

GIG ECONOMY IN AGRICULTURAL BIOTECHNOLOGY: FREELANCE WORKERS FOSTERING SUSTAINABLE FARMING- A CASE STUDY APPROACH

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Abstract:

Agriculture and industry are closely related through agro-based enterprises. In addition to processing and adding value to agricultural products, these sectors make sure that customers can access and purchase them. They accomplish this by offering a vital link between agriculture and the larger economy. The development of agro-industry can also have an important impact on the local agricultural sector as well as the livelihoods of small holder farmers, provided their basic requirements are taken care by the government and facilitate the environment in which the rural people in general and poor in particular would find a sustainable livelihood. Agro-based companies are essential in promoting sustainable development because agriculture is the foundation of many emerging economies. Through effective resource utilization, climate change mitigation, and rural development, these industries—which rely heavily on agricultural products as their core raw materials—promote sustainability and economic prosperity. Examining the economic factors and effects of agricultural research, especially biotechnology research, this work aims to comprehend how agricultural biotechnology may be used to help the impoverished in emerging nations.

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Introduction:

India's rural areas are home to many farmers and agricultural labourers. They offer a range of services associated with agriculture, such as farm maintenance, animal management, and crop supply. Agriculture-related services are essential for the operations of many food processing industries. Large-scale sustainable farming can be adopted by agri-tech enterprises by utilizing technology such as remote sensing and artificial intelligence.

The economic potential of knowledge-based business sectors has been highlighted by a number of people and groups, as the necessity of supporting and investing in them as well as the infrastructure required for their success. One of the major industries in this category that stands to gain from the quickening pace of new discoveries and technological advancements is the bio-

based economy. It is also one of the most rapidly expanding, profitable, and adaptable (e.g., scalable) innovation areas, requiring a significant amount of people and financial resources. Significant increases in agricultural productivity and production can be achieved through agricultural research and technical innovation, which can also spur overall economic growth and help millions of people transcend hardship. An essential connection between industry and agriculture is represented by agro-based sectors. These comprise sectors that depend on plant and animal-based basic materials. These sectors guarantee the distribution and accessibility of agricultural products to customers in addition to processing and adding value to them. They accomplish this by offering a vital link between agriculture and the larger economy. Industries centered around agriculture are in a unique position to

support sustainability. Their growth can be correlated with social well-being, economic advancement, and environmental preservation because they rely on agricultural goods, which are renewable resources.

Sustainable methods can help agro-based enterprises lessen their environmental impact. Environmental deterioration can be reduced, for instance, by encouraging organic farming, lowering the use of chemicals in agriculture, and employing eco-friendly processing methods. Additionally, a closed-loop system, in which waste from one operation becomes an input for another, might be promoted by agro-based enterprises that prioritize responsible resource management.

By rethinking conventional employment structures and facilitating a more flexible, skill-based workforce, the gig economy has emerged as an influential trend across a number of industries. Freelance workers are becoming important sources of innovation and sustainability in the field of agricultural biotechnology. In contrast to traditional full-time employment patterns, the gig economy in this industry enables independent consultants, field technicians, and researchers to work together on a variety of projects, contributing specialized knowledge to tackle important issues in sustainable farming.

Incorporating agricultural biotechnology with ecotourism also opens up new avenues for sustainable growth. Sustainable farming methods are in line with eco-tourism's emphasis on conservation, environmental education, and community involvement. Farms that use biotechnology to improve soil health and crop resilience can also be ecotourism attractions that show off cutting-edge farming practices to tourists. Ecotourism offers visitors practical chances to learn about sustainable agriculture through activities including agritourism stays, organic farm tours, biodiversity conservation programs, beekeeping courses, and sustainable foraging experiences.

Agricultural biotechnology gig workers support these efforts by providing knowledge on biodiversity preservation, sustainable land management, and educational outreach campaigns. These initiatives strengthen the link between sustainable agriculture and responsible tourism by benefiting local communities economically in addition to encouraging eco-friendly travel.

This study uses a case study methodology to investigate how gig workers in agricultural biotechnology are promoting ecotourism and sustainable farming. This research investigates the benefits and drawbacks of gig-based work in this industry by examining actual cases. Comprehending these relationships is crucial for formulating policies that uphold sustainable farming methods and independent contractors, ultimately bolstering a robust food system and encouraging eco-friendly travel.

Review of Literature:

Roopa M. N et.al (2024) investigated how agro-based companies contributed to employment and revenue generation in a few districts of Karnataka. The findings showed that more than 80% of household income in these areas comes from agro-based sectors, which also significantly contribute to local employment. Although they have made a good impact, issues like seasonal employment, labor shortages, and a lack of sustainability measures still exist. In order to optimize the socioeconomic advantages of agro-based companies, the study ends with recommendations for focused infrastructure development, improved skill training programs, and policies.

Phate N. D. et.al (2024) concluded from the study that the gig economy is causing significant shifts in a number of industries, including the animal husbandry sector in India, which has historically relied on full-time agricultural labor. The industry is adopting gig work more and more because of its efficiency and flexibility.

Rupesh Vasudeo Patil et.al (2023) studied Agro-Industries and their effects on socioeconomic development to be the best way to boost socioeconomic progress. With this perspective in mind, an analysis and rationale of the true relationship between the agro-economy has been conducted as a model. Analysis, industry, and socioeconomic growth seem to be the best way to boost socioeconomic growth. The agenda also includes an analysis and discussion of the real relationship between agro-industries and society.

S. Martins et.al (2023) concentrated on highlighting the dire circumstance of small farmers, the obstacles to their expansion and operations at the local level, issues brought on by natural disasters, price swings, inadequate and delayed understanding of market demand, poor planning, farmer suicides, waste from inappropriate storage, and the financial situation of the farmers through secondary data analysis. According to this paper, in order to maintain the welfare of small farmers and enable them to continue making a profit, infrastructure development, cultivation planning, periodic water management, market sales of agricultural products, integration, technology adoption, and the construction of storage and distribution facilities are all recommended.

Dr. Shruti Bekal et.al (2023) analyzed the gig economy's expansion in India, as well as its prospects, difficulties, and policy implications for the country's economy. The scale, extent, and dynamics of India's gig economy, as well as its effects on the labor market and the policy opportunities and problems it presents, were examined using data from a variety of sources, including government papers, academic research, and industry surveys.

P. S. Shashidara et.al (2022) discusses the many facets of sustainability and the many contributions made by scholars working in the agro-based industrial sector. It underlined the need for in-depth research to support appropriate policy formation and

guaranteed the long-term sustainable growth of this industrial sector by identifying the research gap and scope for thorough study in this area of the Indian economy.

Mr. Ashok Niwruutti Kendre et.al (2022) researched the issues facing the Marathwada region's agro-based companies and potential solutions to help them grow. For balanced growth in the region, attention must be paid to the issues and solutions.

Sarina ROSENBERG et.al (2021) conducted research on the dynamics of various work arrangements in rural Romania, beginning with full-time, permanent contracts and moving on to contingent labor arrangements. This article employs the quantitative analysis method. Observations and findings that describe the overall framework of all work in Romania's rural environment as well as the dynamic tendencies of the various types of work commitment over the studied period can be inferred from the study that was conducted.

Baishali Pal (2021) emphasized how the gig economy has affected India. It has fundamentally changed the way our economy functions and completely changed how people interact at work. The gig economy has a detrimental effect on the working environment in the sector even while it provides workers with a wealth of advantages in terms of independence, employment, flexibility, and so forth. It has benefits and drawbacks in both the Indian and global contexts.

Rahul Kumar et.al (2018) presented the study, "Agro-Industries and their Impact on the Socio-economic Development in District Ghaziabad (U.P.)" was undertaken as a model. Analyzing and elucidating the true connection between agro-industries and socioeconomic growth is another goal. Agro-industries like the sugar, flour, rice, textile, and oil industries, as well as agricultural raw materials, are abundant in the Ghaziabad district.

Major agro-based industries, small agro-based cottage industries, livestock-based industries, and horticultural industries all have significant growth and distribution patterns that are crucial to the socioeconomic development of the region.

Case Study:

1. Namaste Natives and the Gig Economy in Sustainable Tourism

In the contemporary world, where hectic urban life frequently has a negative impact on one's physical and mental health, there is a growing need for peaceful getaways that help people rediscover their connection to nature. A trailblazing project that meets this need is Namaste Natives, which provides eco-friendly travel experiences while utilizing the gig economy to advance social responsibility, economic development, and environmental preservation.

The gig economy, which is defined by flexible, temporary work, has grown to be a crucial component of Namaste Natives' business operations. Namaste Natives promotes sustainable and locally generated economic opportunities through a network of eco-friendly lodging providers, organic growers, craftspeople, wellness specialists, and local guides.

Businesses Available to Locals:

Experiential cultural experiences are provided by local storytellers and guides.

By selling their handcrafted goods, artisans support local crafts.

Wellness retreats include yoga instructors, therapists, and holistic healers.

Challenges:

Inconsistent Workforce Reliability: The availability of gig workers, such as guides and artisans, might fluctuate, which can impact the consistency of services.

Seasonal Dependency: Gig workers' revenue is erratic because to fluctuations in ecotourism demand.

Regulatory and Legal Complexities: There are difficulties with unclear gig worker labor rules and tourism restrictions.

Sustainability Issues: Growing tourist numbers may put a burden on the environment and lead to problems with trash disposal.

2. Shivar Agro Tourism and the Gig Economy

Shivar Agro Tourism is an agro-tourism enterprise that was founded in 2014 and provides urban visitors with an immersive experience of farm life. Additionally, the company hosts distinctive events like "Watermelon Festival" and "To Be a Farmer," which offer a captivating fusion of enjoyment, exploration, and real farming environments. Shivar Agro Tourism's business model has been significantly shaped by the growth of the gig economy.

Shivar Agro Tourism is a crucial component of the gig economy since it depends on flexible, temporary job arrangements.

Tourism and Hospitality Services: To improve visitor experiences, temporary hires of chefs, tour guides, and other hospitality personnel are used.

Shivar Agro Tourism adjusted by launching direct-to-consumer sales of farm-fresh products during the COVID-19 lockdown in March 2020. Digital platforms and gig economy workers provided significant support for this change:

Delivery Services: To distribute fruits and grains to clients in and around Mumbai, independent delivery workers were hired.

Online marketing: To increase visibility, freelancers oversaw digital ads, website content, and social media initiatives.

E-commerce Integration: To reduce reliance on conventional retail models, platforms such as

Instagram, WhatsApp, and local delivery applications were used to expedite orders and payments.

3. Plant Nursery plays a significant role in the gig economy

During peak seasons (spring and monsoon for planting, winter for sales), plant nurseries need more workers. This results in gig-based employment for:

Temporary employees are hired to plant, water, prune, and maintain plants are known as nursery workers.

Delivery Staff: Gig workers that bring gardening supplies and plants to clients.

Experts in landscaping and gardening: Independent contractors who help clients create residential gardens.

As online plant shopping has grown, many nurseries now depend on gig workers for:

Social media marketing: Website, Facebook, and Instagram promotions are managed by freelancers.

E-commerce Management: Order processing and inventory updates are handled by temporary employees.

Photos & Content Creation: To draw in customers, gig workers provide blog entries, videos, and product photos.

Obstacles and Prospects

Worker Stability: Because gig workers are used so frequently, it can be difficult to provide consistent service.

Logistics Management: Using third-party gig-based delivery services to ensure the timely delivery of fragile plants might be challenging.

Market Competition: Constant innovation is needed as more nurseries go digital.

Key Findings: Flexible and On-Demand Expertise: Farmers can obtain specialized knowledge as needed through the gig economy, which lowers long-term

employment expenses while providing them with professional advice.

Technology-Driven Sustainability: By using AI-based analytics, remote sensing, and biotech solutions, gig workers support genetic crop improvement, precision farming, and soil health assessments.

Gig Workers' Expanded Role in Agri-Biotech: Sustainable farming methods are being greatly aided by freelancers, such as agronomists, biotechnologists, and digital consultants.

Ethical and Regulatory Considerations Concerns about data security, bioethics, and intellectual property rights are raised by the absence of defined regulations governing freelancing biotech employment.

Rural Digital Divide: In rural villages, a lack of internet and technology access makes it difficult for gig workers and farmers to work together seamlessly.

Prospects for Agri-Biotech in the Future: Gig workers are anticipated to contribute more to the efficiency, sustainability, and profitability of farming as a result of the development of AI, IoT in agriculture, and blockchain traceability.

Conclusion: Agricultural biotechnology's gig economy encourages sustainability and innovation by providing freelancers with agri-tech, organic farming, and precision farming skills. Case studies that highlight gig-based ecotourism and sustainable livelihoods include Shivar Agro Tourism and Namaste Natives. In urban gardening, plant nurseries also increase gig jobs. Gig workers will have a greater influence on environmentally friendly farming practices and sustainable conservation if digital access, fair salaries, and regulations are strengthened.

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