PERFORMANCE ANALYSIS OF AGRIBUSINESS INCUBATORS (ABIs) IN ENTREPRENEURSHIP DEVELOPMENT

THESIS

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By

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2019

DECLARATION

I, hereby declare that the thesis entitled **"Performance Analysis of Agri Business Incubators (ABIs) in Entrepreneurship Development"** is a bonafide record of research work done by me during the course of research and the thesis has not previously formed the basis for the award of any degree, diploma, associateship, fellowship or other similar title, of any other university or society.

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CERTIFICATE

Certified that the thesis entitled **"Performance Analysis of Agri Business Incubators (ABIs) in Entrepreneurship Development"** is a record of research work done independently by **Ms. Ashwini.T (2016-11-093)** under my guidance and supervision and that it has not previously formed the basis for the award of any degree, diploma, fellowship or associateship to her.

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Date: 20-06-2019

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Introduction

1. INTRODUCTION

In modern global economy, technology, research and development, knowledge management and above all innovations are the ways to achieve economic success (Ozor, 2013). The potentiality of innovation has direct relationship with economic and social growth of any country. The developments in the global economy since 1970s provided an active and modest way for socio- economic improvement to use technological dimensions in economic activities. In achieving economic success, technology utilization is a main criterion for modern production which increases the efficiency and also productivity. Hence, nowadays modern methods of production have substituted the traditional production scenario (Machado *et al*, 2017).

But in India the economy is based on agriculture, where 61.5 per cent of population depend on it to earn their livelihood (Baljeeth, 2014). Since Independence, the government of India has framed the policies for growth and development of agriculture sector. Many efforts have been made to achieve socio-economic prosperity in the country through five-year plans. Even though agriculture is considered as primary sector in India, still much progress has to be achieved in the growth of the ago-industrial sector (Nagalakshmi and Sudhakar, 2013).

Being an agrarian economy, many defects like miss-match between the production and market demand, lack of technological support to address the production issues and lack of guidance for the farmers about the production still exists. This led the producer to produce more than the self-sufficiency and distress continues. To address these challenges the solution is in converting the produce into the product. This production of product according to the market demand can be assured and achieved through the entrepreneurship in agriculture. The solution to the problem of unemployment, migration of farming community from rural areas to urban areas in search of jobs other than agriculture, lies in developing entrepreneurs and doing agribusiness (Uplaonkar and Biradar, 2015).

For the development of entrepreneurship in agriculture sector there is a need of improving agribusiness at a faster rate than on-farm production, especially in the areas of food processing and distribution. The encouragement should be given to the aspiring entrepreneurs

to acquire more entrepreneurial qualities and agribusiness institutions should help them to expand their enterprises (Babu *et al.*, 2015).

The debate on whether entrepreneurs are born or they are made still unresolved, but through the right operating environment and pro-entrepreneurship ecosystem in terms of easy policy compliance, availability of funding, good infrastructure, access to information on markets, availability of suitable technology and business support services can reassure entrepreneurship in agriculture sector (Ogutu and Kihonge, 2016).

To achieve transformation in Indian agriculture there is a need to make it as a profitable job through the way of agribusiness, which in turn can be accomplished through the entrepreneurship in agriculture. Entrepreneurship is the process of identifying existing opportunities and utilizing available resources to convert an idea into the form of a product for market. It generates employment, creates wealth, which results in reduction of poverty and economic development of a nation. Entrepreneurship thrives on the ability to take risks and act in an innovative way (Ray, 1981).

The large-scale investment in agriculture is enabled by abundant sources of skilled workers, ever improving levels of education and technical capability and capital accessibility and quickly developing markets, in addition to the forecasts for refining poor agricultural yields, high post-harvest losses, and less effective food processing and marketing gave chances for investment in agriculture (Ozor, 2013).

For the transformation of agriculture into agribusiness in the sector, there is a need of proper conditions that can create an entrepreneurial ecosystem, which support the entrepreneurs to take risks and operate agribusiness start-ups at reasonable costs and also which can help in realizing growth of the venture to attain sustainable stage (Karuppanchetty *et al.*, 2014).

In the need of this system which is dynamic and flexible, the agri-business incubators will provide opportunities to transcend the farming and involve in more meaningful mechanisms of economic contribution (Kahan, 2013). The culture of entrepreneurship and innovation was established by economically developed countries through communication developed by triple helix, an association of universities, companies and government and these are considered as innovation agents (Machado *et al.*, 2017).

The focus on fostering the entrepreneurship in agriculture through business incubators is increasing as small entrepreneurs struggle with lack of access to resources, technologies, and expertise and market information. The incubators can contribute for entrepreneurship development through innovation and value addition by promoting agribusinesses and establishing contact with aspiring entrepreneurs.

Business Incubators

The origin of innovation is in research and major share of the research in particular region or country is likely to be originate in universities and educational institutions. Incubators are the connection between universities, research and companies (Ozor, 2013).

Business Incubators are models for capacity building in entrepreneurship. They deliver networks for building relationships, provide training, business and technology support, infrastructure and other elements which are fundamental in survival of start-ups, deprived of much capital to develop into a full fledge enterprise (Ogutu and Kihonge, 2016). They would detent the extreme failure rate of Small and Medium size enterprises (SME) in the developing countries up to 75 percent within three years. Hence, Business incubators can call as "magic bullets" (Bowen *et al,* 2009).

Business Incubators facilitate upcoming business ventures by giving provision for utilizing several supporting services like guidance in new business and production plans, accessing capital and other professional services. The ventures after their incubation period they become independent and will attain sustainability in business (Grimaldi and Grandi, 2005).

Hence, Government of India has developed an exclusive institutional arrangement called business incubation to increase the survival and growth of business in the modern competitive setting and also to empower entrepreneurs that capacitate them to improve the functionality of their venture by accessing critical and possibly strategic technologies through business incubators (Kalidas and Mahendran, 2016).

Importance of Business Incubators in developing countries

During the past 20 years the importance of business incubators has been on the rise. They serve as instruments in improving the socio-economic prosperity of countries by guiding the entrepreneurs, facilitating entrepreneurial ideas and reassuring the growth and development of new ventures (Grimaldi and Grandi, 2005). They are involved in connecting the gap between research outcomes and commercialization of innovative ideas. Main role of business incubators is to support the ambitious entrepreneurs by providing them technical knowledge, sources of funding, lab space, and network with management experts (Kalidas and Mahendran, 2016).

A study on Total Entrepreneurial Activity (TEA) conducted by Global Entrepreneurship Monitor (GEM) which covered 21 countries, including India, Argentina, Brazil, South Korea and Singapore, used two measures involving the percentage of the adult population presently involved in creating a new business, and the pervasiveness of new firms that have sustained the start-up phase. The countries like Brazil and South-Korea got the top rankings in TEA. In most developing countries entrepreneurs and innovators have to struggle against severe financial, cultural, and bureaucratic constraints. But when these entrepreneurs were transferred to a developed economy, the strong infrastructure and cultural attitudes gave them a head-start, as demonstrated by successful Indian and Chinese innovators in Silicon Valley (Lalkaka, 2001).

This showed us that entrepreneurial ecosystem can play a key role in developing countries in providing support to the aspiring entrepreneurs, specifically in the initial stages of firm's life cycle. In this regard by establishing business incubators in developing countries and providing technology, services and follow up facilities will surely benefit the entrepreneurs.

Historical background of Business Incubators (BIs)

The history of Business Incubation is an amusing one, as majority of incubators have several similar services and functions but still they differ from one another in providing services according to their client requirement and according to the precise locality. Therefore, an evolution is going on till today in the functioning of business incubators (Grimaldi and Grandi, 2005).

The first incubator was established in New York at Batavia Industrial Centre (BIC) in 1959. Modern business incubators came into existence only in 1970s which established in empty donated buildings. Technology centers and science parks concept emerged in 1990s for software and data storage (Allahar *et al.*, 2016). The wide growth of business incubators happened in the 1980's and 1990's. There are nearly 5000-7000 business incubators globally majority existing in USA and China (Ogutu and Kihonge, 2016).

In India also, business incubators drew attention from policy makers by their working importance. The number of business incubators, science and technology parks have increased from 10 in the year of 2000 to 30 in 2009 (Sharma *et al.*, 2014). Business incubation is an economic and social program which provides an intensive support to start-up companies, guide them to pick up speed in their enterprise development and to attain success (Ayatse *et al.*, 2017).

Agri-Business Incubators (ABIs)

The Agri-Business Incubator (ABI) is an institution where the process of starting agri-business venture is stimulated by encouraging the entrepreneurs with agricultural technology, business consultancy, networking with management experts, venture capital funding, infrastructure and other facilities (Baljeeth, 2014). In India, Agri-Business Incubators (ABIs) are the result of Agri-Business Incubation program of 2003 which was an initiative of the International Crops Research Institute for Semi-Arid Tropics (ICRISAT) in partnership with the Department of Science and Technology (DST), Government of India (Sharma *et al.*, 2014).

In order to amalgam technology with agri-entrepreneurship and to forward the agriculture from traditional method to agribusiness, Indian Council of Agricultural Research (ICAR) under National Agricultural Innovation Project (NAIP) which was funded by World Bank established 10 agribusiness incubators in 2008-09 and 12 agribusiness incubators in 2013-14. These agribusiness incubators were established in agriculture research institutes and state agricultural universities where research of agricultural technologies have been taking place (Baljeeth, 2014).

The ABIs are developed to provide the entrepreneur friendly environment to be involved in commercialization of the technologies developed by them. Since they are creating

an interfacing and interacting mechanism among research and development institutions, industries and financial institutions, they are enhancing the practical impact of the research which is conducted in the research institutions by providing technology and services to commercialize new products (Pandey *et al.,* 2014).

Importance of Agri-Business Incubators (ABIs) in entrepreneurship development

ABIs are the institutions which acts as a base and innovatory for employment generation, wealth creation and poverty reduction. They act as catalysts in entrepreneurship development by providing support for the creation of start-ups, small and medium enterprises (Ogutu and Kihonge, 2016). The main goal of BIs is to create successful start-ups, after incubation they should leave the incubators as financially secure and self-reliant units. In addition, the well-established enterprises should able to create jobs, utilize suitable technology, and create wealth for economies. Business incubation helps in strengthening of local economies as the survival rate of the client start-ups is 90 per cent. Hence, it is a key tool for economic development (Al-Mubaraki and Busler, 2013).

In the instance of China, the widespread business incubator program developed in the early 1990s has played a very important role in assisting the country's evolution from a socialist to a market economy through the commercialization of technological developments and building an innovative culture (Chandra and Fealey, 2009). In India, business incubators have formed an integral part of the government's science and technology policy (Koshy, 2011).

Agri-Business Incubators in Kerala

The ABIs in Kerala are situated at Central Plantation Crop Research Institute (CPCRI) in Kasaragod, Central Tuber Crop Research Institute (CTCRI) in Thiruvananthapuram, Kerala Agricultural University (KAU) in Tavanur, Indian Institute of Spice Research (IISR) in Kozhikode, Central Institute of Fisheries Technology (CIFT) and Coconut Development Board(CDB) in Cochin, which are mainly involved in commercialization of technologies for the development of entrepreneurial spirit and for the development of agri-entrepreneurs in the state.

The performance analysis of the enterprises which are facilitated by the ABIs will be helpful in understanding the opportunities and challenges faced by the ABIs and agri-enterprises in the state. This will be beneficial to streamline the activities of ABIs in the state so that more conducive business environment to agri-entrepreneurs by providing opportunities, reducing risks and maximizing success will be achieved. Commercialization of successful technologies related to agriculture in enterprises which are facilitated by the ABIs, ultimately lead to agricultural development. Hence, it is important to study on the performance analysis of ABIs in entrepreneurship development.

Objectives of the study

1. To delineate the different types of ABIs in terms of the structure, functions and roles.
2. To attempt the comparative analysis of the extent of development of new products, technologies and services in ABIs to improve entrepreneurship development.
3. To do the performance analysis of the enterprises facilitated through ABIs.
4. To delineate the challenges faced by the ABIs in entrepreneurship development.

Scope of the study

The purpose of business incubators is in encouraging economic development of its public by associating with start-ups. They offer services for business development and support the establishment of new venture and also helps in expansion of existing small and medium enterprises. As business incubation is a fairly recent phenomenon, the history of performance analysis is short. It involves many stakeholders in which contribution of each affects the overall effectiveness of the system. The performance analysis of the enterprises which are incubated by ABIs and analysis of its structure and functions will help in understanding the opportunities and challenges faced by both agri-entrepreneurs and the ABIs in the state. The purpose is to take the actions and remedies to minimize the constraints facing by them and to enhance the effectiveness of performance of agri-business incubators. This study would be of vital importance to a number of people and stakeholders namely entrepreneurs, business incubators, the researchers, and the governments.

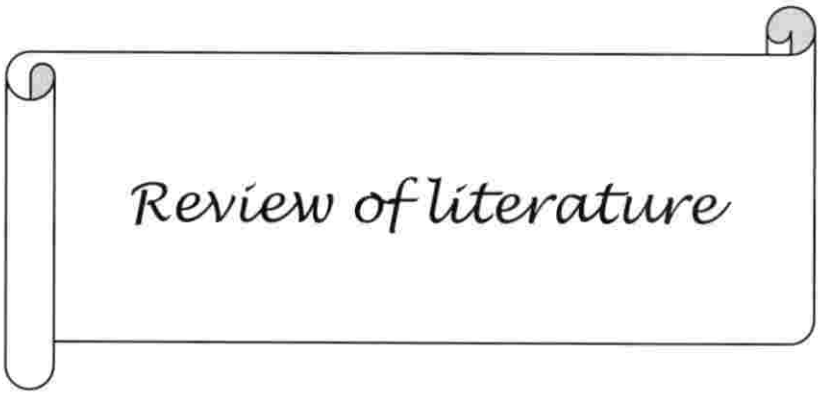
The results can be utilized by the state governments and various development departments to give support and to frame policies for the development of agri-business incubators to create effective entrepreneurial ecosystem in the agricultural sector which ultimately lead to the development of agricultural community. The practical inference of this research is that the documentation of the incubation experiences proposes direction and new insights to incubator developers and managers. This study can form an original input to the stakeholders of the incubators in providing new understandings about the incubation.

Limitations

The present study, being part of the Master's programme, has the inherent limitations of time, funds and other facilities commonly faced by the single student researcher. However, all possible efforts have been taken to do a comprehensive study, paying maximum justice to the objectives at hand. The researcher being a student had limitations for travel too, by way of time availability and access. The research is limited to the extent that the study focuses only on selected six agribusiness incubators from the state of Kerala. Generalizations made based on the findings of the study may not be directly applicable to other areas and need to be substantiated with other studies.

Presentation of the study

The report of the study is presented in five chapters. The first chapter has brief introduction, objectives of the study, scope and limitations. In the second chapter the relevant review of literature is presented. The material and methods which have bearing on measurement of variables, with statistical procedures used are presented in the third chapter. The fourth chapter contains results and discussion based on obtained results. Finally, the fifth chapter have the summary and conclusion of the thesis and then bibliography. At the end appendices and abstract of the study are given.


Review of literature

2. REVIEW OF LITERATURE

According to the appropriateness to the research, the available literature has been utilized to throw light on the objectives of the study. The collected literature has been presented under the following sub heads.

2. 1 Concepts related to Business Incubators (BIs), Agri-Business Incubators (ABIs) and entrepreneurship

2. 2 Relationship between the Business Incubators (BIs) and entrepreneurship development

2. 3 Socio-economic characteristics of entrepreneurs

2. 4 Dimensions of entrepreneurial behavior

2. 5 Types of Business Incubators in terms of structure, function and role

2. 6 Technology, products supported and services provided by different Business Incubators

2. 7 Concept of performance analysis

2. 8 Performance of enterprises facilitated by Business Incubators (BIs)

2. 9 Relationship between the types of incubators and its performance

3. 0 Challenges faced by the Business Incubators (BIs)

3. 1 Suggestions for improvement of Business Incubators (BIs)

2. 1 Concepts related to Business Incubators (BIs), Agri-Business Incubators (ABIs), and entrepreneurship

2. 1. 1 Business Incubators (BIs)

Business incubators are the famous policy instruments in regional economic growth and job creation. They focus on providing guidance to the entrepreneurs and helping them in attaining their goals. The main objectives of the business incubators are to commercialize the

research findings of university, to provide space, to promote the technical capacity of regional ventures and to create entrepreneurial ecosystem (OECD, 1999).

Peters *et al.* (2004) defined business incubators as the creative organizations which came into existence recently. They act as a vehicle for the entrepreneurship development in the society.

Grimaldi and Grandi (2005) stated that business incubators are the mechanisms through which the economic growth of countries can be achieved, by supporting innovative ideas and developing technologies for entrepreneurship and promoting the growth of enterprises.

Phan *et al.* (2005) defined business incubators as the intermediate organizations mainly aim to transform the technical business idea into an efficient enterprise by providing the entrepreneurial environment, technological and organizational resources and facility to communicate with managerial experts.

Ogutu and Kihonge (2016) mentioned business incubation as a model of capacity building for entrepreneurship. They deliver networks for building relationships with business experts, provide training on technology, infrastructure and other elements which are fundamental in survival of start-ups which are deprived of much capital to develop into a full fledge enterprise.

2. 1. 2 Agri-Business Incubators (ABIs)

Bergek and Norman (2008) said that agri-business incubators are the institutions which mainly focus on triggering the growth of the start-ups to achieve stability in their functions and financial matters by providing them incubation and resource services.

Ozor (2013) defined that the agribusiness incubators as the institutions which are involved in transforming obstacles into the opportunities and facilitated need-based research and profit oriented entrepreneurship in agricultural sector.

Baljeeth (2014) explained agri-business incubators as the catalysts for starting agri-business venture by giving support to the entrepreneurs in technology of agriculture, guidance in business, communication facility with management experts, venture capital funding, infrastructure and other facilities.

Pandey *et al.* (2014) defined agri-business incubators as the institutions which are developed to commercialize the technologies which are generated in research institutions to the nascent entrepreneurs for the creation of an entrepreneurial ecosystem and to develop interaction among the agri-entrepreneurs, research and financial institutions.

Sharma *et al.* (2014) mentioned agribusiness incubators as the new resources in supporting agricultural enterprises for their development and promote business within the entrepreneurs and technology developers with research, business planning and development, and access to capital as the pillars of successful business incubation.

Babu *et al.* (2015) opined that in the promotion of small holders to become entrepreneurs in agribusiness and in expanding their enterprises to achieve success in agro-enterprise there is a need of transformation of the agricultural sector into the way of agribusiness. He further mentioned that commercialization of agricultural production can be achieved by providing proper support by agribusiness promoting institutions like business incubators.

Agri-Business incubators facilitates the nascent entrepreneurs by giving them with technical knowhow, easy availability of capital, infrastructure and networking with business experts. It utilizes the ability and creativity of the incubatee in supporting the new enterprise (Kalidas and Mahendran, 2016).

2. 1. 3 Entrepreneurship

Entrepreneurship is the process of recognizing the existing opportunities and capacity to utilize the available resources to transform an idea into a product and to service for the society. Determination to create something new, and ability to identify the opportunities and resources are the assets for the entrepreneur (Ray, 1981).

Entrepreneurship is the process in which an entrepreneur undertakes innovations, risks and efforts along with financial help to convert an idea into products. They see problems as opportunities, act on them to find solutions to those obstacles and are able to find customers for their products (Nkechi *et al,* 2012).

Entrepreneurship is a multi-faceted process as entrepreneur is an individual who starts a business to earn profit and to achieve growth and development. Entrepreneurs carry out entrepreneurship which is not only a creation of business but also involves a process of active vision and innovation (Rehman and Elahi, 2012).

The success in entrepreneurship has been achieved by the entrepreneurs who had a competent mind set and innovative thinking which enabled them to establish and run a venture to attain sustainability in economic benefit (Ogutu and Kihonge, 2016).

2. 2 Relationship between the business incubators and entrepreneurship development

Milliken (1987) described that the entrepreneurs require guidance from the entities with experience to start a venture and to run business as the individual entrepreneur lacks information and guidance to carry out the business activities. He further mentioned that the entrepreneurs can get advisory services from the new form of institutions called business incubators which are established with a mandate to provide services and guidance for the entrepreneurs in business and marketing plans, and other professional services.

Bruneel *et al.* (2010) enlightened that business incubators are amenities deliberated to establish conducive environment for new and small ventures. They help them to stand even in the presence of difficulties by encouraging them to survive and grow to become successful mature business entities. The services in the business incubators are ranges from basic services like physical space at subsidized rates, shared basic business services and equipment at little or no cost, to the business assistance like legal and technical advises and financial supports for entrepreneurship development in the society.

2. 3 Socio-economic characteristics of entrepreneurs

2. 3. 1 Age

Mian (1994) reported that the majority of the entrepreneurs surveyed were belonged to the middle age group with age ranging from 36-47 years followed by the entrepreneurs of young age with age less than 36 years and only few entrepreneurs belonged to old age group with age above 47 years.

According to Wagner and Sternberg (2004) age of entrepreneur is one of the important factors to become successful in running the enterprise. They explained that age influences the entrepreneurs to acquire skills, knowledge and experience.

Thomas (2009) examined the relationship between age and entrepreneurship and found that the young entrepreneurs were more enthusiastic and energetic in acquiring the entrepreneurial skills compared to middle aged and old entrepreneurs.

Raghunath (2014) reported in his study that 51.67 per cent of entrepreneurs belonged to the middle age group, followed by 16.67 per cent to young age category and 31.66 per cent to old age group.

Nargave (2016) indicated that 55.84 per cent of the respondents belonged to the young age group followed by 27.50 per cent to middle age group and 16.66 per cent to old age group.

Kumar (2017) reported that respondents from dairy sector 66.67 per cent entrepreneurs were classified as of middle age followed by 17.50 per cent of old entrepreneurs and 16.25 per cent accounted for young age entrepreneurs.

Raju (2017) reported that 47 per cent of the agripreneurs studied belonged to middle age category which was followed by 39 per cent of old age agripreneurs and 14 per cent of young age group.

2. 3. 2 Education

Mian (1994) reported in his study about the entrepreneurs' educational back- ground which revealed that a large number of them had attended university level education which accounted for 89 per cent of the registered entrepreneurs in the incubators.

Laukkanen (2000) described the importance of education on entrepreneurship in different business schools regarding the development of business skills and qualities which are necessary to run the ventures for creating entrepreneurial spirit in the society.

Veciana *et al* (2005) conveyed that higher education plays an important role in developing the entrepreneurial qualities which are essential for running the enterprises along with other entrepreneurial characteristics like adaptability, knowledge accumulation from the environment and others.

According to Soriano and Roigdobon (2009) education in entrepreneurship was important for the entrepreneurs as it increased the capabilities of the individual to run the enterprise and helped to utilize their qualities to identify the opportunities in the existing environment.

West and Noel (2009) explained about the importance of education and training for entrepreneurs. According to their findings education increased the abilities of the person as an entrepreneur to run the business and develop sector specific strategies.

Morant and Oghazi (2015) elucidated about the education of the tenants in an incubator that it increased the skills of the individuals. He categorized the education of entrepreneurs into two as general education and studies regarding business management.

Nargave (2016) revealed that 45.84 per cent of entrepreneurs had education up to middle school and 22.50 per cent of them had only primary education. Respondents with Higher secondary level of education was 16.67 per cent and only 8.33 per cent were educated up to college level. He also reported that the illiterate category accounted for 6.66 per cent.

Kumar (2017) reported that about 32.50 per cent of the entrepreneurs studied by him were illiterates and 22.50 per cent had only primary level of education. Entrepreneurs with

middle, matriculate and higher secondary level of education were 18.75%, 11.25% and 4.5% respectively. Graduate and Post graduates constituted 5 and 2.5 per cent of the total.

2. 3. 3 Enterprise type

Rathod *et al.* (2011) reported that majority (52.50%) of the entrepreneurs had farming as their main enterprise followed by labour (28.33%). Homemakers and persons with government jobs consisted of 15 % and 4.17 % respectively.

Kumar (2017) reported that the 68.33 per cent of the respondents were following agriculture as their main enterprise. However, 22.50 per cent involved in agriculture had some subsidiary enterprise and 9.17 per cent were doing agriculture along with allied activities like poultry, apiculture etc.

Raju (2017) reported that 34 per cent of respondents had agribusiness as their main enterprise and 25 per cent had farming. Agricultural laborers and persons doing agribusiness services consisted of 4% and 25% respectively and 12 percent of the entrepreneurs were doing allied activities like poultry, apiculture etc.

2. 3. 4 Annual Income

Giridhara (2013) observed that 57.5 per cent of respondents had medium annual income while 32.5 per cent of the respondents were having low annual income. 10 per cent had high level income.

Raghunath (2014) reported that entrepreneurs with medium level of annual income accounted for 66.66 per cent and with high and low level of annual income constituted 16.67 per cent each.

Raju (2017) observed that majority (82%) of the agripreneurs were having medium annual income and 10 and 8 per cent had low- and high-income levels respectively.

2. 3. 5 Social Participation

Singh *et al.* (2012) observed that the respondents who were having medium and high level of social participation accounted for 36.67 per cent followed by 26.66 per cent of the respondents who were having low level of social participation.

Raghunath (2014) reported that among respondents 43.33 per cent comprised of medium level of social participation, followed by 41.67 per cent with low social participation and 15.00 per cent with high level of social participation.

Krishnan (2017) detailed that 61.66 per cent had membership in two organizations and 33.33 per cent of the respondents were members in only one organization. However, five per cent of them were having membership in three organizations.

Raju (2017) reported that majority of the agripreneurs (73%) had medium social participation, followed by 16 per cent with low social participation. There were only 11 per cent of the respondents who showed high social participation. Social participation helped the entrepreneurs to establish contact with the facilitating system that encouraged them

2. 3. 6 Economic motivation

Itawdiya (2012) reported that most of the respondents (41.1) had medium level of economic motivation.

Singh *et al.* (2012) reported that among the respondents who belonged to medium economic motivation accounted for 4.11 per cent followed by 33.33 per cent of the respondents who belonged to the high economic motivation and rest of the respondents (25.56%) had low economic motivation.

Nargave (2016) showed that majority (54.17%) of the respondents belonged to the medium economic motivation group and 31.67 and 11.6 per cent of the respondents belonged to low and high level of economic motivation.

Raju (2017) observed that 77 per cent of the agripreneurs had average economic motivation followed by 12 per cent of the respondents having high and 11 per cent of them having low economic motivation.

2. 3. 7 Attitude towards self-employment

Gurubalan (2007) observed that majority (54.67%) of the respondents were having medium favorable attitude towards self-employment. Another 25.33 per cent and 20.00 per cent of respondents recorded high and low level of attitude towards self-employment respectively.

Somanath (2009) stated that 37.22 per cent of agripreneurs showed for high level of favorable attitude towards self-employment. However, 35.56 per cent of respondents were having medium and 27.22 per cent of respondents were having low level of attitude towards self-employment.

Raju (2017) mentioned that 63 per cent of the agripreneurs comprised of having medium attitude towards self-employment, followed by 19 per cent with low attitude and 18 per cent with high attitude towards self-employment.

2. 3. 8 Mass media contact

Kamaraddi (2011) observed that majority (64.17%) of the respondents were having medium level of mass media contact followed by 20.00 per cent with low and 15.83 per cent with high level of mass media contact.

Giridhara (2013) reported that 41.25 per cent of the women entrepreneurs were having medium level of mass media contact. He also found that 30.00 per cent of women entrepreneurs showed high level of mass media exposure and 28.75 per cent of them had only low level of mass media exposure.

Raju (2017) stated that majority (77%) of respondents had medium level of mass media contact. However, high mass media contact was recorded by 16 per cent of the respondents followed by 8 per cent had only low levels of mass media contact.

2. 4 Dimensions of entrepreneurial behavior

2. 4. 1 Decision making ability

Kamaraddi (2011) classified his respondents based on decision making ability in to moderate, and poor decision makers with 70.83, 15.00 and 14.17 per cent in each category.

Lawrence and Ganguli (2012) showed that 42.00 per cent of the entrepreneurs had moderate level of decision-making ability followed by 17.00 per cent with high level of decision-making ability. However, 31.00 per cent of the respondents showed only low level of decision-making ability.

Archana (2013) reported that the majority of the respondents belonged to the group of medium level of decision-making ability, succeeded by 27.78 per cent of the respondents with high level of decision-making ability. Only 25.5 per cent of the respondents belonged to the category of low decision-making ability.

Patel *et al.* (2014) showed that 55.00 per cent of milk producers belonged to the category of medium level of decision-making ability. He also showed that 26.25 per cent had low and 18.75 per cent had high level of decision-making ability.

Raju (2017) observed that majority (67.20%) of the agripreneurs were having high decision-making ability and further stated that most of the agripreneurs had better more ability regarding decision making about their enterprise. This study also opined that some agripreneurs were involved in getting guidance from other entrepreneurs in relation to the start of a new venture. Obtaining loans and marketing of the produce were the areas required more information.

2. 4. 2 Self-confidence

Lawrence and Ganguli (2012) showed that majority (57.0%) of the respondents belonged to the category of having high level of self-confidence, followed by the 23 per cent of respondents with medium and 20 per cent with low level of self-confidence in them.

Raut and Sankhala (2014) reported that more than half of the respondents (71.25%) belonged to the category of medium level of self-confidence and further reported that large

farmers have ability to deal with difficulties and can able to complete their works, even though they showed the self-confidence ranging from medium to low.

Raju (2017) observed that 68.83 per cent of the respondents were having high level of self-confidence. He further reported that agripreneurs had the confidence to get acquainted with new circumstances and could earn profit from their enterprises. Majority depended on themselves to do their business.

Sadashive *et al.* (2017) showed that more than half of the respondents (59.17%) were having medium level of self-confidence, succeeded by 22.50 per cent of the respondents were having low and 18.33 per cent of the respondents were having high level of self-confidence.

2. 4. 3 Achievement motivation

Archana (2013) viewed that majority (41.11%) of the respondents were having high level of motivation for achievement and 38.89 per cent of respondents were having medium and 31.11 per cent of the respondents had low level of motivation for achievement.

Patel *et al.* (2014) opined that 48.75 per cent of the dairy entrepreneurs belonged to the category of medium level of achievement and 23.75 per cent of them were having high level of motivation. 27.50 per cent of respondents were having low level of motivation for achievement.

Raut and Sankhala (2014) reported that more than half of the respondents (73.75%) were reported to have medium level of motivation for achievement followed by one-fifth of the respondents were belonged to the category having high level of motivation and then remaining were having low level motivation for achievement.

2. 4. 4 Risk orientation

Raghunath (2014) observed that half (50.0%) of the respondents had medium orientation in taking risks, succeeded by 33.33 and 16.67 per cent respondents had high and low favorable orientation in taking risks.

Raut and Sankhala (2014) detailed that majority (54.58%) of the respondents had low risk-taking ability, followed by 42.30 per cent of respondents had high risk orientation.

Gamit *et al.* (2015) showed that more than the half of the respondents had average risk-taking ability followed by 19.00 and 13.00 per cent of the entrepreneurs had low and high level of risk taking abilities respectively.

Raju (2017) reported that majority of the agripreneurs have the ability to take risks even at higher rates in order to achieve high economic benefit.

2. 4. 5 Innovativeness

Archana (2013) explained that majority (40%) of the respondents had high innovativeness followed by 36.67 and 23.33 per cent of the entrepreneurs had medium and low innovativeness respectively.

Patel *et al.* (2014) reported that more than half of the respondents (61.25%) had medium innovativeness succeeded 23.75 and 15 per cent of the entrepreneurs had high and low innovativeness respectively.

Rubeena (2015) opined that majority (56.67%) of the respondents had medium innovativeness succeed by 23.33 and 20 per cent of the respondents had low and high level of innovativeness respectively.

Porchezhiyan *et al.* (2016) noted that 71.60 per of respondents had average innovativeness followed by respondents who had high and low innovativeness consisted of 14.20 percent each.

Mertiya (2017) reported that 38.00 per cent of the women entrepreneurs had high innovativeness. He also found that 35.00 per cent of the respondents had medium innovativeness and 27.00 per cent of them had low innovative ability.

2. 4. 6 Leadership ability

Kumar (2012) mentioned that half of the respondents (50.00%) had average leadership skills succeeded by 30.83 and 19.17 per cent of respondents had high and low leadership ability respectively.

Archana (2013) reported that 45.55 per cent of the respondents had high level of leadership skills followed by the respondents who were having low and medium leadership ability consisted of 27.78 and 26.67 per cent respectively.

Anthony *et al.* (2017) stated that majority of the respondents (73.00 %) were found to have high leadership ability followed by 14.00 per cent and 13.00 of the respondents had low and medium leadership ability respectively.

2. 5 Types of Business Incubators (BIs) in terms of structure, function and role

2. 5. 1 Types of Business Incubators (BIs) in terms of structure

Mian (1994) explained in his study about the structure of the university sponsored technology incubators as two types, The first type is thoroughly connected with the own sponsoring university, which can include Technology Advancement Program (TAP) at University of Maryland, The Advanced Technology development Centre (ATDC) at Georgia Institute of Technology and initially The Technology Innovation Centre (TIC) at North-western University. They are upheld like a special program of studies within the university which safeguards the flow of funds, mainly obtained from the respective states. Consequently, their dependence on the sponsoring university is substantial, with resultant direct influence on their policies.

The second type of University Sponsoring Technology Incubator involves stand-alone non-profit units. They were established by the universities but now rely on heavy private and local funds provided by some of the major private sector interests in their respective communities. An arms- length relationship exists between these USTIs and the university. The university does provide necessary oversight and emergency financial and in-kind support, guaranteeing operational success.

Peters *et al.* (2004) revealed about the types of incubators by stating that incubators are the recently evolved organizational phenomenon which are the vehicles for enterprise development based on the structure of incubators. They said that physical and virtual incubators are the two types whereas physical incubators are involving in providing space facility for the incubatees and virtual incubators convey services by operating computer technology.

Bakkali *et al.* (2014) described about the organizational structure adopted by the incubators as missionary, the incubator structure which is supporting social projects. Entrepreneurial is the incubator structural type which is specialized and focusing on the manager. Bureaucratic type is larger in size with a mechanistic approach and an emphasis on standards. Professional, in which the incubator developed with in an academic environment and Adhocratic, the structural type which is focusing on technology and innovation.

2. 5. 2 Types of Business Incubators in terms of function

Allen and McCluskey (1990) mentioned about the different types of incubators by doing a pioneer research on the classification of incubators. They distinguished the incubators based on the function of developing the entrepreneurs into six types as incubators for profit property development, not- for profit Development Corporation, academic, for-profit seed-capital, hybrid incubator and corporate incubators.

Aernoudt (2004) differentiates five types of business incubators in harmony with the main philosophy, objectives and sectors involved. Mixed types of incubators are offering services both to low and high tech incubatees. Incubators which having objective for regional development concentrate on promoting regional economies and improving regional competitiveness. Technology incubators aim to develop technology oriented firms. Social incubators' main objective is to support people with low employment capacities. Basic research incubators concentrate on in basic research and also providing technical guidance to the entrepreneurs and expanding the existing business ventures.

Vonzedtwidtz and Grimaldi (2006) originate indication in Italy about classification of incubators based on Porter's four elements of competitive scope into vertical scope, segment

scope, geographical focus and industry focus incubators and based on the deliberate objective as incubators for-profit and not-for-profit.

The type of BIs varies from one country to another country. The countries like China, Mexico, Indonesia and Turkey have BIs of university affiliations with technology commercialization objectives. In India there is existence of Government sponsored incubators which are established in research institutions (Koshy, 2011).

Khalid *et al.* (2014) classified the evolution of incubators into four generations like entrepreneur-led which involved in providing help to the individual entrepreneurs and second generation as technology led which mainly focus on providing mixed use business services and specialize in only few sectors and the third generation incubators are university led which are aimed at commercializing research, finally the fourth generation incubators are evolved as Virtual Incubators (VI) for providing services through internet technology.

2. 5. 3 Types of Business Incubators in terms of role

Cooper (1985) elucidated that the role of incubators in supporting new firms for local and regional economic development has become extensively accepted. As incubators are majorly involved in supporting entrepreneurs in terms of finance and encouraging innovative ideas and for now many local and state agencies are offering financial support and other encouragements to targeted firms and these incentives may have transformed the entrepreneurial process as well as minimizing the obstacles to enter into entrepreneurship.

Grimaldi and Grandi (2005) mentioned that public or institutional incubators and private incubators are having objectives for economic development. The main source of revenue for public incubators is the fees for the services and the public funding from local, national and international schemes. In public incubators there are Business Innovation Centers (BICs) and University Business Incubators (UBIs). Private incubators are classified into corporate business incubators and independent business incubators.

He further explained about the types of public incubators as Business Innovation Centers (BICs) and University Business Incubators (UBIs). BICs are traditional ones which are mainly focused on providing tangible services including infrastructure, provision of space,

and information about external financing opportunities. UBIs are modern ones which are providing both tangible and intangible services to establish knowledge based ventures and giving more emphasis on transfer of scientific and technical knowledge from universities to ventures.

Vonzedtwidtz and Grimaldi (2006) enlightened about the five incubator types that appeared as regional business, university, virtual, Independent commercial, and company internal. Regional business and university incubators are of a not-for-profit nature as they are involved mainly in developing entrepreneurship in local areas improvement. On the other hand independent commercial and company internal incubators are private with profit motive. The virtual type of incubators are categorized as a for-profit nature and these have no physical location and inclination for online services. The independent commercial type invests in high-tech sectors and usually they located in industrialized areas and is managed by individuals committed to their ventures who rely on private funding. Company internal types host ventures whose core is related to the parent company and receive funding.

Voisey *et al.* (2006) reported that incubators acts at two levels like macro and at firm level. At macro level they play a role in linking the ideas, technology, capital and know-how and employment generation, at firm level incubators take a role in providing business support system, and helping the venture to get establish in a well manner. They further mentioned that business incubators can incorporated in regional and national development as they play an important role in technology transfer and diversification of local economy.

Ogutu and Kihonge (2016) described the different types of incubators as university based incubators, government run incubators, private incubators and corporate incubators and also reported that business incubators will differ according to their organizational design, policies, tenants, management and funding.

Kalidas and Mahendran (2016) mentioned about the incubator's roles that they vary widely according to sponsors, state, economic development group, and university, and business venture capital, objectives from strengthening location, and sectorial focus (technology and mixed, now including kitchen and arts incubators) and business model (not-for-profit or for-profit) and also pointed out that there are more business incubators in urban (45%), then rural

(36%) and suburban (15%).Main focus areas are mixed use (43%), technology and targeted (34%), manufacturing (10%), Services (6%), and Empowerment (7%) and others.

2. 6 Technology, products and services supported by BIs

2. 6. 1 Technologies supported by BIs

Cooper (1985) described that the technologies require for the success in the field of entrepreneurship will keep on evolving because some technologies which were striking for new firms earlier seem to have advanced in ways that make start-ups more difficult. In his study mentioned about the capital requirements for semiconductor manufacture have increased substantially and new areas have evolved that offer attractive opportunities for company formation, such as computer software and biotechnology. For non- technical growth-oriented firms, opportunities have undoubtedly changed.

Mian (1994) studied about the different types of technologies supported by the University- Sponsoring Technology Incubators (USTI) by selecting the sample comprising three state university-sponsored and three private university-sponsored facilities, generally viewed as being successful. Four out of the six Incubators had more number of software and information technology firms and one out of the six technology incubators the majority firms were related to biotechnology and medical technology and one more incubator was supporting majorly the instrumentation firms.

Becker and Gassman (2006) explained about the classification of corporate incubator types which is identified as the private incubator one and further the authors identify four types of corporate incubators in technology. Corporations based on an incubator's source of technology and the type of technology. The four types are fast-profit, leveraging, in-sourcing and market incubators. Insourcing incubators are characterized by adopting parent core technology which is externally acquired and by achieving higher survival rates.

2. 6. 2 Products supported by BIs

Mian (1994) mentioned that four out of the six surveyed incubators were supporting software and information technology and one out of the six surveyed incubators were

supporting biotechnology and medical technology firms, and one more incubator which is surveyed for the study in USA was supporting instrumentation firms.

Sharma *et al.* (2014) reported that the ABI at ICRISAT incubated more than 158 ventures in agribusiness since 2003.Out of these clients, 62 per cent are seed entrepreneurs, 13 per cent are incubatee located on site, 30 per cent are co business incubatee, and 4 percent are biofuel entrepreneurs.

2. 6. 3 Services provided by BIs

Mian (1994) studied about the university sponsored technology business incubators by selecting six incubators in USA, which revealed that most of the university related services were available in all the six incubators and further explained that more than 50% of the respondents use student labour pool, faculty consultants, library and information database facilities, and research laboratories and workshops. More than 80% of the respondents valued university image conveyance.

Further the study showed that there is a high correlation between the use of most of the university- related services and entrepreneurs' perception on incubators' services available in value-addition. While most of the typical incubator services and university-related services were provided at each of the six facilities, their modes of delivery differed.

Mian (1996) portrayed that the services providing by the business incubators are segmented into two categories as typical incubator services like shared office services, assistance in business, help in access of finance, network with experts and university related services like faculty consultants, university image conveyance, labs, equipment, research and development activity, technology transfer programs.

Grimaldi and Grandi (2005) expressed that most incubators have similar services and activities but still they differ from one other as they provide services according to the requirement of incubatee needs and services also influenced by the local environment and their respective community which made the support distinct among incubators.

Totterman and Sten (2005) analyzed the case studies of three business incubators in Finland and concluded that in getting benefits from the services and resources of business incubators the support from the incubators and networking facilities are prominent ones. They also stated that incubators also involved in providing assistance in the business management, consultancy services and guidance in the technology utilization for aspiring entrepreneurs are also important services for entrepreneurs.

Robinson and Slubberud (2014) explained about more frequent services which are taken by the incubator tenants in the Norway and arranged those services according to order of preference as financial consulting, business development, physical services, specialized services, and general services.

Kalidas and Mahendran (2016) said that Business Incubators provide services and facilities at affordable fees, to the selected firms in helping them to survive and attain stability. In general they provide the services like office space, equipment, business planning and legal advisory services, trade and market information, mentoring by the board members and training.

Ogutu and Kihonge (2016) detailed about the services in incubators as pre-incubation, incubation and post-incubation. In pre- incubation need to apply for incubation, vetting of potential tenants by the incubator and filing up of details regarding duration and facilities. In incubation stage there is support for idea and its development in to output for commercialization. In post incubation period there is follow-up activities by the incubator about the performance of enterprises.

2. 7 Concept of performance analysis

Moullin (2003) said that the main focus of performance analysis is to see how well an institution is functioning and its orientation towards to achieve its targets and standards. He also reported that efficiency and effectiveness are the two fundamental components of performance analysis.

Neely *et al.* (2005) expressed that performance analysis is the system of measuring the effectiveness and efficiency of an organization's role in quantifying way.

Phan *et al.* (2005) portrayed that process of measuring the performance of an incubators is multidimensional and there is no fixed and universally acceptable performance analysis available in the incubation literature which leads to use different performance measurements by the incubator researchers.

Laitinen and Chong (2006) said that performance analysis is a multidimensional concept which involves measurement of both financial and non-financial dimensions.

2. 8 Performance of enterprises facilitated by Business Incubation

Lalkaka (2001) indicated about the business incubation of USA, showed that 87 percent of firms graduated are continuing their business in their local areas, incubators which got public support can able to generate jobs at a cost of about 1,100 dollar each and the incubator tenants could able to provide jobs up to an average of 85 people.

Aerts *et al.* (2007) stated that the survival of start-ups after graduation from the business incubator has been raised to seventy percent and this increase in survival rate will have a positive effect on employment generation, development of economy and reduction in poverty.

Ayyagari *et al.* (2011) mentioned that survival of ventures is an important aspect in the economic development in developing countries.so the role of government in performance of enterprises is very crucial as it is the major player in creating business environment. As it is proved from previous facts that government supported enterprises perform well and got good revenue in terms of job creation particularly for youth, economic growth and poverty reduction.

Barbero *et al.* (2012) mentioned about the performance of incubators which are concentrating on economic development and mainly focus on encouraging the entrepreneurship in areas having below average economic indicators. It implies that incubated firms in economic development incubators are weaker in the areas of idea generation, innovation and entrepreneurial potential. The firms having lower entrepreneurial potential offer lower employee growth and less competitive in nature which leads the economic development incubators to a lack of resources, which causes a lower employee procurement. Employees are not hired ahead of growth but when there is a need as the firms' resources are scant.

Additionally, a low average sales growth implies that employees are not needed at the same rate as firms in basic research incubators, in which average sales growth is higher.

Al-Mubaraki and Busler (2013) conducted a study and compared the performance of different incubators on successful graduation of Bahrain, Jordan and Morocco incubators of small developing countries. The results showed that successful graduation is not an immediate result and nascent incubators do not recruit more clients and also reported that there is a 90 percent survival rate for the businesses which are conducted with in the incubator.

Ogutu and Kihonge (2016) delineated the relationship between the number of incubators and economic growth by conducting a study in Kenya by using Gross Domestic Product (GDP), per capita and Total Entrepreneurship Activity (TEA) as independent variables. The research results showed that there was a very strong relationship between them. The changes in economic growth of a country accounts for 80.7 per cent of the total variance in the number of incubators in a country.

Allahar *et al.* (2016) said that the performance analysis of enterprises are usually done based on the measure of number of graduates who successfully completed their incubation program and able to start an independent enterprise and run them sustainably with meeting the objectives of the main incubator.

2. 9 Relationship between the types of incubators and their performance

Bergek and Norman (2008) mentioned about the idea on which the performance of incubators should be evaluated in different types of incubators. They explained that every incubator is unique and diverse and there can be many levels of goals. Incubators of the same type but operating in different sectors may have similar goals. So performance should be evaluated based on the goal of the institution.

Barbero *et al.* (2012) in his study explained about the relationship between the performance of the incubators and archetypal objectives by comparing between the four different types of incubators like university incubators, basic research, Economic development incubators, Private incubators and the performance of those incubators. The study concluded

that the performance of different types of incubators was best when they could meet the objectives for which purpose they established.

He further explained that the basic research incubators successfully met the objectives and university incubators could able to meet the objectives moderately. Economic development incubators could not able to meet the objectives as its performance is at lower category in areas like regional development, sales growth and employment growth. Naturally, basic research incubator firms are more likely to introduce new products and services, followed by private incubator firms. In the economic development case, pressure from the parent company is required to yield greater new product and service launch capabilities.

Pettersen *et al.* (2016) enlightened about the performance of different types of business incubators in providing services for successful graduation of ventures. They identified the different incubator models as the mentoring incubators, incubators providing managerial advice, incubators focused on specific technology, incubators providing access to networks. They further conveyed that incubators which provide qualitative access to the external network for new firms in addition to the incubator provided network can produce more successful graduated ventures, as the networks increases the responsibility of incubator manager also increases to disseminate knowledge by creating professional networks.

3. 0 Challenges faced by the Business Incubators (BIs)

Grimaldi and Grandi (2005) expressed that the challenge for the incubator was to ensure that the entrepreneurs have sustained enterprise along with their skills and abilities even when they get outside from university business incubators and also to develop and extend their entrepreneurial capabilities.

Meru and Stuwig (2011) reported in their study about the perception of entrepreneurs' in Kenya on the importance of business incubators is also one of the important factors for the successful incubation. They further reported that although there is a prominent relationship between the entrepreneurs and business incubators still there is an existence of connection gap between the actual services delivering by the incubators and the expectations of the tenants.

Sharma *et al.* (2014) revealed the challenges of the ABIs in balancing the technology commercialization and agricultural development, limitation in the availability of professional experts in incubation which reduces the chances of success of ventures, realignments in the institutions will erode the sustainability of ABIs.

Allahar *et al.* (2016) reported the major challenges faced by the incubators as the availability of small pool of potential entrepreneurs, limited recruitment of professional experts, and poor development in building networks, and finally the financial challenges are affecting the efficient performance of ABIs.

Ogutu and Kihonge (2016) detailed on challenges of business incubators in developing entrepreneurship in the society. They said that the major challenge was in attracting and inspiring the youth with new business ideas as they rarely have idea about the existence of incubators who will support their ideas and sometimes they don't want to share their ideas to hold their intellectual property rights.

Machado *et al.* (2017) mentioned regarding the problems in business incubators as lack of management of the incubator and support to incubated companies and difficult to raise money and also to co-ordination with the regions innovation ecosystem.

3. 1 Suggestions for improvement of Business Incubators (BIs)

Al-Mubaraki and Busler (2013) in their study mentioned that the economic development as the result of the positive impact of the successful incubation and explained about the suggestions that if incubation to become an effective tool for economic development the quality initiatives and careful planning of incubation should be adopted by the incubators.

Sharma *et al.* (2014) explained about the suggestions to be considered by the agribusiness incubators for further improvement in their functioning for the development of entrepreneurship. They said that the ABIs should focus on incubating enterprises which are oriented to commercializing technology for agricultural development and they said that to increase the market opportunities alternative end products should produce. They further mentioned about the suggestions regarding organization and policy that Intellectual Property Right (IPR) and Standard Material Transfer Agreements (SMTA) should not hinder the

commercialization of technology and incubation, Hence there should be a liberalize IPR and SMTA polices in incubators.

Kalidas and Mahendran (2016) in their study reported that the ABIs should focus on additional services to be provided by them, standardizing the incubation system and total quality management for the growth and development of the entrepreneurship. They further explained that ABIs should examine about the interaction between the different stakeholders to increase the performance of the incubators.

Ogutu and Kihonge (2016) explained about the improvements that need to be adopted by the business incubators to increase their efficiency in their performance that they need to market their services by targeting the specific tenant types with clear process of incubation. They also mentioned that business plan competitions should be incorporate to tap ideas from the nascent entrepreneurs and can give incubation facility for that even up to global enterprise stage.

Ayatse *et al.* (2017) reported that the incubators are the promoters of entrepreneurship and they are the tools for the proliferation of small and medium enterprises. They mentioned that there should be a support for the business incubators by all the tiers of government to become incubation as confirmed catalyzer for the development of entrepreneurs in the society. For the capacity building of incubators, they should be equipped with more support from government, if the emerging businesses with new ideas participated in the incubation program it would greatly benefit the venture as it significantly increases their chances of survival, revenue growth and job creation.

Weele *et al.* (2017) in their study explained about the improvements need to be adopt by the entrepreneur's and incubators staff's perceptions about the importance of the resources in the incubators. They suggested that the incubators should take a strong step to intervene in stimulating the start-ups to utilize the resources by arranging effective coaching by targeting to reach milestones. As the start-ups matures they will gradually recognize the importance of business knowledge.

Methodology

3. METHODOLOGY

This chapter discusses the methodology used for study and measurement of the independent and dependent variables. It has been organized under the following heads

3. 1 Research design

3. 2 Locale of the study

3. 3 Sampling procedure

3. 4 Operationalization and measurement of independent variables

3. 5 Operationalization and measurement of dependent variables

3. 6 Methods followed in data collection

3. 7 Statistical tools used for the study

3. 1 Research design

It is the arrangement of the conditions for collection and analysis of data in a manner that aims to combine relevance to the research purpose with economy in procedure (Kothari and Gaurav, 2017). The research design followed in the present study is *ex-post facto* design. *Ex-post facto* design is a systematic study in which the scientist does not have direct control over the independent variables because their manifestation have already occurred or because they are inherently not manipulate (Kerlinger, 1973).

3. 2 Locale of study

In order to analyse the performance of ABIs in entrepreneurship development, the ABI units in Central Plantation Crop Research Institute (CPCRI), Kasaragod; Central Tuber Crop Research Institute (CTCRI), Thiruvananthapuram; Central Institute Fisheries Technology (CIFT), Kochi; Coconut Development Board (CDB) Kochi; Kerala Agricultural University (KAU), Tavanur and Indian Institute Spices Research (IISR), Kozhikode were selected. The successful enterprises which were facilitated by the ABIs were recorded in the form of case studies.

3. 3 Sampling

Registered entreprenuers were randomly selected from all the six ABIs studied to make a total sample size of 50. In addition, the data regarding ABIs were also collected from 12 officials working with the ABIs. Purposeful sampling was followed in the selection of six successful enterprises facilitated by the ABIs for detailed Case study.

3. 4. Operationalization and measurement of independent variables

3. 4. 1 Age

It referred to the chronological age of the entrepreneurs who were registered in ABIs at the time of conducting the study. The respondents were classified into three categories based on the method followed by Census of India, (Government of India, 2011).

Sl. No.	Category	Age(years)	Score
1	Young age	Below 35	1
2	Middle age	35-50	2
3	Old age	>50	3

3. 4. 2 Educational status

Education was considered as the qualification of the respondents. Education of entrepreneurs in the academic institutions from elementary school to college level was considered as general education. The specialization of entrepreneurs in specific field was recorded as technical education. The scale adopted by Morant and Oghazi (2015) was utilized for the present study.

Sl. No.	Category	Score
1	General education	1
2	Technical education	2

3. 4. 3 Entrepreneurial status

The entrepreneurial status is defined as the level of economic activity from which an individual enter into the field of entrepreneurship. It was measured for the study as follows.

Sl. No.	Category	Score
1	First generation entrepreneur	5
2	Ex-employee	4
3	Family entrepreneur	3
4	Foreign returned	2
5	NRI	1

3. 4. 4 Income of entreprenurs

The returns from the enterprises was considered as income of the entrepreneurs and expressed in terms of rupees. The scale used by the Sivaprasad (1997) was adopted to measure the income of the respondents from their enterprises. Based on the total income, the respondents were categorized into three groups including 'High', 'Medium' and 'Low' using mean and standard deviation as a measure check.

Sl. No.	Income (Rs)	Score
1	Nil	1
2	<50,000	2
3	50,000-1,00,000	3
4	1,00,000-5,00,000	4
5	5,00,000-10,00,000	5
6	10,00,000-1 crore	6

3. 4. 5 Enterprise type

Enterprises were categorized as farming, enterprises with allied activities including dairy/poultry/goat/fisheries, agribusiness services, agricultural processing and value addition. Method followed by Raju (2017) was utilized for this study. The scores were allotted as given below.

Sl. No.	Category	Score
1	Farming	1
2	Allied activities like dairy /poultry/fishery	2
3	Agribusiness Services	3
4	Agricultural processing and value addition	4
5	Others	5

3. 4. 6 Assets owned

It was referred as the assets possessed by the regiserered entrepreneurs in ABIs. The respondents were asked whether they had land, building, machines and equipment as their assets. The scores were allotted as given below.

Sl. No	Type	Score
1	Land	1
2	Building	2
3	Machines and equipment	3
4	All assets	4

3. 4. 7 Mass media contact

It was referred as the contact of entrepreneurs with the different mass media including radio, newspaper and others. The diverse mass media sources were recorded and the respondents were asked to reply how often they used the mass media. Method followed by Raju (2017) was utilized for this study. The scores were allotted as given below.

Sl. No	Mass media	Score
1	Regularly	3
2	Occasionally	2
3	Never	1

3. 4. 8 Social participation

The participation of the respondents in different organizational activities was characterized as a social participation. The frequency of their meeting was analyzed by asking their response for whether they attended regularly, occasionally, or not participated. Method adopted by Sundran (2016) was followed in the study. The scoring was followed as given below. Based on the scores acquired, the respondents were categorised into low, medium, and high, keeping the mean and standard deviation as check.

Sl. No	Extent of participation	Score
1	Regular	2
2	Occasional	1
3	Never	0

3. 4. 9 Attitude towards self-employment

This was conceptualized as the mental disposition of the entrepreneur towards self-employment. The method followed by Gurubalan (2007) was adopted for the study. It consists of ten statements for which respondents were requested to respond as agreement or disagreement to each statements. The scores were allotted as 5, 4, 3, 2 and 1 for positive statements and 1, 2, 3, 4 and 5 for negative statements. The scores received for every statement summed up to arrive at the individual's score on attitude towards self-employment. Based on the acquired, the respondents were classified into low, medium and high, keeping the mean and standard deviation as check.

Sl. No	Category	Range of scores
1	Low	<(Mean- SD)
2	Medium	(Mean±SD)
3	High	.>(Mean+SD)

SL. No	Statement	SA	A	UD	DA	SDA
1	Farm entrepreneurship is a potential field for self-employment during the present period of extreme unemployment					
2	Self-employment in agriculture is an independent profession as it offers freedom					
3	There is no necessity for an educated unemployed youth to go for self-employment in agriculture as government jobs are easily available					
4	Self-employment in agriculture is desirable, as no much affected interference is required.					
5	It is unwise to select self-employment in agriculture as it needs more physical and mental efforts					
6	Sound family background in agriculture is a necessity for selecting self-employment in it					
7.	Agriculture is the basis for other industries so selecting self-employment in agriculture is always worthy					
8	For an unemployed youth agriculture is a sure profession that help him the vagaries of life					
9	Self-employment in agriculture help one to become self-sufficient in life					
10	Since ample technologies are available in agriculture one can easily make self-employment in agriculture					

3. 4. 10 Economic motivation

Economic motivation was defined as the economic values of an individual in achieving ends. The question was having five statements in which four of them were positive and one statement was negative. The statements were measured on five-point continuum including 'strongly agree', 'agree', 'undecided', 'disagree' and 'strongly disagree' given with weight of 5, 4, 3, 2 and 1 for positive and 1, 2, 3, 4 and 5 for negative statements respectively. The method followed by Raju (2017) was adopted with suitable modifications. The summation of the scores of all statements formed the scores for economic motivation. Based on the acquired, the respondents were classified into low, medium and high, keeping the mean and standard deviation as check.

Sl. No	Category	Range of scores
1	Low	<(Mean- SD)
2	Medium	(Mean±SD)
3	High	.>(Mean+SD)

Sl. No	Statements	SA	A	UD	DA	SD
1	An entrepreneur should work hard for economic profit					
2	The most successful entrepreneur is one who makes more profit					
3	An entrepreneur should try new ideas which may earn more money					
4	An entrepreneur must earn his/her living but most important thing in life cannot be defined in economic terms					
5	It is difficult for one's to make good start unless one provide them with economic assistance					

3. 5 Operationalization and measurement of dependent variables

The entrepreneurship development through ABIs depends on the variables below.

3. 5. 1 Dimensions of entrepreneurial behavior

3. 5. 2 Dimensions of the enterprises

3. 5. 3 Structure, function and role of ABIs

3. 5. 4 Services, technology and products supported in ABIs

3. 5. 5 Performance of ABIs in facilitating enterprises

3. 5. 6 Challenges faced by ABIs in facilitating enterprises

3. 5. 1 Dimensions of entrepreneurial behavior

The entrepreneurial behavior level was analyzed by using 'Entrepreneurial Behavior Index' followed by Aiswarya (2016) which included dimensions like decision making ability, achievement motivation, risk taking ability, self-confidence, innovativeness, leadership ability. The entrepreneurs were asked to rate the statements representing selected dimensions. The response of the entreprenurs were assigned scores of 1, 2, 3, 4 and 5 indicating the most negative to most positive degree of opinion as per Likert scale. The total score of each statement was calculated by summing up the values obtained. The following formula was used for calculating the index of each statement and composite index for all the dimensions:

$$Index\ of\ each\ statement = \frac{\text{Total score for each satement}}{\text{Maximum score of the statement}} \times 100$$

$$Composite\ index = \frac{\sum \times}{\text{M} \times \text{N} \times \text{S}} \times 100$$

Where, $\sum X$ = sum of total scores of all statements (Sum of frequencies multiplied by weight)

M = Maximum score

N = Number of respondents

S = Number of statements

The indices were then classified into three categories as followed by Aiswarya (2016) for interpreting the result as given below:

Range of index value	Category
0-32	Low
33-66	Medium
67-100	High

3. 5 . 1. 1 Decision making ability

Decision making ability was functionally defined as the extent to which an entrepreneur choose the best one from among the available alternatives for achieving the maximum economic benefit. The decision making ability of the entrepreneurs was analyzed by getting their responses for the provided nine relevant statements as given below. Method followed by Parimaladevi (2004) was adopted in the study. The score 0 was given for responses 'In consultation with others' and 1 for 'Independently'. Total scores were obtained by summing up the values of all the statements. The composite index was used for calculating the level of decision making ability of entrepreneurs.

Sl. No	Decision making area	Response pattern	
		Independently	In consultation with others
1	Decision to start an enterprise		
2	Decision to avail loans		
3	Decision to hire labour		
4	Decision regarding storage and marketing of produce		
5	Decision regarding the value addition process		
6	Decision to use/purchase a machinery and equipment		
7	Decision to meet business experts		
8	Decision to follow suitable methodology of production		
9	Decision to attend training		

3. 5. 1. 2 Self-confidence

It was conceptualized as the accomplishment of desires and works by an individual by believing their own power and ability. The method followed by Sundran (2016) was utilized for the study. It consists of eight statements for which the respondents were asked to give their response on five point continuum ranging from strongly agree, agree, undecided, disagree, and strongly agree with scores 5, 4, 3, 2 and 1 respectively and it was reversed for negative statements. The composite index was used for calculating the level of self-confidence in entrepreneurs.

Sl. No	Statements	SA	A	UD	DA	SDA
1	I feel no obstacle can stop me from achieving my goal					
2	I am generally confident of my ability					
3	I am bothered by inferiority feelings that I cannot with other					
4	I am not interested to do things at my own at my own initiatives					
5	I usually work out things for myself rather than to get someone else to show me					
6	I get discouraged easily					
7	Life is a strain for me much of the time					
8	I find myself worrying about something or other					

3. 5. 1. 3 Achievement motivation

Achievement motivation was conceptualized as the urge in an individual to do great things. Method followed by Manmohan (2013) was adopted in the study. This was analyzed by asking the respondents to provide their response to six statements. The statements were in five point continuum ranging from strongly agree, agree, undecided, disagree, and strongly agree. The scores given were 5, 4, 3, 2 and 1 for positive statements and 1, 2, 3, 4 and 5 for negative statements respectively. Total score was obtained by adding the scores of all statements. The composite index was used for calculating the level of achievement motivation of the entrepreneurs.

Sl. No	Statements	SA	A	UD	DA	SDA
1.	Work should come first even if one cannot get proper rest in order to achieve ones goals					
2.	It is better to be content with whatever little one has, than to be always struggling for more					
3.	No matter what I have done always want to do more					
4.	I would like to try hard at something really difficult even if it proves that I cannot do it					
5.	The way things are now-a-days discourage one to work hard					
6.	One should succeed in occupation even if one has to neglect his family					

3. 5. 1. 4 Risk taking ability

It was characterized as the ability of the entrepreneur to take the risks and finding the solutions to the problems of their enterprise. Risk taking capacity of the entrepreneurs was analyzed by utilizing the scale followed by Sreeram (2013). It consists of six statements to be measured by five point continuum including strongly agree, agree, undecided, disagree, and strongly disagree with the scores of 5, 4, 3, 2 and 1 respectively for positive statements and this score is exactly reversed for negative statements. The total score was obtained by summing up the scores obtained. The composite index was used for calculating the level of risk taking ability of the entrepreneurs.

Sl. No	Statements	SA	A	UD	DA	SDA
1	An entrepreneur should start more enterprise to avoid greater risks involved in a single enterprise					
2	An entrepreneur should rather take more of a chance in making more profit than to be content with a smaller but less profit					
3	An entrepreneur who is willing to take a greater risk than an average one usually do better financially					
4	It is good to take risks when one knows that chance of success is fairly high					
5	It is better not to try new ideas unless others have done it with success					
6	Trying an entirely new method involves risk but it is worthy					

3. 5. 1. 5 Innovativeness

It was operationalized as the extent to which an entrepreneur is actively interested in adopting new ideas in their enterprises. The scale followed by Raju (2017) was utilized to analyze the innovativeness of the entrepreneurs. It consists of five statements in which three of them were negative. The respondents were asked to give response on a five point continuum including strongly agree, agree, undecided, disagree, and strongly agree with scores of 5, 4, 3, 2 and 1 respectively and this scoring method was reversed for negative statements. The composite index was used to calculate the level of innovativeness of the entrepreneurs.

Sl. No	Statements	SA	A	UD	DA	SDA
1	I would feel restless unless, I try out an innovative method which I have come across					
2	I am cautious about trying new practices					
3	I like to keep up-to-date information about the subjects of my interest					
4	I would prefer to wait for others to try out new practices first					
5	I opt for the traditional way of doing things than go in for new methods					

3.5.1.6 Leadership ability

Leadership ability was characterized as the ability of an individual to influence the behavior in others. The method followed by Raju (2017) was adopted for the study. It consists of five statements for which the respondents were asked respond. It was measured on a three point continuum including 'always', 'sometimes', and 'never' with scores 3, 2 and 1 respectively. By summing up the scores for each statement the total score was recorded and to calculate the level of leadership ability of the entrepreneurs the composite index was used.

Sl. No	Statements	Always	Sometimes	Never
1	Did you participate in group discussions on new practice in your enterprise?			
2	Whenever you see/hear a new innovation did you initiate discussion about it with your colleagues?			
3	Do people in your community regard you as good source of information on new things?			
4	Do you assign the farm work to your members?			
5	Do you offer new approaches to the problems faced by you in field?			

3. 5. 1. 7 Motivation for entrepreneurs to join ABI

Motivation was conceptualized as the inner urge of an individual entrepreneur to achieve something in life. In accomplishment of success in the entrepreneurship, motivation was an important factor. It was responsible for entrepreneurs to join ABIs to gain guidance.

In analyzing the motivational factors of an entrepreneurs the scale developed by the Choto (2015) was utilized with certain modifications. It consists of five statements for which the respondents were asked to repond on a three point continuum including 'High', Moderate, and 'Low' with scores 3, 2 and 1 respectively. Total score obtained by summing up the scores of each statement recorded. The composite index was used to know the major motivation to join for ABI by the entrepreneurs.

Sl. No	Motivational factors	High (3)	Medium(2)	Low(1)
1	To gain skills and expertise			
2	To meet the challenges of obtaining fund			
3	To get suitable technology			
4	Access to business networks			
5	To obtain infrastructural facilities			

3. 5. 2 Dimensions of the enterprises

The dimensions of enterprises was analyzed based on indicators including stage of enterprises at the time of joining to ABIs, number of workers employed, facilitation schemes cost and income of the enterprises identified by the Barbero *et al.* (2012) was utilized for the study.

3. 5. 2. 1 Stage of enterprise at the time of joining to ABIs

It was characterized as the stage at which the entrepreneurs joined to the ABI for gaining incubation facilities for the development of their enterprises. It was asked as follows.

Sl. No	Stage of enterprise at the time of joining	Scores
1	Nascent	1
2	Young	2
3	Matured	3
4	Senile	4

3. 5. 2. 2 Number of workers employed

The question was asked for the entrepreneurs about the number of workers employed in their enterprises. It was as follows.

Sl. No	Number of workers employed	Scores
1	0-5	5
2	5-10	4
3	10-15	3
4	>15	2

3. 5. 2. 3 Facilitation schemes for the enterprises

Sl. No	Name of the Scheme	Scores
1	Entrepreneurial Support Scheme(ESS)	1
2	Pradhan Mantri Young Entrepreneurship Programme(PMYEP)	2
3	Micro-Unit Development Refinance Agency (MUDRA)	3
4	Loan from bank with subsidy	4
5	Technology Mission On Coconut (TMOC)	5

The above list of schemes were given to get the appropriate choice from the respondents.

3. 5. 3 Types of ABIs in structure, function and roles

In order to delineate the types of ABIs based on their structure, functions and roles the question was asked to the officials working with the ABIs.

3. 5. 3. 1 Types of ABIs based on organizational structure

Hierarchy of the organization and their functions were was identified in delineation of ABIs types based on their structure. The scale developed by Bakkali *et al.* (2014) was adopted for the study. It was as follows.

Sl. No	Organizational hierarchy	Structural type
1	Tending to be specialized and focus on the managers	Entrepreneurial
2	Supporting social projects	Missionary
3	Developed with academic environment	Professional
4	Focus on technology and innovation	Adhocratic
5	Larger in size and emphasis on standards	Bureaucratic

3. 5. 3. 2 Types of ABIs based on roles

The roles of ABIs were considered as their intervention in establishment of new ventures and its growth. The question was asked to the officials of ABIs. To delineate the types of ABIs based on their roles the scale developed by Grimaldi and Grandi (2005) was used.

Sl. No	Role of ABI	Types of ABI
1	Offering set of tangible services including space, infrastructure, communication channels and information about external financing opportunities.	Business Innovation Centers (BICs)
2	Offering set of both tangible services and also intangible services including transfer of scientific technologies from universities to enterprises.	University Business Incubators (UBIs)

3. 5. 3. 3 Functional types of ABIs

In delineation of ABIs types based on their functions, the scale developed by Aernoudt (2004) was adopted for the study. It was as follows.

Sl. No	Philosophy	Primary objective	Secondary objective	Functional type
1	To fill entrepreneurial gap	To create start-ups	Stimulating innovations in start-ups.	Technology incubators
2	To fill business gap	To create Spin offs	Employment creation	Mixed Incubators
3	To fill discovery gap	Research	Stimulating innovations in start-ups.	Basic research Incubator
4	To fill regional gap	Regional development	Business creation	Economic development incubators

3. 5. 4 Challenges faced By ABIs in entrepreneurship development

The challenges were conceptualized as the difficulties faced by the ABIs in providing support the entrepreneurs. The identified challenges were given for ranking to the officials working with the ABIs. The Garrett ranking was used to analyse the results.

Sl. No.	Challenges	Rank
1	Lack of funding	
2	Inconsistency in stakeholder support	
3	Lack of commitment of entrepreneurs	
4	Geographic area	
5	Government policies	
6	Competent and motivated management team	

3. 6 Methods followed in data collection

3. 6. 1 Instruments utilized in the study

The data was collected through an interview schedule which was prepared under the guidance of advisory committee. The final interview schedule which was used for data collection is given in Appendex I and II. The interview schedule consists of two sections. The first section was prepared for the registered entrepreneurs of the ABIs. It was divided into four parts. The first part was about the general information of the respondents including name, and address. The second part consists of information about profile of an entrepreneur including age, education, occupational status and others. The third part was included to get data on entrepreneurial qualities of the registered entrepreneurs in the ABIs and fourth part was about the information related to the performance of enterprises. Second section was utilized to collect data from officials regarding the ABIs.

3. 6. 2 Method of data collection

A qualitative approach of investigation was used for the study including visits to the Agri Business Incubators (ABIs) to observe their functioning in their natural settings, interaction with the nodal officers and staffs. In order to understand the main features of the incubators the data was collected from registered entrepreneurs and officials workinig in ABIs. The data was also collected from secondary sources including websites, technical reports, bulletins and folders of ABIs.

3. 6. 3 Statistical tools used for the study

Classification,tabulation and analysis of the collected data was done by using statistical techniques such as arithmetic mean, standard deviation and percentage.

3. 6. 3. 1 Arithmetic Mean (AM)

It is defined as the sum of all the values of observation divided by the total number of observations.

3. 6. 3. 2 Standard Deviation (SD)

It is positive square root of the mean of the squared deviations taken from arithmetic mean.

3. 6. 3. 3 Frequency and percentages

Frequency distribution and percentages were used to know the distribution pattern of respondents according to variables.

Percentages were used for standardization of sample by calculating the number of individuals that would be under the given category.

3. 6. 3. 4 Garrett Ranking Method

Garrett ranking was used to determine the challenges faced by ABIs officials in supporting entrepreneurs. The identified major problems incorporated in the interview

schedule and the respondents were asked to rank it. The rank was given to each challenge were converted into per cent position using the following formula:

$$\text{Per cent position} = \frac{100\,(R_{ij} - 0.5)}{N_j}$$

Where, R_{ij} is the rank for i^{th} constraint by the j^{th} individual

N_j is the number of constraints ranked by the j^{th} individual

The rank obtained is an interval on a scale where its midpoint denotes the interval, hence

e 0.5 is subtracted from each rank. Using the Garrett Table, the per cent position obtained is changed into score (Garrett and Woodworth, 1969). Mean score was determined from the score obtained for each challenge and they are ranked according to the mean score.

3. 6. 3. 5 Break even analysis

Break even analysis is used to analyze the performance of the enterprises facilitated in ABIs. For this analysis the details regarding production and sales per month of the enterprises with respect to the major produce were collected. Break even analysis is based on the assumption of constant input price, technology and selling price. The point at which the total cost curve and revenue curve intersects is called Break Even Point (BEP), which indicates the level of production at which the producer neither loses money nor makes profit. It is a point of no profit and no loss (Reddy *et al.*, 2016).

Estimation of Break Even Point (BEP)

a. Algebraic approach

BEP= F/P-V BEP=Break Even Point

F=Fixed Cost for production

P=Price per unit of product

V=Variable cost per unit of product

b. Graphic approach

Break Even Point is estimated for the selected enterprises of the ABIs. The total cost curve and total sales curve were utilized. The point at which these two curves intersect is the Break Even Point (BEP). (Fig.1)

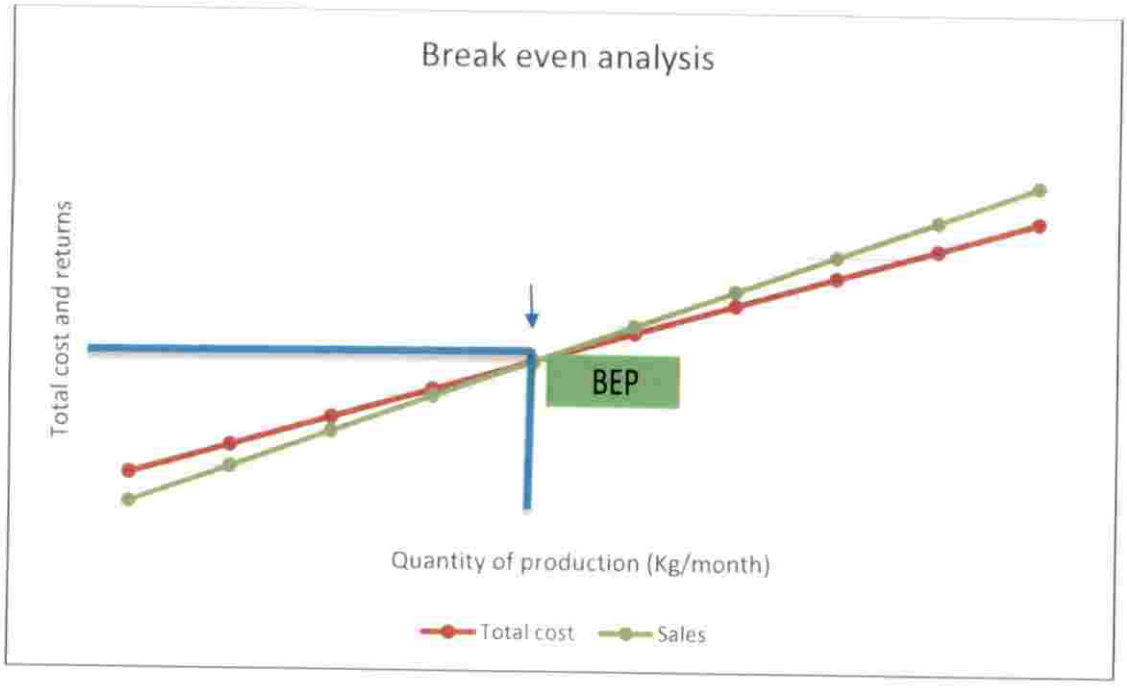


Fig. 1 Graphic representation of Break Even Point (BEP)

Results and Discussion

4. RESULTS AND DISCUSSION

According to the objectives of the research, the data was collected and examined by suitable interpretation. The results of the present study on the performance analysis of agribusiness incubators on entrepreneurship development was explained under following subheads:

4. 1 Socio-economic characters of entrepreneurs

4. 2 Dimensions of entrepreneurial behavior

4. 3 Dimensions of enterprises

4. 4 Types of ABIs in terms of structure, function and roles

4. 5 Comparison of services, technology and products supported in ABIs

4. 6 Performance of ABIs in facilitating enterprises

4. 7 Performance of enterprises facilitated in ABIs

4. 8 Challenges faced by the ABIs

4. 9 Case studies on performance of enterprises facilitated in ABIs

4. 10 Suggestions for improvement of ABIs

4. 1 Socio-economic characters of entrepreneurs

In this section, the study of socio-economic characteristics of entrepreneurs was made with reference to age, education, and occupational status, enterprise type, assets owned, mass media contact, social participation, attitude towards self-employment and economic motivation of the respondents. The analyzed data are presented in the form of Tables and Figures with the explanations for the results.

4. 1. 1 Age

It could be observed from Table 4.1 that 58.00 per cent of the entrepreneurs were of middle age group followed by 24.00 and 18.00 per cent of them were of young and old age entrepreneurs respectively. (Fig.2)

Table: 4. 1 Distribution of entrepreneurs according to their age (n=50)

Sl. No	Category	Frequency	Percentage
1	Young(<35 years)	12	24.0
2	Middle age(36-50)	29	58.0
3	Old age(>50)	9	18.0
Total		**50**	**100.00**

The results in the Table 4.1 showed that majority of the respondents were middle aged entrepreneurs. The description for the above result can be given by saying that the middle aged individuals were desired to be engage in independent decision making to fulfil their requirements and objectives. Above all, the middle aged ones were mature and physically efficient in performing the works. The results in the Table 4.1 showed that 24 per cent of the entrepreneurs were young age group which was a good sign, as the young generation was showing interest towards the entrepreneurship. The young entrepreneurs were enthusiastic with having ability to learn business strategies and their application earlier than the old aged ones. The results also showed that only 18.00 per cent of the entrepreneurs were old age group. These were the entrepreneurs of established companies who were taking guidance on new technologies from ABIs for their business activities. These results were in harmony with the findings of Mian (1994).

4. 1. 2 Education of entrepreneurs

Table: 4. 2 Distribution of entrepreneurs according to their education (n=50)

Sl. No	Category	Frequency	Percentage
1	General Education	19	38.00
2	Technical Education	31	62.00
Total		**50**	**100.00**

The results in the Table 4.2 showed that 62.00 per cent of the entrepreneurs had technical education followed by 38.00 per cent of them had general education. The outcome was a mirror image of the higher literacy rate of Kerala State. There was no illiterate among the entrepreneurs. This designated that now a days entrepreneurs were enough educated and skillful in understanding of the entrepreneurial activities. The general educated entrepreneurs comprised of 38.00 per cent, in which they attended education up to college level. Another 62.00 per cent entrepreneurs had technical education category were attended their education up to university level. These results are in line with the findings of Morante and Oghazi (2015). (Fig.3)

4. 1. 3 Entrepreneurial status

The entrepreneurial status was defined as the stage from which an individual entered into the field of entrepreneurship. The data presented in the Table 4.3 revealed that 78 per cent of the entrepreneurs from ABIs were first generation entrepreneurs. However, 14 per cent of entrepreneurs were family entrepreneurs followed by 6 per cent of them were ex-employees and 1 per cent of them were foreign returned entrepreneurs. (Fig. 4)

Table: 4.3 Distribution of entrepreneurs according to their entrepreneurial status (n=50)

SL. No	Entrepreneurial status	Frequency	Percentage
1	First generation entrepreneur	38	78.00
2	Ex-employee	2	4.00
3	NRI	-	-
4	Foreign returned	2	4.00
5	Family entrepreneur	7	14.00
Total		50	100.00

The suitable explanation for the above results could be given by utilizing the study conducted by Valenzuela in 2000. He delineated the reasons for taking entrepreneurship by the individuals of the society. He explained that there are two types of entrepreneurs called value entrepreneurs and disadvantaged entrepreneurs.

Value entrepreneurs are those who chosen self-employment rather than having low wage jobs. They are in requirement of independent thinking, autonomy, social status and flexibility. Disadvantaged entrepreneurs are those who came to entrepreneurship because of disadvantages in labour market and to earn by deploying their human capital rather than for wage or salary job. They also came for entrepreneurship for not having other options for employment. With this study, the above results could be interpret that majority (78%) of the entrepreneurs were first generation entrepreneurs who had choosen entrepreneurship at first in their family without any entrepreneurial background and they were value entrepreneurs.

4. 1. 4 Enterprise type

The data obtained in Table 4. 4 showed that 42 per cent of the entrepreneurs of ABIs had agricultural processing and value addition as their enterprise followed by 7 per cent of enterprises was related to allied activities including dairy, poultry, goats and fisheries. The study revealed that 2 per cent of them had agribusiness service enterprises. These results were in line with the findings of Raju (2017). (Fig 5)

Table: 4.4 Distribution of entrepreneurs according to their enterprise type (n=50)

Sl. No	Type of enterprise	Frequency	Percentage
1	Farming	-	-
2	Allied activities Dairy/Poultry/goat/Fisheries	7	14.0
3	Agribusiness services	1	2.0
4	Agricultural processing and value addition	42	84.0
	Total	50	100.00

4. 1. 5 Assets owned

The results from the Table 4.5 showed that 36.00 per cent of entrepreneurs had building as their assets and 28.00 per cent of the entrepreneurs had machines and equipment followed by 24.00 per cent of the entrepreneurs had all the three assets However, 12.00 per cent of them had land as their assets (Fig.6).

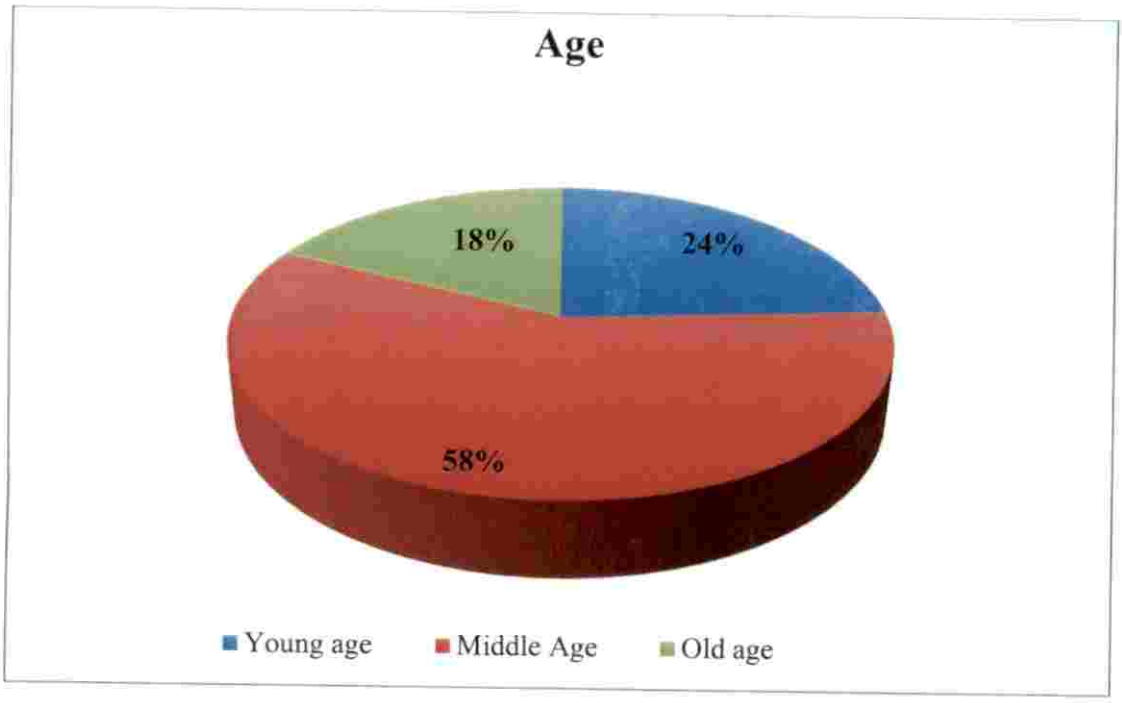


Fig. 2 Distribution of entrepreneurs according to their age

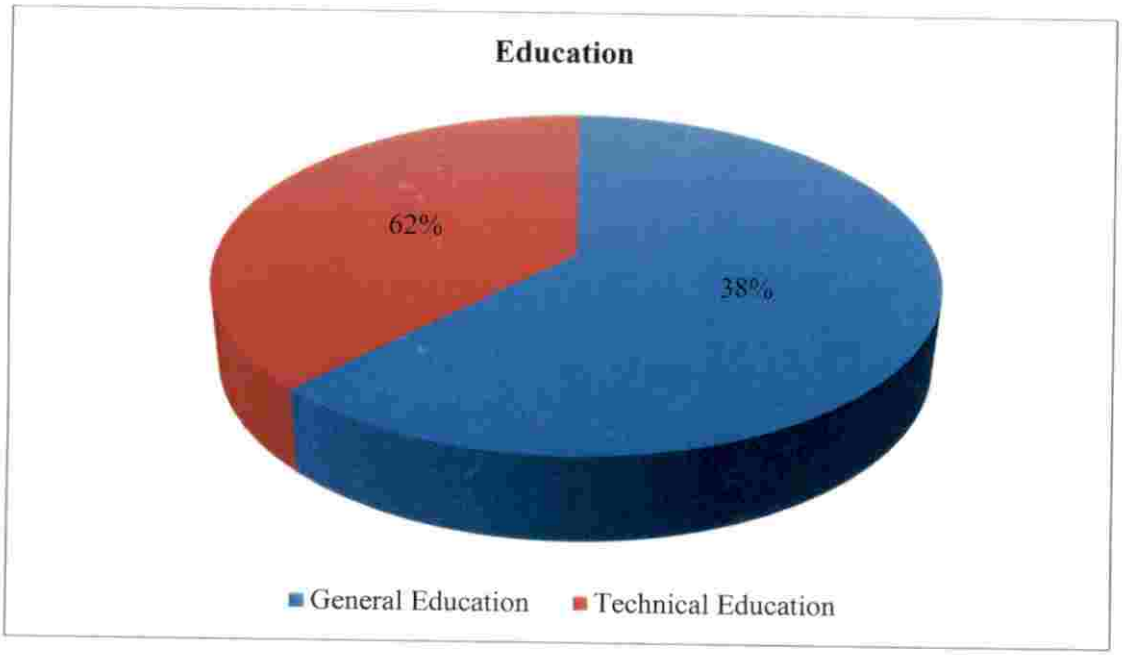


Fig. 3 Distribution of entrepreneurs according to their education

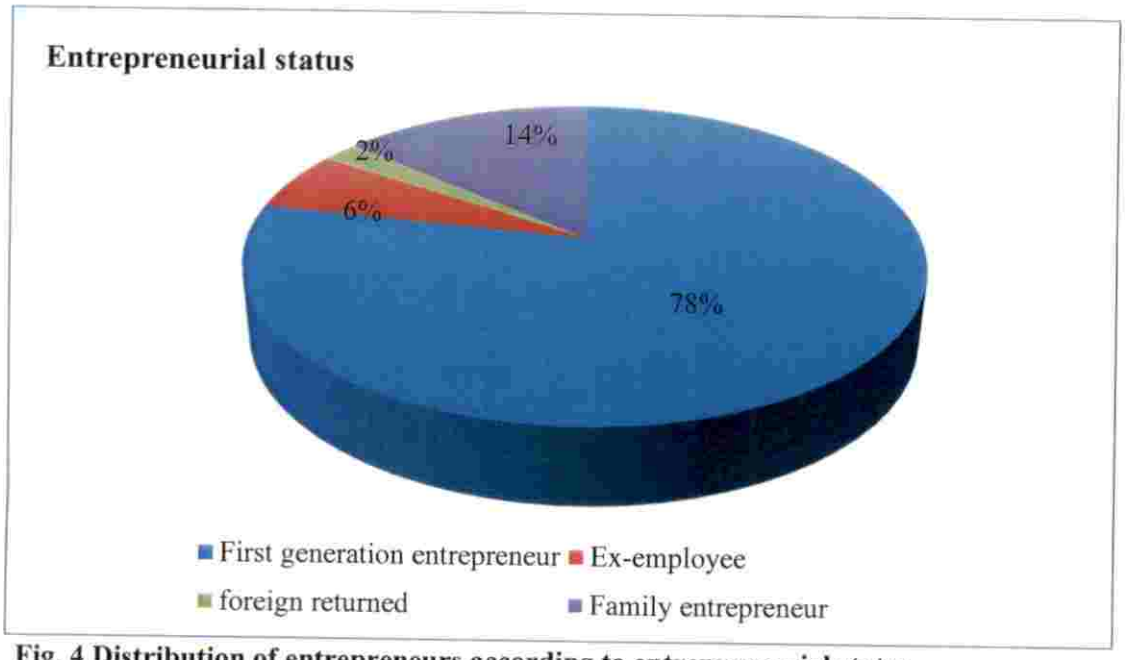


Fig. 4 Distribution of entrepreneurs according to entrepreneurial status

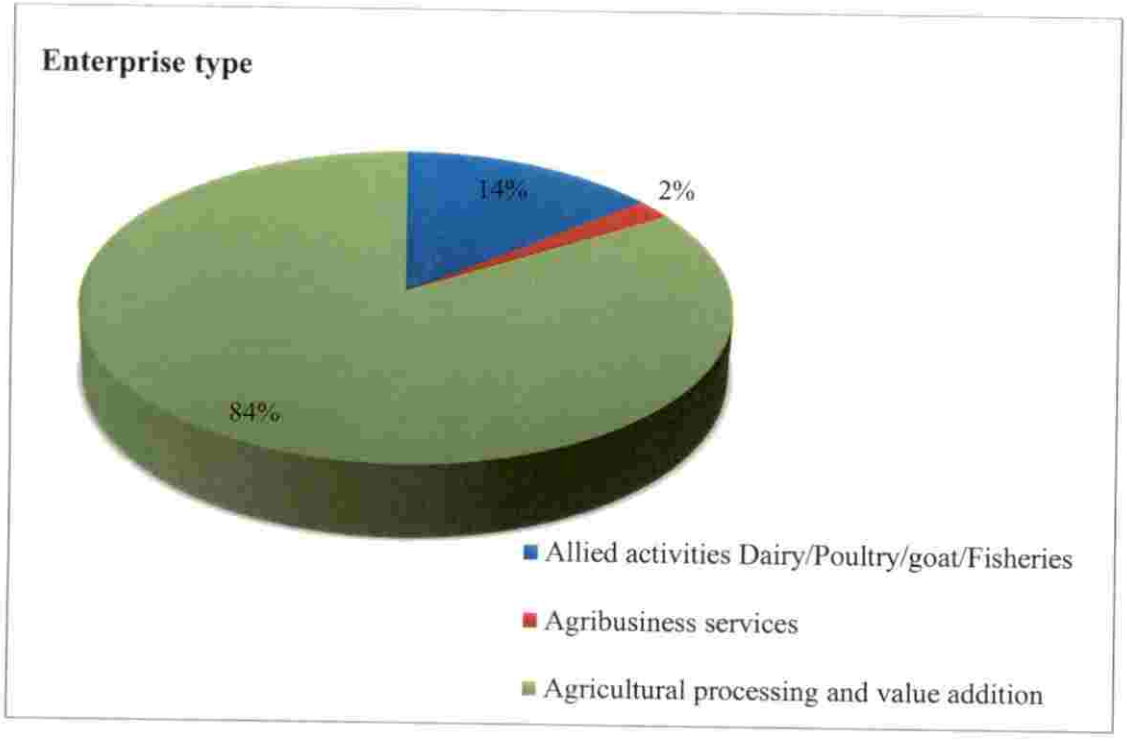


Fig. 5 Distribution of entrepreneurs according to their enterprise type

Table: 4. 5 Distribution of entrepreneurs according to their assets owned (n=50)

SL. No	Assets	Frequency	Percentage
1	Land	6	12.0
2	Building	18	36.00
3	Machines and equipment	14	28.00
4	All assets	12	24.00
Total		50	100.00

4. 1. 6 Mass media contact

It could be perceived from the Table 4.6 that majority (78%) of the respondents had medium level of contact with mass media. However 12 and 10 per cent of the entrepreneurs had high and low mass media contact respectively. (Fig.7)

Table: 4. 6 Distribution of entrepreneurs according to their mass media contact (n=50)

Sl. No	Category	Range of scores	Percentage
1	Low	<12.5	10.00
2	Medium	12.5-16.5	78.00
3	High	>16.5	12.00
Mean: 14.5			**SD: 2.0**

4. 1. 7 Social participation

The results presented in Table 4.7 revealed that 66.00 per cent of the entrepreneurs had medium level of social participation. However 18.00 per cent of the entrepreneurs had high social participation followed by 16.00 per cent of them had low social participation. (Fig.8) Social participation emphasized the entrepreneurs to establish an interaction with the support system which can inspire them for obtaining more support from colleague members.

Table: 4. 7 Distribution of entrepreneurs according to their social participation (n=50)

Sl. No	Category	Range of scores	Percentage
1	Low	<4.27	16.00
2	Medium	4.27-11.45	66.00
3	High	>11.45	18.00
	Mean: 7.86		**SD: 3.59**

For medium social participation the reason could be that the entrepreneurs are keen to take an interest in social participation for getting better ideas and to inculcate new practices in their enterprises and they are better in social participation than low category of social participation. The medium social participation may be due to lack of time or lack of perceived benefits and evading local politics could be the reasons. These results are in harmony with the findings of Krishnan (2017).

4. 1. 8 Attitude towards self-employment

The results from the Table 4.8 referred that 68 per cent of the entrepreneurs had medium favorable attitude towards self-employment and the respondents with high and low favorable attitude towards self-employment constituted 16 per cent each respectively. (Fig. 9) Even though Kerala is the state with high literacy rate, the presence of unemployment made the individuals to go for self-employment, this may be the reason that majority of the entrepreneurs were belonged to medium and high category of attitude towards self-employment. The reasons for the category of entrepreneurs who belonged to low attitude towards self-employment might that they are doing entrepreneurship as no options left for them and in mean while they waiting for the jobs in other sectors (Buys and Mbewana, 2007).

Table: 4. 8 Distribution of entrepreneurs according to their attitude towards self-employment (n=50)

Sl. No	Category	Range of scores	Percentage
1	Low	<38	16.00
2	Medium	38-44.56	68.00
3	High	>44.56	16.00
Mean: 41.36			**SD: 3.20**

4. 1. 9 Economic motivation

It could be observed from the Table 4.9 that majority (78.82%) of the entrepreneurs had medium economic motivation. Another 16.00 per cent of the entrepreneurs had high motivation for economic benefits followed by 6.00 per cent of them had low economic motivation. (Fig.10). Major goal of entrepreneurship is to utilize the resources and opportunities for getting financial benefits. The motivation for economic gains is one of the most important factors for success in entrepreneurship. These findings are lined with the studies of Nargave (2016).

Table: 4.9 Distribution of entrepreneurs according to their economic motivation (n=50)

Sl. No	Category	Range of scores	Percentage
1	Low	<19	6.00
2	Medium	19-23.82	78.82
3	High	>23.82	16.00
Mean: 21.41			**SD: 2.41**

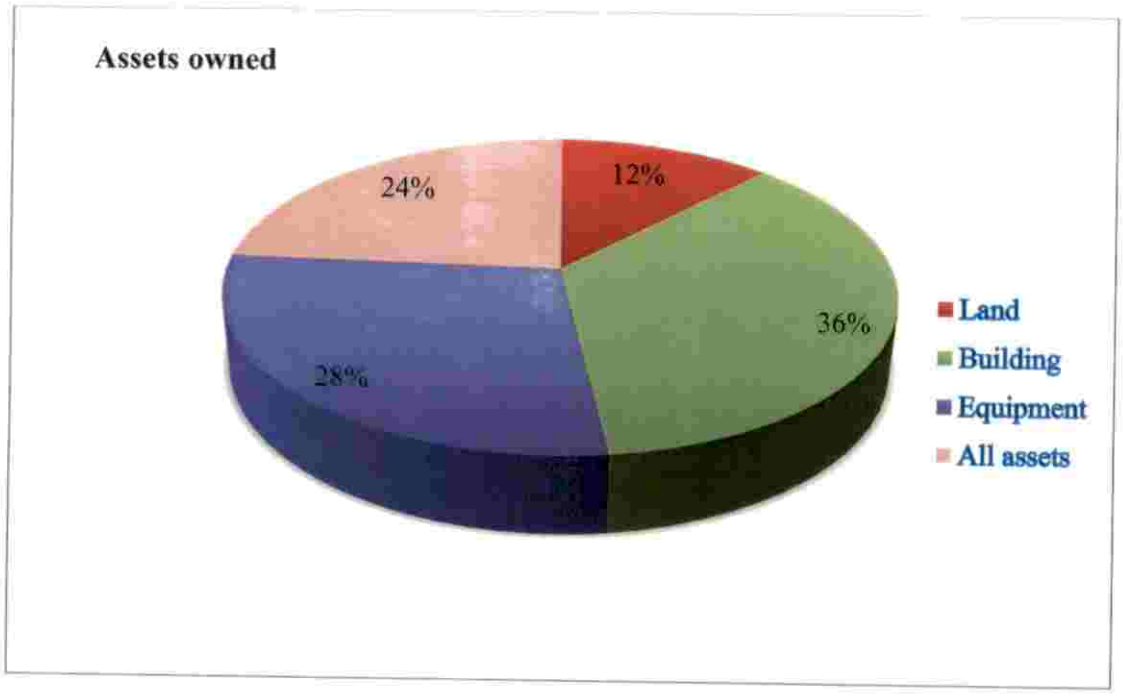


Fig.6 Distribution of entrepreneurs according to assets owned

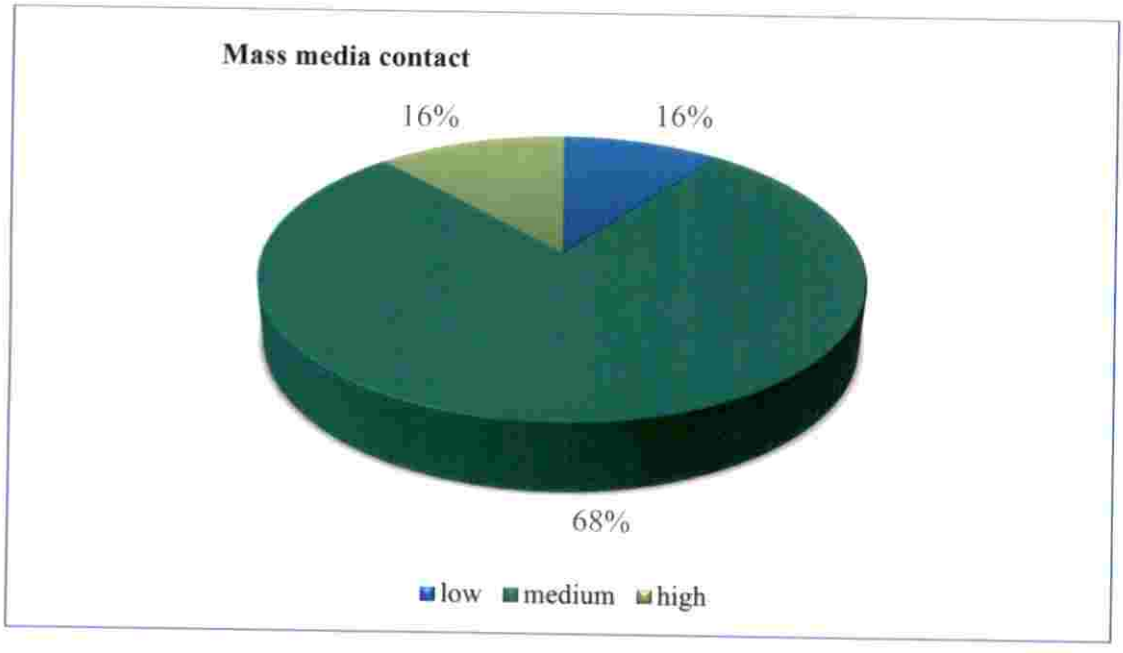


Fig.7 Distribution of entrepreneurs according to their mass media contact

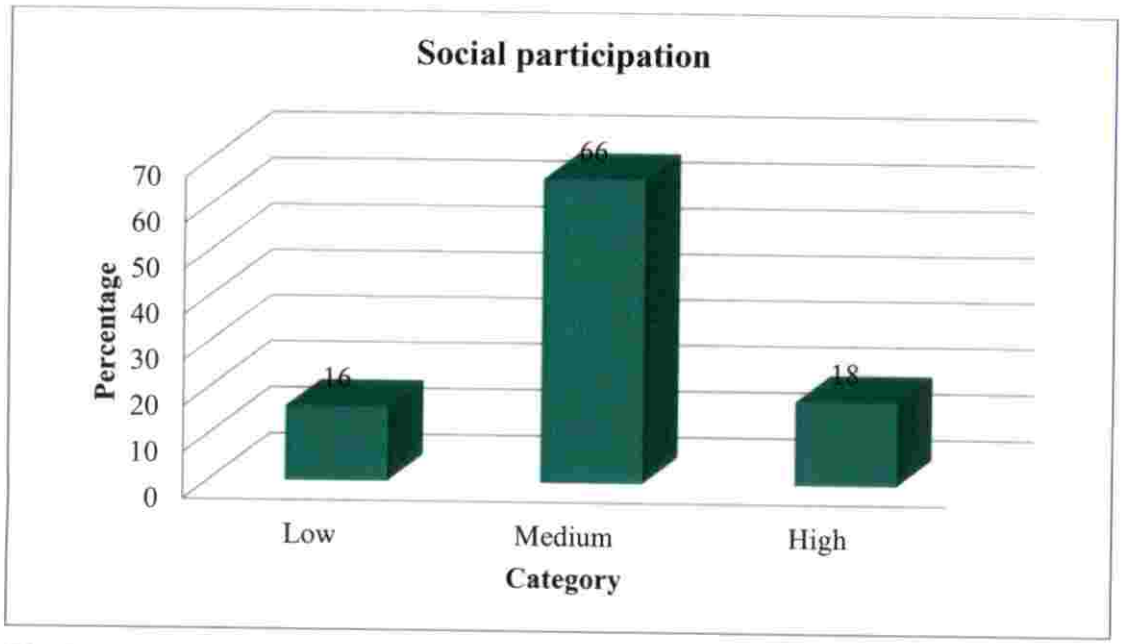


Fig. 8 Distribution of entrepreneurs according to their social participation

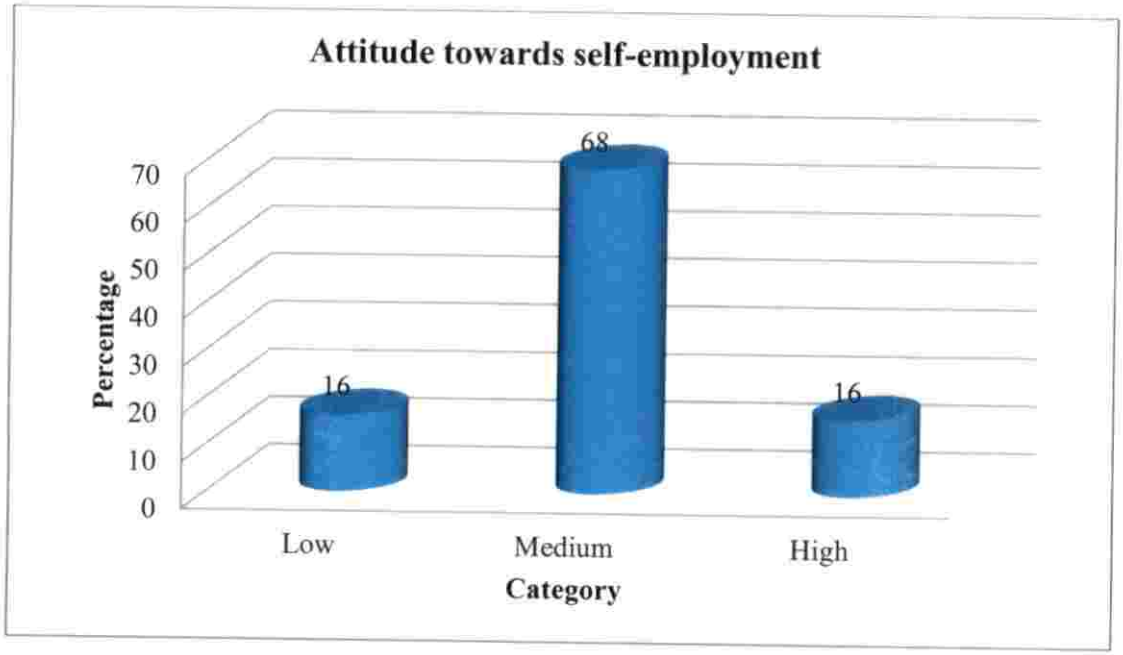


Fig. 9 Distribution of entrepreneurs according to their attitude towards self-employment

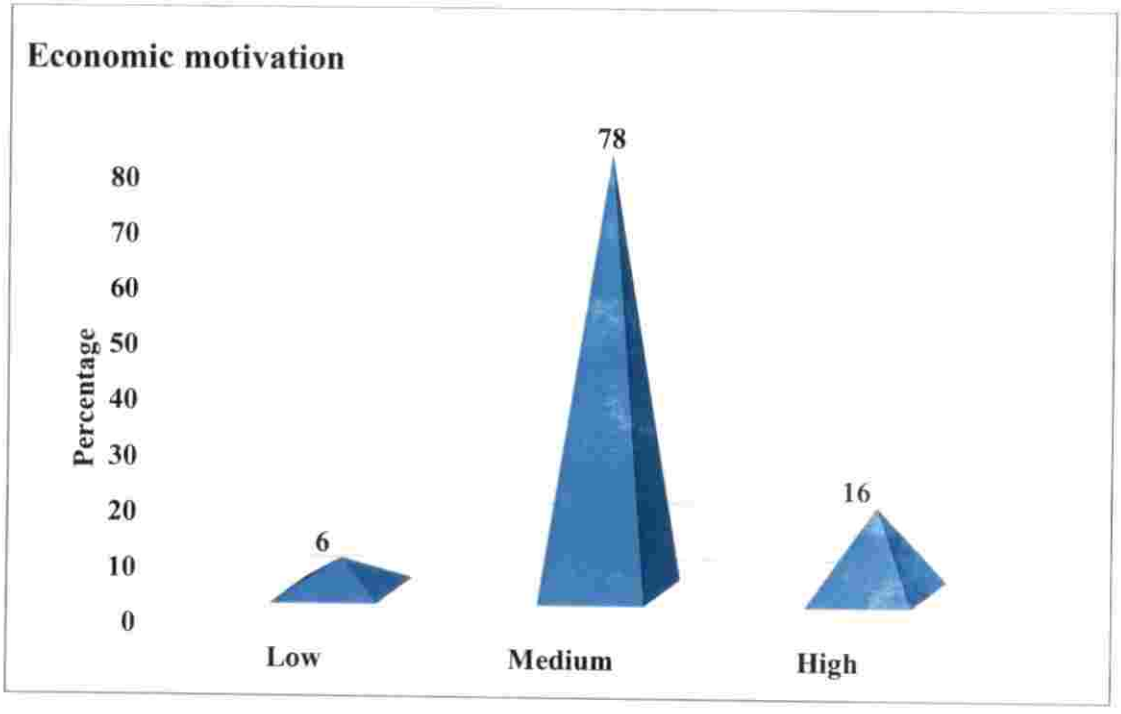


Fig. 10 Distribution of entrepreneurs according to their economic motivation

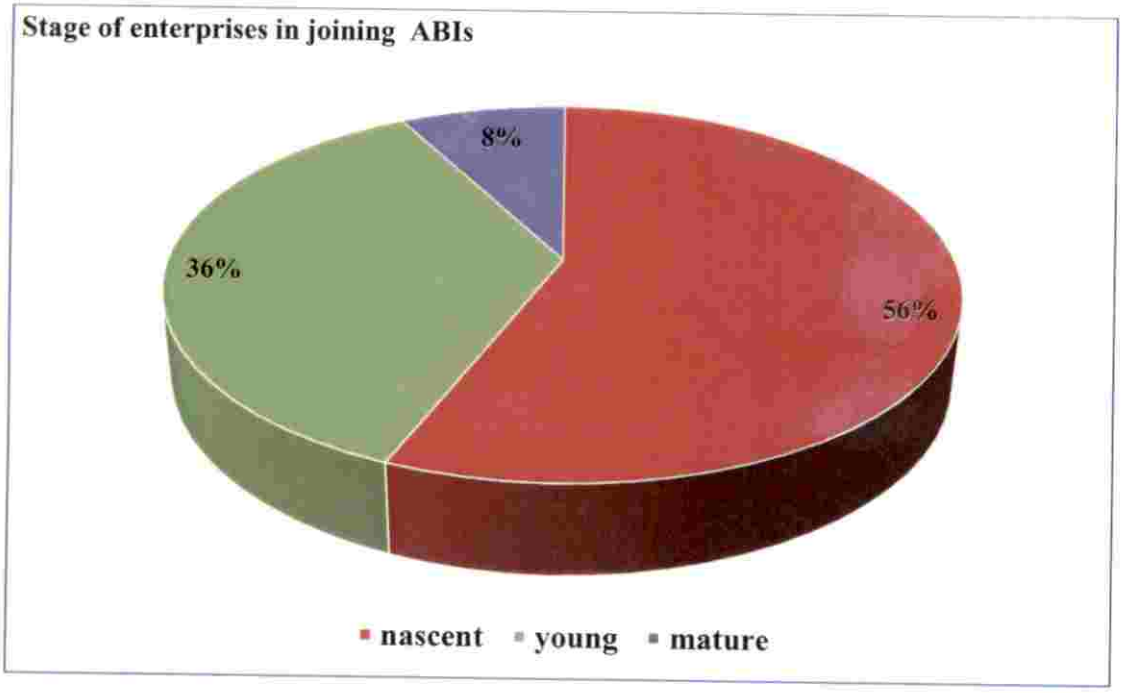


Fig. 11 Distribution of enterprises according to their stages at the time of joining to ABIs

4. 2 Dimensions of entrepreneurial behavior

4. 2. 1 Decision making ability

The results from Table 4.10 showed that composite index for decision making ability of the entrepreneurs was 'Medium' with a value of 58.66. Statements (3), (7) and (9) came under the 'High' category with the index values 68.00, 70.00 and 84.00 respectively. This proved that entrepreneurs were well aware about their business activities which promoted them to take almost all decision independently.

Statements (1), (2), (4), (5), (6) and (8) showed that the entrepreneurs were in 'Medium' category with index values 54.00, 56.00, 52.00, 44.0, 58.00 and 42.00 respectively. This indicated that most of the entrepreneurs consulted ABIs and other source of information to take decisions about starting of new enterprise, in getting loans, regarding value addition, storage and marketing of produce. They required more information with regard to starting new enterprise, availing loans, storage of produce and marketing facilities. These findings are in accordance with Mertiya (2017).

4. 2. 2 Self-confidence

The results from the Table 4.11 revealed that composite index for self-confidence among the entrepreneurs was 'High' with a value of 77.42. All statements showed that the respondents were in 'High' category which revealed that the entrepreneurs can adjust readily to new situation and they were more confident to make profit in their enterprises . A similar finding was reported by Raju (2017).

4. 2. 3 Achievement motivation

The results from the Table 4.12 indicated that composite index for achievement motivation of the entrepreneurs was high with a value of 78.66. All statements showed that respondents were in 'High' category. The entrepreneurs were not satisfied with the little thing what they had and wanted to achieve success in their enterprise. This might be the reasons to categorize them into high category of achievement motivation. A similar finding was reported by Archana (2013).

Table 4. 10 Distribution of entrepreneurs according to their decision making ability (n=50)

Sl. No	Statements	No. of respondents		Total score	Index	Category
		Independently	In consultation with Others			
1	Decision to start an enterprise	27	23	27	54.00	Medium
2	Decision to avail loans	28	22	28	56.00	Medium
3	Decision to hire labours	34	16	34	68.00	High
4	Decision regarding storage and marketing of produce	26	24	25	52.00	Medium
5	Decision regarding the value addition process	22	28	22	44.00	Medium
6	Decision to use/purchase a machinery and equipment	29	31	29	58.00	Medium
7	Decision to meet business experts	35	15	35	70.00	High
8	Decision to follow suitable methodology of production	21	29	21	42.00	Medium
9	Decision to attend training	42	8	42	84.00	High
Total Score				263		
Composite Index					**58.66**	**Medium**

Table 4. 11 Distribution of entrepreneurs according to their self-confidence (n=50)

Sl. No	Statements	No. of respondents					Total score	Index	Category
		SA	A	UD	D	SD			
1	I feel no obstacle can stop me from achieving my goal	12	22	7	6	3	184	73.60	High
2	I am generally confident of my ability	16	24	6	3	1	201	80.40	High
3	I am bothered by inferiority feelings that I cannot with other	5	7	5	18	15	181	72.40	High
4	I am not interested to do things at my own at my own initiatives	3	9	4	15	19	188	75.20	High
5	I usually work out things for myself rather than to get someone else to show me	11	26	7	3	3	189	75.60	High
6	I get discouraged easily	0	3	5	30	12	201	80.40	High
7	Life is a strain for me much of the time	0	0	0	32	18	218	87.20	High
8	I find myself worrying about something or other	4	6	4	22	14	186	74.4	High
Total Score							1480		
Composite index								**77.42**	**High**

Table 4. 12 Distribution of entrepreneurs according to their achievement motivation (n=50)

Sl. No	Statements	No. of respondents					Total score	Index	Category
		SA	A	UD	D	SD			
1	Work should come first even if one cannot get proper rest in order to achieve ones goals	15	22	3	5	5	187	74.8	High
2	It is better to be content with whatever little one has, than to be always struggling for more	0	2	3	32	13	210	84.00	High
3	No matter what I have done always want to do more	12	26	2	7	3	187	74.8	High
4	I would like to try hard at something really difficult even if it proves that I cannot do it	14	24	4	5	3	191	76.4	High
5	The way things are now-a-days discourage one to work hard	0	8	3	20	19	200	80.00	High
6	One should succeed in occupation even if one has to neglect his family	16	20	7	10	4	205	82.00	High
Total Score							1130		
Composite index								**78.66**	**High**

4. 2. 4 Risk taking ability

The results in the Table 4.13 showed that composite index for risk taking ability of the entrepreneurs was 'Medium' with index value of 64.40. Here statements (1), (2), (3) and (5) showed that the entrepreneurs were in 'Medium' category. These statements indicated that the entrepreneurs were not ready to try new ideas unless there was a guidance for it, which means they took calculated risk and with the guidance of ABIs. This could be the reason for their medium level of risk orientation. These results are in accordance with the findings of Raghunath (2014), Gamit *et al.* (2015) and Rubeena (2015).

4. 2. 5 Innovativeness

It could be noticed from the Table 4.14 that composite index for innovativeness among the respondents was 'High' with index value of 69.04. The respondents were categorized into 'High' for (1), (3), (4) and (5) statements. For the statement (2) the respondents were categorized as 'Medium". The reason for this might be that they try new practices under the guidance of ABIs. These results implied that the entrepreneurs were innovative and trying new practices under the guidance of ABIs. They were taking advantage of opportunities by keeping up-to-date information about the subjects of their interest. The results are in consonance with the findings of Gamit *et al.* (2015).

4. 2. 6 Leadership ability

It could be observed from the Table 4.15 that composite index for the leadership ability of the entrepreneurs was 'High' with value of 81.59. The respondents came under the category 'High' for all the statements. This indicated that the leadership skills were high among the entrepreneurs. They were able to inspire others to work together towards common goals. The findings were in accordance with the studies of Kumar (2012).

Table 4. 13 Distribution of entrepreneurs according to their risk taking ability (n=50)

Sl. No	Statements	No. of respondents					Total Score	Index	Category
		SA	A	UD	DA	SDA			
1	An entrepreneur should start more enterprise to avoid greater risks involved in a single enterprise	8	18	4	16	4	160	64.40	Medium
2	An entrepreneur should rather take more of a chance in making more profit than to be content with a smaller but less profit	9	12	6	21	2	155	62.00	Medium
3	An entrepreneur who is willing to take a greater risk than an average one usually do better financially	6	21	7	14	2	165	66.00	Medium
4	It is good to take risks when one knows that chance of success is fairly high	11	12	8	15	4	161	64.40	High
5	It is better not to try new ideas unless others have done it with success	8	17	6	7	12	148	59.20	Medium
6	Trying an entirely new method involves risk but it is worthy	18	12	5	7	8	175	70.00	High
Total Score							964		
Composite index								**64.40**	**Medium**

Table 4. 14 Distribution of entrepreneurs according to their innovativeness (n=50)

Sl. No	Statements	No. of respondents					Total Score	Index	Category
		SA	A	UD	DA	SDA			
1	I would feel restless unless, I try out an innovative method which I have come across	8	27	5	2	8	175	70.00	High
2	I am cautious about trying new practices	8	12	4	22	4	152	60.80	Medium
3	I like to keep up-to-date information about the subjects of my interest	17	12	5	11	5	175	70.00	High
4	I would prefer to wait for others to try out new practices first	4	8	3	18	17	186	74.40	High
5	I opt for the traditional way of doing things than go in for new methods	5	12	4	12	17	175	70.00	High
Total Score							863		
Composite index								**69.04**	**High**

Table 4.15 Distribution of entrepreneurs according to their leadership ability (n=50)

Sl. No	Statements	No. of respondents			Total score	Index	Category
		Always	Sometimes	Never			
1	Did you participate in group discussions on new practice in your enterprise	25	15	10	115	76.66	High
2	Whenever you see/hear a new innovations did you initiate discussion about it with your colleagues	28	20	2	126	84.00	High
3	Do people in your community regard you as good source of information on new things	28	17	5	123	82.00	High
4	Do you assign the farm work to your members	27	20	3	124	82.66	High
5	Do you offer new approaches to the problems faced by you in field	29	16	5	99	82.66	High
Total Score					597		
Composite Index						**81.59**	**High**

4. 2. 7 Overall entrepreneurial behavior of entrepreneurs

Table: 4. 16 Overall entrepreneurial behavior of entrepreneurs

Sl. No	Dimensions	Index	Category
1.	Leadership ability	81.59	I
2.	Achievement motivation	78.66	II
3.	Self-confidence	77.42	III
4.	Innovativeness	69.04	IV
5.	Risk taking ability	64.40	V
6.	Decision making	58.66	VI
Composite index		**71.62**	**High**

It could be observe from the Table 4.16 regarding entrepreneurial behavior measured with composite index (71.62). It revealed that the respondents had high level of entrepreneurial behavior. From the Table 4.16 it could be seen that the composite index for leadership ability was ranked the highest (81.59). Leadership abililty is a vital component to become a successful entrepreneur as it implies inspirinig others to work together towards common goal. It was also found from the Table 4.16 that achievement motivation of the entrepreneurs ranked second followed by self-confidence, innnovation and risk taking ability ranked third, fourth and fifth respectively.

4. 2. 8 Motivation for entrepreneurs to join ABIs

It could be noticed from the Table 4.17 that composite index for motivation among the entrepreneurs was 'High' with a value of 85.53. All statements showed that respondents were in 'High' category. The results revealed that the entrepreneurs had high motivation to join ABIs in order to gain skills and expertise, to access suitable technology for their enterprise. The results also showed that the entrepreneurs had motivation to join ABIs to access business networks, to use infrastructural facilities of ABIs. The similar finding was reported by Choto (2015).

. **Table 4.17 Distribution of entrepreneurs according to their motivation to join ABIs (n=50)**

Sl. No	Motivational Factors	Number of respondents			Total score	Index	Category
		High (3)	Medium (2)	Low (1)			
1	To gain skills and expertise	26	24	0	126	84.00	High
2	To meet the challenges of obtaining fund	16	26	8	108	72.00	High
3	To get suitable technology	38	12	0	138	92.00	High
4	Access to business networks	34	16	0	134	89.33	High
5	To obtain infrastructural facilities	36	12	2	134	89.33	High
Total Score					640		
Composite Index						**85.33**	**High**

4. 3 Dimensions of enterprises

In this section, the study was made with reference to stage of enterprises at the time of joining to ABIs, number of workers employed, facilitation schemes of the enterprises.

4. 3. 2 Stage of enterprises at the time of joining to ABIs

It could be perceived from the Table 4.18 regarding the stage of enterprises at the time of joining to ABIs. The results represented that 56 per cent of the enterprises joined ABIs during their nascent stage. However 36 per cent of the enterprises joined ABIs when they were in young stage followed by 8 per cent of the matured enterprises joined ABIs.

Table: 4. 18 Distribution of enterprises according to their stage of joining to ABIs

Sl. No	Stage of enterprise	Frequency	Percentage
1	Nascent	28	56
2	Young	18	36
3	Matured	4	8
	Total	50	100

4. 3. 3 Number of workers employed

It could be seen from the table 4.19 that majority (72%) of the entrepreneurs employed workers ranging from 1 to 5 in numbers in their enterprises. However 16 per cent of the entrepreneurs employed workers ranging from 5 to 10 followed by 12 percent of them employed workers ranging from 11-50 in numbers in their enterprises. (Fig.12). Majority of the entrepreneurs employed workers less than 5 in numbers because most of them were first generation entrepreneurs. These results are in harmony with the Choto (2015).

Table: 4. 19 Distribution of enterprises according to the number of workers employed

Sl. No.	Number of casual workers employed		
	Range	Frequency	Percentage
1	1-5	36	72
2	5-10	8	16
3	11-50	6	12
	Total	50	100

4. 3. 7 Facilitation scheme for enterprises

It could be perceived from the table 4.20 that 28 per cent of the entrepreneurs were facilitated by the technology mission on coconut. The scheme was recently launched by the ministry of agriculture through coconut development board to support the entrepreneurs with the technologies and hygienic post-harvest and management in coconut. As the majority of the respondent entrepreneurs were doing business related to the coconut products like Virgin Coconut Oil, Neera products and others. The major share of respondent entrepreneurs was facilitated by this mission.

It could be perceived from the same Table that 24 per cent of the respondent entrepreneurs were facilitated by MUDRA followed by 16 per cent of the entrepreneurs were benefited by Entrepreneur Support Scheme (ESS), which is an initiative of Kerala government. However 12 per cent of the entrepreneurs were facilitated by PMYEDP followed by 8 per cent of the respondent entrepreneurs benefited by PMEGS. (Fig.13)

Table: 4.20 Distribution of enterprises according to their facilitation schemes

Sl. No	Name of the Schemes	Frequency	Percentage
1	Entrepreneurial Support Scheme (ESS)	8	16
2	Pradhan Mantri Young Entrepreneurship Programme (PMYEDP)	6	12
3	Pradhan Mantri Employment Generation Scheme (PMEGS)	4	8
3	Micro-Unit Development and Refinance Agency (MUDRA)	12	24
6	Technology Mission On Coconut (TMOC)	14	28
7	Loans from bank with subsidy facility	6	12
	Total	**50**	**100**

4. 3. 8 Cost of enterprises

It could be perceive from the Table 4.21 regarding the cost invested by the entrepreneurs for their enterprises. It is represented that 42 per cent of the entrepreneurs have established their enterprise with cost less than 1.17 lakhs as a small ventures. It is followed by 30 per cent of the entrepreneurs owned the enterprises which had cost range from 1.17 lakh to 3.47 lakhs and trailed by 28 per cent of the entrepreneurs had establish their enterprises by investing more than 3.47 lakhs among the respondent entrepreneurs.

Table: 4.21 Distribution of enterprises according to their cost

Sl. No	Category	Cost of enterprise(Rs)	Percentage
1	Low	<1.17lakh	42
2	Medium	1.17lakh-3.47 lakh	30
3	High	>3.47 lakh	28
Total			100.00
Mean:2.3200			**SD:1.15069**

4. 3. 9 Income from enterprises

It could be perceived from the Table 4.22 regarding the income for the entrepreneurs which showed that 48 percent of the entrepreneurs had medium level of income followed by 46 and 6 per cent of the entrepreneurs who had low and high level of income respectively. These results are in line with the Raghunath (2014).

Table: 4.22 Distribution of enterprises according to their income

Sl. No	**Category**	**Income range**	**Percentage**
1	Low	<3.65 lakh	46
2	Medium	3.65-4.59 lakh	48
3	High	>4.59 lakh	6
Total			100.00
Mean:2.3200			**SD: 1.15069**

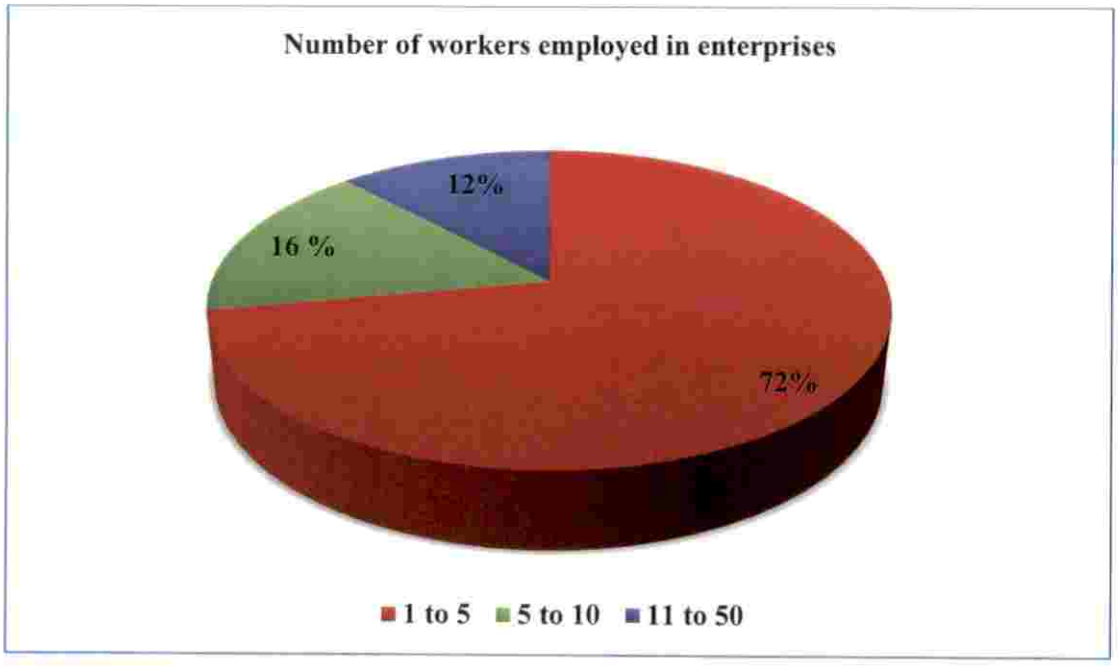


Fig. 12 Distribution of enterprises according to the number of workers employed

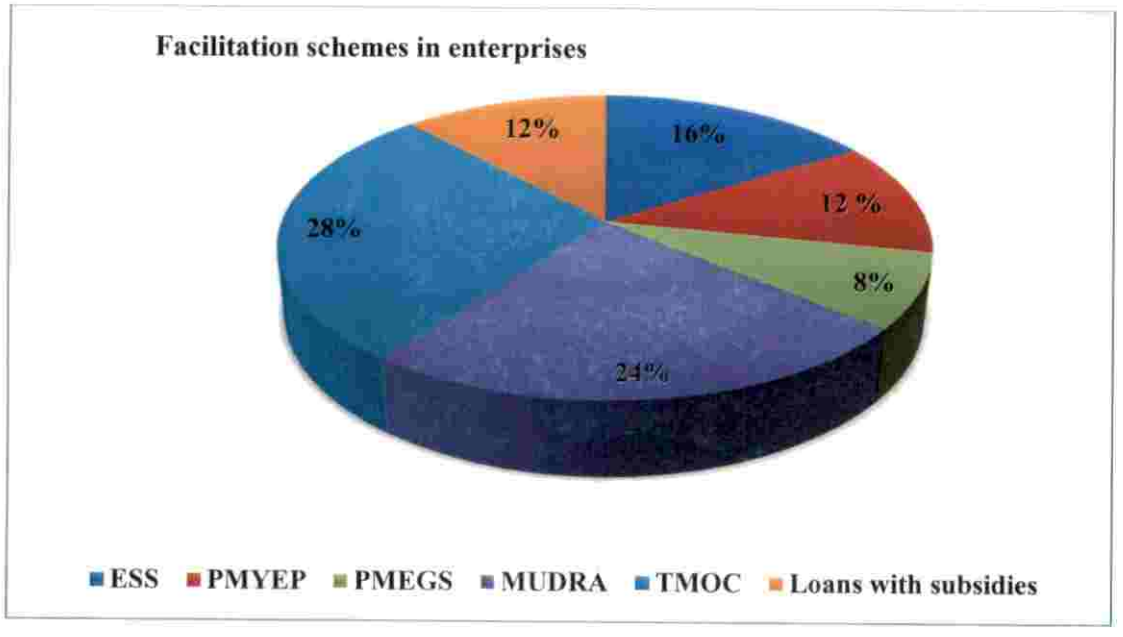


Fig. 13 Distribution of enterprises according to their facilitation scheme

Plate 1: Survey in ABIs

1. CIFT

2. CTCRI

3. CPCRI

4. CDB

5. Training Institute of CDB in Aluva

6. IISR

7. KAU

4.4 Different types of ABIs in terms of structure, functions and roles

In this section, the study was made to delineate types of ABIs according to their organizational structure, functions and roles of ABIs in venture creation.

4.4.1 Types of ABIs in terms of organizational structure

In order to delineate types of ABIs based on organizational structure, the hierarchy and their functions in the organization were identified. The structural classification identified by Bakkali *et al.* (2014) was adopted for the present study. As per the results the ABI-units in CPCRI, CTCRI, CIFT and IISR displayed the features of 'Entreprneurial' and 'Adhocratic' structural types. ABI-unit in CDB showed the elements of 'Entrepreneurial', 'Adhocratic', 'Missionary' and 'Bureacratic' structural types. ABI-unit in KAU indicated the features of 'Entrepreneurial', 'Adhocratic' and 'Professional' structural types.

The results from Table 4.23 revealed that the ABI unit in Central Plantation Crop Research Institute (CPCRI), Kasaragod operated within an ICAR-research institution environment. This is governed by Director, the daily functions given by Director and Principal Investigators (PIs) were executed by business manager. CPCRI developed technologies on processing and value addition in coconut, provided technical guidance to entrepreneurs through Co-Principal Investigators (Co-PIs). The ABI unit's structure in CPCRI does not fit to any of the identified pure types, but displayed the elements of an 'Entrepreneurial' and 'Adhocratic' structures. However, entrepreneurial structure from the specialization in coconut sector executed through their managers and directors predominate over adhocratic structure

The results from Table 4.23 related to the Techno-Incubation Centre (TIC) in Central Tuber Crop Research Institute (CTCRI), Thiruvananthapuram, also indicated the features of both ' Entrepreneurial' and 'Adhocratic' structures. However, the entrepreneurial structure from the specialization in tuber crops executed through managers and directors predominated over adhocratic structure. CTCRI worked on development of technologies on processing and value addition in tuber crops and commercializing these technologies for the entrepreneurship development in the society.

The results from Table 4.23 related to the ABI unit in Central Institute of Fisheries Technology (CIFT), Cochin also showed features of both 'Entrepreneurial' and 'Adhocratic' structures. However, the entrepreneurial structure from the specialization in fish value addition executed by managers and directors predominate over adhocratic structure. CIFT focused on technologies related to fish processing and value addition and commercialization of these technologies.

The results from Table 4.23 also revealed that the ABI unit in Indian Institute of Spice Research (IISR), Kozhikode, also indicated the features of both 'Entrepreneurial' and 'Adhocratic' structures. However, the entrepreneurial structure from the specialization in spice crops executed through managers and directors predominate over adhocratic structure. The ABI unit is governed by Director and the daily functions were carried out by business manager. IISR provided facilities and developed technologies for spice processing and value addition.

ABI unit in the Coconut Development Board (CDB), Cochin operated within a statutory body established by GOI for the integrated development of coconut cultivation in the country. CDB is functioning under the administrative control of the Ministry of Agriculture and Farmers welfare, GOI. It was having its headquarters at Cochin and regional offices at Bangalore, Chennai, Guwahati, and Patna. This was governed by Director, the daily functions were executed by business manager. CDB developed technologies on processing and value addition in coconut, provided technical guidance and supported innovations in business. CDB implemented programmes for development, demonstration and adoption of technologies for management of insect pest and disease affected coconut gardens. Development and adoption of technologies for processing and product diversification, market research and promotion. The ABI unit's structure in CDB does not fit to any of the identified pure types, but displayed the elements of an 'Entrepreneurial' , 'Adhocratic', 'Missionary' and 'Bureaucratic' structures. However, the Missionary structure from supporting social projects with subsidies and financial support predominate over other structural elements (Table 4.23). Entrepreneurial structure of specialization in coconut sector with operational support from managers and directors. Adhocratic structure emanated from supporting the businesses through innovations with a strong technological content and Bureaucratic structure from larger organization size with regional offices spread through out India.

The results from the Table 4.23 related to the ABI unit in Kerala Agricultural University is located at Kelappaji College of Agricultural Engineering and Technology(KCAET), Tavanur. The ABI-unit indicated the features of Entrepreneurial' and 'Adhocratic' and 'Professional' structures. However, the Professional structure from operating within an academic environment and governed by Dean predominate over other structural types (Table 4.23). Entrepreneurial structure from the specialization in food processing and value addition executed by Incubator Head (IH). Adhocratic structure from supporting the innovations and commercializing the technologies on food processing and value addition.

Table: 4. 23 Types of ABIs based on organizational structure

Hierarchy of ABIs	Name of ABIs					
	CPCRI-ABI unit	**CTCRI-TIC unit**	**CIFT-ABI unit**	**CDB-ABI unit**	**IISR-BPD unit**	**KAU-ABI unit**
Director/Dean	Authority	Authority	Authority	Authority	Authority	Authority
(PI)/ (IH)	Decision making	Decision making	Decision making	Decision making	Decision making	Decision making
Co-Principal Investigators	1. Guidance to entrepreneurs 2. Technology up scaling	1.Guidance to entrepreneurs 2.Technology up scalin	1.Guidance to entrepreneurs 2. Technology up scaling	1.Guidance to entrepreneurs 2. Technology up scaling 3. Projects and programmes implementation	1. Guidance to entrepreneurs 2. Technology up scaling	1.Guidance to entrepreneurs 2. Technology up scaling
Business manager	Executing activities	Executing activities	Executing activities	Executing activities	Executing activities	Executing activities
Location	Kasaragod	Thiruvananthapuram	Cochin	headquarter in Cochin and regional offices	Kozhikode	Kerala Agricultural University in Thrissur
Structural features	Entrepreneurial and Adhocratic	Entrepreneurial and Adhocratic	Entrepreneurial and Adhocratic	Entrepreneurial Adhocratic, Missionary and Bureaucratic	Entrepreneurial and Adhocratic	Entrepreneurial, Adhocratic and Professional
Predominate structural type	**Entrepreneurial**	**Entrepreneurial**	**Entrepreneurial**	**Missionary**	**Entrepreneurial**	**Professional**

4.4.2 Types of ABIs based on functions

To delineate the types of ABIs in terms of functions, the philosophy, primary and secondary objectives and sectors focused by ABIs were identified.

The selected ABIs were categorized based on three functional types identified by Aernoudt (2004) in the present study. Accordingly incubators with technology development functions were oriented to the development of technology based enterprises with the philosophy of entrepreneurship development. The secondary objectives under this function was the stimulation of innovations in the start-ups.

Basic research incubators were involved in the function of bridging the discovery gap by connecting the principle of incubation with fundamental research. ABIs following this function were worked on converting ideas into commercial utility products or services for economic development. It forms the secondary philosophy of getting IPR rights for technologies developed.

Economic development incubators served the functions of diversification of regional economy and enhancing regional competitiveness by supporting technology based firms. They were established in close connection with higher educational institutes and research institutes. ABIs primary function was research in domain areas of coconut, tuber crops, fish, spices and food processing was carried out.

Hence, commercialization of these technology of their respective domains of expertise through entrepreneurship development by ABIs was extended further from their dominant area. However, with respect to CDB incubator which had missionary structure had no direct research or technology development functions. It was mostly focused on economic development of coconut based farming system through appropriate selection and popularization of technologies. Hence, they had predominate economic development function. The results of the functional delineation was presented in Table 4. 24.

Table: 4.24 Types of ABIs based on functions

Functional categories	Name of ABIs					
	CPCRI	**CTCRI**	**CIFT**	**CDB**	**IISR**	**KAU**
Main philosophy	Promotion of entrepreneurship in coconut value addition	Promotion of entrepreneurship in tubers value addition	Promotion of entrepreneurship in fish value addition	Integrated development of coconut cultivation	Promotion of entrepreneurship in spices value addition	Promotion of entrepreneurship in food processing and value addition
Main objective	Entrepreneurship development through incubation	Entrepreneurship development through incubation	Entrepreneurship development through incubation	Imparting technical advice to entrepreneurs	Entrepreneurship development through incubation	Entrepreneurship development through incubation
Secondary objective	Developing technology firms in coconut value addition	Developing oriented firms in tubers value addition	Developing technology firms in fish value addition	Developing technology firms in coconut vaue addition	Developing technology firms in spices value addition	Developing technology firms in food processing and value addition
Sectors involved	To act as processing unit of coconut products	To act as processing unit of tuber products	To act as platform for speedy commercialization of ICAR technologies	Encouraging adoption of modern technologies in coconut	To enhance competitiveness in spice sector	To facilitate agribusiness enterprises
Functional features	'Technology', 'Basic research' and Economic development ABI	'Technology', 'Basic research' and Economic development ABI	'Technology', 'Basic research' and Economic development ABI	'Technology', 'Basic research' and Economic development ABI	'Technology', 'Basic research' and Economic development ABI	'Technology', 'Basic research' and Economic development ABI
Predominate functional type	**Technology Incubator**	**Technology Incubator**	**Technology Incubator**	**Economic development Incubator**	**Technology Incubator**	**Technology Incubtor**

4. 4. 3 Types of ABIs based on roles

In order to delineate types of ABIs based on roles variables including venture creation, services provided, sectors focused by them, origin of ideas, phase of intervention, incubation period, sources of revenue for them are being used as indicators.

The types of Business incubators based on their roles in venture creation identified by Grimaldi and Grandi (2005) was adopted for the study. Business Innovation Centers (BICs) and University Business Incubators (UBIs) were the two types identified under it. The evolution of different types of Business Incubators happened in accordance with the requirements and necessities of the tenant companies. This resulted in diversification of services and support from each type of Business Incubators. BICs and UBIs both are the public incubators, but they differ from each other in terms of services provided to the incubatees. BICs are the incubators whose services are more inclined towards providing tangible services of physical assets at low prices, creating favorable environment in creating entrepreneurial activities. The services and activities of BICs fit with requirements of companies functioning in the traditional sectors. UBIs more evolved than BICs for overcoming certain weaknesses of their traditional incubators. In addition to the provision of tangible assets including laboratories and equipment, they also provided intangible services including scientific and technological knowledge, networks with the business experts and conveyance of image of affiliated research institutes to the enterprises.

The results from the Table 4.25 showed that ABI units in CPCRI, CTCRI, CIFT, CDB IISR and KAU were focused on entrepreneurship development in their respective domains. All the six ABIs were involved in commercializing the technologies to their enterprises. The phase of intervention in supporting the ventures was started from nascent stage to the independence stage.. The incubation period ranges from six months to two years. The management teams are the intermediaries in disseminating the technologies between ABIs, research institute and entrepreneurs. The ABIs were involved in providing tangible services of laboratories and equipment and intangible services of technical guidance and networking facilities with management experts. Based on the above features the selected six ABI units were delineated as University Business Incubators (UBIs). The results on delineation types of ABIs based on roles presented in Table 4.25.

Table: 4.25 Types of ABIs based on roles

Role of ABIs	Name of ABIs					
	CPCRI	**CTCRI**	**CIFT**	**CDB**	**IISR**	**KAU**
Sector focusing	Entrepreneurship in coconut value added products	Entrepreneurship in tropical tuber crop products	Entrepreneurship in fish value addition	Entrepreneurship in coconut value addition	Entrepreneurship in spices value addition	Entrepreneurship in food processing and value addition
Origin of ideas	Commercializing ICAR technologies	Commercializing ICAR technologies	Commercializing ICAR technology	Commercializing technologies developed in various higher educational and research institutes	Commercializing ICAR technologies	Commercializing ICAR technologies
Phase of intervention in ventures	Nascent to graduation	Nascent to graduation	Nascent to graduation	Nascent to graduation	Nascent to graduation	Nascent to graduation
Incubation period	6 months to 1 year	6 months to1 year	1 year	Short(trainings)	2 years	6 months to 1 year
Sources of revenue	ICAR	SFAC	ICAR	MOA & FW	ICAR	Kerala State Government
Services offering	1. Laboratories and equipment usage 2.Technical guidance on innovation	1. Laboratories and equipment usage 2.Technical guidance on innovation	1. Laboratories and equipment usage 2.Technical guidance on innovation	1. Laboratories and equipment usage 2. Technical guidance on innovation	1. Laboratories and equipment usage 2.Technical guidance on innovation	1. Laboratories and equipment usage 2.Technical guidance on innovation
Type of ABI	**University Business incubators**	**University Business incubators**	**University Business incubators**	**University Business incubators**	**University Business incubators**	**University Business incubators**

Plate 2: A view of ABIs

1. CPCRI

2. CTCRI

3. CIFT

4. CDB

5. IISR

6. KAU

4. 5 Products, technologies and services supported in ABIs

In this section, the study was made with reference to the products supported, technologies developed and services provided to the entrepreneurs.

Table: 4.26 Products, technologies and services supported in CPCRI and CDB ABI-units

Products	Technology	Advantages	Services offered
1.Virgin Coconut Oil (VCO)	1.Dry processing	1. Light viscosity 2. Long shelf life 3. Sweet flavor of coconut 4. Improves immunity 5. Reduce cholesterol 6. Skin purification	1.Low pressure oil extraction equipment 2.Virgin oil cooler equipment 3.Pulverizing machine 4.Hydraulic jack type oil press 5.Vertical screw type Expeller
2.Coconut chips	Osmotic dehydration followed by drying of coconut kernel	1.Coconut chips can be used as healthy crispy snacks 2.Concieved as healthy, nutritious alternative to potato chips 3.Coconut chips offers a new taste experience	1.Coconut slicing machine 2.Coconut testa remover machine 3.Coconut chips production With flavors of vanilla, strawberry, pineapple, chat masala and tomato.
3.Neera	Neera Bottling technology Hygienic harvesting, preservation and processing technology	1. Pure neera can be preserved under refrigeration condition without fermentation for more than 45 days	1.Training on collecting neera from coconut palm in a most hygienic way 2.Coconut Sap Chiller (CSC)

It could be observed from the Table 4.26 regarding the products, technologies and services supported in ABI units of CPCRI and CDB. The product Virgin Coconut Oil (VCO) was supported in both the ABIs through dry processing technology. In this method, initially dehusked coconuts were selected and fresh kernel is obtained after grating with the help of electric grater. Brown tests was removed and pulverized in a suitable coconut shredder. The grated kernel to be dried in a solar dryer, as it was the cheapest method. For extraction of VCO low pressure oil extraction equipment, hydraulic jack type oil press machine were facilitated in ABI units. Through this technology, VCO of clear water appearance with light viscosity and sweet flavor of coconut can be obtained. Coconut chips production using the technology of osmotic dehydration and subsequent drying of coconut kernel at 70 degree temperature was also supported. The coconut chips being crispy snacks can be consumed as nutritious alternative to potato chips. The product offered a unique and new taste experience. Various flavored coconut chips including vanilla, strawberry, pineapple, chat masala, tomato were developed in CPCRI and CDB. In facilitating coconut chips production the machines including coconut slicing machine and coconut testa remover were provided in the above ABIs. (Fig 14)

From the Table 4.26 could be observe that both the ABIs supported neera through neera bottling technology with hygienic harvesting, processing and preservation. Neera is the sweet sap in the coconut palm collected from unopened inflorescence, which is a non-alcoholic, delicious nutritious drink. After collected from tapping the unopened inflorescence of the coconut palm it was filtered, pasteurized and bio preservatives were added. The sap is processed into non-alcoholic condition through centrifugal filtration and pasteurization. The trainings and technical guidance on processing of neera was provided by both the ABIs.

It could be noticed from the Table 4.27 the ABI unit in CTCRI was supporting value added products from sweet potato, fried snack foods from sweet potato and cassava . Hands on trainings were provided on preparation of jam, soft drinks and pickles from sweet potato through heat processing technology. Ready To Eat (RTE) fried snack foods from cassava were prepared through hot extrusion technology. In extrusion technology the tubers were cooked at high temperatures for short time.

Fig. 14 Products and services in ABI-units of CPCRI and CDB

1. Virgin Coconut Oil (VCO)

2. Coconut chips

3. Neera collection

4. Coconut milk extractor

5. Coconut pulverizing machine

6. Virgin Coconut Oil cooker

Table: 4.27 Products, technologies and services supported in CTCRI, ABI-unit

Products	Technology	Advantages	Services offered
1. Value added products from sweet potato	Heat Processing technology	1. High protein and energy value 2. High pectin content 3. Low glycemic index	1.Hands on training for preparation of jam, soft drinks and pickle from sweet potato
2. Fried snack foods from cassava	Ready To Eat (RTE) hot extrusion technology	1. High protein and tasty snacks with good texture 2. High temperature short time cooking technology with high product quality	1.Hands on training on preparation of sweet fries, crisps , nutrichips and pakkavada 2.Kneading machine for making dough
3. Pasta from cassava and sweet potato	Hot Extrusion technology	1.Good textural quality 2.High protein content 3.Anti-oxidant properties	1.Hands on training on preparation of different types of pasta including functional pasta, orange fleshed sweet potato pasta, Cassava pasta, fish powder enriched pasta

The extrusion method of cooking was suitable for starchy and proteinacious foods. The advantages of this cooking is that food ingredients undergoes changes including starch gelatinization, inactivation of raw food enzymes, destruction of naturally occurring toxic substances. The products with desirable shapes can be obtained through this method. Fried snack foods from cassava which includes cassava pakkavada, sweet fries, crisps and nutrichips were produced from cassava through extrusion technology. Hands on trainings were provided to the entrepreneurs on preparation of these products.(Fig.15)

It could be noticed from the Table 4.28 that dry fish, cleaned fish and coated fish products were supported by ABI-unit in CIFT. As presented in the above Table 4.28 dry fish products were developed through solar fish drying technology by utilizing hybrid solar dryer with LPG backup which is installed in CIFT-ABI unit. The advantages of drying in the CIFT-dryer was that it could provide hygienic drying conditions even during cloudy or rainy days. The parts in machine were made of food grade stainless steel helped in preserving nutritional properties in drying fish. Cleaned fish products were developed in CIFT through hygienic bulk drying. For this purpose, model hygienic bulk drying yards were constructed in CIFT. Coated fish products were produced under extrusion technology with retort packing. These were the fish products which are coated with another food stuff which includes breaded shrimp, fish fingers, coated squid rings, coated fish fillets and coated fish balls. (Fig.16)

Fig. 15 Products and services in ABI-units of CTCRI

1. Tapioca pakkavada

2. Tapioca crisps

3. Tapioca Pasta

4. Tapioca French fry cutter

5. Dough mixture

6. Tapioca slicer

Table: 4.28 Products, technologies and services supported in CIFT, ABI-unit

Products	Technology	Advantages	Services offered
1. Dry fish	Solar fish drying	1. Hygienic harvesting 2. Safe and uniform drying 3. Protection against dust, insects. 4. Preservation of nutritional properties	1. CIFT dryer: SDL-250, hybrid solar dryer with LPG backup having 250 kg capacity. 2. All the food contact parts in machine were made up of food grade stainless steel
2. Cleaned fish	Cleaning and packaging technology	1. Bulk drying under hygienic conditions	1.Model hygienic bulk drying yards
3. Coated fish products	Extrusion and retort packing technology	1. Principal sea food products packed in thermoformed trays	1.Trainings on preparation of shrimp, fish fingers, fish balls fillets

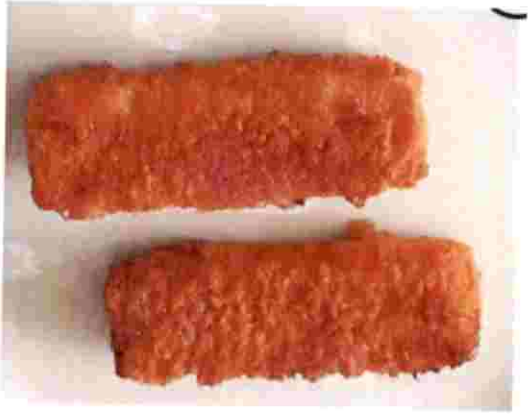
Fig. 16 Products and services in ABI-units of CIFT

1. Hygienic bulk drying of fish

2. Training on fish drying and handling

3. Solar drying machine for fish

4. Fish de-scaling machine



4. Fish fillets (coated fish products)

5. Breaded shrimp

Table: 4.29 Products, technologies and services supported in IISR, ABI-unit

Products	Technology	Advantages	Services offered
1. White pepper	Bacterial fermentation technology	1.Production of high quality off odour free pepper	1.Devloped 'microbial inoculant' for converting berries into white pepper
2. Bio-capsules of AIMO	Storing and delivering PGPR microbes through bio-capsules technology	1.Alternative to existing bio fertilizer formulation 2.Easy and reliable technology of storing and delivering PGPR bio agents	1.Delivery of AIMO capsules to spices growers
3. a. Coated spice seeds b. Spice powder	a. Seed coating technology b. Spice powder processing technology	a.1.Coating strains of PGPR on seed spices 2.Enhance yield from 15 to 30 per cent compared to uncoated seeds b. 1. Production of high quality spice powder	a.1.Trails were conducted in vegetable seeds in collaboration with Kerala Agricultural University b.1.Technical guidance processing facilities in pepper and turmeric, chilly,coriander powder production

It could be seen from the Table 4.29 about products, technologies and services supported by IISR-ABI unit. White pepper developed through bacterial fermentation technology, bio-capsules of Agriculturally Important Micro-organisms (AIMOs) and spice powders were supported in IISR- ABI unit.

Green pepper collected from farm were washed and immersed in a mid-log phase culture of bacteria (1:1) after it is to be kept for incubation at room temperature for five days. After five days of incubation the pepper berries were trampled and washed with water for removal of degraded pericarp. The obtained white pepper was dried under sunlight for three days and quality analysis of white pepper showed that there is no difference from traditional pepper in constituents of piperine content, oleoresin content. In traditional method, white pepper was produced from ripe red berries by retting in water for 8 to 10 days and trampling to remove the pericarp and drying in the sun up to moisture level of 10-11 per cent. The main hindrance to produce white pepper through this traditional method is in availability of red berries only in seasons and usage of black pepper corns takes more than 20 days soaking and after producing white pepper from them, the color will not be favorable in the market. Hence, the bacterial fermentation technology developed by IISR to produce white pepper with off odour free.

It could also be observed from the Table 4.29 that IISR supported bio-capsules for AIMO through encapsulation which is an alternative to existing talc/liquid based bio fertilizer formulation. The process includes encapsulation of any AIMO in a gelatin capsule, which weighs only about one gram. The cells in the capsule will get activate when they dissolved in 100 ml sterile distilled water, this technology can be used to encapsulate all AIMO including nitrogen fixers, nutrient solubilizers and they can smartly deliver to the farmers to enhance the crop production. It could also be seen from the Table 4.29 that IISR supported coated seed spices through seed coating technology. It is a novel process for coating seeds by strains of PGPR with the help of binding agent at particular temperature which is suitable for the organisms to survive. The coated seeds can be stored at room temperature. Coated seeds will enhance the yield up to 15 to 30 per cent and free from incidence of storage pests. The technical guidance and processing facilities were provided for production of high quality spice powder in chilly, coriander, pepper and turmeric in IISR- ABI unit. (Fig.17)

Table: 4.30 Products, technologies and services supported in KAU, ABI-unit

Products	Technology	Advantages	Services offered
Vacuum fried fruits and vegetables	Vacuum frying technology	1.Improved method from existing conventional frying 2.Efficient method in producing snacks from fruits and vegetables without much scorching 3.Enhanced nutritive value 4.Reduction in oil uptake while frying	1.Standardized protocol for vacuum frying 2.Hands on training for entrepreneurs 3.EDP and trainings 4.Gender friendly processing equipment
Tender jack fruit packaging	Retort pouch technology	1.Improved method from conventional packing 2.Extends the shelf-life for about six months	1.Developed Process protocol for retort pouch packaging 2.Hands on training for entrepreneurs 3.EDP and trainings
Fruit Juice powders	Spray dried fruit technology	1.Extending shelf life 2.Removal of moisture from fruit pulp making it stable to chemical and microbial spoilage	1.Developed Process protocol for spray dried fruit juice powders 2.Hands on training for entrepreneurs 3.EDPs and trainings

It could be noticed from the Table 4.30 that major products, technologies and services supported in KAU-ABI, unit which includes vacuum fried vegetables and fruits, tender jack fruit packaging and fruit juice powders. Vacuum fried fruits and vegetables were developed through vacuum frying technology which is an improved method than the conventional frying method. Through this method fruits and vegetables can be fried at lower temperatures and without much scorching when compared to conventional frying method.

The KAU-ABI, unit has standardized the protocol for tender jack fruit packaging through retort pouch which extends shelf-life for about six months. Fruit juice powders were developed through spray dried fruit technology which extends the shelf-life by removing moisture from fruit pulp making it stable to chemical and microbial spoilage. KAU, ABI-unit has established hall for providing hands on training and demonstrations to entrepreneurs. It conducted more than fifty Entrepreneurship Development Programmes (EDPs) to entrepreneurs. (Fig.17)

In addition to the above mentioned products, technologies and services supported by the ABIs, several other products, technologies and services were also developed by all the ABIs in their specific sectors. They also provided follow-up services on quality analysis, certification and technology refinement.

Fig.17 Products and services in ABI-units of IISR and KAU-ABI units

1. Bio capsules of AIMO

2. Coated Spice seeds

3. Workshop on Intellectual Property Rights in IISR

4. Demonstration and Training in KAU-ABI unit

4. 6 Performance of ABIs in facilitating enterprises

The performance of BIs often evaluated by the number of entrepreneurs who establish successful businesses and move on to a growth track and contributing to the accomplishment of BIs objectives of economic development, establishment of entrepreneurial ventures and employment generation.

In this section, the study was made to analyze the performance of ABIs in facilitating the enterprises. The number of entrepreneurs registered, graduated and currently in business, activities and successful clients of incubators from ABI-units were identified for the purpose of present study.

Table: 4. 31 Performance of ABI-unit of CPCRI in facilitating entrepreneurs

Year of start	Number of entrepreneurs and technologies	Successful clients	Activities
2013	**A. Entrepreneurs** Registered-70 Graduated-35 In business-27 **B. Technologies** Available:5 Commercialized:5	1.Shreekalpa industries in Kasaragod 2.MaggiCco company in Kasaragod	1.Awareness camps: on various coconut technologies and value addition 2.Commercialized technologies : VCO, coconut chips, Neera, 3.Funding :ICAR 4.Average turnover: One lakh/year 5. Fee for technology: Rs. 15,000 to Rs.1 Lakh

The ABI unit in CPCRI is established in the year 2013, focused on processing and value addition in coconut. Among 70 registered entrepreneurs in ABI 35 of them graduated and 27 entrepreneurs were in business. The ABI organized awareness camps on various technologies on coconut value addition. The successful clients of CPCRI includes Shreekalpa industries involved in manufacturing and selling of VCO and MaggicCo company on coconut chips in Kasaragod. The ABI unit in CPCRI is funded by ICAR having one lakh average turnover per year. The fee for technology transfer ranges from Rs.15, 000 to one lakh in CPCRI, ABI-unit.

Table: 4. 32 Performance of ABI-unit of CTCRI in facilitating entrepreneurs

Year of start	Number of entrepreneurs and technologies	Successful clients	Activities
2014	**A. Entrepreneurs** Registered-92 Graduated-72 In business- 63 **B. Technologies** Available:4 Commercialized:4	1.Raju from Pala 2.Rajashree from Alappuzha	1.Enhancing the value of tubers which are treasures of soil 2.Commercialized technologies: fried snack foods from cassava, pasta from sweet potato and cassava, value added products from sweet potato 3.Funding:SFAC 4.Average turnover: one lakh/year 5. Fee for technology: Rs. 15,000 to Rs.100000

It could be noticed from the Table 4.32 that the ABI unit in CTCRI was established in the year 2014, mandated on developing entrepreneurship in processing and value addition of tuber crops. The technologies for value added products from sweet potato, fried snack foods and pasta from cassava were commercialized. In CTCRI, 92 entrepreneurs were registered, 72 of them were graduated and 63 of the entrepreneurs were in business. The ABI unit in CTCRI was established to promote entrepreneurship at various levels and enhancing the value of tubers which are treasures of soil. The successful clients of CTCRI includes Raju from Pala and Rajashree from Alappuzha. It was financially supported by Small Farmers' Agribusiness Consortium (SFAC) in collaboration with ICAR

Table: 4. 33 Performance of ABI-unit in CIFT in facilitating entrepreneurs

Year of start	Number of entrepreneurs and technologies	Successful clients	Activities
2009	**A. Entrepreneurs** Registered-112 Graduated-75 In business-65 **B. Technologies** Available:50 Commercialized:20	1.M/S Charis food products 2.M/S Ideal foods and caterers	1.Awarded a certificate of appreciation from NAIP-ICAR in 2012 2.Commercialized technologies: Dry fish, coated fish products and cleaned fish 3. Funding : ICAR 4. Average turnover: 50 lakhs/year 5. Fee for technology transfer: Rs15,000 to Rs. 1 lakh

It could be seen from the Table 4.33 that the ABI-unit in CIFT was founded in 2009, supported processing and value addition in fish. The retort pouch fish products, coated fish products and extruded fish products were available for commercialization. In CIFT, ABI-unit 112 entrepreneurs registered, 75 of them were graduated and 65 entrepreneurs were in business. The ABI unit was funded by ICAR and successful clients includes M/S charis fish food products with brand 'Prawnoes' and M/S Ideal foods caterers of fish products with brand 'freedom kitchen'. The ABI unit in CIFT was awarded a certificate of appreciation under National Agricultural Innovation Project (NAIP)-ICAR in 2012.

Table: 4. 34 Performance of ABI-unit in CDB in facilitating entrepreneurs

Year of start	Number of entrepreneurs and technologies	Successful clients	Activities
1981	**A. Entrepreneurs** Registered-200 Graduated-100 In business- 70 **B. Technologies** Available:20 Commercialized:10	1.Keratech coconut oil manufacturing company in Thrissur 2.Amrutha foods in Kannur 3.Keraleeyam food products in Thrissur	1.Under the project of Integrated development of coconut industry, the ABI-unit has implemented coconut developmental programmes 2.Technologies commercialized : VCO, neera, coconut chips 3. Funding: MOA & FW 4. Average turnover : 1 to 5 lakhs/year 5. Fee for technology transfer: Rs. 15,000 to Rs.1 Lakh

It could be observed from the Table 4.34 that the CDB was founded in 1981, supported processing and value addition in coconut. It is a statutory body established by GOI, for integrated development of coconut cultivation and industry in the country. The CDB is funded by Ministry Of Agriculture and Family Welfare. The technologies for the production of Virgin Coconut Oil, neera and its by-products were available for commercialization. More than 200 entrepreneurs received trainings from CDB and more than 70 entrepreneurs were in business on coconut products. The successful clients are mentioned in the Table 4.34 for present study. The development programmes for production and distribution of planting material, expansion of area under coconut, integrated farming for improving the productivity are implemented by the CDB under the project called integrated development of coconut industry. The CDB also promoting the programmes for management of insect pest and diseases affected coconut gardens and adoption of technologies for product diversification in coconut.

From the Table 4.35 it could be seen that the ABI unit of IISR was founded in 2013 and supports processing and value addition in spices. The technologies for seed coating in seed spices, bacterial fermentation technology for production of white pepper, bio-capsules of agriculturally important micro-organisms, processing facilities for spice powder production were available for commercialization. In IISR, ABI-unit, 70 entrepreneurs were registered, 40 entrepreneurs were graduated and 30 entrepreneurs were in business. 'Mannil Spices' in Kozhikode was successful client from IISR.

Table: 4. 35 Performance of ABI-unit in IISR in facilitating entrepreneurs

Year of start	Number of entrepreneurs and technologies	Successful clients	Activities
2013	**A. Entrepreneurs** Registered-70 Graduated-40 In busniness-30 **B. Technologies** Available:10 Commercialized:5	1.'Mannil spices' in Kozhikode	1 Enhancing the value of spices 2. Technologies commercialized: Spices powder, bio capsules of AIMO 3.Funding : ICAR 4. Average turnover: one to five lakhs/year 5. Fee for technology transfer: Rs. 15,000 to Rs. 1 lakh

It could be observed from the Table 4.36 that the ABI-unit in KAU was founded in 2013, supported food processing and value addition. Vacuum frying technology, retort pouch packaging, spray dried fruit powder technology are available for commercialization. 200 entrepreneurs registered, 150 entrepreneurs were graduated and 100 entrepreneurs were in business. The ABI is funded by state planning board of Kerala government. The successful clients includes Artrocarpus food industry in Kannur and Chandragiri rice mill in Malappuram. The ABI unit organized monthly training/workshops for entrepreneurship development in food processing.

Table: 4. 36 Performance of ABI-unit in KAU in facilitating entrepreneurs

Year of start	Number of entrepreneurs and technologies	Successful clients	Activities
2013	**A. Entrepreneurs** Registered-80 Graduated-60 In business-35 **B. Technologies** Available:11 Commercialized:11	1.Artrocarpus food industry in Kannur 2.Chandragiri Rice mill, Malappuram	1.Monthly workshops and EDPs on food processing 2.Technologies commercialized: Vacuum frying technology, retort pouch packaging, spray dried fruit powder technology 3.Funding: Kerala State governmen 4.Average turnover: 1-5 lakhs 5.Fee for technology transfer: Rs.15,000 to Rs. 1 Lakh

The ABI units in CPCRI, CTCRI, CDB, CIFT and IISR were transferring the technology to their entrepreneurs through the mode of consultancy and contract services. The consultancy services is one of the methods of transferring the technology in which the entrepreneur is involved in receiving the technical guidance and product development and networking services with the help of scientists and business experts. The contract services is one in which the entrepreneur approaches the ABIs having an innovative idea with the intention of developing that idea into product or service to the market with the technical help from ABIs. In both modes of technology transfer the technical guidance has given through trainings and demonstrations. The ABI units in CPCRI, CTCRI, CDB, CIFT, IISR and KAU were giving follow up services including quality analysis, guidance in marketing and IPRs and technology refinement to their entrepreneurs.

4. 7 Performance of enterprises facilitated by ABIs

The performance of enterprises facilitated by ABIs were anlysed by the type of product technology used, present stage of enterprises and markets covered by the enterprises. The socio-economic parameters including quantity of production and sales per month , number of employees in enterprises and diversification of products were also considered for the present study. Break even analysis (BEP) was used in categorizing the enterprises in to successful and less successful by comparing the production of one major product with its sales in the markets. If the production and sales of major product of the enterprises was more than the calculated BEP, such enterprises were considered as successful. If production and sales in the enterprises was less than the BEP, they were classified as less successful enterprises.

4. 7. 1 Performance of successful enterprises

The successful enterprises were identified from ABIs was presented in Table 4.37(a) and (b).

Table: 4.37 (a) List of successful enterprises facilitated by ABIs

Enterprise	Product	ABI	Technology	Present stage	Markets
MaggicCo Kasaragod	Coconut chips	CPCRI	Osmotic dehydration	Currently in business	Kerala, Delhi, Canada, USA
Tuber based enterprise	Pasta	CTCRI	Extrusion technology	Currently in business	Supermarkets in Kerala
M/S charis food products	Prawn falvoured snacks	CIFT	Extrusion technology	Currently in business	Kerala, Tamil nadu
Keratech coconut oil manufacturing Pvt. Ltd	Virgin Coconut Oil	CDB	Dry processing	Currently in business	USA, Singapore, Malaysia
Mannil Spices	Spice powder	IISR	Processing facility	Currently in business	Kerala
Artrocarpus food industry	Jack fruit pulp	KAU	Retort pouch technology	Currently in business	Kerala, Mangalore, Chennai

Table: 4.37 (b) Socio-economic parameters of successful enterprises facilitated by ABIs

Name of enterprise	Production/ month	Sales/month	Year of start	Number of employees	Product Diversification
MaggiCco, Kasaragod	600kg	580kg	2009	10	1. Coconut chips 2.Coconut laddu with dry fruits 3. VCO
Tuber based enterprise	82kg	80kg	2014	5	1.Pasta 2.Cutlet 3. Pickle 4.Noodles 5.Pakkavada
M/S charis food products	500kg	495 kg	2014	10	1.Protein snacks 2.Spicy prawn 3.Picante rings 4.Shrimp n onion
Keratech coconut oil manufacturing Pvt. Ltd	15,000litres	14,500 liters	2008	20	1. VCO 2.Natural hair cream
Mannil Spices	650kg	645kg	2016	20	1.Turmeric powder 2. Chili powder 3.Coriander powder 4.Pickles
Artocarpus food industry	900kg fruits	850kg	2014	15	1.Tender jack fruit 2.Teriyaki jack fruit 3.Jack fruit noodles 4. Jack fruit paste

The list of successful enterprises facilitated from the ABIs could be noticed from the Table 4.37 (a) and socio-economic parameters of those entreprises in Table 4.37 (b). The coconut chips enterprise named 'MagicCo' was facilitated by the ABI unit of CPCRI. Osmotic dehydration and kernel drying technology was used and the enterprise covered the markets in Kerala, Delhi Canada and USA. The MagicCo coconut chips enterprise was started in 2009 .

It was having employees up to ten members. The production per month is about 600kg with sales ranging about 580 kg per month which was more than the Break Even Point (BEP) which is presented in the Fig.18. In addition to the coconut chips the enterprise was producing coconut laddu with dry fruits, Virgin Coconut Oil (VCO) and massaging oil.

The tuber based enterprise which was facilitated by the ABI unit of CTCRI was producing pasta. The extrusion technology was used and the enterprise covered the supermarkets in Kerala for selling its products. The enterprise was started in 2014 and having five employees. The production per month is about 82kg with sales ranging about 80 kg per month which was more than the Break Even Point (BEP) which is presented in the Fig.19. In addition to the pasta and noodles the enterprise was producing cutlet, pickles, pakkavada.

The prawn flavoured snacks enterprise was facilitated by the ABI unit of CIFT. The extrusion technology was used for product development and the enterprise covered the supermarkets in Kerala, Karnataka and Tamil Nadu for selling its products. The enterprise was started in 2014 and having ten employees. The production per month is about 500kg with sales ranging about 495 kg per month which was more than the Break Even Point (Fig.20). The other products of the enterprise includes protein snacks, spicy prawn and picante rings.

The VCO processing unit in Keratech coconut oil manufacturing Pvt. Ltd which was facilitated by the ABI unit of CDB. The Dry processing technology was used for product development and the enterprise covered the supermarkets in Kerala and exported its products to the countries including USA, Malaysia and Singapore. The enterprise was started in 2008 and having twenty employees. The production per month is about 15,000 liters with sales ranging about 14,500 liters per month which was more than the Break Even Point (BEP) (Fig.21). In addition to the Virgin Coconut Oil (VCO) the enterprise was producing natural hair cream.

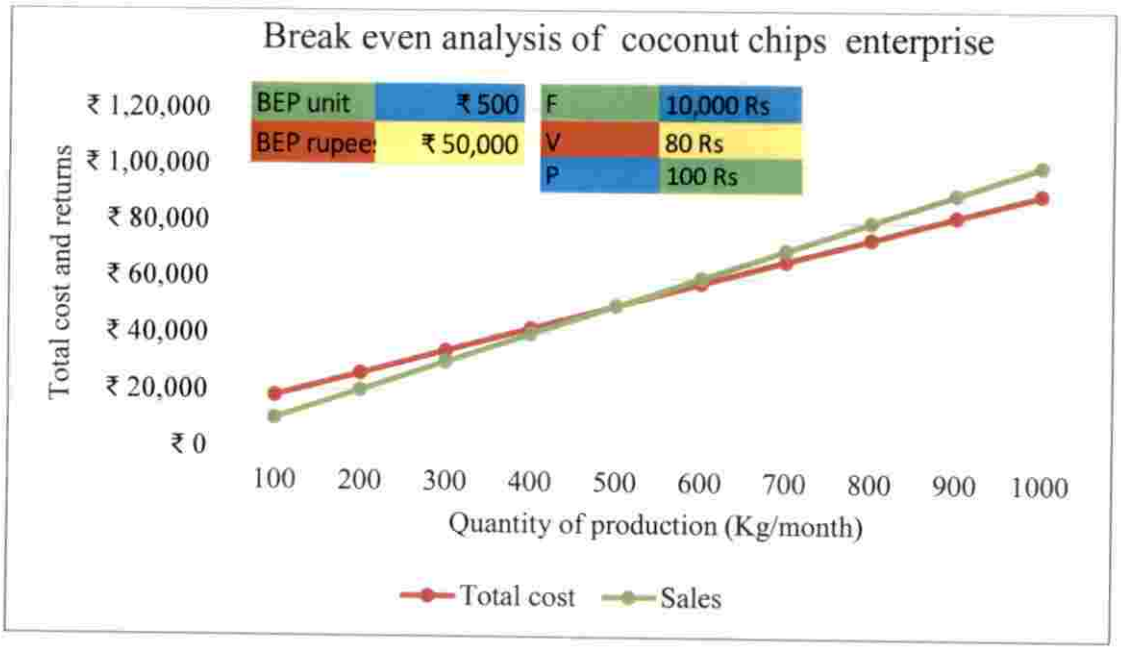


Fig. 18 Break even analysis of coconut chips enterprise

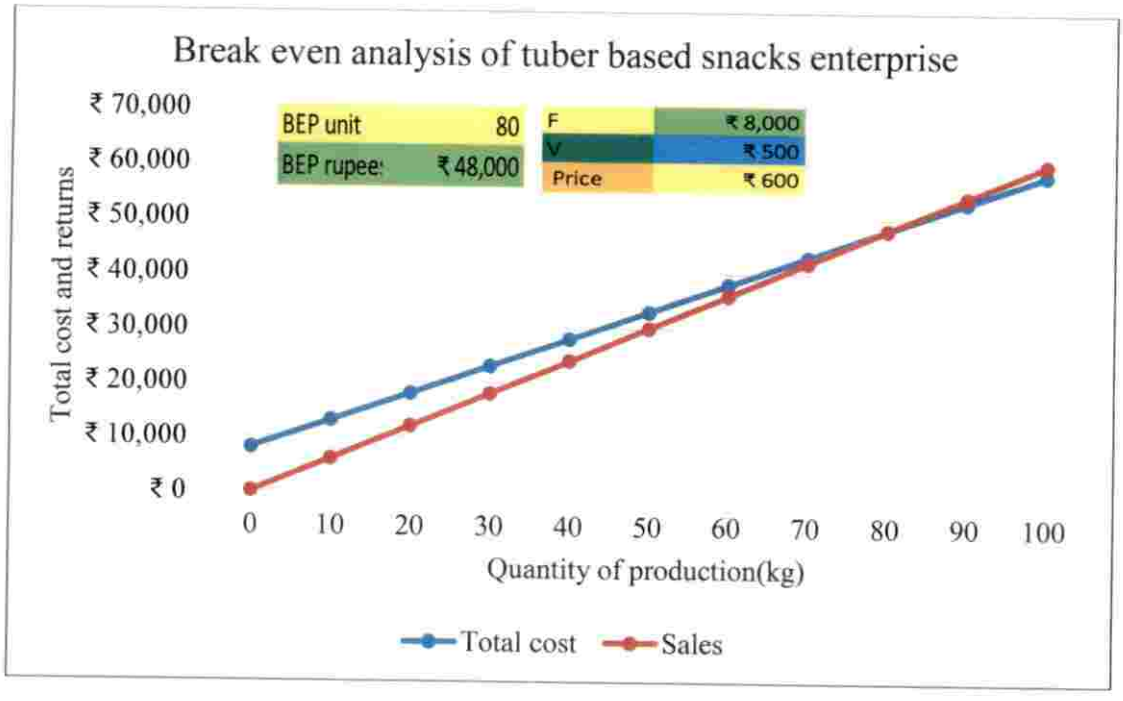


Fig. 19 Break even analysis of tuber based snacks enterprise

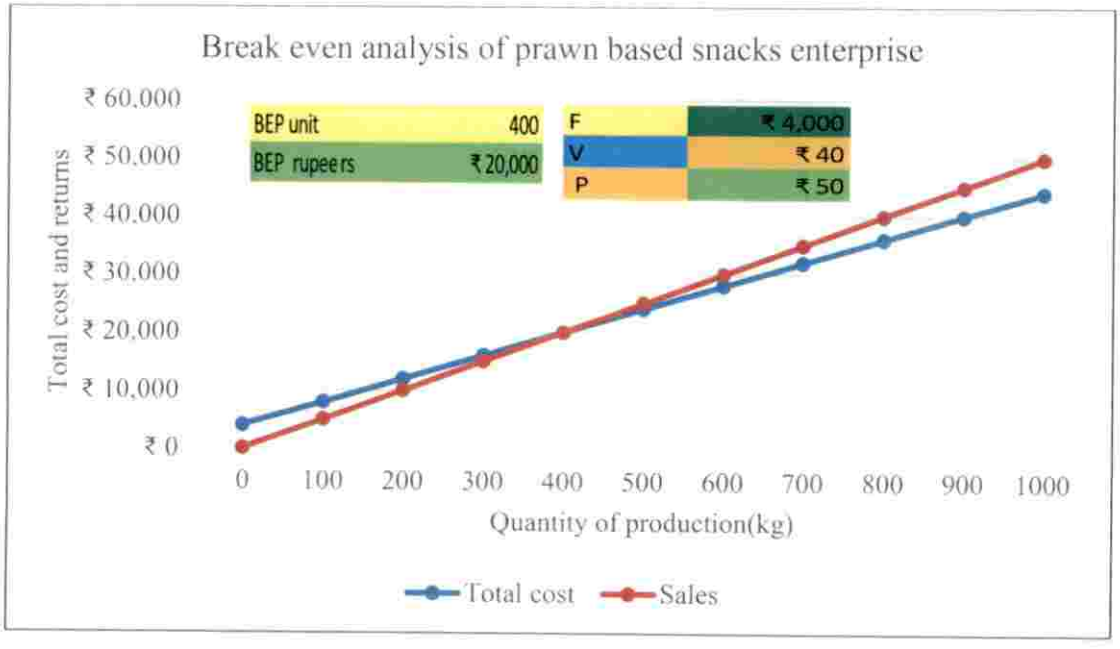


Fig. 20 Break even analysis of prawn based snacks enterprise

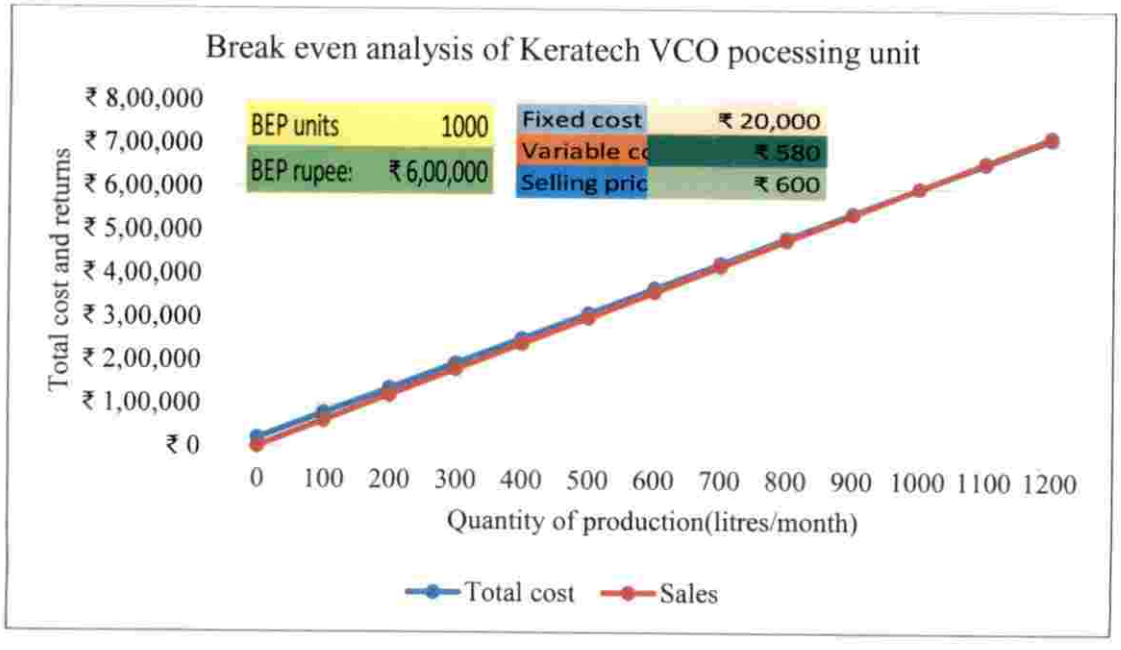


Fig. 21 Break even analysis of Keratech VCO processing snacks enterprise

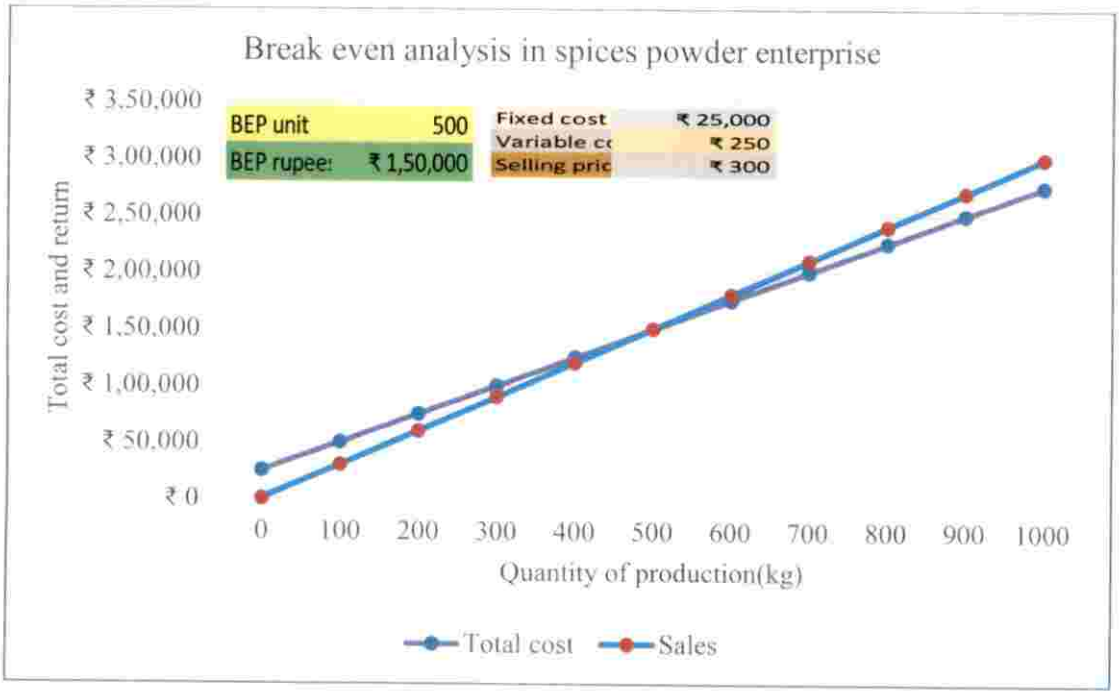


Fig. 22 Break even analysis of spices powder enterprise

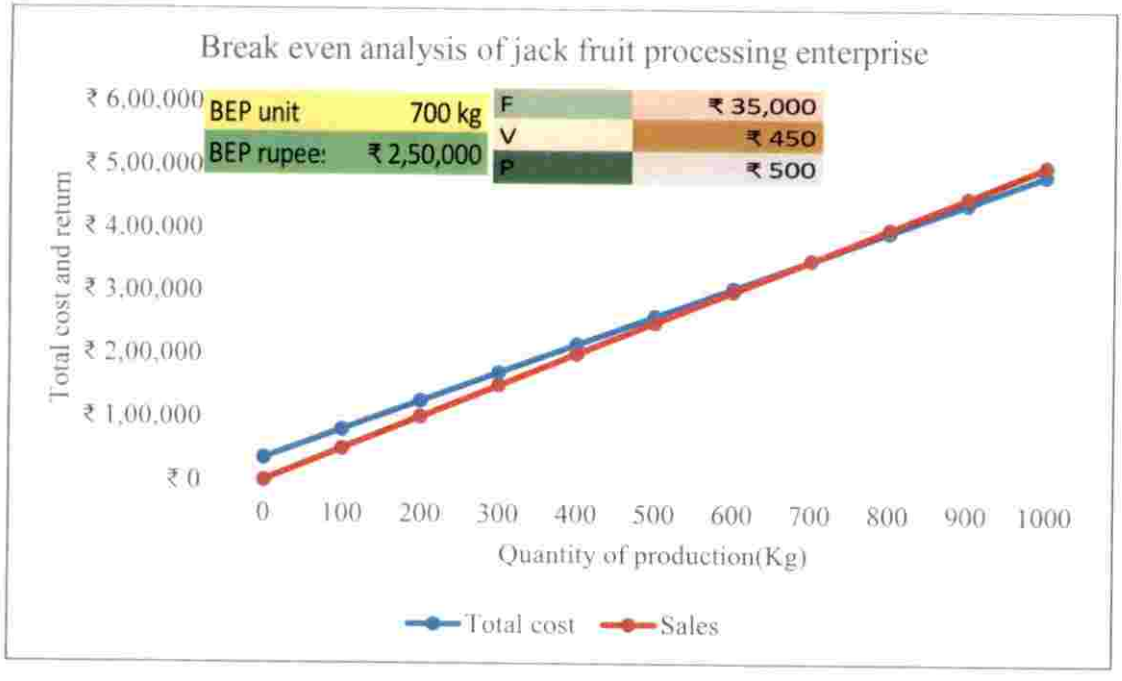


Fig. 23 Break even analysis of jack fruit processing enterprise

The Spice powder enterprise facilitated by the ABI unit of IISR. The processing facility was provided for producing spice powders including coriander, turmeric and chilli. The enterprise covered the supermarkets in Kerala, Karnataka and Tamil Nadu. The enterprise was started in 2016 and having twenty employees. The production per month was about 650kg with sales ranging about 645 kg per month which was more than the Break Even Point (BEP). The products of the enterprise includes turmeric powder, chili powder, coriander powder and pickles. (Fig.22).

Artocarpus food industry processing and packing jack fruit pulp was facilitated by the ABI unit of KAU. The retort pouch technology for packing was the service provided by the ABI-unit. The enterprise was selling its products to the supermarkets in Kerala, Mangalore and Chennai. The enterprise was started in 2014 and having fifteen employees. The processing of fruits per month was about 900 kg with sales ranging about 850 kg of jack fruit pulp per month which was more than the Break Even Point (BEP) (Fig.23). The other products of the enterprise includes tender jack fruit, teriyaki jack fruit, jack fruit noodles and jack fruit paste.

4.7. 2. Performance of less successful enterprises

The less successful enterprises facilitated from the ABIs can be noticed from the Table 4.38 (a) and socio-economic parameters of those entreprises in the Table 4.38 (b).

The coconut chips enterprise started by Yamuna in 2017 was facilitated by the ABI unit of CPCRI. The technology of osmotic dehydration and kernel drying was used in the enterprise. It covered the local markets in Kerala and having only two employees. There was less product diversification in the enterprise. The production per month was about 400kg with sales ranging about 390 kg per month which was less than the Break Even Point (BEP). (Fig.24)

The tuber based snacks enterprise started in 2015 by Shaji in Pala was facilitated by the ABI unit of CTCRI. The extrusion technology was used in the enterprise and it covered the local markets in Kerala. The enterprise was having three employees. The product diversification was less in the enterprise . The production per month was about 72kg with sales ranging about 70 kg per month which was less than the Break Even Point (BEP). (Fig.25)

Table: 4.38 (a) List of less successful enterprises facilitated by ABIs

Name of enterprise	Product	Supported ABI	Technology	Present stage of enterprise	Markets covered
Coconut chips enterprise by Yamuna	Coconut chips	CPCRI	Osmotic dehydration	Graduated	Local areas and Regional supermarkets
Tuber based snacks enterprise by Shahji	Noodles	CTCRI	Extrusion technology	Graduated	Friends and Regional supermarkets
Cleaned fish by Vijith	Cleaned fish	CIFT	Technical guidance on drying	Post incubation	Regional market
Coconut chocolate enterprise by Sundran	Chocolate	CDB	Dry processing	Graduated	Local areas and Regional supermarkets
Malu pure food mix	Spice powder	IISR	Spice Processing facility	Post incubation	Local areas and Regional supermarkets
Suma foods Supplements	Banana powder	KAU	Processing protocol facility	Graduated	Local areas and Regional supermarkets

Cleaned fish enterprise started by Vijith in Ernakulum which was facilitated by the ABI unit of CIFT. The technical guidance was given for product development and the enterprise covered the local markets in Kerala. The enterprise was started in 2014 and having only two employees. The production per month was about 355 kg with sales ranging about 350 kg per month which was less than the Break Even Point (BEP). (Fig.26). Coconut chocolate enterprise started by Sundran which is facilitated by the ABI unit of CDB. The technical guidance was given for product development and the enterprise covered the local markets in Kerala. The production per month is about 150 kg with sales ranging about 100 kg per month which was less than the Break Even Point (BEP) which is presented in the Fig.27.

Table: 4.38 (b) Socio-economic parameters of less successful enterprises

Name of enterprise	Production	Sales	Year of start	Number of employees	Product Diversification
Coconut chips enterprise by Yamuna	400kg/month	390kg/month	2017	2	1. Coconut chips
Tuber based snacks enterprise by Shahji	72kg/month	70kg/month	2015	3	1.Noodles
Cleaned fish by Vijith	355 kg/month	350kg/month	2014	2	1.Cleaned fish
Pickle enterprise by Sadanandan	150kg/month	100kg/month	2008	3	1.Chocolate
Malu pure food mix	550kg/month	525kg/month	2016	2	1. Chili powder
Suma foods supplements	500kg/month	450 kg/month	2014	5	1.Banana powder with rice and ragi

The Malu pure food mix enterprise started by Pradeep Kumar was facilitated by the ABI unit of IISR. The technical guidance was given for product development and the enterprise covered the local markets in Kerala. The enterprise was started in 2016 and having only two employees. The production per month is about 550 kg with sales ranging about 525 kg per month which was less than the Break Even Point (BEP) (Fig.28).

Suma food supplements enterprise which is facilitated by the ABI unit of KAU. The technical guidance was given for product development and the enterprise covered the local markets in Kerala. The enterprise was started in 2014 and having five employees. The production per month was about 500 kg with sales ranging from 450 kg per month which was less than the Break Even Point (BEP) (Fig.29). The enterprise was facing marketing difficulties and products of enterprises includes banana powder with rice and banana powder with sweetened ragi.

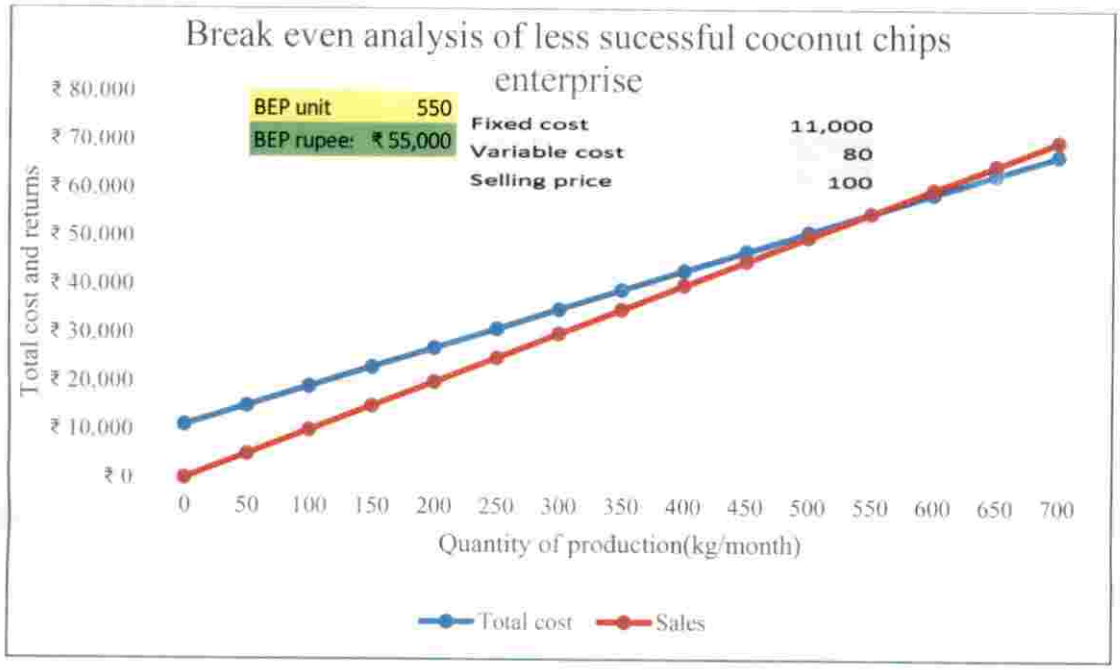


Fig. 24 Break even analysis of less successful coconut chips enterprise

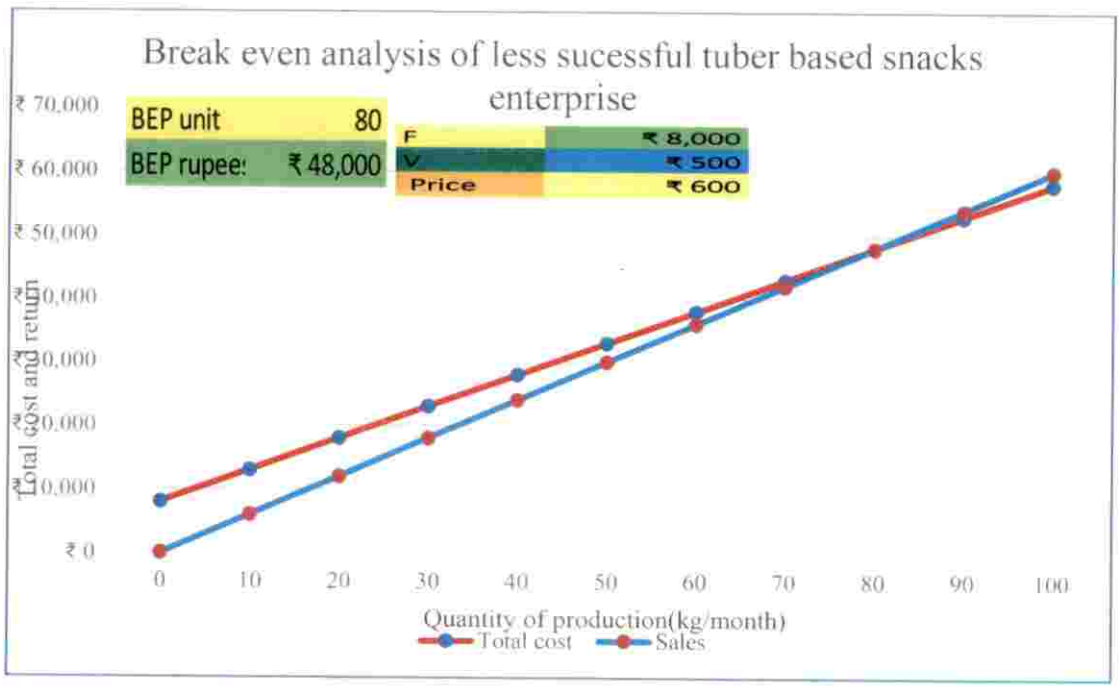


Fig. 25 Break even analysis of less successful tuber based enterprise

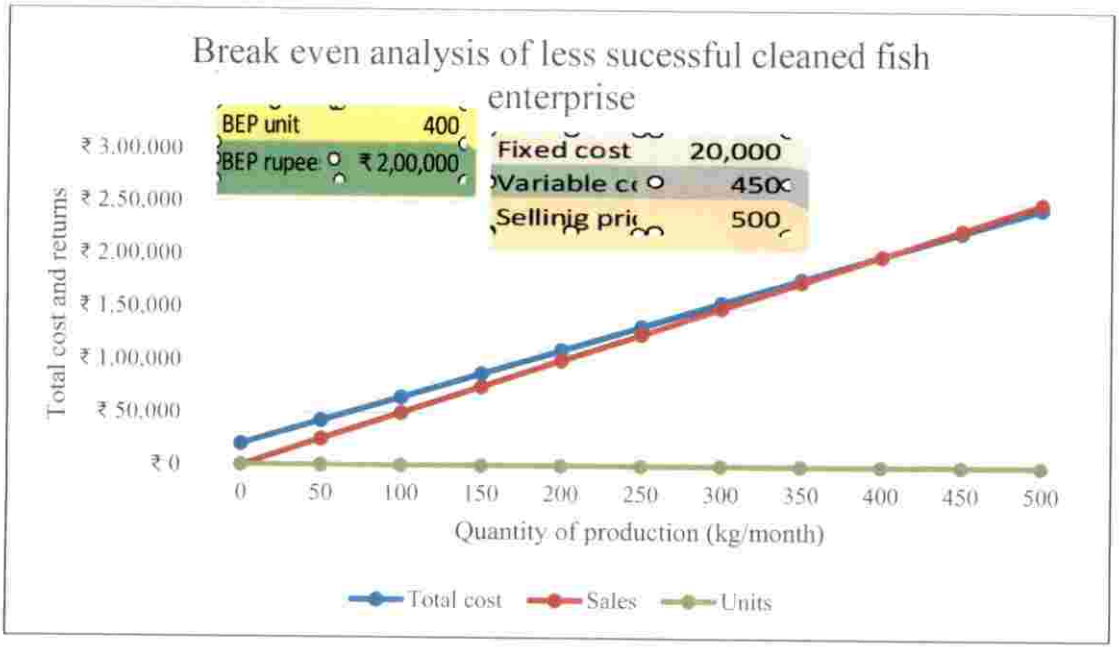


Fig. 26 Break even analysis of less successful cleaned fish enterprise

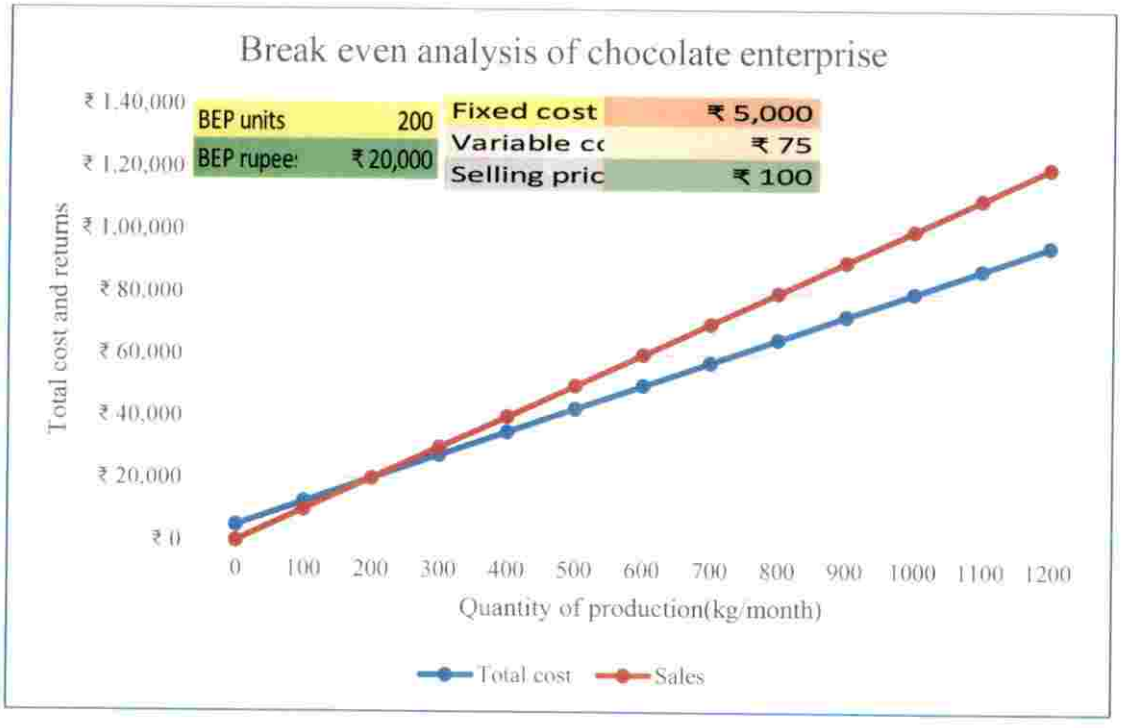


Fig. 27 Break even analysis of less successful chocolate enterprise

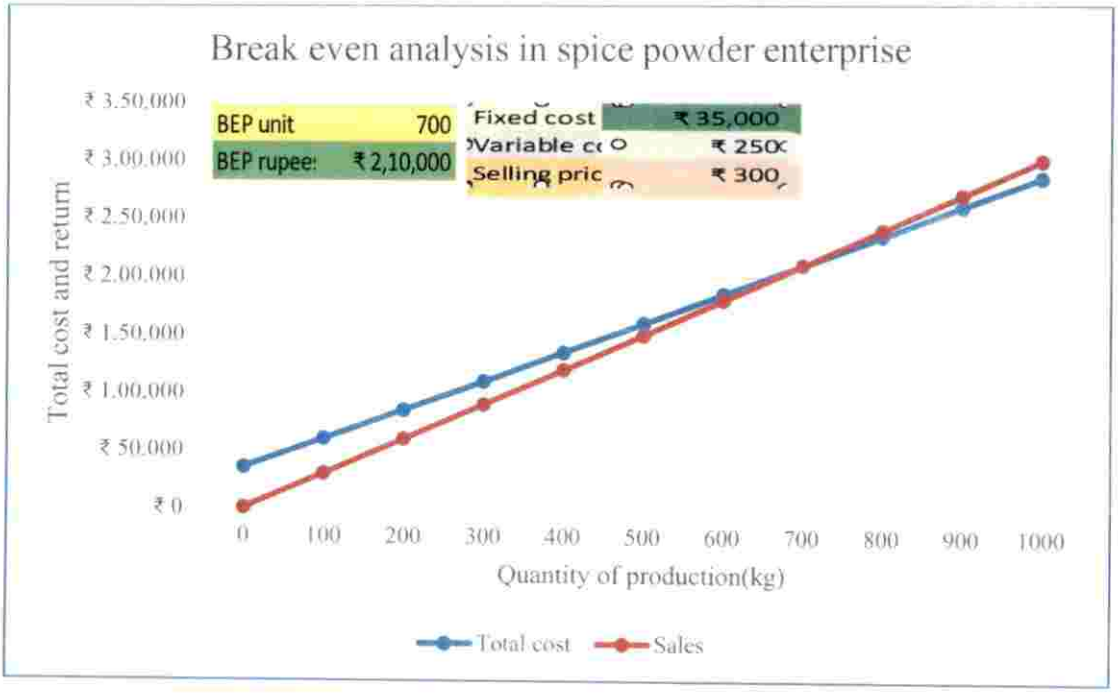


Fig. 28 Break even analysis of less successful spice powder enterprise

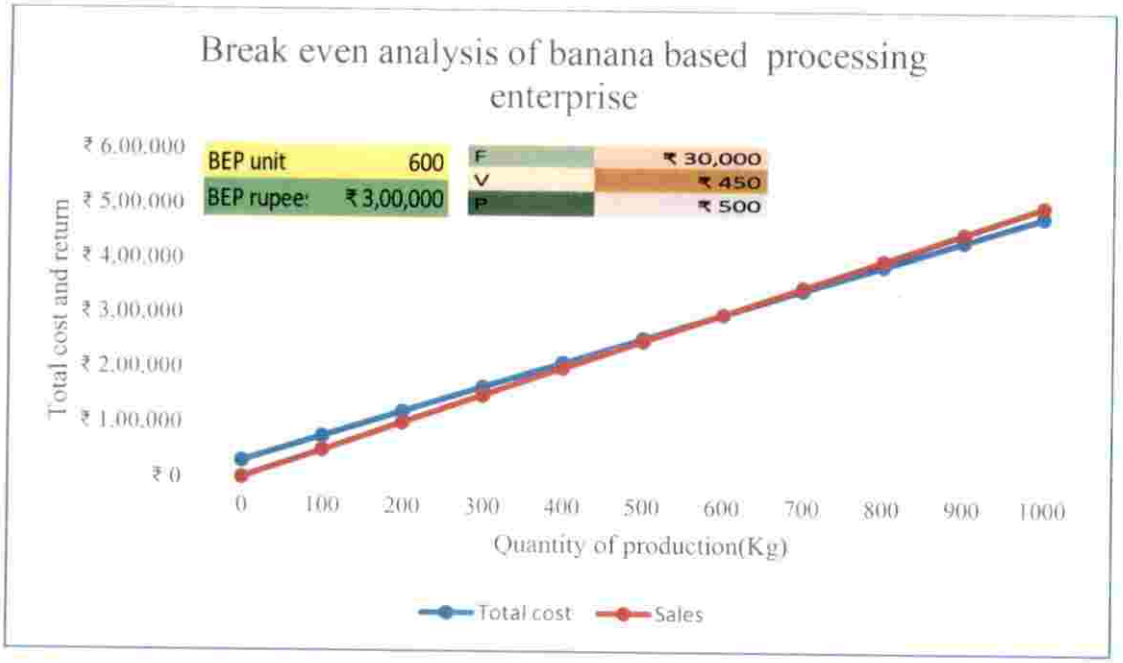


Fig. 29 Break even analysis of less successful banana processing enterprise

4. 7. 3. 1 Dimensions of entrepreneurial behavior

There was difference in performance of the above selected enterprises, even though they were facilitated by the same incubators. This was due to the difference in entrepreneurial qualities of entrepreneurs which they possessed. The performance of the enterprises was influenced by the entrepreneurial qualities of their entrepreneurs. For this purpose the entrepreneurial qualities of the entrepreneurs of above selected successful and less successful enterprises was analysed by utilizing composite index.

4. 7. 3. 1. 1 Dimensions of successful entrepreneurs behavior

In order to find the reseaons for differences in the performance of the enterprises facilitated by the same ABIs, the entrepreneurial behavior dimensions was caluculated for the entrpreneurs of above selecected six successful (Table 4.37) enterprises. The composite index was utilized for the study.(Fig.30)

It could be noticed from the Fig. 30 that composite index for decision making ability of the successful enterprises was 'High' with a value of 81.44. This proved that the entrepreneurs were well aware about their business activities which promote them to take decision efficiently. The Fig. 30 showed that composite index for self-confidence among successful entrepreneurs was 'High" with a value 94.16. This revealed that the entrepreneurs can adjust readily to new situation and they were confident to make profit in their enterprises.

The composite index for achievement motivation among successful entrepreneurs was 'High" with a value of 87.77. This showed that the entrepreneurs were not satisfied with the little thing what they had and they wanted to move forward in their business. The Fig.30 portrayed that composite index for risk taking ability among successful entrepreneurs was 'High" with a value of 92.77. This result showed that the entrepreneurs were ready to try new ideas. The composite index for innovativeness among successful entrepreneurs was 'High" with a value of 93.32. This revealed that the entrepreneurs were innovative and trying new practices. They were taking advantage of opportunities by keeping up to date information about the subjects of their interest. The Fig 30 showed that composite index for leadership ability among successful entrepreneurs was 'High" with a value of 96.66. This showed that the

respondents were in 'High' category and they were having high level of leadership skills. They were able to inspire others to work together towards common goals. In addition to the high entrepreneurial behavior dimensions, the successful entreprises had more product diversification they made efforts to cover more number of markets which could be observed from the Table 4.37(a) and (b).

4. 7. 3. 1. 2 Dimensions of less successful entrepreneurs behavior

In order to find the reason for differences in the performance of the enterprises facilitated by the same ABIs, the entrepreneurial behavior dimensions was caluculated for the entrpreneurs of above selecected six less successful (4.38) enterprises. The composite index was utilized for the study.

It could be noticed from the Fig .31 that composite index for decision making ability of the less successful enterprises was 'Medium' with a value of 38.88. This showed that the entrepreneurs required more guidance with regard to running enterprise, storage of produce and marketing facilities. It could be noticed from the Fig.31 that composite index for self-confidence of the less successful enterprises was 'Medium' with a value of 50.82. This showed that the entrepreneurs required more guidance in their entrepreneurial activities.

It could be noticed from the Fig.31 that composite index for achievement motivation of the less successful enterprises was 'Medium' with a value of 52.21. It could be noticed from the Fig.31 that composite index for risk taking ability of the less successful enterprises was 'Medium' with a value of 55.55 and composite index for innovativeness of less successful entrepreneurs was 'Medium' with the index value of 53.99. From the Fig. 31 it can be seen that the entrepreneurs had medium leadership ability with index value of 62.21.

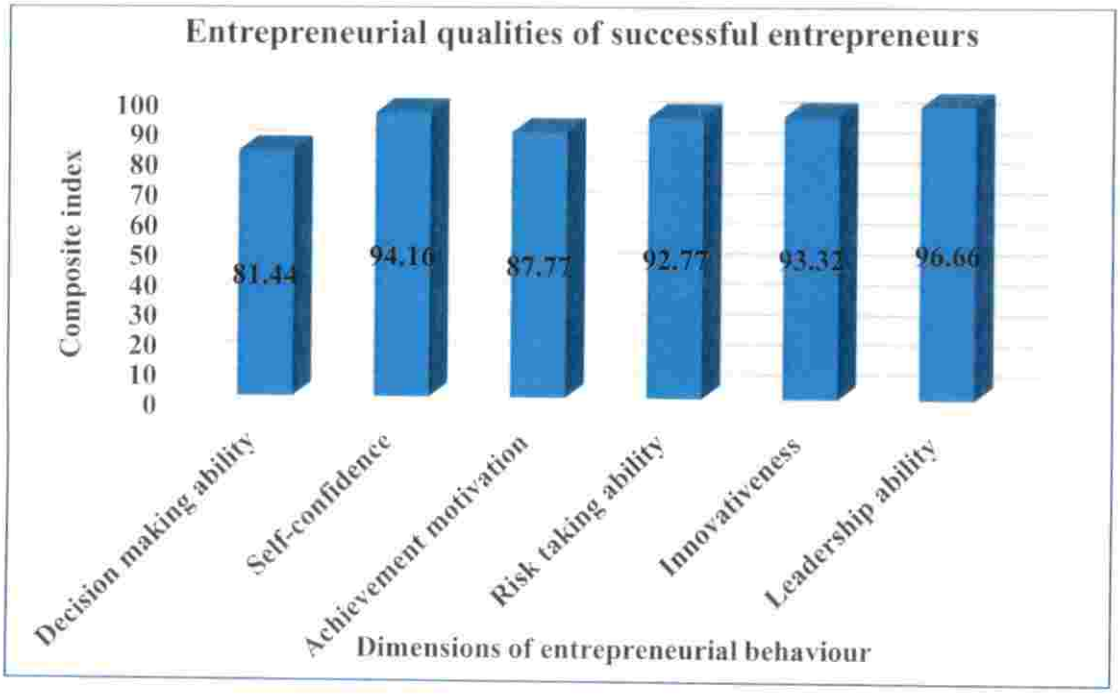


Fig. 30 Entrepreneurial qualities of successful entrepreneurs

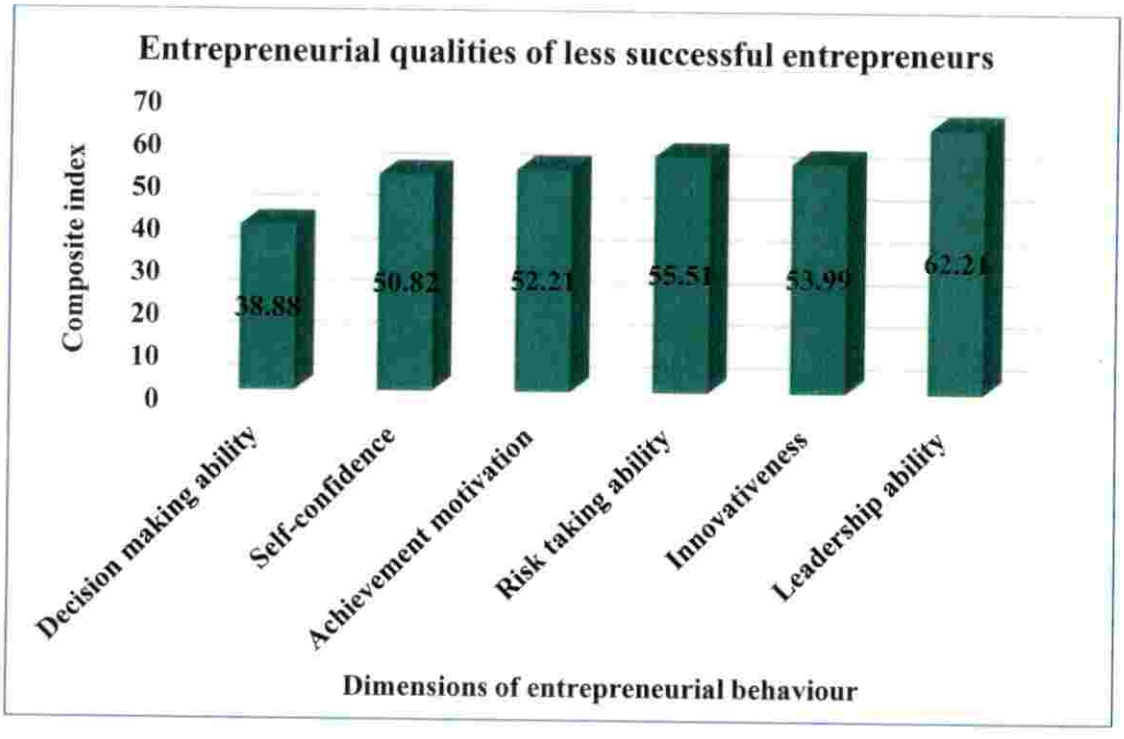


Fig. 31 Entrepreneurial qualities of less successful entrepreneurs

4.8 Challenges faced by ABIs in facilitating enterprises

In this section , the major constraints perceived by the officials of ABIs in providing support to entrepreneurship development was analysed. Garrett ranking was used to rank the challenges faced by the ABIs officials in facilitating enterprises.

Table: 4.39 Major Challenges faced by ABIs officials

Sl. No	Challenges	Garrett score	Rank
1	Lack of funding	214	III
2	Inconsistency in stakeholder support	222	II
3	Lack of commitment of entrepreneurs	205	V
4	Geographic area	239	I
5	Government policies	209	IV
6	Competent and motivated management team	183	VI

Table 4.39 showed that ABIs officials have perceived geographic area in which Agri Business Incubator located, as the major constraint faced by them in providing support to the entrepreneurs. The reason for this could be given by utilizing the explanation of Buys and Mbewana (2007) that the entrepreneurs resided in different geographic locations and some entrepreneurs located in remote and rural area for whom the business incubators are unable to reach who are in need of the services.

It could also be noticed from Table 4.39 that ABIs officials perceived inconsistency in stakeholder support as the second major constraints, because for the proper functioning of business incubators there is a requirement of co-operation with consistency from stakeholders. The stakeholders which includes government, incubators' management, local business, and venture capital providers should co-operate with clarity and consistency. The activities of stakeholders should be in line with the needs of clients and in harmony with the philosophy and objectives of the business incubators.

At certain times business incubators also faced financial difficulties, as they do not have in house seed funds and receiving funds from external agencies. hence the ABIs officials perceived lack of funding as the third major constraint in supporting entrepreneurs. The ABIs officials perceived government policies,commitment of entrepreneurs in their business and management teams of ABIs as less constraints in supporting for entrepreneurship development in the society.

4.9 Case studies of successful enterprises facilitated by ABIs

A case study is considered as the most operative research approach able to capture and extract data from experiences of difficult situations.

1. Coconut chips enterprise - struggle to success by Sibi Mathew

Sri. Sibi Mathew born and brought up in Pala, Kottayam, Has completed his graduation in economics. Even though he joined for post-graduation, unfortunately he had to discontinue his studies because of his family situations. The conditions necessitated him to join for employment. As Sibi Mathew was a man of independent thinking, he started his career by establishing a distributing agency of ayurvedic medicines with the help of his friends. In the beginning everything was going right and the enterprise was also expanding and started to produce ayurvedic medicines in venture itself for distribution purposes. But this business doesn't hit the top of profit graph.

Since Sibi Mathew had keen interest in starting his own venture from childhood, he didn't lose his hope from the past experience. In 2009, he came in contact with ABI unit of CPCRI, Kasaragod, an ICAR institute to support entrepreneurship development and later he realized that as the the wisest decision he had ever taken in his career. First he bought 50kg of Coconut chips samples from CPCRI and he understood its demand in the various segments of market in India. In short span of time he got really good responses from all parts of India like Chennai, Bangalore, Mumbai, and Delhi which made him to realize the demand for that product. He brought the technology of coconut chips from CPCRI and set up its production unit at Kanhangad in Kasaragod District, Madikai. He realized the demand for this product in the market, as it is an innovative product and doesn't have much competitors in the track at

that moment. In the year of 2009 itself, he started a manufacturing unit for coconut chips with the product name "MagicCo tender chips" and brand name as "MagicCo Life Care Products" (website : http://magicco.in/).

The product is very famous over the area with its ultra-pure quality and taste. Recently Sri Sibi Mathew got an order for consignment of 20 tons of coconut chips from Canada, 5 tons from USA, 5 tons from Delhi and more. With this simple innovative product he was able to improve his standard of living and able to generate employment opportunities for others in his venture. About 10-15 people were working with him. In addition to the Coconut chips, he also started manufacturing of laddu with Coconut and dry fruits and Virgin Coconut Oil which are also CPCRI technologies.

2. Progress through processing in jack fruit - a story of Subash Koroth

Subash Koroth is a graduate in mechanical engineering from Kannur. As he had high achievement motivation and wanted to start his career as an entrepreneur. He observed the fact that eighty per cent of jack fruit is being wasted without proper processing and value addition. In utilizing this opportunity for business, he setup an enterprise named as "Artocarpus foods" in Kannur in 2015 for value addition of jackfruit. Before this, there was less people who ventured for value addition in jackfruit and also less number of value added products from jackfruit were known. In the initial stage, the company made jackfruit juice, pickle and porridge from jack seed.

Later he visited ABI unit of Tavanur in Kerala Agricultural University and attended trainings. Based on the 'jack fruit pulp' technology acquired from ABI-unit in Tavanur, he started manufacturing jack fruit pulp in large quantities to supply for bakery and ice-cream industries for preparing cakes, muffins and ice-creams. The price for a kg of pulp is about 150 rupees and the products of the enterprise was selling under the brand name "Hebon". The company used retort technology for packaging where there was no added preservatives. After packaging it is subjected to high temperature, hence it is sterilized inside the packet and enhanced the shelf life of pulp up to one year. The company has contacts with the agriculture growers' forum and coconut growers' forum. These groups collect the jack fruit from member growers and supply to this company. The company is processing about 200-300 fruits per day

and 400-500 fruits are always there in storage for using after their ripening. The products are sold to companies like elite cakes, Milma and 5-6 small bakeries in Kerala. The products are sold outside of Kerala, like Mangalore in Karnataka and Chennai and the company also planning to expand its market coverage. The entrepreneurial qualities like ability to identify the opportunities in existing environment, independent decision making to start venture, taking risks in marketing their manufactured products, ability in identifying the resources and raw materials for the venture helped him to succeed in this field. The combination of these entrepreneurial qualities and the technology support and guidance in an efficient manner from ABI unit in KAU made the "Artocarpus foods", a company which is started at first as venture become succeeded in this global competition era.

3. Prawn based snacks- success of women entrepreneur in Kerala

This is the story of smt. Omana Muraleedharan from Aroor, who graduated from CIFT with technical guidance on preparation of extruded snacks. Earlier, Smt. Omana was running a small scale metal industry named Amrutha metal works in Aroor. She approached CIFT for incubation with an idea of developing prawn flavored extruded snack food. 'Spicy shrimp', 'shrimp in onion', and 'prawn seasoning 'are the three varieties of 'fish kure' was developed and standardized for the incubatee under the brand name 'Prawnoes' which is the first prawn flavored ready to eat snack food.

Usually extruded products are prepared using cereal flour which is having less protein content and limited amino acids. By adding the protein rich prawn flavor, the product became delicious. This delicious and nutrient rich prawn flavored snack foods under brand name 'Prawnoes' added newly to the food world.

The young, educated women entrepreneur with her dream and vision started M/s Charis Food products - a manufacturing unit at industrial development area, Aroor panchayath in Alappuzha district. She took technical guidance for product development, standardization of process parameters, testing, packing solutions, and ideas for branding and guidance for setting up a manufacturing unit in Aroor. Ready to eat snack food industry is a potential market where consumers generally try new products emerging in the markets. This story revealed that

motivation and innovation along with proper guidance can pave way to success of any enterprise for establishing as an independent venture.

4 . Virgin coconut oil processing unit in keratech company - an intervention by CDB

Keratech coconut oil manufacturing Co. (pvt). Ltd is an oil supplier company started in 2008 by K.V. Mohanan located in Thrissur. It is identified as one of the high quality coconut oil selling companies in the market. Keratech recently established a virgin oil processing unit in the company as a result of technology transfer from Coconut Development Board under Technology Mission on Coconut (TMOC).

Technology Mission on Coconut under the CDB was launched in 2001, to coordinate farming community, industry, market, and research organizations enabling work on a mission mode to diversify the products and value addition of coconut. Keratech Company, Thrissur submitted the project proposal for processing coconut and producing virgin coconut oil by taking guidance and technology from Coconut Development Board. CDB provided financial assistance to entrepreneur at 25 per cent of the project cost. The main aim of this mission is to increase the cultivation and processing of coconut in the country. Keratech established four virgin coconut oil processing units under the guidance of CDB. The company products are sold under the brand name 'Virgin Plus'.

5. Snack foods in tubers - success of Rajashree in establishing enterprise

This is the story of Rajashree from Alppuzha, who established her own venture for manufacturing snack foods in tubers including pasta, noodles and tapioca pakkavada. She got technical guidance from CTCRI on preparation of snack foods from tubers through the extrusion technology. These snack foods have high protein content, good texture and taste. Under the guidance of CTCRI, she established a tuber snacks manufacturing unit . The agribusiness started could prove that tubers are the real treasures in soil, which can compete with any other commodity in agriculture sector.

6. 'Mannil Spices' in Malabar region - venture by group of passionate farmers

This is the story of a group of passionate farmers in the malabar region of Kerala , who have started spice powder venture with the support of Indian Institute of Spice Research (IISR). The venture was established with the vision of globalizing the local spices in order to empower the local farming group. The mission of the unit is to supply the best quality spice products to the consumers. They were getting raw spices for their enterprises either by direct farming or by procuring them from the local growers. The products of the venture were black pepper powder, chilli powder, turmeric powder, coriander powder and other spices powders. The spices powder were manufactured at spice processing unit of IISR with the guidance of its scientists. The venture, 'Mannil spices' established with a vision of rediscovering the ancient fragrances of spices in Malabar region with the support of IISR. The license agreement for utilizing the facilities of spice processing unit in IISR was signed between IISR and Mr. Shuhaib, M/S Mannil spices.

4.10 Suggestions for improvement in performance of ABIs

1. Articulate the activities in ABIs to the changing content of innovation and market needs.
2. Adopt self-evaluation exercises based on metrics designed to evaluate performance in relation to goals.
3. Strengthening of the incubators by linking with other well performing incubators.
4. Organize annual conference for all incubatees to promote community building, share experiences and strengthen networks.
5. Arrangement of periodic meetings between managers of incubators in the state to enhance systematic sharing and coordination.
6. Conducting meet-ups between sector-specific incubator and incubatee meet-ups through 'networks of incubators' for sharing resources best practices and for generating new ideas.
7. Creating mechanisms for testing and validation of new technologies that are developed in enterprises, but have no established standards or mechanisms for validation.
8. There should be a introduction of entrepreneurship education in schools itself, in order to equip future entrerpeneurs at an early stage.
9. There is a need to encourage the involvement of communities in the entrepreneurial activities by ABIs through conducting workshops and campaigns in rural areas.

1. MagicCO company on coconut chips

2.Artrocarpus food industry on jack fruit

3. Prawn based snack foods

4. Mannil spices in Kozhikode

Fig. 32 Logos of successful enterprises facilitated from ABI-units of Kerala

Summary and Conclusion

5. SUMMARY

5. 1 Entrepreneurship development through Agri Business Incubators (ABIs)

Agri Business Incubators (ABIs) are the institutions which facilitate the process of agribusiness by providing suitable technology, consultancy services and networking with management experts. They are stimulators and capacity builders in the development of entrepreneurship in the society. ABIs are taking concerned efforts to develop technologies, products and services for entrepreneurs. They are involved in diversification of economy by commercializing the technologies developed in academic and research institutions to the enterprises.

The study was conducted on performance analysis of ABIs in entrepreneurship development. A total sample size of 50 registered entrepreneurs and 12 officials from six ABIs of Kerala were selected using random sampling technique. Purposive sampling was used in the selection of six successful enterprises facilitated by the ABIs for detailed Case Study.

The study entitled 'Performance Analysis of Agribusiness Incubators in Entrepreneurship Development' was conducted with following objectives.

1. To delineate the different types of ABIs in terms of structure, functions and roles
2. To attempt the comparative analysis of the extent of development of new products, technologies and services in ABIs to improve entrepreneurship development
3. To do the performance analysis of the enterprises facilitated through ABIs
4. To delineate the challenges faced by the ABIs in entrepreneurship development

5. 2 Salient findings of the study

Socio-economic profile of entrepreneurs

1. Majority (58%) of the registered entrepreneurs in the ABIs were in the age group of 36-50 years and 62 per cent of them had technical education. Majority (78%) of the registered entrepreneurs with ABIs were first generation entrepreneurs. Majority (84.00%) of the entrepreneurs had agricultural processing and value addition as their enterprises.

Dimensions of entrepreneurial behavior

2. Self-confidence (86.82), achievement motivation (78.66), innovativeness (82.93), leadership ability (81.59) were found high among entrepreneurs.

Dimensions of enterprises

3. Majority (56%) of the enterprises were in nascent stage when they joined ABIs and 72 per cent of the enterprises employed workers ranging from one to five. Twenty eight per cent of the enterprises were facilitated by Technology Mission on Coconut (TMOC) scheme, followed by 24 per cent of them were facilitated by MUDRA and 16 per cent of them were benefited by Entrepreneurial Support Scheme (ESS).

4. Majority (42%) of the entrepreneurs established their enterprises with cost less than Rs. 1.17 lakh and 30 per cent of them established their enterprises with cost ranging between Rs. 1.17 lakh to Rs. 3.47 lakhs. Majority (48%) of the entrepreneurs had medium level of income which ranges from Rs. 3.65 to Rs. 4.59 lakhs.

Types of ABIs based on organizational structure

5. The ABI units in CPCRI, CTCRI, CIFT and IISR had predominant 'entrepreneurial' structure. The ABI units in CDB and KAU had predominant 'missionary' and 'professional' structures respectively.

Types of ABIs based on functions and roles

6. The ABI units in CPCRI, CTCRI, CIFT, IISR and KAU were delineated into 'technology'inicubators based on their functions. The ABI unit in CDB was identified as 'economic development incubator'.

7. The ABI units in CPCRI, CTCRI, CIFT, CDB, IISR and KAU were delineated into 'University Agri-Business Incubators' based on their roles.

Products, technologies and services supported in ABIs

1. Virgin Coconut Oil (VCO), coconut chips, neera were the major products supported by ABIs in CPCRI and CDB. Dry processing, osmotic dehydration and subsequent kernel drying, hygienic harvesting and preservation of neera were supported. The services of low pressure oil extraction equipment, virgin oil cooker equipment, pulverizing machine, hydraulic jack type oil press, vertical screw type expeller, coconut slicing machine, coconut sap chiller and technical guidance for product development support and marketing information were provided to the entrepreneurs.

2. The ABI-unit in CTCRI, commercialized the heat processing technology for production of value added products from sweet potato including jam, pickles and soft drinks, extrusion technology for production of fried snack foods including cassava nutrichips, pakkavada and nutritional pasta from cassava.

3. Dry fish through solar drying technology, cleaned fish through hygienic bulk drying technology and coated fish products through extrusion and retort packaging technology were supported. The services of CIFT-solar dryer equipment, bulk drying yards, trainings on preparation of the fish value added products were facilitated by ABI-unit of CIFT.

4. White pepper production through bacterial fermentation technology, Bio-capsules of AIMO, coated spice seeds through seed coating technology and spice powders through processing were the products and technologies supported in IISR.

5. Vacuum fried fruits and vegetables through vacuum frying technology, tender jack fruit packaging by retort pouch technology and fruit juice powders through spray dried technologies were the products and technologies supported in ABI unit of KAU. The ABI-unit conducted Entrepreneurship Development Programmes (EDPs), hands on trainings, monthly workshops for providing technical guidance were the services given to the entrepreneurs.

Performance of ABIs in facilitating entrepreneurship

6. The ABI-unit of CPCRI in Kasaragod established in 2013 which is funded by ICAR. From the ABI-unit of CPCRI, 70 entrepreneurs registered, 35 of them were graduated and 27 entrepreneurs began an active business. Shreekalpa industries of VCO, MagicCo company on coconut chips were successful clients of the ABI-unit in CPCRI.

7. The ABI- unit of CTCRI in Thiruvananthapuram was established in 2014 which is funded by Small Farmers Agribusiness Consortium (SFAC). In ABI-unit of CTCRI, among 92 registered entrepreneurs, 72 of them were graduated and 63 entrepreneurs were currently in business. Tuber based ventures started by Raju from Pala and Rajashree from Kannur were successful clients of CTCRI.

8. The ABI-unit in CIFT was established in 2009, funded by ICAR. Among 112 entrepreneurs registered, 75 of them were graduated and 65 entrepreneurs were currently in business. M/S charis foods was the successful client of CIFT. The ABI-unit awarded a certificate of appreciation from NAIP-ICAR in 2012.

9. The Coconut Development Board was established in 1981 for integrated development of coconut cultivation and industry in the country. The ABI-unit was funded by Ministry of Agriculture and Farmers Welfare. From the ABI unit of CDB, 200 entrepreneurs have received training on coconut processing and value addition and 70 entrepreneurs were currently in businesses. Keratech coconut oil manufacturing company in Thrissur, Amrutha foods in Kannur and Keraleeyam food products in Thrissur were successful clients from ABI-unit of CDB.

10. The ABI unit in IISR was founded in 2013 for promotion of processing and value addition in spices. It was which is funded by ICAR. In the case of IISR, 70 entrepreneurs registered, 40 entrepreneurs were graduated and 30 entrepreneurs were currently in businesses. 'Mannil spices' in Kozhikode is a successful client of IISR, ABI-unit.

11. The ABI unit in KAU was founded in 2013 for promoting food processing and value addition. Among 80 registered entrepreneurs 60 entrepreneurs were graduated and 35 entrepreneurs were currently in business. Artrocarpus food industry in Kannur and Chandragiri rice mill in Malappuram were successful clients of ABI-unit of KAU.

Challenges faced by officials of ABIs in facilitating enterprises

12. ABIs officials had perceived geographic area of establishment, inconsistency in stakeholder support and lack of funding as major constraints in providing support to the entrepreneurs.

Conclusion

1. The ABI-units in CPCRI, CTCRI, CIFT and IISR were predominantly having 'Entreprenurial' structure. The ABI-units in CDB and KAU were delineated as 'Missionary' and 'Professional' structure respectively. This finding showed that the organizational structure of ABI-units in Kerala were entrepreneurial friendly and focused mainly in supporting entrpreneurs.

2. The surveyed ABIs in Kerala were involved in development of technology firms through incubation. Hence, they were delineated as 'Technology Incubators'. However, the ABI-unit in CDB was classified as 'Economic Devlopment Incubator'. Since it was involved in economic development of coconut based farming system through appropriate selection and popularization of technologies. From this finding, we can conclude that the ABI-units in Kerala were involved in developing entrepreneurial culture in the society.

3. The ABI-units in CPCRI, CTCRI, CIFT, CDB, IISR and KAU were delineated as 'University Business Incubators' based on their roles. Since, they were involved in providing laboratories, equipment, technical guidance and network with business experts and scientists. This research result showed that the ABI-units in Kerala were more advanced than traditional business incubators, since they were providing both tangible and intangible services to entrepreneurs.

4. The research results has shown that the entreprenurs who completed business incubation program had a greater success in their business. Furthermore, those who attended and completed incubation programs had greater access to technologies and Entrepreneurship Development programmes (EDPs). This showed that ABIs in Kerala were involved in generating employment and increasing the competitiveness in agriculture sector.

5. The study revealed that the geographic area in which ABIs are located is the major challenge being faced in servicing aspiring entrerpeneurs. Since, ABIs are located in urban and cosmopolitan areas the rural population found difficult to approach them. Therefore, the research concludes that by opening regional offices of ABIs in rural areas, can create great impact on entrepreneurs and in reducing business failures. In addition, the technical support to rural entrepreneurs helps generation of employment and economic diversification in rural areas.

6. The other challenges faced by ABIs are lack of funding, inconsistency in stakeholder support. Therefore, the optimistic support and active involvement of all the stakeholders including government, research institutes, ABIs, farmers, entrepreneurs is required for successful commercialization of ideas and university research.

Policy recommendations

1. Adoption of Agri Business Incubators (ABIs) as a policy instrument for entrepreneurship development in the society.
2. Consideration of Agri Business Incubation Programme as a mechanism for transformation of agriculture into agribusiness in the society.
3. Need for comparative study between Agri Business Incubators of different states, to analyze the role of environment in success of Business Incubators.
4. The study by linking the performance of the incubators with the growth of graduates in running their businesses.

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Appendices

Appendix 1

Questionnaire for Performance Analysis of Agribusiness Incubators on Entrepreneurship Development

I. General Information

1. Name of the respondent:
2. Gender:
3. Address:

II. Profile of entrepreneur

1. **Age:** Below 35 years ◯ 36-50 years ◯ , above 50 years ◯
2. **Education**:

General education	Technical education

3. **Entrepreneurial Status:**

SL. No	Type	Response
1	First generation entrepreneur	
2	Ex-employee	
3	NRI	
4	Foreign returned	
5	Family entrepreneur	

4. **Enterprise type:**

Sl. No	Type of enterprise	Response
1	Farming	
2	Allied activities Dairy/Poultry/goat/Fisheries	
3	Agribusiness services	
4	Agricultural processing and value addition	
5	Others (specify)	

5. Assets owned:

SL. No	Assets	Response
1	Land	
2	Building	
3	Machines and equipment	

6. Mass media exposure:

Please indicate your response in the appropriate alternatives by putting a tick mark

Sl. No	Mass media	Frequency of exposure		
		Regularly	Occasionally	Never
1	Radio			
2	Newspaper			
3	Television			
4	Farm magazine			
5	Bulletins			
6	Books			
7	Others, specify			

7. Social participation:

(R-regular, ST-sometimes, N-never)

Sl. No	Organization	Nature of participation		Frequency of participation of meeting		
		Member	Non-member	R	ST	N
1	Committees of Krishi Vignana Kendras(KVK)					
2	Committees of Agricultural Technology Management Agency(ATMA)					
3	Member of Farmer producer societies					
4	Co-operative society					
5	Farmer producer company					
6	SHGs					
7	Any other specify					

8. Attitude towards self-employment

Please indicate your response in the appropriate alternative by putting a tick mark
SA-Strongly Agree, A-Agree, UD-Undecided, D-Disagree, SD-Strongly disagree

SL. No	Statement	SA	A	UD	DA	SDA
1	Farm entrepreneurship is a potential field for self-employment during the present period of extreme unemployment					
2	Self-employment in agriculture is an independent profession as it offers freedom					
3	There is no necessity for an educated unemployed youth to go for self-employment in agriculture as government jobs are easily available					

4	Self-employment in agriculture is desirable, as no much affected interference is required.					
5	It is unwise to select self-employment in agriculture as it needs more physical and mental efforts					
6	Sound family background in agriculture is a necessity for selecting self-employment in it					
7.	Agriculture is the basis for other industries so selecting self-employment in agriculture is always worthy					
8	For an unemployed youth agriculture is a sure profession that help him the vagaries of life					
9	Self-employment in agriculture help one to become self-sufficient in life					
10	Since ample technologies are available in agriculture one can easily make self-employment in agriculture					

9. Economic motivation

Please indicate your response in the appropriate alternative by putting a tick mark

SA-strongly agree, A-agree, UD-Undecided, DA-Disagree, SD-strongly agree

Sl. No	**Statements**	**SA**	**A**	**UD**	**DA**	**SD**
1	An entrepreneur should work hard for economic profit					
2	The most successful entrepreneur is one who makes more profit					
3	An entrepreneur should try new ideas which may earn more money					

4	An entrepreneur must earn his/her living but most important thing in life cannot be defined in economic terms					
5	It is difficult for one's to make good start unless one provide them with economic assistance					

III. Entrepreneurial qualities of registered entrepreneurs

10. Decision making ability:

Please tell me whether you have taken decision for each of the following. If yes is the decision taken on your own or in consultation with others

Sl. No	**Decision making area**	**Response pattern**	
		Independently	**In consultation with Others**
1	Decision to start an enterprise		
2	Decision to avail loans		
3	Decision to hire labors		
4	Decision regarding storage and marketing of produce		
5	Decision regarding the value addition process		
6	Decision to use/purchase a machinery and equipment		
7	Decision to meet business experts		
8	Decision to follow suitable methodology of production		
9	Decision to attend training		

11. Self confidence

Please indicate your agreement or disagreement to the following statements
(SA-Strongly Agree, A-Agree, UD-Undecided, DA-Disagree, SDA-Strongly agree)

Sl.No	Statement	SA	A	UD	DA	SDA
1	I feel no obstacle can stop me from achieving my goal					
2	I am generally confident of my ability					
3	I am bothered by inferiority feelings that I cannot with other					
4	I am not interested to do things at my own at my own initiatives					
5	I usually work out things for myself rather than to get someone else to show me					
6	I get discouraged easily					
7	Life is a strain for me much of the time					
8	I find myself worrying about something or other					

12. Achievement Motivation:

Please indicate your degree of consensus to each of the following statement

Sl. No	**Statement**	**SA**	**A**	**UD**	**DA**	**SDA**
1.	Work should come first even if one cannot get proper rest in order to achieve ones goals					
2.	It is better to be content with whatever little one has, than to be always struggling for more					
3.	No matter what I have done always want to do more					
4.	I would like to try hard at something really difficult even if it proves that I cannot do it					
5.	The way things are now-a-days discourage one to work hard					
6.	One should succeed in occupation even if one has to neglect his family					

13. Risk Orientation:

Please indicate your response in the appropriate alternative by putting a tick mark.

SA-Strongly Agree, A-Agree, UD-Undecided, D-Disagree, SD-Strongly disagree

SL. No	Statements	SA	A	UD	DA	SDA
1	An entrepreneur should start more enterprise to avoid greater risks involved in a single enterprise					
2	An entrepreneur should rather take more of a chance in making more profit than to be content with a smaller but less profit					
3	An entrepreneur who is willing to take a greater risk than an average one usually do better financially					
4	It is good to take risks when one knows that chance of success is fairly high					
5	It is better not to try new ideas unless others have done it with success					
6	Trying an entirely new method involves risk but it is worthy					

14. Innovativeness:

Please indicate your response in the appropriate alternative by putting a tick mark

SA-strongly agree, A-agree, UD-undecided, D-Disagree, SD-Strongly disagree

Sl. No	Statements	SA	A	UD	DA	SDA
1	I would feel restless unless, I try out an innovative method which I have come across					
2	I am cautious about trying new practices					
3	I like to keep up-to-date information about the subjects of my interest					
4	I would prefer to wait for others to try out new practices first					
5	I opt for the traditional way of doing things than go in for new methods					

15. Leadership ability:

The statements related to this aspect are given below. Please indicate your response on a three point continuum.

Sl. No	Statement	Always	Sometimes	Never
1	Did you participate in group discussions on new practice in your enterprise			
2	Whenever you see/hear a new innovation did you initiate discussion about it with your colleagues			
3	Do people in your community regard you as good source of information on new things			
4	Do you assign the farm work to your members			
5	Do you offer new approaches to the problems faced by you in field			

III. Dimensions of enterprises facilitated by Agri-Business Incubator

1. Details of the enterprise started

Sl. No	Name of Venture	Location	Year of Start	No. of workers employed	Present Status	
					Production	Income
1						
2						
3						
4						
5						

2. ABI from which the guidance has been taken?

Sl. No	ABI	Year of start	Type of enterprise	Type of support	Period of support
1	CIFT		1.Production 2.Processing 3.Value addition	1.Idea 2.Product development 3.Branding and packaging 4.Quality improvement 5.Shelf-life improvement 6.Marketing 7.Finance 8.Infrastructure	
2	CPCRI		1.Production 2.Processing 3.Value addition	1.Idea 2.Product development 3.Branding and packaging 4.Quality improvement 5.shelf-life improvement 6.Marketing 7.Finance 8. Infrastructure	
3	CTCRI		1.Production 2.Processing 3.Value addition	1. Idea 2.Product development 3.Branding and packaging 4.Quality improvement 5.shelf-life improvement 6.Marketing 7.Finance 8. Infrastructure	

4	IISR		1.Production 2.Processing 3.Value addition	1. Idea 2.Product development 3.Branding and packaging 4.Quality improvement 5.shelf-life improvement 6.Marketing 7.Finance 8. Infrastructure	
5	KAU		1.Production 2.Processing 3.Value addition	1. Idea 2.Product development 3.Branding and packaging 4.Quality improvement 5.shelf-life improvement 6.Marketing 7.Finance 8. Infrastructure	
6	CDB		1.Production 2.Processing 3.Value addition	1. Idea 2.Product development 3.Branding and packaging 4.Quality improvement 5.shelf-life improvement 6.Marketing 7.Finance 8. Infrastructure	

3. Major Motivation to join ABI?

Sl. No	Motivational Factors	High	Medium	Low
1	To gain skills and expertise			
2	To meet the challenge of obtaining fund			
3	To get suitable Technology			
4	Access to business networks			
5.	To obtain Infrastructural facilities			

4. Stage of enterprise/venture at the time of joining to ABI

Sl. No	Stage of enterprise at the time of joining	Response	year of joining
1	Nascent		
2	Young		
3	Matured		
4	Senile		

5. Present stage of Venture in receiving services

Sl. No	Stage of Entrepreneur	Select your response
1	Pre-Incubation Stage	
2	Incubation Stage	
3	Post Incubation Stage/graduated	
4	Running enterprise with stability	

6. **Cost of enterprise**

Sl. No	Cost of enterprise	Response
1		
2		

7. **Income/returns**

Sl. No	Income from enterprises	Response
1		

8. **Scheme through which enterprises receiving funds**

SL. No	Facilitating scheme	Amount of funding
1		
2		
3		
4		
5		
6		

Appendix 2

Questionnaire for collecting information from officials of Agri-Business Incubators (ABIs)

1. **Name of ABI:**
2. **Year in Operation:**
3. **Number of ventures registered:**
4. **Number of ventures that graduated:**
5. **Number of ventures currently in business:**
6. **Number of employees:**
7. **Source of funding for ABI:**
8. **Organization structure of ABI:**

SL. No	Hierarchy	Function
1.		
2		
3		
4		
5		

9. **Function of ABI**

SL. No	Function of the ABI	Response
1	Philosophy of ABI	
2	Major objective	
3	Secondary objective	
4	Sector focused	

10. Role of ABI

Sl. No	Role of ABI	Response
1	Idea	
2	Infrastructure	
3	Finance	
4	Branding and packaging	
5	Shelf-life improvement	
6	Marketing	
7	Product development	

11. Professional services

Sl. No	Services	Response
1	Business planning and forming an enterprise	
2	Training to develop a skill	
3	Help with raising bank finances, grants, seed and venture capital	
4	Advice on development of new products and services	
5	Others, specify	

12. Details of providing guidance:

Sl.No	ABI	Year of start	Number of enterprises facilitated	Period of support
1	CIFT			
2	CTCRI			
3	CPCRI			
4	IISR			
5	KAU			
6	CDB			

13. Products, technologies and services supported by ABIs

Sl. No	ABI	Products	Technology	Service provided
				1. Equipment 2. Capital 3. Market 4. Infrastructure 5. Employee assistance 6. Specify others

14. Current turnover of ABI

Sl. No	ABI unit	Turnover/year
1		
2		
3		
4		
5		
6		

15. Mode of technology transfer:

Sl.No	Mode of transfer	Response
1	Consultancy services	
2	Contract services	
3	Training	

16. Number of technologies and their commercialization

Sl. No	ABI	Number of technologies available	Number of technologies transferred	Average time span of enterprise in ABI
1	CIFT			
2	IISR			
3	CPCRI			
4	CTCRI			
5	KAU			
6	CDB			

17. Follow-up services by ABI

Sl. No	Follow-up action	Response
1	Quality analysis	
2	Marketing	
3	Certification	
4	Technology refinement	

18. Challenges faced by ABIs in entrepreneurship development

Sl.No	Challenges	Rank
1	Lack of funding	
2	Inconsistency in Stakeholder support	
3	Lack of commitment of Incubatee	
4	Geographic Area	
5	Government Policies	
6	Competent and motivated management teams	

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By

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ABSTRACT

Performance Analysis of Agri-Business Incubators (ABIs) in Entrepreneurship Development

Agri Business Incubators (ABIs), the institutionalized mechanisms which are involved in supporting entrepreneurship, were pioneered in India by International Crops Research Institute for Semi-Arid Tropics (ICRISAT) in partnership with Department of Science and Technology (DST) in 2003. This was further strengthened by Indian Council of Agricultural Research (ICAR), which started 10 ABIs in 2008-09 and an additional 12 ABIs in 2013-14. The performance analysis of the ABIs of Kerala in entrepreneurship development was studied with the objectives of delineating the types of ABIs based on their organizational structure, functions, roles and compared the products, technologies and services developed from ABIs. It also analyzed the performance of enterprises facilitated in ABI-units and delineated the challenges faced by ABIs in supporting the entrepreneurs.

A total sample size of 50 registered entrepreneurs and 12 officials from six ABI-units of Kerala were selected using random sampling technique. The ABI-units in Central Plantation Crops Research Institute (CPCRI), Kasaragod; Central Tuber Crops Research Institute (CTCRI), Thiruvananthapuram; Central Institute of Fisheries Technology (CIFT), Kochi; Coconut Development Board (CDB), Kochi; Indian Institute of Spices Research (IISR), Kozhikode and ABI-unit in Kerala Agriculture University (KAU), Tavanur were selected for the present study. Purposive sampling was used in the selection of six successful enterprises facilitated by the ABIs for detailed Case Study.

The results of profile of registered entrepreneurs in ABIs showed that the majority (58%) of the respondents were of middle age group (36-50 years) and 62 per cent of them had technical education. Self-confidence (86.52), achievement motivation (78.66), innovativeness (82.93), leadership ability (81.59) motivation to join ABIs (85.33) were rated high among dimensions of entrepreneurial behavior. Majority (56%) joined ABIs in nascent stage of enterprise and maximum (28 per cent) enterprises were facilitated by Technology Mission on Coconut (TMOC) scheme.

The study on types of ABIs based on organizational structure showed that the ABI-units in CPCRI, CTCRI, CIFT and IISR had predominant 'Entrepreneurial' structure. However, CDB incubator and ABI unit in KAU had predominant 'Missionary' and

'Professional' structure respectively. Based on functions, the ABI units of CPCRI, CTCRI, CIFT, IISR and KAU were delineated as 'Technology Incubators' and CDB was identified as 'Economic Development Incubator'. All the six ABIs were delineated as 'University Business Incubators' (UBIs) based on their roles.

The study on products, technologies and services supported in ABIs indicated that Virgin Coconut Oil (VCO) by dry processing, coconut chips by osmotic dehydration were developed in ABI-units of CPCRI and CDB. Fried snack foods and pasta from cassava through extrusion technology were supported in ABI-unit of CTCRI. Dry fish by solar drying, coated fish products by extrusion technology were supported in CIFT. White pepper through bacterial fermentation technology and spice powders with processing facility were supported in IISR. Tender jack fruit packaging through retort pouch technology was supported in KAU-ABI unit.

The study on the performance of ABIs revealed that the ABI-units in CPCRI and IISR were established in 2013 with 27 and 30 entrepreneurs respectively in business. The ABI-unit in CTCRI was established in 2014 from which 62 entrepreneurs were in business. The ABI-unit of CIFT in Cochin was established in 2009 from which 65 entrepreneurs were running enterprises. The ABI-unit in CDB was established in 1981, in which 70 entrepreneurs were currently in business. The ABI-unit of KAU was established in 2013 from which 35 entrepreneurs were facilitated into business. The performance of the enterprises facilitated by ABIs were also assessed through break even analysis.

The officials in the ABIs perceived geographic location of establishment, inconsistency in stakeholder support and lack of funding as the major challenges in supporting the entrepreneurs. Coconut chips venture by Sibi Mathew, supported from ABI-CPCRI, the tubers venture by Mrs. Rajashree, Alappuzha, facilitated from ABI-CTCRI, M/S Charis foods, Aroor by Mrs. Omana, guided from CIFT, Virgin Coconut Oil (VCO) processing unit in Keratech oil manufacturing company, Thrissur, by CDB, 'Mannil spices', Kozhikode supported by ABI-IISR and 'Artrocarpus foods', Kannur by Subash Koroth, facilitated by KAU-ABI were the successful enterprises presented as case studies.