reasons for discontinuation of POULTRY enterprise

Nagaland –Mr. Nchumthung Murry: Mr. Nchumthung attended the ARYA training in 2021 at KVK, Wokha and established poultry unit (Vanaraja-meat purpose) in the same year. Due to **financial issues** he stopped the unit and currently he is working as a teacher in private school.



West Bengal –Ms. Aparna Sahoo: Ms. Aparna, who was homemaker, started a poultry unit in 2016 with the help of KVK, South 24 Parganas. Initially, she started with 285 birds and received income of Rs. 29,800. Furthermore, during 2019 she earned net income of Rs. 47,190 by selling 460 birds. In 2020, she discontinued the enterprise due to a **cyclone and issues in marketing channel and transportation caused by COVID.**



Odisha –Mr. Jitendar Nayak: Mr. Jitendar took ARYA training from KVK, Nayagarh in 2018 and started poultry unit by rearing Vanaraja birds in low cost semi-pucca rearing house and earned net income of Rs. 31,700. **Lack of housing facility, poor drainage, threat of snake and other dangerous reptiles and objection from neighborhood for foul smell** compelled Jitendar to close the poultry unit. Further, he has applied for Pradhan Mantri Awas Yojana for assistance to construct the new house in village outskirts and willing to restart the unit in new location with 150 birds.



Sneha Community Nursery, Nalgonda, Telangana



Mr. Sebastian Michael, Kannur, Kerala

5.4. Nursery

Nursery enterprise is among the highly profitable activities promoted under ARYA. Nursery production in Maharashtra were operational for larger duration (1403 days/unit), generated higher net income (Rs. 1979833/unit) than other centers. Nursery enterprises were also highly profitable in Kerala (Rs. 1483000/unit). Nursery enterprises in Haryana invested more and created greater household assets compared to other states, and generated income of Rs. 943881/unit. The nursery units of West Bengal generated highest employment (3870 person days/unit) and were operational for 554 days (Table 45).

Table 45: Performance of nursery enterprises across the states

Sl. No.	State	Total operational duration (days)	Total Household assets created (Rs./unit)	Total exp. (All Years) (Rs. /unit)	Total net income (Rs. /unit)	Total employment (Person days)	Total investment (Rs. /unit)
1.	Andhra Pradesh	290	43529	106991	125201	247	83072
2.	Haryana	538	616250	880494	943881	718	2647000
3.	Himachal Pradesh	1049	120416	175363	741304	715	345542
4.	Karnataka	544	0	165200	606100	403	309000
5.	Kerala	600	0	217000	1483000	570	200000
6.	Madhya Pradesh	1143	77666	395337	515333	1160	101333
7.	Maharashtra	1403	183333	390000	1979833	3160	420667
8.	Nagaland	863	0	220000	202000	863	220000
9.	Rajasthan	510	20000	39600	121150	510	26667
10.	West Bengal	554	28000	504340	217460	3870	89210
	<i>F value</i>	15.52	6.413	6.985	7.846	2.947	7.729
	<i>Sig.</i>	0.000**	0.000**	0.000**	0.000**	0.008**	0.000**

Note: ** indicates significance at one per cent level of probability

Success stories and the contributing factors for continuing NURSERY enterprises

Maharashtra – Mr. Mahipal Gedam: Mr. Mahipal lives in a Kukdipanjra village of Nagpur. With a hope of getting an assured income from nursery unit, he attended the ARYA training in the year 2016-17 and started the nursery unit “Mahipal Nursery” in the same year. He is involved in raising Nagpur Mandarin, Sweet lime and Lemon saplings. The net income generated from the unit in 2022-23 is Rs. 21,65,000. **Quality planting materials, timely supply and significant success rate of saplings (establishment and fruit bearing) in the farmers’ fields, demand for saplings in the region has attracted farmers of nearby town and distant places from neighboring state MP.** He received “Arvindbabu Deshmukh Smrithi Krushirathna” Gaurav Puraskar for his remarkable achievement and success in fruit plants nursery.



Madhya Pradesh –Mr. Mahesh Singh Rawath: Mr. Mahesh lives in Nikodi village of Gwalior. He attended ARYA training in 2016-17 and started a nursery unit in 2017. In initial years he earned net income of Rs. 20,000, which increased to Rs. 9,00,000 by selling 85,000 saplings in 2021-22. **Mahesh’s honesty, hard work and wife support in monitoring nursery and co-coordinating female workers; demand for seedlings in the locality; timely guidance, consultancy and support from KVK, Gwalior and department of horticulture; promotion and/or popularity of nursery through social media, T.V. and newspaper** have enabled Mr. Mahesh to thrive and shine successfully in the nursery sector.



Kerala – Mr. Sebastian Michael: In 2018-19, Mr. Sebastian received ARYA training from KVK, Kannur under ARYA project and started “Agro Centre Nursery” in the same year. Initially, he started selling ornamental plants, fruit saplings and vegetable seedlings later expanded the unit from planting materials to other gardening tools like cocopeat, vegetable grow bags, coir pith, cow dung, bio-cedar nutrient spray, different types of pots (plastic, earthen and hanging), potted plants, hybrid seeds and bee colonies. Initially, there was neither profit nor loss but over the years by selling diverse products he is able to earn income up to Rs. 3,30,000 from the nursery unit. **Support from KVK, Kannur in production and marketing, diversified products, landscaping services (Rs. 50/sq. ft), improved knowledge in identifying different plants and its growth patterns and location of nursery near to road** have played a crucial role in success of “Agro Centre Nursery”.



West Bengal –Mr. Raju Molla: Mr. Raju attended ARYA training in 2018-19 at KVK, South 24 Parganas and started enterprise unit in 2019. He is involved in raising fruit crop saplings (mango, sapota, jackfruit, guava, sweet orange, lime, karonda, water apple, jamun, dragon fruit, papaya and ber), flower crops (marigold, ixora, chrysanthemum, alyssum, pansy, dianthus and gazania), Plantation crops (coconut and arecanut). He has obtained License from NHB in 2020. He has earned a net income of Rs. 1,60,990 in 2022 by increasing the mother plants and by online marketing. The factors like **family support, diversity in the crops, selection of the crops that are suitable to the region as per the technical advice of KVK, selling both at farm gate and at retail shop located in the nearby town** has enabled Mr. Raju to run the nursery unit successfully.



Nagaland – Ms. Loreno Tungoe: Ms. Loreno is a graduate and teacher by profession; and her husband works in a medical department. She was very passionate about flowers and attended ARYA training in 2019 at KVK, Wokha and started a floriculture unit in the same year, with cultivation of Gerbera. **Due to relative advantage of growing Lilium and Statis over Gerbera in disease management and suitability of climatic conditions,** she started the cultivation of Lilium and Statis from 2021 and has earned net income of Rs. 1,55,000 from the unit. The unit is now in a position to construct the polyhouse.



Andhra Pradesh - Mr. T. Venkaiah: Mr. T. Venkaiah, a farmer of Jagadevapat, Nellore, took ARYA Training in 2017-18, and started the nursery unit in addition to farming by raising chilli (rabi), Tomato (late kharif) and brinjal (rabi) seedlings in shade net by using pro-trays and earned a net income of Rs. 89,500. Later, diversified to marigold and papaya seedlings. In 2021-22, he earned a net income of Rs. 1,45,000. With the help of KVK, Nellore and department of horticulture, he has constructed a storeroom. **Diversity in seedling production, demand for vegetable seedlings in the locality, permanent/regular customer base and no competition in nearby villages** has helped Mr. Venkaiah to flourish in the business.



Telangana- Sneha Community Nursery: The group consisting of five members attended ARYA training in 2017-18 and started the unit in 2018-19. They are involved in raising vegetable seedlings (tomato, chilli, brinjal, marigold, cabbage and caulifower). In 2021-22, they have earned a net income of Rs. 6,42,000 by selling 11,60,000 vegetable seedlings. The factors such as **diversity in vegetable seedling production, helathy and quality seedlings, higher demand in the locality, trained workers, knowldege about market demand and growing season, less competition in nearby village and KVK, Nalgonda guidance in disease management** has helped them to run the unit successfully.



Discontinued cases and the reasons for discontinuation of NURSERY enterprises

Andhra Pradesh – Mr. Sudhakar: Mr. Sudhakar, a paddy farmer received training from KVK Nellore during 2017-18 and started a nursery during the same year. He sold chilli, papaya and tomato through contract farming and received a net income of around Rs. 3 lakh every year until 2020. His **nursery unit was destroyed** due to **Nivar cyclone** in November 2020 and thus his enterprise was discontinued.



West Bengal - Mr. Surajit Baidya: Mr. Surajit started a nursery enterprise after receiving training from KVK,



South 24 Parganas. He produced and sold seedlings of vegetable, fruit and flower crops. He had earned net income of Rs. 20,150, but discontinued the enterprise due to **lack of capital** and **problem of soil salinity**. He wishes to restart the journey, if subsidies are provided by the state line departments and also desires to get training on organic farming.

Kerala –Ms. Ruksana C.H: Ms. Ruksana attended ARYA training at KVK, Kannur in June 2021 and started the



nursery unit in November 2021 in her courtyard. She sold ornamental plants and chilli seedlings and earned Rs. 6,900. The unit closed in March 2022 due to **nursery located away from the road, less visibility, less demand and minimum turnover**. **Poor infrastructure** exposed the plants to rain and adverse weather damage. **Inability to mobilize finances and compete with other nurseries** was the reason for discontinuation. But, she is making use of her skills by working in KVK, Kannur nursery unit and earns Rs. 8,000/month.

Nagaland –Ms. Chibeno Lotha: Ms. Chibeno is from Niroyo village of Wokha. She took training in 2019 and



started the nursery in the same year. She cultivated Gerbera and earned net income of Rs. 2,050 and Rs. -12,250 in 2019 and 2020 respectively. The unit was closed in 2020 due to **financial issues** during **COVID-19**. Later she worked as salesperson in handloom shop during 2020-22 and in 2023 she started a new handloom business i.e. traditional dress outlet in nearby town.

Madhya Pradesh –Mr. Vishwambhar Singh Gurjar: Mr. Vishwambhar is an agricultural graduate from Banwar village of Gwalior and was working in agricultural inputs company. In 2016-17, he obtained ARYA training from KVK, Gwalior in nursery and protected cultivation and started the nursery unit in same year. Later in 2020, he applied for **Custom Hiring Center under Start Up India, Stand Up India** and **got approved** and earning R. 40,000 to Rs. 50,000 per month from CHC.

Haryana –Mr. Umesh Kumar : Mr. Umesh obtained ARYA training from KVK, Gurugram in 2018-19 and started the nursery unit. The unit was closed in 2020 due to **poor family support, poor connectivity and lack of transportation facility, and marketing issues**.



Mr. Sujil, Kannur, Kerala

5.5. Bee Keeping

Bee keeping is promoted by 6 KVKs under ARYA during 2017-2021. Among the six centres, bee keeping in Punjab was found to be more profitable with an average net income of Rs. 946664/unit, followed by Uttarakhand (Rs. 525500/unit). Bee keeping activity generated higher employment in Jharkhand (1395 persondays/unit) and a net income of Rs. 492681/unit (Table 46). Further, bee keeping units were least operational in Kerala (305 days).

Table 46: Performance of bee keeping enterprises across the states

Sl. No.	State	Total operational duration (days)	Total Household assets created (Rs./unit)	Total exp. (All Years) (Rs. /unit)	Total net income (Rs. /unit)	Total employment (Person days)	Total investment (Rs. /unit)
1.	Bihar	665	60000	245500	324500	995	520000
2.	Jharkhand	570	65298	34222	492681	1395	79487
3.	Karnataka	376	0	2630	14968	153	48150
4.	Kerala	305	6538	44315	88531	285	41476
5.	Punjab	539	0	1194592	946664	581	213700
6.	Uttarakhand	613	7000	75000	525500	604	322500
	<i>F value</i>	6.534	4.194	15.252	11.56	42.501	32.963
	<i>Sig.</i>	0.000**	0.005*	0.000**	0.000**	0.000**	0.000**

Note: ** indicates significance at one per cent level of probability

Bihar state has not been considered as it contains only one sample enterprise

The case studies presented below bring forth the struggle, success and failure of beekeeping

Success stories and the contributing factors for continuing BEE KEEPING enterprises

Kerala – Mr. M. J. Jomon: Mr. Jomon was working as driver and earned Rs. 20,000/month. In 2019-20



due to covid-19 there was no earnings and it was difficult to run the family so, he took training from KVK, Kannur and started bee keeping with 5 bee box and colonies provided from KVK. He sells honey, stingless bee honey, box with colony and without colony, and bee wax under the brand name “JJ Honey”. In 2021-22, he earned net income of Rs. 189225, from a total of 116 bee boxes. **Availability of stingless bee honey helped in popularizing the unit and created name in the locality. This has helped to sell honey of stingless bee. There is a demand in locality for JJ honey due to its quality and support from KVK in marketing.**



Kerala – Mr. Sujil: Mr. Sujil was engaged in construction work before he took training from KVK, Kannur in



2020. He started bee keeping with five colonies and initially shared the honey to neighborhood families. He is selling honey, **stingless bee honey**, bee boxes both with and without colony and bee wax under the brand name “**Vichus Honey**”. In 2021-22, he earned a net income of Rs. 163150, from the expanded unit of 100 bee boxes. Honey is **sold in nearby supermarkets** and there is a **demand for the honey through tele marketing**.



Discontinued cases and the reasons for discontinuation of BEE KEEPING enterprises

Kerala – Mr. Jistha Anthony: Mr. Anthony took ARYA training from KVK, Kannur during Covid in 2020. He extracted around 2.5 kg honey. He was **not able to maintain the colonies** due to **hospitalization of a family member**. The bee colonies **migrated and fled away**. He later joined as consultant in Muthoot Finance.

Kerala – Mr. Roopesh: Mr. Roopesh took online training from KVK, Kannur during Covid and started a beekeeping unit in 2020. He extracted around 1.5 kg honey and due to **heavy and continuous rainfall**, **bee colonies migrated**. **Unable to restart** the activity due to **financial problems**. In 2021 he continued his previous job as auto driver as he was the only breadwinner in the family.



Mr. Shrikanth, Nalgonda, Telangana

5.6. Goat farming

Goat farming was promoted in six ARYA centres as detailed in Table 47. Goat farming was most profitable in Madhya Pradesh with an average net income of Rs. 1463750/unit, with a meagre investment of Rs. 105333/unit and an average operational expenditure of Rs. 206250/unit. Goat farming was also profitable in Telangana with an average net income of Rs. 416818/unit. Even though goat farming units were operational for longer period in Haryana (1460 days), the Jharkhand goat farming units generated higher employment (3541 person days/unit).

Table 47: Performance of goat farming enterprises across the states

Sl. No.	State	Total operational duration (days)	Total Household assets created (Rs./unit)	Total exp. (All Years) (Rs. /unit)	Total net income (Rs. /unit)	Total employment (Person days)	Total investment (Rs. /unit)
1.	Bihar	755	11388	22901	43814	343	54967
2.	Haryana	1460	272500	102938	316005	1485	80756
3.	Jharkhand	980	115800	25195	340608	3541	90869
4.	Madhya Pradesh	824	466660	206250	1463750	764	105333
5.	Rajasthan	753	49843	127921	134560	810	156922
6.	Telangana	557	144615	46905	416818	566	144231
	F value	13.224	3.448	4.452	4.655	86.208	0.923
	Sig.	0.000**	0.007**	0.001**	0.001**	0.000**	0.47

Note: ** indicates significance at one per cent level of probability

In Telangana, Swathi and Shrikanth demonstrated success in their enterprise, earning Rs. 3,86,000 and Rs. 2,98,000, respectively.

Success stories and the contributing factors for continuing GOAT FARMING enterprises

Telangana – Ms. Swathi: Ms. Swathi, an unemployed M.Tech. graduate from Nalgonda district of Telangana, joined the training in 2018-19 and started the enterprise in the same year with 10 goat kids earning a net income of Rs. 1,17,000. In 2021-22, earned a net income of Rs. 3,86,000 by selling 50 goats and 10 kids.



Family support and involvement, grazing through community shepherds, feed formulation at home and good health management ensured higher productivity. Establishment of

new marketing channel by opening a retail shop at Nellore where they sell milk, rice, vegetables and goat meat has been a game changer in providing consistent marketing channel.



Telangana – Mr. Shrikanth: Mr. Shrikanth attended ARYA training at KVK, Nalgonda in the year 2018-19 and started enterprise in the same year. In 2021-22, he has earned net income of Rs. 2,98,000 by selling 20 adults and 20 kids. **Grazing in his own orange orchard reduced the cost of rearing. Better health care and management of goats, providing calcium as per vet advice helped in achieving faster growth and weight gain (30-35kg body weight in 6 months, worth Rs. 12000/goat).**



Madhya Pradesh –Mr. Balbeer Kushwah: Mr. Balbeer lives in the Econa village near foothills in Dabra block of Gwalior. He was working as a daily wage labour besides carrying out agriculture and allied activities. He took ARYA training from KVK, Gwalior in 2019 and started the enterprise in the same year with 2 goat kids. He is **rearing three different breeds** viz., Jamunapari, Sirohi and Barbari. In 2022, he earned net income of Rs. 98,000 (goat for meat purpose and goat milk). **Good quality meat and milk due to forest grazing, rearing of diversified breeds, timely vaccination and disease management, good rapport with KVK and animal husbandry department** have helped Mr. Balbeer to run the enterprise sustainably and successfully over the years. The success has boosted his confidence as he has applied for loan under National Livestock Mission to build a unit with the capacity of 525 goats.



Discontinued cases and the reasons for discontinuation of GOAT FARMING enterprises

Telangana – Mr. Sai Kumar: Mr. Sai Kumar, an unemployed graduate, used to work in agricultural field by cultivating paddy. With the assistance of KVK Nalgonda, he started goat farming during 2017. He earned net income of Rs. 3.35 lakh, Rs. 3.0 lakh respectively during 2017-18, 2018-19, but the COVID spoiled the progress with just Rs. and Rs. 1.02 lakh per annum during subsequent years. He discontinued the enterprise, as there was **low demand in market due to COVID**. The problem was further got aggravated due to **disease incidence in goats**. Therefore, he had to discontinue the enterprise and joined a private job.



Jharkhand – Mr. Soma: Mr. Soma took ARYA training in 2016-17 from KVK, Gumla. In 2020, family divided and he shared the goats among his 3 sons and also few goats died due to PPR disease. Despite having interest in goat farming, due to **lack of family support** he is unable to maintain more than 4-5 goats, along with agriculture and allied activities.

Haryana – Mr. Satbir: Mr. Satbir attended ARYA training in 2016 at KVK, Gurugram . In 2017, majority of goats died due to disease epidemic in the region. Currently he is working in a private company and earning Rs. 14,000/month and his wife is working in KVK. He couldn't restart the goat farming due to **non- availability of land holding for fodder cultivation and lack of family support** as they are family of only 4 and children are still studying.



Ms. Pooja Sharma, Gurugram, Haryana



Mr. Amel Siroshi, Kannur, Kerala

5.7. Processing and value addition

Processing and value addition as a vocation was promoted by 4 KVKs. The processing and value addition activities promoted in Himachal Pradesh have generated maximum returns to the entrepreneurs (Rs. 868813/unit) with an investment of Rs. 248125/unit and operational cost of Rs. 490938/unit. Punjab centres also generated higher income (Rs. 461438/unit) and employment (594 person days/unit), although at higher expenditure (Table 48).

Table 48: Performance of processing and value addition enterprises across the states

Sl. No.	State	Total operational duration (days)	Total Household assets created (Rs./unit)	Total exp. (All Years) (Rs. /unit)	Total net income (Rs. /unit)	Total employment (Person days)	Total investment (Rs. /unit)
1.	Chhattisgarh	467	37142	35357	138360	411	81750
2.	Himachal Pradesh	526	347500	490938	868813	799	248125
3.	Kerala	180	0	22000	48000	170	150000
4.	Punjab	594	17500	661218	461438	617	231125
<i>F value</i>		0.474	6.175	9.103	6.254	1.021	1.734
<i>Sig.</i>		0.63	0.008**	0.002**	0.008**	0.378	0.202

Note: ** indicates significance at one per cent level of probability

Success stories and the contributing factors for continuing PROCESSING AND VALUE ADDITION enterprises

Haryana- Ms. Pooja Sharma: Ms. Pooja, a housewife, used to engage in cattle rearing, sold milk in the neighborhood and even worked as a social worker in NGO to support her family. In 2017, she took ARYA training and with the support of KVK, Gurugram started the processing unit with an income of about Rs. 90,000. In collaboration with “Feeding India”, ragi and peanut laddu are prepared which are distributed to pregnant women through Anganwadi’s. Awards and recognitions- Nari Shakthi Samman, Pandith Deen Dayalu Award, Ludhiana. **Passion and determination towards achieving success, higher entrepreneurial competency, family support, good rapport, collaboration and support from/with KVK and other social institutions like RUDSETI, NGO and State departments, continuous experimentation and preparation of new products and flavors, careful selection and procurement of quality raw materials and well established marketing linkages** helped Ms. Pooja to run the unit successfully. By 2021, her gross turnover was around Rs. 20 lakh.



Kerala – Mr. Amel Siroshi: Mr. Amel was working in a bakery before ARYA training. He attended ARYA



training at KVK, Kannur in group consisting of three members in 2019-20 and started the group unit in the same year by producing chips, mixture, cake and pickle with an initial investment of Rs. 1 lakh and the unit incurred loss due to Covid-19. In November



2021, he restarted the new unit “Amma Food Lines” individually producing pickle, virgin coconut oil, chutney powder and dosa batter and earned an income of Rs. 6,00,000. **Maintaining diversity in products, good quality and packaging, regular customer base, unique taste of pickles and encashing new marketing channels like home delivery and online marketing** have played a prominent role in sustaining Amma Food Lines in the market.



Discontinued cases and the reasons for discontinuation of PROCESSING AND VALUE ADDITION enterprises

Kerala – Mr. Arjun M. Raj – passion fruit for processing: Mr. Arjun, a plantation and vegetable crops grower



from Kannur received ARYA training during 2020 and started producing squash by processing of passion fruit. He sold the product through his own bakery and earned income of Rs. 40,000 during the same year. Because of **continuous rainfall**, **passion fruit wines** were infected with **fungal diseases** and the wines died. Due to **labour shortage** and **higher wages** during the period, **could not rejuvenate passion fruit production and processing**. **Depending solely on his farm produced passion fruit for processing** was the reason for discontinuation.

Kerala – Ms. Varsha V: Ms. Varsha set up Shaa Organic Mushroom production unit in 2019-20 with the help of KVK, Kannur. She received net income of Rs. 5,02,000 per year by selling raw mushroom and pickles to retail shops, Ayurveda doctors and Govt. offices. She discontinued her enterprise during February 2022, because of **unavailability of raw material and failure to control contamination** in mushroom production.



Mr. N. Sukumaran, Nellore, Andhra Pradesh

5.8. Vermicomposting

Vermicompost production as a commercial activity was promoted under ARYA, by south Indian states. The scale of operation was limited and the income generated was meagre, with highest net income of Rs. 102311/unit in Telengana (Table 49). The analysis of variance ANOVA result shows that there is a statistically significant mean difference in all the given outcome variables across the states for vermicomposting.

Table 49: Performance of vermicomposting enterprises across the states

Sl. No.	State	Total operational duration (days)	Total Household assets created (Rs./unit)	Total exp. (All Years) (Rs. /unit)	Total net income (Rs. /unit)	Total employment (Person days)	Total investment (Rs. /unit)
1.	Andhra Pradesh	494	8434	14579	39586	307	36680
2.	Karnataka	245	0	16808	22582	211	218158
3.	Tamil Nadu	194	4100	9630	47687	174	14027
4.	Telengana	766	48590	42123	102311	788	54909
	F value	85.128	24.027	42.59	41.212	91.542	35.319
	Sig.	0.000**	0.000**	0.000**	0.000**	0.000**	0.000**

Note: ** indicates significance at one per cent level of probability

Success stories and the contributing factors for continuing VERMICOMPOSTING enterprises

Telengana - Ms. Swapna: Ms. Swapna, an unemployed graduate started the vermicompost production with 2 units. In the first year, four batches produced 8 tons of vermicompost and a net income of Rs. 32,200. In 2021-22 an additional unit was established which resulted in production of 18 tons of vermicompost yielding a net income of Rs. 1,17,900. She employs 10-15 labour during pit filling and harvesting. **Technical support and supply of worms from KVK, Nalgonda, more demand and direct marketing** has helped Swapna to achieve profits in vermicomposting.



Andhra Pradesh –Mr. N. Sukumaran: Mr. Sukumaran was a daily wage worker in nearby farm. He took ARYA training in 2019-20 at KVK, Nellore and started the unit in the same year. During first year he didn't get any profit due to higher initial investment. In 2021-22, he earned a net income of Rs. 96,750. Mr. Sukumaran has made his own intervention in separation of worms by keeping coconut husk with shell for easy separation of worms from vermicompost. **Higher demand and optimum market opportunities** for vermicompost in locality due to practice of natural farming in paddy and **KVK support in supplying of worms** has enabled Mr. Sukumaran to run the unit successfully.



Discontinued cases and the reasons for discontinuation of VERMICOMPOSTING enterprises

Andhra Pradesh –Mr. S.K. Mastan Basha: Mr. Basha received information about training from Krishi Sarathi and attended ARYA at KVK, Nellore. He started vermicompost production with two units during 2018-19 and realized net income of Rs. 65,800. However, in 2020 due to **Nivar cyclone** his whole unit was destroyed which led to discontinuation of his enterprise.



Telangana – Mr. Madhu: Mr. Madhu an unemployed graduate received ARYA training from KVK, Nalgonda and set up a vermicomposting unit during 2017-18. He started with production of 8 tonnes of vermicompost per year. During 2019-20, he realized a yield of 16 tons with Rs. 1,17,400 net income. Due to **labour problem**, he found it difficult to continue but invested the income to **setup a road-side hotel**, which is running profitably.





Mr. Ajay Mahali, Gumla, Jharkhand



Mr. Chobathung, Wokha, Nagaland

5.9. Piggery

Piggery enterprise has been promoted by few centres, mostly in eastern and north-eastern India. Most piggery units in Jharkhand are profitable with an average net income of Rs. 701959/unit and also generated higher employment (1161 person days/unit). Piggery units in Assam were functional for longer duration (1095 days) during the period 2017-2021 and generated Rs. 387630/unit net income (Table 50).

Table 50: Performance of piggery enterprises across the states

Sl. No.	State	Total operational duration (days)	Total Household assets created (Rs./unit)	Total exp. (All Years) (Rs. /unit)	Total net income (Rs. /unit)	Total employment (Person days)	Total investment (Rs. /unit)
1.	Assam	1095	232000	287912	387630	757	163514
2.	Jharkhand	438	137545	85310	701959	1161	77984
3.	Nagaland	695	0	65477	334386	721	56591
	F value	11.61	8.884	7.013	9.213	6.963	72.625
	Sig.	0.000**	0.001**	0.002**	0.000**	0.002**	0.000**

Note: ** indicates significance at one per cent level of probability

Success stories and the contributing factors for continuing PIGGERY enterprises

Jharkhand –Mr. Ajay Mahali: Mr. Ajay's family was practicing piggery as a traditional occupation. He attended ARYA training on Scientific Piggery in 2018 at KVK, Gumla and started piggery unit in the same year. He has earned net income of Rs. 2,00,000 during 2019 and Rs. 5,00,000 during 2022 by selling piglets, pigs and manure. Family background of pig farming, **determination to not to work under others, technical and infrastructural support from KVK, effective management of swine fever and feed crisis management during Covid-19 pandemic by placing bins/ boxes outside houses at a distance of 100 meters in the neighborhood to collect the household leftover food** has enabled Mr. Ajay to run the unit successfully.



Nagaland –Mr. Chobathung: Mr. Chobathung lives in a hospital colony in Wokha. He attended ARYA training in 2020 and started the enterprise in the same year with 4 sows and a boar, sold only piglets in the initial year. From 2021, he started to sell live pigs for meat purpose in addition to piglets and earned a net income of Rs. 2,13,700 and Rs. 2,35,350 in 2021 and 2022 respectively. **Family member's involvement and support in rearing piglets and technical assistance by KVK, Wokha in vaccination and management of swine fever** has enabled Mr. Chobathung to run his unit successfully.



Discontinued cases and the reasons for discontinuation of PIGGERY enterprises

Nagaland –Mr. Wonchibemo Ngullie: Mr. Wonchibemo through social media came to know about the ARYA and took training in 2020 from KVK, Wokha, and started the piggery enterprise in the same year. The unit was running successfully and earned net income of Rs. 1,57,00 in 2021 and 2022 respectively. Due to **lack of sanitation and African swine fever infection all the piglets died.**



Jharkhand –Mr. Ajay Rao: Mr. Ajay attended ARYA training in 2016 at KVK, Gumla and started the piggery unit in 2018. Unit was closed in 2020 due to **poor management and sudden loss of pigs and piglets due to non-availability of swine fever vaccine. Lack of entrepreneurial competency and passion towards pig farming were the other reasons.** At present he is involved in vegetable cultivation for livelihood.



Mr. Ranjit Mondal, South 24 Parganas, West Bengal

5.10. Fisheries

Fisheries activities were promoted by eastern states of India, in Bihar, Odisha and West Bengal. Fisheries units in Bihar generated an average net income of Rs. 518500/unit, by incurring an expenditure of Rs. 406500/unit. Fisheries units in Odisha generated more employment, but could not generate adequate income (Table 51).

Table 51: Performance of fisheries enterprise across the states

Sl. No.	State	Total operational duration (days)	Total Household assets created (Rs./unit)	Total exp. (All Years) (Rs. /unit)	Total net income (Rs. /unit)	Total employment (Person days)	Total investment (Rs. /unit)
1.	Bihar	850	65000	406500	518500	370	197000
2.	Odisha	662	0	202509	-35671	4866	130445
3.	West Bengal	338	25000	107081	185356	820	103313
	F value	28.161	2.822	4.103	11.89	135.377	1.946
	Sig.	0.000*	0.081	0.031*	0.000**	0.000**	0.167

Note: ** & * indicates significance at one and five per cent level of probability

Fisheries units in Odisha were affected by cyclones and hence resulted in a negative average net income.

However, Mr. Sushanta's enterprise in Odisha posted a positive net income of Rs. 2,53,000. Similarly, Mr. Ranjith from West Bengal surpassed the average income in his state, earning Rs. 1,99,250.

Success stories and the contributing factors for continuing FISHERY enterprises

Odisha –Mr. Sushanta Samantaray: Mr. Sushanta, a political science graduate was working in private firm at Surat, Gujarat. In 2020, he quit the job and returned to native to develop his farm and to stay with his family. He took ARYA training from KVK, Nayagarh and started the enterprise in 2020. Initially he started fish seed production with 2 ponds and earned net income of Rs. 1,24,000. In 2022, he earned a net income of Rs. 2,53,000 by selling 270kg of fish and 21,000 fingerlings. **Favorable aquatic ecosystem, less degree of pollution from industrial and domestic effluents, adequate feeding and marketing facility, fish seed production, family support, technical support from KVK and Dept. of fisheries has helped Mr. Sushanta in running unit successfully. Have plans to expand the unit to 10 ponds and to establish a hatchery unit and offseason fish fingerlings production.**



West Bengal –Mr. Ranjit Mondal: Mr. Ranjit owns a small sweet shop, run by the family besides being involved in fish culture since childhood. Before ARYA, he was culturing Catfish using low cost polythene sheet trays for fish seedling production. In 2019-20, he took ARYA training and started the unit using glass tanks (3x3ft) and produced 218 kg fish seeds and earned Rs. 1,99,250. He also started ornamental fish production in buckets and planning for establishing carp hatchery. **Ranjit's passion, commitment towards fishery unit and family support; diversity in fish production, quality fish production by selecting healthy brood fish and avoiding inbreeding, training and inspiration from fishery unit of KVK, South 24 Parganas** have enabled him to run the unit successfully.



Discontinued cases and the reasons for discontinuation of FISHERY enterprises

West Bengal –Mr. Anupam Munda: Mr. Anupam from Singerchak village received ARYA training from KVK, South 24 Parganas during 2016 and started fishery unit in 2017. He sold fish seeds in the local market and in Kolkata and earned income of Rs. 96,000, Rs. 1.86 lakh and 1.35 lakh, respectively during 2017, 2018 and 2019. His unit was damaged due to **Amphan cyclone** during May 2020 due to which he discontinued and started a petty shop and continues paddy cultivation.



Odisha –Mr. Bidyadhar Pradhan: Mr. Bidyadhar was working in temple and he had 2 ponds in his farm so he thought to utilize them and attended ARYA training and started the fishery unit. Initially, he earned net income of Rs. 11,000 from the unit. In 2020-21, the unit was closed due to **sudden demise of his father and less marketing due to covid-19**. He rejoined to temple work in 2021 and earning Rs. 12,000/month. Further, he is willing to restart the enterprise if financial support in the form of loan and assistance in marketing is provided from KVK, Nayagarh.



CONCLUSION

The impact of ARYA project on agri-preneurship could be seen as a huge success considering the success rate and quantum of income and livelihood created for the participants, their family members and those who were influenced by the successful ARYA enterprises. The project has achieved positive return on investment and continues to generate greater returns through direct and indirect benefits.

The results are confirmative of the success of ARYA project in attracting rural youth towards agri entrepreneurship. Planned capacity developments both on technological aspects as well on entrepreneurial competencies by KVKs were crucial in establishing and sustaining the enterprises.

Sustainable rural entrepreneurship in the farming and related activities is a challenging proposition, particularly among small-scale enterprises. Sustaining an enterprise until a critical operational duration was the survival indicator and continuous employment generation was the growth indicator. However, a certain degree of economic success only could ensure enterprise sustainability.

Nursery, poultry, piggery, bee keeping, processing and value addition have better economic performance potential, and hence could be promoted in a big way. Choice of enterprise is critical, as these activities were more likely to succeed in rural India.

More number of youths showed inclination to start mushroom, vermicomposting, goat farming and fisheries considering the ease of starting a business, but the smaller scale of operation of most of the units was not economically viable. Future entrepreneurship promotion on these areas have to be planned with lot of care.

Individuals with higher entrepreneurial competencies have performed better across the enterprises, which is crucial to attract and retain rural youth in agri entrepreneurship. Identifying the potential entrepreneurs based on their entrepreneurial competencies hold the key for greater success of ARYA. Persons with entrepreneurial competencies could operate agri enterprises at economically viable levels, therefore, it is of paramount importance to identify the gaps in competencies and empower through well-planned educational activities.

Information use was a dominant differentiating factor for both functional and discontinued entrepreneurs, but the information sources differed greatly between the two categories of respondents. Younger and college educated entrepreneurs are more likely to succeed and therefore demand greater focus in an entrepreneurship drive. Human capital possession and more female participation add to the

probability of success. These findings have implications for potential entrepreneurs and agribusiness promoting organizations.

About one-third of the ARYA enterprises failed to continue for various reasons. Discontinuation occurred as the entrepreneurs could not diversify the product portfolio and could not generate enough revenue required to meet the operational costs. Inability to establish required contacts/linkages to expand the enterprise, non-availability of inputs, high cost of raw materials, and poor quality of inputs were also the reasons for discontinuation. Wherever possible, corrective measures need to be initiated to minimize discontinuation in future and also to make an attempt to restart the discontinued activities.

Some of the trained youth under ARYA could not start the enterprise for various reasons such as waiting for suitable programs and schemes for assistance, continuing the activity that was being done prior to ARYA training, lack of confidence in the new enterprise / business and more time required to mobilize resources for the new enterprise and many more. These aspects need special attention and appropriate supportive actions by the promoting agencies, so that the skilled and willing rural youth kick-start activities of their choice.

Many of the successful ARYA enterprises influenced family members, friends, relatives and others to take up entrepreneurship in various fields. About 32 per cent of the secondary entrepreneurs were influenced by successful ARYA entrepreneurs. This augurs well for revitalizing the rural areas towards agri-business activities. Electronic, print, and social media should provide publicity to the successful ARYA enterprises to boost, motivate and encourage the unemployed rural youth to venture into agribusiness activities.

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ARYA Functional Enterprises

PART A

I. Details of Investigator

I.1 Name of investigator: _____

I.2 Date of survey: _____

I.3 State: _____

I.4 District: _____

2. Details of the Entrepreneur and his family

2.1 Name of the entrepreneur: _____

2.2 Age of the entrepreneur: _____

2.3 Education level of the entrepreneur: Illiterate/Primary (up to 4th Std.)/ Higher Primary (5-7 Std.)/ Secondary (8-10 Std.)/ Pre-University / Diploma / ITI/ Graduate/ Post Graduate/ Doctorate

2.4 Gender of the entrepreneur: Male/ Female

2.5 Mobile number of the entrepreneur: _____

2.6 Email: _____

2.7 Family members (No.): _____

2.8 Family total net income

Particulars	2016-17	2020-21
A. Agriculture and allied activities		
Family members engaged in agriculture and allied activities (0/1/2/3/4/5)		
Total cultivated area (acres) by the family		
Total net income (Rs.) from cultivated area		
Allied activities (Dairy, Poultry, Fisheries etc.) practiced by the family		
Total net income (Rs.) from allied activities (Dairy, Poultry, Fisheries etc.)		
B. Non-farm activities		
Family members engaged in non-farm activities (business, employment etc.), (0/1/2/3/4/5)		
Total net income earned by family members engaged in non-farm activities (business, employment etc.)		
Family total net income (Rs.) from agriculture, allied activities, non-farm activities etc.		

2.9 Communication sources and frequency of contact for ARYA enterprise purpose

Communication source	Frequency of contact						
	Daily	Weekly	Fortnight	Monthly	Seasonal	Once in a year	No
Family members							
Neighbours/friends							
Progressive farmer							
Fellow farmers							
Village leaders							
Field workers							
Department officers							
KVK scientists							
SAU/ICAR institute							
Newspaper							
Publications							
Radio							
TV							
Face book							
WhatsApp							
Instagram							
Mobile Apps							
SMS/MMS							
Web browsing							
Portals							

3. Household Livelihood Vulnerability Assessment (Human capital, Natural capital, Social capital, Physical capital, Financial capital)

3.1 Human capital - Health, livelihood strategy, knowledge/Skill

Particulars	Yes	No
Household has sanitary latrine toilet		
Household head often got sick		
Health care centre is within reach (<5km)		
Household did NOT have any migrant		
Lived on agriculture as major source of income		
Has family member engaging in non-farm activities		
Household has diversified Livelihood options		
Household head is illiterate		
Household head has only primary education		
Household head NOT joined the training course		

3.2 Natural capital - Land, natural resources, natural disasters, climate variability

Particulars	Yes	No
Household is landless		
Household has marginal landholding (<0.5ha)		
Household lived on exploiting natural resources		
Household has death/injury from floods/drought in last 10 years		
Household did NOT receive flood /drought warning		
Area has frequent floods/storms/Drought		
Area has high variability in rainfall		
Area has high variability in temperature		

3.3 Social capital- Socio-demographic, social networks

Particulars	Yes	No
Household head is female		
Household has more dependents (<15 and > 65 years)		
Household is poor (BPL)		
Household receives help when needed		
Household NOT a member in any organizations		

3.4 Physical capital - Housing and production means

Particulars	Yes	No
Lives in a temporary house		
House affected by floods/storms		
Household has NO access to production means		

3.5 Financial capital

Particulars	Yes	No
Household lends money		
Household did NOT have cash when needed		

4. Entrepreneurial Competency

4.1 Operations and marketing competencies

Particulars	Yes	No	Not Applicable
Able to create enterprise brand advertising			
Able to sell products and/or services			
Able to design new products and services			
Able to plan and organize the production of products/services			
Able to appropriately set prices of product/service			
Able to analyse characteristics of products/services			

4.2 Socio-business and legal organization competencies

Particulars	Yes	No	Not Applicable
Able to analyze customers preferences/choices			
Able to organize members/workers according to the work that they are going to do			
Able to choose the most appropriate management model for the enterprise			
Able to design the organogram of the firm/enterprise			
Able to start the Enterprise and carry out the procedures/practices /activities			

4.3 Economic and financial competencies

Particulars	Yes	No	Not Applicable
Able to explain the enterprise's accounting book			
Able to do a results account (e.g. balance sheet analysis)			
Able to calculate the costs, profits and revenues			

PART B

ARYA Enterprise Basic details

5. Please specify the ARYA enterprise for which data is being collected: _____
(Mushroom/Poultry/Nursery/Processing and Value Addition/Bee Keeping/Goat farming/Piggery/Vermicomposting/ Fisheries)

5.1 ARYA training year: _____

5.2 ARYA enterprise year of start: _____

5.3 ARYA enterprise location - Village, Block/Taluk: _____

5.4 Name of the ARYA enterprise/unit: _____

5.5 Support provided under ARYA

Particulars	Regularly	Whenever needed	Sometimes	No
Training - on and off campus				
Entrepreneur's visits to KVK				
Exposure visits to other enterprises				
Seminar/webinar/conference				
Telephonic consultations				
Mobile SMS advisories				
Scientists visits to enterprise				
Input support				
Equipment /machinery support				

5.6 Operational duration of enterprise:

Particulars	2017-18	2018-19	2019-20	2020-21
Operational duration of Enterprise (days/year)				

5.7 Names and value of the infrastructure assets created for the enterprise - sheds, houses, labs, etc.

Particulars	Name	Value (Rs.)
Infrastructure 1		
Infrastructure 2		
Infrastructure 3		
Total value (Rs.) of infrastructure created for the enterprise		

5.8 Names of the equipment/machinery procured for the enterprise

Particulars	Name	Value (Rs.)
Equipment/machinery 1		
Equipment/machinery 2		
Equipment/machinery 3		
Total value (Rs.) of equipment/machinery procured for the enterprise		

5.9 Names of livestock assets created for the enterprise

Particulars	No.	Value (Rs.)
Livestock 1 (at present)		
Livestock 2 (at present)		
Total present value (Rs.) of livestock assets		

6. ARYA enterprise Production, Marketing, Turnover details

6.1 Products and by-products produced and marketed by the ARYA Enterprise: _____

6.2 Marketing linkages facilitated under ARYA

Particulars	Every Year	Most Years	Few Years	None
Formation of SHG / producer group				
Linkage with local markets				
Linkage for online marketing				
Linkage with consumers - direct market				
Establishment of sale outlets				
Participation in melas and exhibitions				
Facilitation for export				
Facilitation for branding, packing				

6.3 Product/output marketing channels used by enterprise

Particulars	2017-18	2018-19	2019-20	2020-21	None
Farm gate / production place					
Local agents					
Nearby markets					
Distant markets					
Online marketing					

6.4 Gross turnover (Rs.) from sales of ALL PRODUCTS/BY-PRODUCTS

Particulars	2017-18	2018-19	2019-20	2020-21
Gross turnover (Rs.)				

7. ARYA enterprise expenditure details

7.1 Names of all INPUTS used for the enterprise (excluding infrastructure and equipment listed in section 5): _____

7.2 Total input expenditure (Rs)

Particulars	2017-18	2018-19	2019-20	2020-21
Total input expenditure (Rs.)				

7.3 Salary/wage paid (Rs.)

Particulars	2017-18	2018-19	2019-20	2020-21
Salary/wage paid (Rs.)				

7.4 Other Exp. (Rs.)

Particulars	2017-18	2018-19	2019-20	2020-21
Other Exp. (Rs.) (electricity, water, rent, license fee, tax etc)				

7.5 Total expenditure (Rs.)

Particulars	2017-18	2018-19	2019-20	2020-21
Total expenditure (Rs.)				

8. Employment Generated

8.1 Persons involved in enterprise activities: Family members only/both family members and hired persons/hired persons only

8.2 No. of family members engaged in ARYA enterprise: 0/1/2/3/4/5

8.3 No. of hired persons engaged in ARYA enterprise: _____

8.4 Total employment generated (man days)

Particulars	2017-18	2018-19	2019-20	2020-21
Total employment generated (man days)				

9. Investment, Expansion and Technology Adoption

9.1 Sources of loans/financial assistance for the enterprise

Particulars	Loan period		Subsidy type		Grant type	
	Long term loan	Short term loan	Cash	Kind	Cash	Kind
Banks						
Cooperatives						
Government departments						
NGOs						
Private lending sources						
Personal sources						
ARYA						
None						

9.2 Total loan/credit (Rs.) borrowed for the Enterprise: _____

9.3 Total value of subsidy (Cash/Kind) received for the enterprise (Rs.): _____

9.4 Total value of grants (Cash/Kind) received for the enterprise (Rs.): _____

9.5 Investment from OWN/FAMILY sources (Rs.) for the enterprise: _____

9.6 Total investment made for the enterprise from ALL sources (Rs.): _____

9.7. Incremental expansion of enterprise

Particulars	Specify
New raw material usage	
New product developed	
New process/method/practice adopted	
New by-product developed	
New services initiated	
New contacts/linkages	

9.8 New raw material used:

9.9 New products developed:

9.10 New processes adopted in production, marketing:

9.11 New by-products developed:

9.12 New services provided - consultancy etc. :

9.13 New contacts/linkages/networks established:

9.14 Technology/innovation adopted for the enterprise

Particulars	Specify
Technology/innovation 1 adopted	
Technology/innovation 2 adopted	
Technology/innovation 3 adopted	
Technology/innovation 4 adopted	
Technology/innovation 5 adopted	

10. Supporting factors for successful performance of the enterprise

10.1 Technological factors

Technological factors	Extent of support			
	Highly supportive	Moderately supportive	Least supportive	Not relevant
Information on new technologies				
Technology availability to enhance production				
Technology availability to reduce cost				
Technology availability to enhance quality				

10.2 Situational factors

Situational factors	Extent of support			
	Highly supportive	Moderately supportive	Least supportive	Not relevant
Suitable climate for processing				
Availability of raw material				
Availability of input suppliers				
Availability of packaging material				
Sufficient electric supply				
Availability of skilled labour				

10.3 Financial factors

Financial factors	Extent of support			
	Highly supportive	Moderately supportive	Least supportive	Not relevant
Support for working capital				
Low cost of inputs				
Low cost of electricity/Free electricity				
Low cost of labour				
Low cost of land acquisition/lease				

10.4 Social factors

Social Factors	Extent of support			
	Highly supportive	Moderately supportive	Least supportive	Not relevant
Support from family and friends				
Support from group members				
Support from community				

I0.5 Marketing factors

Marketing factors	Extent of support			
	Highly supportive	Moderately supportive	Least supportive	Not relevant
Markets information				
Markets accessibility				
Availability of transport				
Availability of storage facility				
Information on quality standards				
Information on prices in various markets				
Support from middlemen				

I0.6 Policy/government factors

Policy/Government factors	Extent of support			
	Highly supportive	Moderately supportive	Least supportive	Not relevant
Favourable rules, regulations and guidelines				
Ease of getting license and permission				
Support from ongoing programmes/schemes				

I0.7 Any other factors that have supported the enterprise performance: _____

II. Impact/influence of the enterprise

II.I Household assets created using the income generated from the enterprise

Household assets created	2017-18	2018-19	2019-20	2020-21	None
Land/plot					
House					
Tractor/transport vehicle					
Four-wheeler					
Two-wheeler					
Refrigerator/Washing Machine etc.					

II.2 Total value of household assets created due to enterprise (Rs.): _____

II.3 Recognition, awards etc. received for self/enterprise: _____

II.4 Influence of enterprise success on others to become entrepreneurs/start an enterprise

Particulars	Influence		
	Yes	No	May be, not aware
Family Members			
Friends			
Relatives			
Others			

II.5 Enterprises started by others (Secondary Entrepreneurs)

Enterprises Started by	No. of units	Turnover Range in 2020-21 (Rs.)
Family members		
Friends		
Relatives		
Others		

II.6 Any other significant impact of the enterprise: :

ARYA Discontinued Enterprises

PART A

Same as ANNEXURE I

PART B

ARYA Enterprise Basic Details

5. Please specify the ARYA enterprise for which data is being collected: _____

(Mushroom/Poultry/Nursery/Processing and Value Addition/Bee Keeping/Goat farming/Piggery/Vermicomposting/ Fisheries)

5.1 ARYA training year: _____

5.2 Year of starting ARYA enterprise: _____

5.3 Year of closing/discontinuing ARYA enterprise: _____

5.4 Chance of restarting ARYA enterprise/unit: Yes/No/Not sure

5.5 Support provided under ARYA: Same as Question No. 5.5 of ANNEXURE I

5.6 Operational duration of Enterprise: Same as Question No. 5.6 of ANNEXURE I

5.7 Names of the infrastructure assets created for the enterprise - sheds, houses, labs, etc.: _____

5.8 Total value (Rs.) of infrastructure created for the enterprise: _____

5.9 Names of the equipment/machinery procured for the enterprise: _____

5.10 Total value (Rs.) of equipment/machinery at the time of closure: _____

5.11 Names of livestock assets created for the enterprise: : _____

5.12 Total value (Rs.) of livestock assets at the time of closure: _____

5.13 Total value (Rs.) of material in stock at the time of closure: _____

6. ARYA Enterprise Production, Marketing, Turnover details

Same as ANNEXURE I

7. ARYA enterprise expenditure details (variable cost on inputs, wages, salaries, maintenance etc.)

7.1 Inputs used/procured for the enterprise: _____

7.2 Total input expenditure (Rs): Same as Question No. 7.2 of ANNEXURE I

7.3 Salary / wage paid (Rs.): Same as Question No. 7.3 of ANNEXURE I

7.4 Other Exp. (Rs.): Same as Question No. 7.4 of ANNEXURE I

7.5 Total expenditure (Rs.): Same as Question No. 7.5 of ANNEXURE I

8. Employment Generated

Same as Question No. 8 .I to 8.4 of ANNEXURE I

9. Investment details, Reasons for Discontinuation

9.I to 9.6 Same as Question No. 9.I to 9.6 of ANNEXURE I

9.7. Reasons for discontinuation of enterprise

Reasons	Yes	No
Enterprise not profitable		
Products not accepted in market/by consumers		
By-product not accepted in market/by consumers		
Production process/method failed to perform		
Technologies not adopted or did not give good results		
Raw material not available/costly/poor quality		
Could not plan for any additional services that could earn revenue		
Could not establish required contacts/linkages		

9.8 Details of the non-profitability or losses incurred : _____

9.9 Details of products NOT accepted in market/by consumers: _____

9.I0 Details of by-products NOT accepted in market/by consumers: _____

9.II Details of processes/methods that did not perform: _____

9.I2 Details of technologies that could NOT be adopted/failed to give satisfactory results:_____

9.I3 Details of raw materials which were not available or poor quality or high price:

9.I4 Details of services that could NOT be mobilized:_____

9.I5 Details of contacts/linkages that could NOT be established:_____

10. Constraints faced in the enterprise

10.1 Technological constraints

Technological constraints	Major constraint	Moderate constraint	Minor constraint	Not relevant
No information on new technologies				
No technology to enhance production				
No technology to reduce cost				
No technology to enhance quality				

10.2 Situational constraints

Situational constraints	Major constraint	Moderate constraint	Minor constraint	Not relevant
Unsuitable climate for the enterprise				
Non-availability of raw material				
Non-availability of input suppliers				
Non-availability of packaging material				
Insufficient electricity supply				
Non-availability of skilled labour				

10.3 Financial constraints

Financial Constraints	Major constraint	Moderate constraint	Minor constraint	Not relevant
Lack of working capital				
High cost of inputs				
High cost of electricity				
High cost of labour				
High cost of land acquisition /lease				

I0.4 Social constraints

Social constraints	Major constraint	Moderate constraint	Minor constraint	Not relevant
Lack of support from family and friends				
Lack of support from group members				
Lack of support from community				

I0.5 Marketing constraints

Marketing Constraints	Major constraint	Moderate constraint	Minor constraint	Not relevant
Lack of markets information				
Poor markets accessibility				
Non-availability of transport				
Lack of storage facility				
No information on quality standards				
No information on prices in various markets				
Exploitation by middlemen				

I0.6 Policy/government constraints

Policy/Government constraints	Major constraint	Moderate constraint	Minor constraint	Not relevant
Complex rules, regulations and guidelines				
Difficulty in getting license and permission				
No support from ongoing programmes/schemes				

I0.7 Any other constraints that have adversely affected the enterprise performance:

II. Alternative Livelihood Opportunities taken up (parallel/after discontinuation)

II.I Alternative livelihood opportunities

Alternative livelihood opportunities	Yes	No
Got a job/employment		
Started a new enterprise		
Engaged in family enterprise		
Joined an activity started by friends/relatives		
Engaged in some other livelihood activity		

II.2 Name of job/employment: _____

II.3 Year of getting job/employment: _____

II.4 Amount earned (Rs/year) from job employment: _____

II.5 Alternative enterprise started: _____

II.6 Year of start of alternative enterprise: _____

II.7 Amount earned (Rs/year) in the alternative enterprise: _____

- II.8 Name of FAMILY enterprises involved:_____
- II.9 Year of involving in FAMILY enterprises:_____
- II.I0 Amount earned (Rs/year) by involving in FAMILY enterprises:_____
- II.I1 Name of FRIENDS enterprises:_____
- II.I2 Year of involving in FRIENDS enterprises:_____
- II.I3 Amount earned (Rs/year) by involving in FRIENDS enterprises:_____
- II.I4 Name of any other livelihood activity taken up:_____
- II.I5 Year of any other livelihood activity taken up:_____
- II.I6 Amount earned (Rs/year) in any other livelihood activity:_____

*Respondents from Not-Started category*PART A

Same as ANNEXURE I

PART B**5. ARYA Details****5.1 Please specify the enterprise for which support was provided under ARYA:_____**

(Mushroom/Poultry/Nursery/Processing and Value Addition/Bee Keeping/Goat farming/Piggery/Vermicomposting/ Fisheries /Any other)

5.2 ARYA training year: 2016/2017/2018/2019**5.3 Chance of starting the ARYA enterprise/unit:** Yes/No/Not Sure**5.4 Support provided under ARYA:** Same as Question No. 5.5 of ANNEXURE I**6. Reasons/constraints for NOT starting the Enterprise under ARYA****6.1. Reasons for NOT starting the enterprise under ARYA**

Reasons	Yes	No
Continuing the activity that was being done prior to ARYA training		
Lacked confidence in the new enterprise/business		
Lacked confidence in the new Production Process		
Could not establish required contacts for the new enterprise		
Needed more time to mobilize resources for the new enterprise		
Need more training and handholding for the new enterprise		
Looking for suitable programs and schemes for assistance		
None of the above		
Others (Specify)		

6.2 Technological constraints for NOT starting the enterprise under ARYA

Technological Constraints	Major Constraint	Moderate Constraint	Minor Constraint	Not Relevant
No Information on new technologies				
Technology not available				
Technology was inappropriate to the location				

6.3 Situational constraints for NOT starting the enterprise under ARYA: Same as Question No. 10.2 of ANNEXURE II**6.4 Financial constraints for NOT starting the enterprise under ARYA:** Same as Question No. 10.3 of ANNEXURE II

6.5 Social constraints for NOT starting the enterprise under ARYA: Same as Question No. 10.4 of ANNEXURE II

6.6 Marketing constraints for NOT starting the enterprise under ARYA

Marketing Constraints	Major constraint	Moderate constraint	Minor constraint	Not relevant
More distance to market/s				
Lack of markets information				
No market accessibility				
Non-availability of transport				
Lack of storage facility				
No information on quality standards				
Poor keeping quality and shelf life of products				

6.7 Policy/government constraints for NOT starting the enterprise under ARYA: Same as Question No. 10.6 of ANNEXURE II

6.8 Any other constraints that prevented starting the enterprise under ARYA: _____

7. Alternative Livelihood Activities taken up (2016-17 onwards)

7.1 Alternative livelihood activities

Particulars	Yes	No
Got a job / employment		
Started a new enterprise		
Engaged in family enterprise		
Joined an activity started by friends /relatives		
Engaged in some other livelihood activity		
None of the above		

7.2 Name of job/employment: _____

7.3 Year of getting job/employment: _____

7.4 Amount earned (Rs/year) from job/employment: _____

7.5 New enterprise (other than ARYA) started: _____

7.6 Year of start of enterprise: _____

7.7 Amount earned (Rs/year) in the enterprise: _____

7.8 Name of FAMILY enterprises involved: _____

7.9 Year of involving in FAMILY enterprises: _____

7.10 Amount earned (Rs/year) by involving in FAMILY enterprises: _____

7.11 Enterprises started by FRIENDS: _____

7.12 Year of involving in enterprises started by FRIENDS: _____

7.13 Amount earned (Rs/year) by involving in FRIENDS enterprises: _____

7.14 Name of any other livelihood activity taken up: _____

7.15 Year of starting such other livelihood activity: _____

7.16 Amount earned (Rs./year) in such other livelihood activity: _____

8. Investment details for Livelihood activities (2016-17 onwards)

8.1 Sources of loans/financial assistance availed: Same as Question No. 9.1 of ANNEXURE I

8.2 Total loan/credit (Rs.) borrowed: _____

8.3 Total value of subsidy (Cash/Kind) received (Rs.): _____

8.4 Total value of grants (Cash/Kind) received in kind (Rs.): _____

8.5 Investment from OWN/FAMILY sources (Rs.): _____

8.6 Total investment made from ALL sources (Rs.): _____

*Respondents from Control category***PART A**

Same as ANNEXURE I

PART B**5. Livelihood Activities taken up (2016-17 onwards)****5.1 Livelihood activities**

Particulars	Yes	No
Employed in a job		
Running own enterprise		
Engaged in family enterprise/farming		
Joined an activity started by friends/relatives		
Engaged in some other livelihood activity		
Daily wage work/petty works		
Unemployed		
Others (Specify)		

5.2 Net income earned (Rs/year):

Particulars	2017-18	2018-19	2019-20	2020-21
Net income earned (Rs/year)				

6. Investment details for livelihood activities (2016-17 onwards) by respondent and family

6.1 Sources of loans/financial assistance availed: Same as Question No. 9.I of ANNEXURE I

6.2 to 6.5 : Same as Question No. 8.2 to 8.5 of ANNEXURE III

7. Reasons for NOT joining ARYA Project, so far**7.1. Reasons for not involving in ARYA**

Reasons	Yes	No
Not aware of ARYA project		
Aware about ARYA and I am waiting for the right time to join		
Aware about ARYA, but I was not interested		
Aware about ARYA, but lack of time did not permit		
Aware about ARYA, but family did not want me to join ARYA		
Aware about ARYA, but friends and peer group discouraged		
Aware about ARYA, but lack of resources discouraged me		
Aware about ARYA, but sufficient guidance and information was not available		
Engaged in other livelihood activities		
None of the above, reasons not specific		
Others (Specify)		

7.2 Any other constraint that prevented joining ARYA: _____

7.3 Would you like to join ARYA project now or in future: Yes/No/Not Decided

7.4 If YES, please specify the ARYA Enterprise you would like to pursue:
Mushroom/Poultry/Nursery/Processing and Value Addition/Bee Keeping/Goat
farming/Piggery/Vermicomposting/ Fisheries

7.5 Any other enterprise you would like to take up under ARYA: _____

7.6 What motivates/influences you to join ARYA ? Successful entrepreneur under ARYA in my
village/Impressed by the activities of KVK under ARYA /No other livelihood option available/others