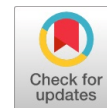


# Economic Development of Rural India Through Establishment of Agri-Tech Park

Rayisha Rana, Kusum Rana, Gunjan Chhabra



**Abstract:** India has always been on the top spot in terms of tourism and has attracted domestic and foreign tourists throughout the year. India is the land of farmers, has a rich and diverse culture and is best known for its hospitality. Tourism has become a source of income for many people, therefore it's time to connect tourism along with agriculture to enhance the income of Indian farmers. Indian farmers generally face a lot of issues related to their income; hence numerous suicide cases have been registered in the past. The objective of this research paper is to provide a solution for the farmers by introducing Agri-tourism Technology Park. Agri-tourism offers the domestic and foreign tourists an opportunity to connect with the heritage, providing a hands-on-experience, showcasing the rich biodiversity, local food products, handicrafts and culture. On the other hand, the amalgamation of technology can provide smooth and secure tourism experience for the visitors. This Park includes an agricultural patch of about 5 acres, earmarked to cater the needs of Rabi and Kharif crops. Latest agricultural crop growing techniques like vertical farming using 70% less water than traditional farming. Hydroponic system for demonstrating these techniques to Agri-tech park visitors to acquaint them with futuristic farming operations. Aquaponic solar greenhouse will be established for growing vegetables and medicinal plants. A space of about 1 acre shall be delineated for a cattle farm that would be used to rear different breeds of cows like Sahiwal and Haryana and buffalo breeds like Murrah and Nili Ravi. Internet of Things (IoT) and Artificial Intelligence techniques will be employed for monitoring cattle feed, nutrition and milk processing and general well-being of animals. Re-circulatory Aqua culture system will be used for high density stocking of fish in a smaller space. Interactive virtual field trips and activities will be offered in a variety of themes that would give information on the importance of plants, various cropping techniques, role of insects and the feeding and living pattern of animals, fish bees etc. The establishment of an Agri-tourism technology park at Amritsar district of Punjab has been planned with a focus on the sustainable development of human environment in and around the region.

**Keywords:** Agro-tech, Internet of Things, Tourism, Sustainable Development, Agro-tourism

## I. INTRODUCTION

Tourism is recognised as a tool towards economic growth of many economies in the world. The Govt. of India is making sustained efforts to attract tourists to the country. 2.93 million foreigners arrived on e-Tourist Visa, in 2019, submitting a boom of 23.6% (Annual Report, 2019-20) [1]. Agriculture is a major contributor towards the Indian economy. Approximately 70% population in the country is more or less dependent on agriculture and 16.5% of India's GDP comes from Agriculture (Economic Survey, 2019-20) [6]. In this rapid mechanization of the world, many people have lost the essence about the source and method of production of the foodstuffs produced by the farmers for our consumption. Agri-tourism has the potential to link the economic, social and environmental components of sustainability that can provide new avenues in rural sustainable development, with positive influence on the environment, rural heritage, and economic growth. Agri-tourism offers the indigenous visitors an opportunity to reunite with their land by providing "hands-on-experience" with local foods and pursuits like picking fruits, tending bees, milking cows, etc. and other educational activities. It also offers an opportunity to attract foreign tourists by showcasing the rich biodiversity, local food products, handicrafts and culture thereby earning foreign exchange in the process. There is a wide scope for the concept of agri-tourism to grow in all agricultural states of India (Shembekar, 2017). Punjab is known as India's breadbasket and the birthplace of "Green Revolution" in agriculture. Patil (2018) [14] reported that there are 23 and 37 agritourism destinations in Karnataka and Punjab respectively. India has many tourist attractions with varied agro-climatic conditions which can form the basis for tourist attraction. It was well suggested that the Ministry of Agriculture, Ministry of Tourism and Agricultural Universities should give importance to agritourism by providing some new original ideas and by training the farmers in their areas. Agritourism was reported as an economic development instrument with great potential to contribute towards improving the farmers' income. This report outlines the establishment of Agro-tourism Park in Amritsar district of Punjab, its feasibility aspects, design execution with integral components/units. Besides spearheading growth in the region, the Agro-tourism Park, is likely to give a fillip to creating added source of income and diverse economic opportunities to the farmers thereby providing an impetus to the quality of rural life.

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## II. OBJECTIVES

Keeping the mentioned lacunae in view, the proposed study aims at achieving the following objectives:

- To develop and promote agricultural tourism by helping farmers and interested entrepreneurs to grow, diversify and generate awareness among urban populace about local agricultural products through the application of environment friendly sustainable agricultural methods.
- To promote national integration and international understanding by attracting national and international tourists through popularization of traditional forms of art and music, handicraft and culture.
- To alleviate poverty of farmers by providing an opportunity for creation of jobs and augmentation of their income along with providing a broader market base to arrest their migration to urban areas.

## III. LITERATURE REVIEW

As India is a developing nation, it faces a huge problem of unemployment among the youth and poor conditions of the farmers, investing in agritourism would help in creating employment opportunities, improving the condition of the farmers, and promoting a greener and healthier lifestyle.

### A. World Scenario of Agri-tourism

#### Malaysia

Bhuiyan et al. (2011) [3]; Kunasekaran et al. (2012) [9]; Lintangah et al. (2010) [10] studied the reports from the World Tourism and Travel Council (2011) [17] and found that, in Malaysia, USD 41.8 billion contributed to 14.8% of gross domestic product in 2011 via tourism activities and it is likely to rise by 4.3% in 2012, thereby contributing USD 66.5 billion in 2022 and without doubt, the proposed venture is one of the contributors to this exceptional output.

#### Italy

Mastronardi (2015) [12] reported that the Italian agritourism has developed improved environment friendly agricultural practices, thereby having a worthwhile effect on biodiversity, landscape and natural resources.

#### Sri Lanka

Malkanthy and Routry (2011) [11] carried out a study in Sri Lanka which reported loads of potential in the selected districts of study for the implementation of agritourism activities which could help the local population immensely to sustain their life. The agricultural sector in the country, in 2010, constituted 12.6% of GDP and provided employment to about 32.7% of its people. 1.8 million families in Sri Lanka are engaged in farming. Thus, this country has immense potential in agro-tourism.

#### Nepal

Khanal and Shreshtha (2019) [8] recently reported that in different parts of the country, homestay and agro-tourism activities have developed upon noticeable progress in the tourism sector. This country has a lot to offer the seekers of adventure who incline towards agricultural pursuits. Farmers also get a chance to get added source of income by selling the local farm produce. Therefore, the need of the hour is to work towards uplifting the Agri-industry from

governmental, nongovernmental, private and community sectors. Agro-tourism development can prove to be a possible alternative, seeing the trend.

#### Vietnam

Vietnam News Agency (2021) [16] has recently reported that the development of a hi-tech agricultural park complex in the Central Highland province has been confirmed on May 28. This 66 million USD project will cover 200 ha consisting a 80-ha farm for breeding 2,400 pigs selected and imported from the Netherlands; a 30-ha chicken breeding area; and a 15-ha plant for pork slaughtering and organic fertiliser production. The centre will incorporate supreme techniques for animal husbandry, creation of chained products, animal feed, organic fertiliser, and commercial livestock products. Grid-connected solar power system and breeding process applying technology 4.0 in accordance with Global GAP standards would be used.

### B. Indian Scenario of Agrotourism

Chatterjee and Durga Prasad (2019) [4] have recently published some success stories about the evolution of agri-tourism practices in India. The work related to the promotion of agro-tourism in some of the states in India is reviewed under:

#### Haryana

Devender Kumar et al. (2010) [5] conducted a study on farmers of Haryana and reported that they have developed a keen interest in acquiring the right training for the expansion of their farms into agri ventures. More than three-fourth of the respondents agreed that further branching of farming to agri-tourism would be beneficial to improve their current income. Difficulty in getting a loan from a bank is one prime constraint in the development of agri-tourism.

#### Maharashtra

Sunil Ogale (2020) [13] analysed the prospects of agro-tourism in the area of Baramati Tahsil, Pune district, Maharashtra. Agro-tourism is one such form of tourism which has recently emerged in Maharashtra. Agriculture being the main sector of Indian Economy with 84.89% of the net sown area being agrarian, around 65% of the population is directly or indirectly dependent on it. 15 % GDP of the cumulative comes from agriculture sector. Agro-tourism can help in providing additional push to the current economic condition in the agricultural sector.

#### Karnataka

Hamilpurkar (2012) [7] examined the problems that hinder the development of Agri-tourism in Karnataka, challenges faced by Agri-tourism industry and suggested recommendations for the success of Agri-tourism in Karnataka.

#### Punjab

Binali (2018) [2] studied the consumer awareness of farmers regarding agri-tourism in Bathinda district. Many respondents were not aware of the term "agri-tourism" but all were willing to visit the farms and want to participate in the farm activities.



Samjetsabam and Kaur (2014) analysed the scope and challenges faced by agri ventures in the state of Punjab. 15 registered farmers from Punjab Heritage and Tourism Promotion Board were selected for the research. Arrangement of a consolidated tourism brochure, marketing and sales support, better outreach programmes, collaborations with the schools, colleges, NGOs, clubs and other organizations were suggested in the study.

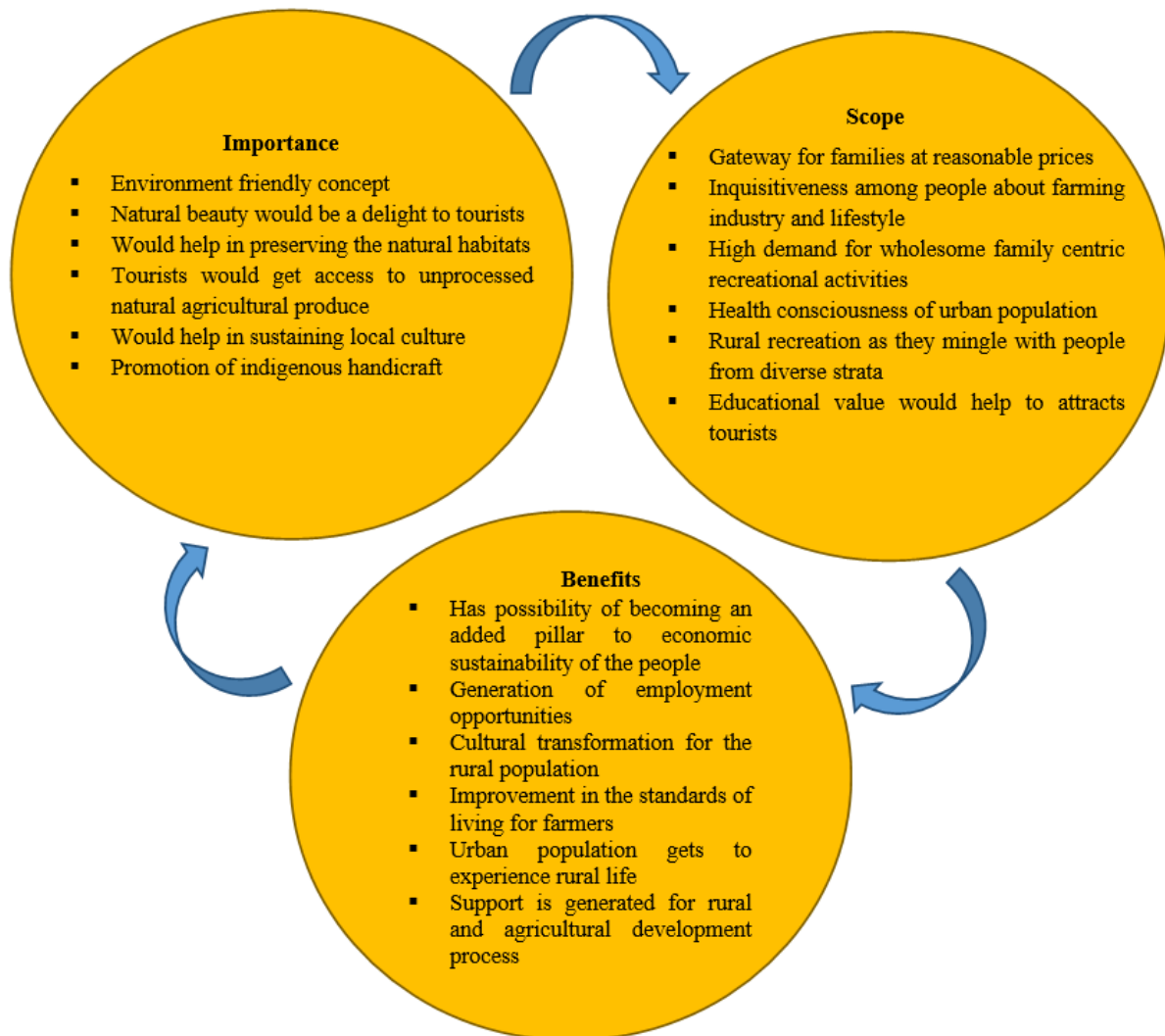
#### IV. METHODOLOGY

##### A. Development of Agri-tourism Park

Punjab, the land of generous people with kind hearts, abundant fields and mighty rivers, with its vibrant and rich surroundings and distinctive culture makes it an ideal location for Agri-tourism. The prospects of agri-tourism in the state of Punjab are crystal clear given the knowledge that agriculture and tourism are two of the major thrust areas of the state government. Punjab has a plethora of natural beauty along with the local traditions, customs and foods which highlight the higher probability of success of Agri-tourism in the state (Samjetsabam and Kaur, 2014) [15].

##### B. Tools and Techniques for Data Collection and Analysis:

For collection of data, a questionnaire was prepared on Google Forms, comprising of eighteen questions. More than 100 respondents (135) had participated in the survey. Respondents comprising different age groups from 16 – 61 yrs. were purposively chosen to participate in the survey. They were categorized under different groups: <25 years, 25-35 years, 36-45 years, 46-55 years and >55 years of age. These respondents had access to daily news and were well-informed about the economic development of Rural India. Respondents of all age group were an essential part of the survey since agri-tourism is a new concept in up-coming time as everybody wants to escape from mundane city life to venture into the sustainable rural life to rejuvenate themselves. The main aim of conducting this survey was to ascertain the opinion on various aspects of agri-tourism like importance, scope and benefits of developing an agri-tourism park.



## V. LAYOUT AND DESIGN EXECUTION

The establishment of an Agro-tourism Nature Park at Amritsar District of Punjab has been planned with a focus on the sustainable development of human environment in and around the region.

### *Agricultural Patch*

An agricultural patch of about 5 acres shall be earmarked that would cater to the needs of Rabi and Kharif crops. The Rabi crops would include gram, wheat and oil seeds whereas the Kharif crops would include maize, rice, sugarcane, bajra, peas, etc. High technology farming techniques will be employed to enhance farming operations. High yielding organic crop varieties resistant to pests and diseases will be grown at the farm. Latest agricultural crop growing techniques like vertical farming using 70% less water than traditional farming. Hydroponic system will be employed for demonstrating these techniques to Agri – park visitors to acquaint them with futuristic farming operations.

### *Kitchen Garden*

A kitchen garden of about 1.5 acres to assist in the daily preparation of food for guests shall be earmarked to give them a taste of organically grown vegetables. Seasonal vegetables like ladyfinger, peas, tomatoes, cauliflower, spinach, coriander, radish and carrot etc. will be grown in the kitchen garden from time to time. Aquaponic solar greenhouse will be established for growing vegetables and medicinal plants. Vertical farming considered potential to provide sustainable farming to combat chronic climate change and reduced inputs like soil and water will be practised for growing mushrooms, hydroponic fodder, strawberry and leafy vegetables etc.

### *Cattle Farm*

Space of about 1 acre shall be delineated for a cattle farm that would be used to rear different breeds of cows like *Sahiwal* and *Haryana* and buffalo breeds like *Murrah* and *Nili Ravi*. Various milk products like cheese, ghee, curd, buttermilk will be prepared and served in the common dining area for the guests. All the waste generated from the kitchen garden and the cattle farm would be transported to the biogas plant where the waste products would be acted upon by microbes to produce biogas. Internet of Things (IoT) and AI techniques will be employed for monitoring cattle feed, nutrition and milk processing and general well-being of animals.

### *Vermicomposting Unit*

There would also be a vermicomposting unit that would be used for the decomposition of kitchen waste (vegetable and food waste). This process would be facilitated with the help of earthworms which would convert the decomposed matter into fertile compost which would help improve the quality of soil for farming.

### *Apiary Unit*

A bee keeping unit would also be set up to show the tourists how bees are reared and a demonstrative unit would be set up to show the visitors how the bees are reared.

### *Fish Pond*

A fish pond of 1 acre would have freshwater fishes like carp, rohu and catfish for the consumption of tourists and sale to nearby areas. Re – circulatory Aqua culture system will be used for high density stocking of fish in a smaller

space. Biofilters will be used to purify water and reduce ammonia toxicity from fish water. Waste water generated from fish pond will be reused for irrigation of crops. Mechanical means will be employed for feeding fish. This hi-tech pond in future can be used for training of youths and SHGs interested in fish farming to start an enterprise and supplement agricultural income.

### *Orchards*

There would be seasonal plantations of fruits from time to time like the orange (Oct-Feb), Plumes/mulberries and *Jamuns* (March-July), grapes, guava, *ber* and banana, etc. The Internet of Things or cloud computing technology will be used for irrigating the plants. Strategically placed precise sensors will be used to quantify the presence or absence of water which receives message from cloud-based computer. Electronic sensors capable of detecting nutrient deficiency in plants will be employed to prevent overuse of fertilizers. These high-resolution sensors will be manned on drones which will also provide complete image of entire orchard besides detecting regions which require more nutrients for healthier fruit production. Automated sprayers will be used for water conservation.

### *Recreation Centre*

There would be a provision of camel ride, tractor ride and horse ride to entertain the tourists. A small animal shelter would be set up that serve as an area for the kids to play with rabbits, goats and deer. There would also be *kho-kho* and pottery session to keep the children engaged. There would also be *giddha* and *bhangra* performances by local artists to keep the tourists entertained and acquaint them with the folk culture of Punjab along with providing employment to the rural population. A small telescope would be set up in the evening which will enable the tourists to indulge in star gazing.

### *Herbal Park*

Herbal Park would be set up to show tourists and give them a guided tour in the herbal park. Various plants like *amla*, *ashwagandha*, *tulsi*, aloe vera, *giloy*, lemongrass, citronella and *neem* would be grown which would help tourists understand the agricultural diversity of our country. Moreover, knowledge of herbal and medicinal plants will increase the business related to naturopathy, and allow tourists to buy organic and pure products directly. This will give huge impact on increase in farmer's income.

### *Eco – Housing*

We would incorporate the use of fly ash in creation of the structure/walling and finishing of the eco-house. Provision will be kept for renewable energy based outdoor lighting as under:

- 10% of the overall electricity demand shall be met through renewable energy power
- Solar lighting
- LED Lighting
- Occupancy sensing lighting control

Solar thermal collectors would be used (hot water demand) to meet the requirements of the tourists. Low flow plumbing fixtures would be used to achieve maximum water conservation.



### Demonstration Unit

This would be a major contributor in displaying the cultural and indigenous beauty of the state of Punjab and would be delight for the tourists as they would get to see the famous Phulkari handiwork, live demonstration of *piddhi* and *dari* making and the famous Inlay work of Punjab. It would showcase the beauty of Punjab to international tourists as well.

### Essential Services

All medical emergencies will be dealt with at the medical centre where there would be trained professionals to address the grievance of the person concerned. Fire-safety mechanism and ATM services will also be put in place. Clean packaged drinking water would also be available for everyone. Tourists would be able to avail the eco-toilets that would be created near the entrance.

### Safety Protocols

Mandatory sanitization of visitors and temperature checks will be followed at the entrance. Minimum maintenance of social distance, face masks, contactless payments and no touch practices will be followed wherever possible. Mass rapid screening using radio frequency and 3-D images analysed by AI for weapon detection can be employed for people to pass through quickly. People counting sensors will be used at park entrance to observe a real – time visitors. Virtual queuing with RFID will be done by scanning the guests and texting them when their turn comes next. RFID wearables allow the management to cost efficiently address COVID specific requirements. Various safety technologies such as video surveillance, access control RFID, and biometrics will be used to monitor ticket fraud, control crowds and enhance the experience at Agri – park.

### Virtual 3-D tour of park

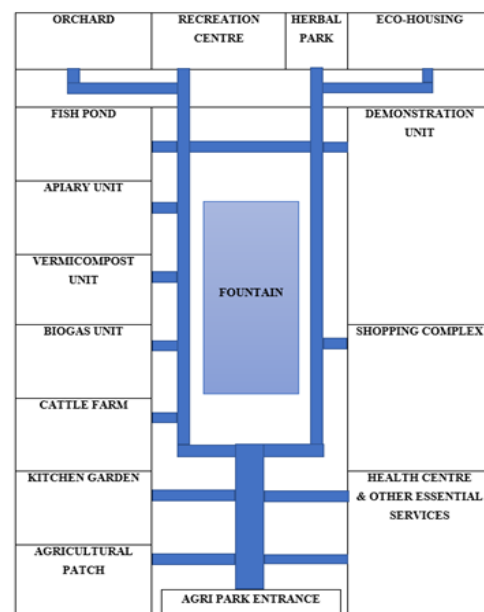
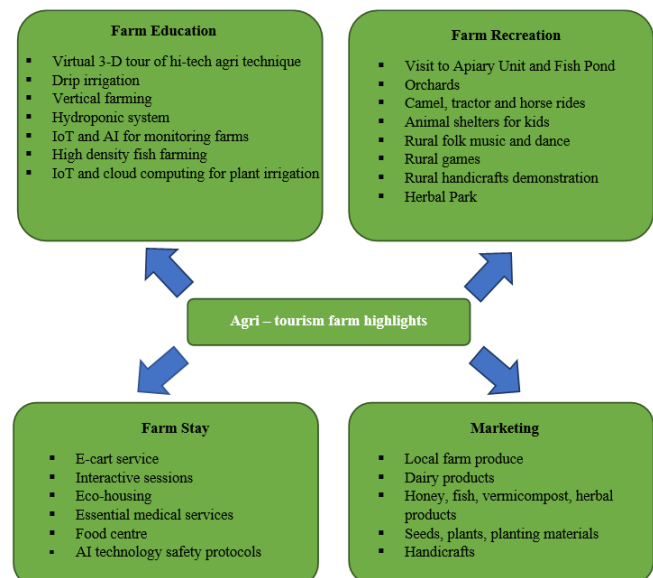
Interactive virtual field trips and activities will be offered in a variety of themes highlighting the importance of plants in human existence, the cropping pattern of diversified crops, medicinal plants and an interesting session on “Designing your own plant specimen” while learning about different plants. The guests would also be told about the important roles insects play in the environment with an informative session on the feeding and living pattern of animals, fish, bees etc.

### Daily Activities at the Agro tourism Park

- Guided crop/vegetables/orchards and allied fields’ visits through E-cart.
- Agricultural and allied training classes on how to grow grapes, sugarcane, guava, vegetables, beekeeping etc.
- Evening entertainment programs like Folk dance (*giddha* & *bhangra*), music, campfire, movie time, star gazing.
- Fun filled sports like *Kho-kho*, *Kabaddi*, Tug-of-war, bullock cart and tractor rides, pottery, etc. to keep the tourists engaged.
- Food Centre to cater to the breakfast, lunch and dinner in true rural style.
- Sale of fresh produce from the agricultural farm at the shopping complex.
- Provide “home-stay” facilities to the tourists and employees.

### Research and Development Centre

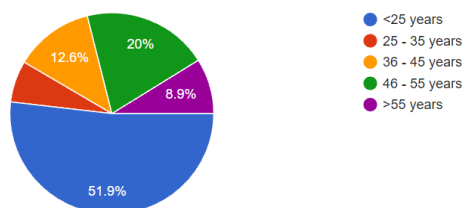
Agro-tech domain is now open for various research and development in terms of food quality, improved yield production, soil-less culture and many more. Under this, Agri-tourism Technology Park, R&D centre will be plotted for live monitoring of various plants and crops. Additionally, many more outcomes are expected under the domain of food technology, food processing, nutrition security, food supply and chain management, food security and others. Robotics and automation are another area of research that will improve the agriculture domain in India. With the rise of data analytics, under this R&D centre real time data analysis will be possible to draw new facts and conclusions. Hence, Agri-tourism Technology Park will open many other gateways in terms of research and development.



## VI. RESULT AND DISCUSSION

### Age

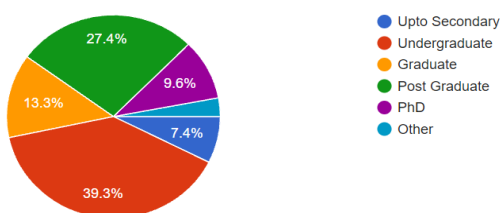
135 responses



Data reveals that more than half (51.9%) of the respondents are <25 years of age, followed by 25-35 years of age (6.6%), 36-45 years (12.6%), 46-55 years (20%) and >55 years (8.9%).

### Educational Background

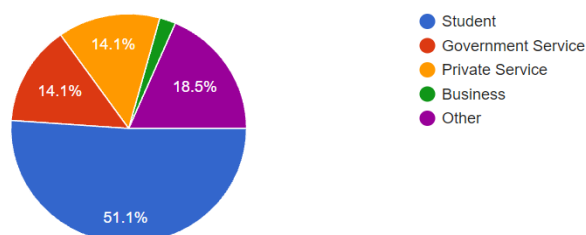
135 responses



Data in the pie chart reveals that 39.3% of the respondents were studying at an undergraduate level, followed by post graduates (27.4%), with 13.3% graduates, PhD holders (9.6%), secondary level (7.4%) and 3% in the others category.

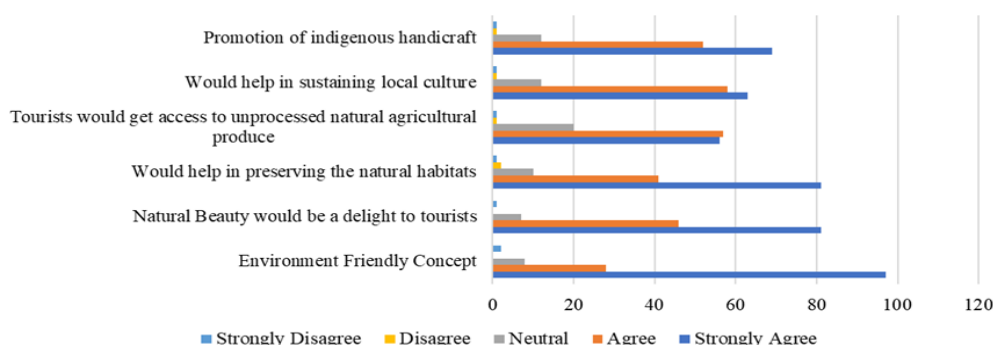
### Profession

135 responses



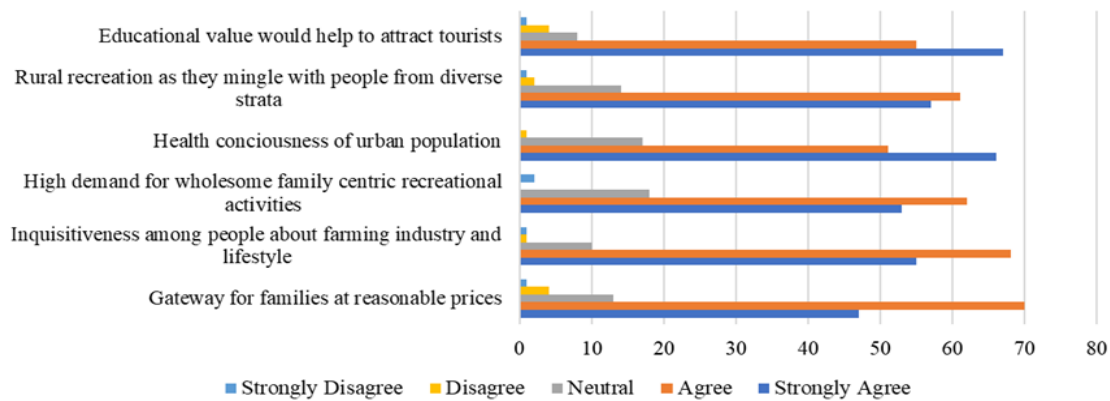
The following pie – chart representation depicts that 51.1% of the respondents were students, succeeded by those in the others category (18.5%), with equal number of respondents in government service and private service (14.1%) and 2.2% in the business sector.

### Importance of developing an Agri-Tech Park



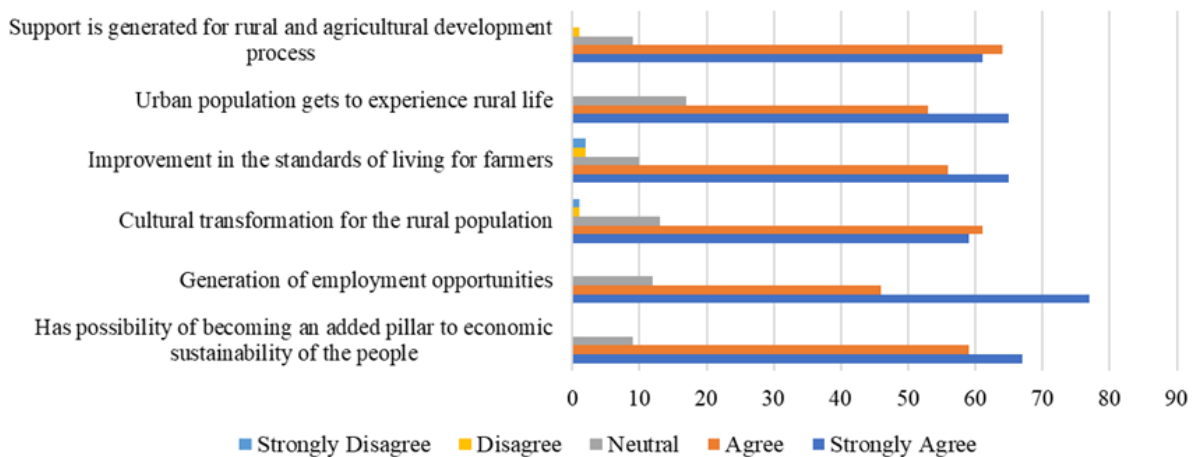
Regarding importance of developing an Agri-Tech Park majority strongly agrees that it's an environment friendly concept, would help in preserving the natural habits and sustaining local culture. Further it's strongly agreed that the development of an Agri-Tech Park would be a plus for the tourist as they would get access to the natural agricultural produce and also promote indigenous handicraft. Only a few were indecisive about the importance of developing the Agri-tech park whereas those who disagreed about its importance were in the minority.

### Scope of developing an Agri-Tech Park



Respondents strongly agreed that the agri-tourism park has educational value to attract tourists and could be a possible promoter for health consciousness among the urban population. It is widely agreed that the scope of agri-tech park reaches to rural recreation for the people, is a promoter of family recreation, increases inquisitiveness among the people about the farming industry and introduces them to their lifestyle and is a reasonable gateway for families. Those who were indecisive about the scope of developing an agri-tech park were less than 1/3<sup>rd</sup> of the total respondents. Very few disagreed about the scope of developing an Agri-tech park.

### Benefits of developing an Agri-Tech Park



Opinion on benefits of developing an Agri-tech park reveals that majority strongly agreed that it will help in improving the standards of living of farmers besides generating employment opportunities in rural area and will enhance urban population getting experience of rural life. Development of technologies in the field of tourism and agriculture opens up gateway to generate more revenue. Further it was widely agreed that the development of agri-tech park generates support for rural and agricultural development process along with promoting a cultural transformation for the rural people. Only 1/3<sup>rd</sup> of the respondents had a neutral view on the benefits of developing an agri-tech park, also only a small percentage of the respondents disagreed about the benefits of agri-tech park.

## VII. EXPECTED OUTCOMES AND BENEFITS

Agri-tourism is unquestionably an enterprise which is not everyone's cup of tea. However, for people who are motivated by the idea of bringing the farm experience to the general public, this enterprise shows promising economic benefits. Agritourism can transform a farmer into an opportunity provider instead of a being at mercy of lack of basic sustenance.

### Increased profits

Agritourism provides a major thrust to improve the lives of the farming community by adding a support to their economic condition—it also enables new farmers and the farming families to work in newer jobs generated by this venture.

### Interaction with the customer

Many entrepreneurs in agriculture appreciate the chance to interact with their target market, nurture their relationships, and hear their needs. This venture provides room for developing farmer-customer relationships.

### Education

Numerous educational institutions and families recognise the importance of imparting children the knowledge about where their food comes from and lots of adults have an interest in reconnecting with their roots, as well. Such ventures are promising sources for providing real-world educational opportunities.

## Rural entertainment

These ventures are great for people who enjoy getting away from the daily hustle-bustle of life. A vacation to a healthy environment is a fun getaway for families and also helps them to interact with nature, livestock and everything that comes with farm life.

## Improved sales of local products and services

People visiting such places from their metropolitan hometowns usually appreciate the idea of purchasing local produce. So, having a marketing venue for the people visiting the Agri-park can further supplement the income of the farmers. The ultimate aim of the park will be to bring more visitors and generate higher revenue and encourage local artisans and artefacts.

Of course, inviting the general public onto your farm carries certain liabilities, but there's no doubt that this venture can successfully foster a fruitful collaboration between the farmer and the public. Therefore, Agri-tourism can be rightly put in the category of sustainable agriculture.

## VIII. ROLE OF TECHNOLOGY IN AGRITOURISM

Technological advancement changes the vision of tourism industry in different way. Similarly, embedding the technological advancements in Agri-tourism will give rise to more revenue generation for rural population. Additionally, major issue with rural population is lack of knowledge in various means; hence technology implementation give change to rural people to gain more knowledge as well. In agriculture domain, various technologies like Internet of Things, Machine learning, data science, etc. added to improvise the agriculture sector in India. Similarly, those applications can be used in Agri-tourism domain to take care about the quality of products, field, animals, and surroundings to give much better experience to the visitors. Another advantage in terms of technology inclusion can be observed like hygiene management, safety and security of tourists, feedback analysis, sentiment analysis, etc. All these will help farmers to grow their business globally and they can improvise their services accordingly. As Punjab region has lot of potential for agro tourism, government and entrepreneurs must help farmers in development of such parks to overcome the financial burdens.

## IX. CONCLUSION AND FUTURE SCOPE

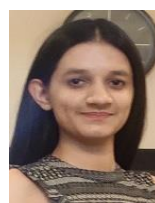
Based on the study it has been observed that the development of Agri-tourism Nature Park is helpful for the farmers to increase their income. In addition to that, Agri-tourism will improvise the environment of rural areas and open up many other opportunities for other residents. This concept will bring lot of creativity among people and can offer various innovations. Along with this, it will help in preserving traditional culture and heritage, improve infrastructure and provide various skills and knowledge to the farmer and the family. The development of such tourism parks will also affect the regional development and give opportunities like accommodation services, transportation, catering, etc. It should also be noted that there are many challenges are also associated with this such as communication skills, insufficient financial support, lack of

trained human resources, and many others. These challenges are unavoidable there for lot of work should done on these to maximize the benefits. Improvement of basic infrastructure development in rural areas can make the future bright one.

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