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RESEARCH ARTICLE

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## ORGANIC VEGETABLE PRODUCTION AS A SUSTAINABLE LIVELIHOOD STRATEGY

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### ABSTRACT

Horticulture production generates a lot of revenue in India, and organic vegetable farming is an excellent long-term livelihood strategy. Sustainable livelihoods aid in immediate development, sustainable resource management, and poverty eradication, according to the United Nations Conference on Environmental Development (UNCED). Individuals' livelihoods can be enhanced by implementing various livelihood strategies. The focus of this study paper is on the development of income through organic vegetable farming. A conceptual framework for organic vegetable farmer's sustainable livelihood was created, and a research was conducted on nine farmers across Potka and Golmuri Blocks of East Singhbhum District, Jharkhand, using the framework. The framework is designed in such a way that it can demonstrate the benefits of organic farming in terms of human well-being and environmental health, as both have an impact on a farmer's livelihood. In addition, a resource mapping of the research areas is carried out to determine the livelihood resources used by these farmers in their production. As a consequence, the study discovered that, while farmers practise organic farming and earn a good living, they confront a number of obstacles, including climatic change, market instability, poor product quality, and so on.

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## INTRODUCTION

India is the world's greatest producer of fruits and vegetables, accounting for between 12.5 and 9.7% of global production in 2010. (FAO, 2012). The country exports roughly 6, 99,600.34 metric tonnes of fresh veggies, with the Bangladesh, Malaysia, the Netherlands, the United Kingdom, Sri Lanka, Nepal, UAE, Pakistan, Saudi Arabia, and Qatar (ICAR-IIVR, 2017). Fruits and vegetables, among other crops provide producers with a very appealing return. More than 70 different species of vegetables are grown, generating a lot of money and jobs for small farmers, especially in peri-urban areas (ICAR-IIVR, 2017). Organic agriculture is viewed as a long-term livelihood strategy that improves agriculture's adaptability and ability to contribute to environment (Lasco et al., 2011; Scialabba and Muller Lindenlauf, 2010). It can be used in a variety of climate regions and under many local conditions (Muller, 2009). Because it provides resource ownership, access to basic requirements, and livelihood strategies as described by The Brundtland Commission in 1987, it is the best adaptive sustainable livelihood plan for rural people. Organic vegetables are 10 to 50 percent more expensive than ordinary ones. Organic vegetable production is a long-term source of income since it can withstand and recover from stresses and shocks, as well as retain or improve its capabilities and assets in the present and future.

Organic farming practices reduce the use of synthetic inputs, which is better for the environment and human health. They also enhance soil structure by generating greater air space and water retention. The plants' taste and nutritional content enhance as a result of the natural, healthy growth. Organic fruits and vegetables aid in the production of sustenance, health maintenance, illness prevention, and the elimination of vitamin shortages. Chemical fertilizers, on the other hand, have a negative impact on the health of soil microbes that are useful to plants (Sarfraz, 2022). This also results in water contamination, crop burns, increased air pollution, soil mineral loss, and lower crop yields (Hunt, n.d.). As a result, agrochemical contamination of vegetables occurs, posing a risk to human health and the environment. Organic farming has a good influence on people, the economy, and the environment through achieving Sustainable Development Goals like SDG 15 Life on Land, because organic farming has 30-50 percent greater biodiversity. SDG 6: Clean Water and Sanitation, since organic soil has a higher water holding capacity than chemical soil, and SDG 12: Responsible Consumption and Production, by providing farmers with certificates and recognition. SDG 3 Good health and wellbeing, because organic foods include more nutrients, as well as SDG 2 Zero Hunger and SDG 8 Decent Work and Economic Growth, because organic foods contain no chemicals that harm workers' lives. SDG 13 Climate Change is also indirectly achieved since plants are carbon sequestrers, and SDG 14

Life Below Water is indirectly achieved because there is no chemical fertilizer runoff (Nature& more, n.d.). The research will demonstrate the advantages and limitations of organic farming in a variety of areas, including the impact on plant and soil health, ecosystem wellbeing, farmer livelihood, job creation, and public health. Farmers that grow organic vegetables are given a conceptual framework to help them live sustainably. Furthermore, a resource mapping and a sustainable livelihood framework is used to demonstrate the organic vegetable growers' livelihood. Environmental health, economic progress, and social and cultural development are all examined.

**Sustainable Livelihood Approach:** When dealing with shocks and maintaining or improving its capabilities and assets, as well as the natural resource, a livelihood strategy is defined as the capabilities, assets, and activities essential for survival (Chambers and Conway, 1992; Carney, 1998). The Department for International Development popularized the concept of sustainable livelihood in the late 1990s (DFID). Perspectives on poverty, exactly how poor people create their lives, and the role of operational and institutional challenges are all changing as a result of sustainable livelihoods initiatives (Ashley and Carney ,1999). Yearly and seasonal formal-sector employ, informal labour, household gardens, livestock production, cultivation or use of natural resources, labour trading, contracted work, borrowing, scavenging, stealing, and begging are just a few examples of livelihood activities. Sustainable livelihoods, according to the United Nations Conference on Environment and Development (UNCED), serve as an integrating factor that allows for simultaneous development, sustainable resource management, and poverty eradication. The Sustainable Livelihood conceptual framework focuses on examining the roots of poverty, people's access to resources, and their various livelihood activities, as well as the relationships between related factors at the micro, intermediate, and macro levels, as well as assessing and prioritizing interventions (Adato & Meinzen-Dick,2002). The framework could be dynamic, recognizing changes as a result of external fluctuations and human actions. It begins with the vulnerability context in which people operate, which includes trends (such as national or international economic trends, technological changes, and political systems), shocks (such as illness or death, conflict, and weather), and seasonality (such as illness or death, conflict, and weather) (of prices, production cycles). These three elements have a direct impact on poor people's efforts to make a living now and in the future. An illness in the family, for example, can rob a family of a significant source of income and force them to liquidate crucial assets they have accumulated. Seasonal fluctuations in prices, production, and employment prospects are also a constant source of misery for the poor. The majority of developing nations are sensitive to the negative effects of climate change on socio-economic sectors such as water resources, agriculture, forestry, fisheries, and human settlements, as well as natural systems and human health (IPCC 2000a).

The five capitals are then shown in the DFID (1999) framework, starting with Human capital is defined as "skills, knowledge, labour capacity, and good health that enable people to attain their livelihood goals." Natural capital refers to "natural resource stocks such as land, plants, and minerals"; social capital refers to "social resources on which people rely in pursuit of their living aspirations through networks and membership of organisations; Physical capital refers to "fundamental infrastructure and producer commodities including transportation, shelter and buildings, water supply and sanitation, energy, and communication," while financial capital refers to "cash-based financial resources." Public and private institutions, as well as national policy and local culture, can alter the vulnerability environment as well as the assets available to poor individuals. The public and private sectors, community institutions, civil society, and laws and culture can all impact livelihood strategies, or the choices people make in pursuit of income, security, well-being, and other reproductive goals. Growing a vegetable crop, for example, is a minor means of income supplementation or stability for a small farmer. Various activities can have a significant impact on financial and labour availability, as well as the effectiveness of certain poverty-reduction development programmes.

An asset base, less vulnerability, and other dimensions of well-being such as health, sense of control, self-esteem, and even cultural asset preservation are all possible outcomes of Framework for Sustainable Livelihoods (DFID, 2000).

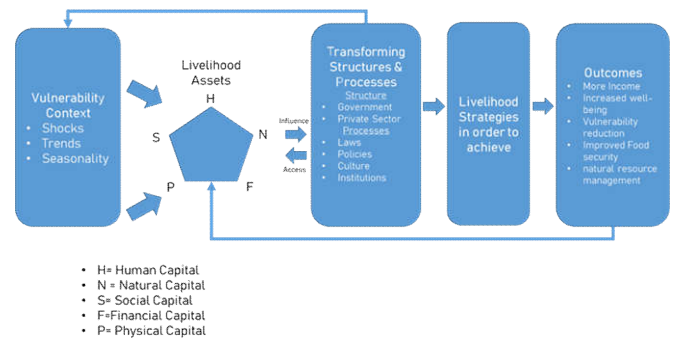


Figure 1. Sustainable Livelihood Framework (DFID 2000)

**Organic Farming:** Working with energy from the cosmos, soil, cows, and plants, which produce and maintain life, is what organic farming entails (ICAR-IIVR,2017). It entails particular ideas and practices for good soil, healthy plants, human food, and animal feed. It is based on the understanding that earth, plants, animals, and humans are all part of the same agricultural cycle. Synthetic fertilizers, herbicides, growth regulators, genetically engineered organisms, and livestock food additives are not allowed in organic farming. Crop rotations, crop residues, animal manures, legumes, green manures, off-farm organic wastes, bio fertilizers, and mechanized cultivation are all used in this system (Vikaspedia, n.d.). Organic farming began 10,000 years ago in India, when ancient farmers began cultivating solely with natural resources. The usage of animal excrement as manure is mentioned in the Rigveda, although the value of green manure is mentioned in the Atharvaveda, that was used before 1000 BC (Bisoyi, 2003; Bhattacharya and Chakraborty, 2005). Farm productivity will increase as a result, environmental damage will be remedied, and farmers will be better connected to more sustainable distribution networks, resulting in increased food security. The excessive use of chemical fertilizers and harmful pesticides, on the other hand, has a negative impact on the ecosystem, resulting in loss of topsoil, decreased soil fertility, surface and ground water contamination, and genetic variety loss. Soil organic carbon contain is depleting, soil fertility is declining, and productivity is declining, all of which raises production costs. At the same time, environmental quality is degrading (Yadav et al., 2016).

**Benefits of Organic Farming:** Organic farming is one of the most long-term agricultural system, with recurring benefits to the soil health and long-term production stability due to higher tolerance to biotic and abiotic pressures. The addition of organic manure to the soil improves the fertility and quality of the soil. In three years, according to the IIVR annual report 2016, there was a 39 percent rise in organic carbon and a 22.3 percent increase in soil carbon stock in organic fields compared to conventional systems. The use of animal compost (such as cattle dung and chicken manure) to soil for crop growth reduced mineral nutrient leaching (Ramesh et al 2010). Increases total carbon content, which stimulates soil micro and macro fauna and turns the soil into a living organism. In a similar study, Manjunath et al. (2016) discovered that vermi compost application promoted higher bacterial and actinomycetes development in soil. Higher fungal populations were found in both FYM and vermi compost treated soils, which might be attributed to a sufficient amount of organic matter serving as a better substance for microbial growth and a conducive soil environment. The "ability of a soil to function within ecosystem boundaries to sustain biological productivity, maintain environmental quality, and promote plant and animal health" is the most common definition of soil quality or health (Doran and Parkin, 1994). Existing and emerging widespread nutrient deficiencies are endangering agricultural output, reducing nutritional quality, as well as affecting animal and human health, because the majority of nutrients essential for human health are

obtained from the soil via plants or animals products consumed by the humans. Soil carbon and organic matter are strongly linked to soil quality, and they have a direct impact on soil chemical, physical and biological function. Organic matters in soil stabilizes the entire landscape, helps in erosion prevention, boosts water holding capacity, and releases nutrients gradually (Karlen et al., 1990). In addition, organic matter, longer rotations, and the use of cover crops reduce bulk density and increase porosity, which promotes root growth conditions (Reganold, 1988; Lal et al., 1994; Gerhardt, 1997; Zhang et al., 1997; Seiter and Horwath, 2004). Because of the reduction in soil quality, soil organic matter is very vulnerable to management measures (Karlen et al., 1990; Ding et al., 2002). Structure, porosity, and bulk density all have an impact on rooting depth, water availability, and aeration, as well as nutrient availability and salinity, which have an impact on plant productivity and health. Reduced soil moisture has an immediate effect on the plant's ability to absorb nutrients and endure drought (Pinamonti, 1998). Adding organic matter to the soil encourages soil organisms to develop and reproduce, while also retaining soil nitrogen in a relatively stable state (Drinkwater et al. 1998). Organic farming also helps to prevent water depletion caused by the use of synthetic fertilizers. Water is essential for human and ecosystem health. Chemical pesticides and fertilizers are used in food production, which degrades water quality and increases societal expenditures on health. In many farmlands, contamination of ground and surface waterways from agricultural sources is a persistent problem. Chemical fertilizers, which are mixed with ponds (Anh, 2010) and other bodies of water, are the source of the contaminants. The chemical inputs used in conventional farming systems, like as nitrogen and phosphorus, cause eutrophication, which is considerably reduced by organic farming. Climate change is also mitigated by organic farming. Growing temperatures, reduced irrigation water availability, flooding, and salinity will be important limiting factors in maintaining and increasing productivity under a climate change scenario. Due to regulated crop rotations and a preference for crop types with high resistance to complex abiotic and biotic variables such as climatic extremes, pests, and diseases, organic farms have more diversity (ICAR-IIVR, 2017).

Farm biodiversity is linked to resiliency to climatic disasters; techniques that increase biodiversity allow farms to replicate natural ecological processes, allowing them to adjust to change more quickly and lower risk. Organic agriculture improves the ability of the agro-ecosystem to function in the face of unforeseen occurrences like climate change by boosting resilience within the agro-ecosystem (Borron, 2006). Organic agricultural approaches can help decrease the negative effects of drought while also enhancing productivity by preserving soil fertility and maintaining or growing organic matter (ITC and FiBL, 2007; Niggli et al., 2008). Organic farming improves soil water-holding capacity, allowing farmers to weather droughts better (Borron, 2006). Organic matter, on the other hand, improves water capture in soils, lowering the risk of flooding (ITC and FiBL, 2007; Niggli et al., 2008). Organic farming approaches reduce fossil fuel energy consumption, reduce carbon dioxide and nitrous oxide emissions, reduce soil erosion, and raise carbon stocks (ICAR-IIVR, 2017). Crop diversity was critical in both systems for smallholder resilience, allowing them to distribute risks such as yield loss or declining demand for a particular vegetable. More than 80% of respondents cited economic reasons for having a wide range of crops.

Statements like "More varieties equals more clients, which equals more money" reflected a diverse desire (Jacobi et al., 2009). The necessity to react to pricing changes was also emphasized, and several respondents said that house-to-house sales necessitated a wide choice of products. More than half of those polled felt that diversification made them less susceptible to insect infestations and yield losses. Broad variety reduces vulnerability and can thus be considered a technique for boosting resilience (Cromwell, 2001). Increased food security through minerals, vitamins, and proteins intake and generate income assets through the sale of their produce. Crop diversity has indirect benefits such as adapting to variable input prices and water scarcity (by using a reliable wastewater source) and risk reduction (by cultivating plants with agro-ecological necessity) (compensation of losses due to the failure of one particular plant with another yield).

**Livelihood and Organic vegetable production:** The concept of "livelihoods" has grown popular in development activities as a way of conceptualizing the various economic activities of poor people. Organic vegetable growing has a number of advantages for improving the lives of the underprivileged in rural areas. It increases food security through nutritional diversity in minerals, vitamins, and proteins aided by self-consumption of farmed vegetables, as well as money generation through the sale of their goods, are two immediate benefits of organic vegetable cultivation for farmers. Farmers in our country are primarily small-scale, with few options, who rely heavily on resources available on their farms or in their towns. Furthermore, the climate in which tropical vegetables are grown varies depending on the season and location, thus temperature and soil quality may have an impact on the crop. As a result, farmers' resilience in the face of climate change must be bolstered through the use of simple, affordable, and accessible technology. Within this perspective, the role of government, private sector, and community organisations is regarded as either facilitating or impeding the process of translating livelihood assets into livelihood strategies (Kinsella et al. 2000) such as organic vegetable production. Access to markets may improve non-farm activities, resulting in higher household income (Haggblade et al., 1989; Reardon, 1997; Barrett et al., 2001; Escobar, 2001), as well as the production of high-value fresh commodities (Haggblade et al., 1989; Reardon, 1997; Barrett et al., 2001; Escobar, 2001). By cutting transportation costs, easier access to markets enhances the benefits of other operations such as crop cultivation and dairy production (Pender, 2004).

### Conceptual Framework



The ability to avoid, or more commonly to tolerate and recover from, such pressures and shocks is part of a sustainable livelihood. For micro policy study of rural livelihoods, Ellis has established a sustainable livelihood framework in a rural context (modified from Ellis, 2000). Livelihood is different in all places, as well as across farm sizes and income and wealth levels, according to him. In addition, women's possible sources of income differ from men's. Environmental resources such as pasture, fuelwood, and water, as well as agricultural lands and tenure farm lands, are available to the village community. The conceptual Framework was created with the livelihood of organic vegetable growers in mind, as well as the labourers that work on these fields. Every farm is unique in terms of income generation, labour availability, gender ratio, culture, land size, and resource availability. The farmer's livelihood is dependent on two factors: first, human well-being, and second, nature health. The framework is divided into two parts: one for human livelihood results and the other for environmental outcomes. Farmers rely on the availability of resources such as manpower, land, water, money, technology, and the assistance of social ethical groups. Natural capital includes things like land, water, and trees; physical capital includes things like irrigation canals, implements, and roads; human capital includes things like education and health; financial capital includes things like cash, savings, cattle, and jewellery; and social capital includes things like associations and networks (Ellis, 2000). For livelihood wellbeing, farmers use these resources for agriculture production with indigenous agriculture adaptation, government support, equal participation among genders, and market practise, while taking advantage of culture practise and agriculture institutions

for soil, plant, and animal health. Farmers' socioeconomic well-being is influenced and affected by context such as trends, shocks, and seasonality. For example, vegetable prices vary according to the season, and postharvest losses due to climate change or transportation delays, as well as a lack of employment possibilities and the usage of chemical fertilisers, have an impact on plant and soil health. Organic vegetable farming has been implemented to overcome the vulnerabilities. Organic farming not only creates a significant amount of cash, but it also helps to safeguard the environment. Farmers and staff who practise organic farming, such as using compost, manures, cover crops, and a variety of crop rotations, enhance the biologically accessible organic matter. The practise of organic farming, which protects against water stress and pollution, is also a sustainable use of water resources. The adaptive technique lowers the chance of individual income failures and provides involuntary reactions to unforeseeable crises. The livelihood outcomes will be increased production, income, job creation, food security for impoverished farmers, and access to nutritious vegetables for everybody, as well as a reduction in the risk of unexpected shock and seasonal variations. Organic farming also increases soil quality, water quality, and biodiversity, all of which benefit the ecosystem and help to mitigate climate change. Livelihood adaptation is a constant process of changing one's way of life in order to improve existing security and wealth while also attempting to lessen vulnerability and poverty (Davies and Hossain, 1997). The positive outcomes not only safeguard the farmers from risk, but also assist them improve their resources, assets, and social networks. Farmers' high earnings, for example, give not only income but also funds for reinvestment in technologies and other projects. Plant and soil health boost natural resources while also making land more fruitful for future agricultural development.

## METHODOLOGY

In this study, the qualitative method has been applied. Several farmers who specialize in organic vegetable cultivation were interviewed. The probability sampling approach is used to select simple random members from a population for research purposes. Following the collection of the sample, an analysis was conducted using the framework for Sustainable Livelihoods described above. The resource mapping of the investigated villages is also carried out in order to determine which of the five resource categories are utilized in the villages.

### Research Objectives

- The purpose of this research is to learn more about how farmers make a living.
- To apply the sustainable livelihood framework to organic vegetable farmers and employees in rural areas.
- To determine the farmers wellbeing and development by organic farming and issues that farmers confront during the agricultural cycle.

**Study Area:** The East Singhbhum District, with a total geographic area of 3,533 km<sup>2</sup>, is located on the undulated surface of the Chhotanagpur plateau between 22.78732 latitude and 86.2279 longitude, at an altitude of 50 meters to 719 meters above mean sea level. Ghatsila, Dhalbhumgarh, Chakulia, and Bhargora are among the district's nine development blocks, which include Golmuri-cum-Jugsalai, Patamda, Potka, Mosabani, Ghatsila, Dumaria, Dhalbhumgarh, Chakulia, and Bhargora. The research is divided into two blocks: Potka and Golmuri. The majority of the inhabitants are tribals, who work in agriculture, cattle ranching, and as daily wage labourers. In total, nine organic vegetable farm lands are assessed in four villages in Potka block (Hesalbil, Jhariya, Chandanpur, Jojosai) and one in Golmuri-cum-Jugsali Block (Kadamdih). With a little technical assistance, all of the farmers follow indigenous agricultural practices. Around 70% of the Jharkhand population relies on rain-fed agriculture, which is categorized by low production, unpredictable weather and natural disasters, soil with low fertility, unproductive irrigation, and depleted natural resources (Chakraborty et al., 2009).

Agriculture and animal production's potential to establish sustainable lives for people is in perpetual decline since current production outcomes, distribution of productive assets, and productive talents are out of step with what is required (Maske et al., 2011). The purpose of the study is to determine the risks that tribal farmers confront and the techniques they use to ensure good productivity.

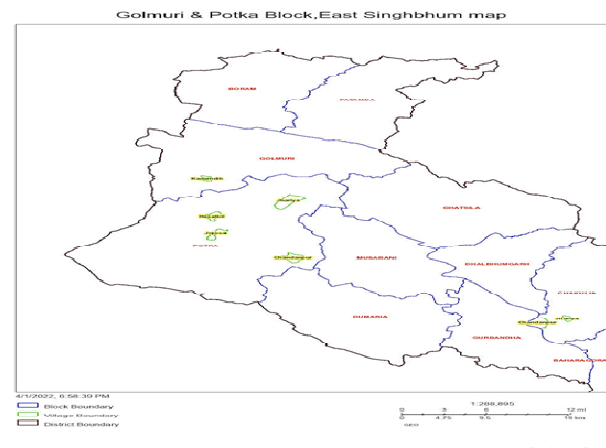


Figure 3 Study Area Map (Jharkhand GIS Portal)

**Resource Mapping of Study Areas:** As stated in the conceptual framework for sustainable living, resource mapping is done to determine the resources used in the production of organic vegetables. Land, water, trees, irrigation canals, roads, education, health, cattle, associations, and networks are among the five categories of resource capitals identified. According to ICAR unirrigated cultivable land (92 percent), forest (32.74 percent), irrigated cultivable land (12 percent), cultural able wasteland (3.59 percent), unculturable wasteland (1.29 percent), and non-agricultural use are the current land use patterns in Jharkhand (0.02 percent). Whereas, the land use cover in East Singhbhum is as follows: Forest (22.06%), unculturable waste land (7.57%), non-agricultural use (28.59%), orchards (1.61%), pasture (0.40%), and cultivable wasteland (0.40%). Rice currently dominates the cropping pattern, accounting for more over 80% of the gross cropped area, followed by pulses (4.20%), maize (2.87%), wheat (1.8%), and oil seeds (0.8%). Crop yields are low due to a lack of irrigation facilities and traditional management practises. The area is ideal for growing vegetables and fruits.

The district grows potatoes, brinjal, tinda-okra, cowpea, capsicum, cauliflower, chilli, tomato, beans, and cucumber, which are largely consumed by the residents. The local tress are sal, gamhar, mango, jamun, jack fruit, karanj, palas. In the East Singhbhum district, there are three soil types Entisols, Inceptisols, and Alfisols. Alfisols are the most common soils, accounting for 71.4 percent of total geological area, followed by Entisols (13.4 percent), and Inceptisols (13.4 percent) (12.8 percent). Soils in 3.9 percent of the district are neutral, 0.7 percent are somewhat alkaline in reactivity, and 61.6 percent of the district has a lot of organic carbon. Primary nutrients include nitrogen (N), phosphorus (P), and potassium (K), whereas secondary nutrients include Sulphur (S) are present in the soil, aid plant growth, development, and yield. Data taken from the report published by National Bureau of Soil Survey and Land Use Planning (ICAR) in collaboration with Department of Soil Science Agriculture Chemistry, BAU, Ranchi. The annual temperature is maximum temperature 40°C – 45°C and minimum of 8°C and annual rainfall is 1200 mm to 1400 mm. All five villages (Hesalbil, Jhariya, Chandanpur, Jojosai and Kadamdih) have Santhali Tribe dominated population, with agriculture and animal husbandry occupation, stable male and female ratio and good literacy rate. Each village have elementary school, anganwadi, health care centers, community service centres or Pragya Kendras and PDS store. Many homes are constructed of native bricks that have been mud plastered and have mud tiled roofs and only a few paccha houses, each have sanitation facilities. The villages are connected with good road networks and

have water resources such as lakes, streams, wells, farm pond, bore wells, and Gudra River in two villages. The schemes adopted by the villagers are MGNAREGA, Mukhyamantri Laxmi Laadli Yojana, Indira Gandhi Matritva Sahyog Yojana, Mukhyamantri Kanyadaan Yojana, PDS, Pradhan Mantri Kisan Mandhan Pension Yojan, Jal Jeevan Mission, Ayushman Bharat scheme, Adarsh Gram Yojana. Also have village institutions such as Krishi Vigyan Kendra, Bazaar Samiti which support in production of vegetables.

#### Data Analysis using livelihood framework

**Table 1**

Livelihood Assets	Analysis
Human Assets	Farms of a smaller scale on a daily salary, 4-5 labourers from the local hamlet are employed, whereas large farms employ 18-20 workers. Farmers and their families also collaborate to get the best possible results and earnings.
Social Assets	Follow traditional agricultural practices, such as using organic manure and drawing water from rivers, ponds, and wells, as well as relying on rain. During the kharif cropping season, one farmer family assists another. Also, Krishi Vigyan Kendra facilities.
Physical Assets	Ploughing equipment and technology, water pumps, a delivery vehicle, and a small house shop.
Natural Assets	Land for farming, water resources (wells, ponds, rivers, and bore wells), and native seeds
Financial Assets	Liquid assets are invested in production, and a bank loan is obtained.

**Table 2**

Transforming Structure and Processes	Analysis
Farmers	Farmers on all nine farms use organic methods to raise vegetables, utilizing existing resources such as land, natural water resources, and bank loans. A farm named "Tribalag Limited" is a large agrobusiness, grows vegetables in quantity.
Government	Many farmers do not receive adequate government assistance.
Gender, Ethnicity and class	The majority of the farmers interviewed were from tribal communities; some were modest farmers who owned little plots of land, while others were huge farmers who won larger plots of land; both genders participated equally.
Law & Policies	Not all farmers asked for government assistance because they were unaware of them due to a lack of ground-level visits, training, and education by government authorities. Also don't know how to acquire the benefits out of it.
Market Practice	The productions were then taken to the local market to be sold. Some farmers sell it on the market on their own, while others sell it at a trading price to other farmers. Some farmers also run small shops out of their homes.
Land Tenure	Two farmers have leased land and are growing vegetables all year.
Cultural Institution	Follow the indigenous farming methods Krishi Vigyan Kendra, Bazaar Samiti, only few farmers send the soil for testing in laboratory
NGO/ Self-help Group	There are no farmers in any self-help groups.

**Table 3**

Vulnerability Context	Analysis
Input Price	Half of the profit. For example, if a farmer earns Rs. 50,000 per month, half of that is invested and the remaining Rs. 25000 is the farmer's income. Because they use a diesel pump to extract water, it is a little more expensive.
Crop Price	The market committee decides on the price of the veggies, or the market auction determines the price. Cheap vegetables are always preferred, but they are chemically farmed. As a result, organic vegetables are more expensive because their production costs more money. For example, a cabbage costs Rs 12 and the cost of cultivating it is Rs 15 due to the high cost of organic materials, but chemically grown cabbage costs Rs 12 simply due to the low cost of production.
Post-Harvest Loss	Because local seed crops degrade quickly while being provided, hybrid seeds is used. They have two days to pluck the veggies; if they wait too long, they will not obtain a good crop.
Employment Opportunities	Farms of a smaller scale On a daily salary, 4-5 labourers from the local village are employed, whereas large farms employ 18-20 workers. The labour is done by very tiny farm land farmers and their families.
Population health	Farmers' lives have improved, and customers have access to high-quality, chemical-free veggies that keep them healthy.
Production Cycle	Farmers begin by ploughing the soil and evening it out by draining all of the water from the field. The mud is then examined, and an amount of organic compost and, if necessary, chemical compost is applied based on the results. Plant samples are planted, along with ridges and furrows. After 10 days, they loosen the mud, remove the unwanted weeds, and the produce is ready in 50 days. Water flows through the furrows on a regular basis.
Soil Health	The soil is tested first, and then a specific amount of organic compost is applied based on the results; some farmers also use chemical compost if needed. Plastic mulches are used by some farmers to boost agricultural yield. This has the advantage of allowing the plants to grow faster, use 70% less water, and maintain the soil's high temperature. Some of them let the soil dry in the sun for 3-4 days before adding water to keep the soil warm during the winter.
Crop Health	Jeevan Amrit fertilizer was used, which is made from cow dung, composted plant waste, and cow urine. Jeevan Amrit is a fantastic performer. Every day, small village farmers stay in the field to tend to their crops and ensure that cattle do not consume them.
Climate Change	Plants are harmed by frequent rainfall, and farmers must endure an unpleasant situation. High temperatures also impair cultivations.

**Table 4**

Organic Farming	Analysis
Technology	Water pumps, ploughing technologies
Techniques	Indigenous method of farming, Plastic Mulches
Seeds	Some people buy seeds from the market or from Krishi Vigyan Kendra, while others buy from other states.
Field preparation	In the first phase, we use a hoe and a garden trowel to prepare the field and totally dry it. After that, apply manure and sow the seeds. When the sprouts emerge after 3-4 days, we water them every 3-4 days to keep the soil temperature steady.
Manure	cow faeces and plant composts, as well as Amrit Jeevan jal
Water	bore wells, wells and local stream, river, pond
Pest	Use organic pest

Table 5

Outcomes	Analysis
Production	A farm with 40,000 cabbages produced well, resulting in a nice profit.
Income	Workers gain half of their earnings from the sale per day of daily wage rate.
Employment	Many villagers' labourers will be able to find job.
Food Security	Good vegetable sales improve the farmers' well-being and ensure food security.
Nutritional Food	Both the client and the farmer's family benefit from organic vegetable eating in terms of nutrient absorption.
Risk Reduction	Improve the livelihoods of farmers and their workers, and safeguard individuals from diseases that are damaging to them. Contribute to the reduction of climate change
Soil Health	Organic farming improves soil health by increasing nutrient and mineral content.
Biodiversity	Vegetable cultivation that is organic promotes the farm's biodiversity.
Water	Chemicals are not used so no effect to the water bodies, and organic matter improves soil quality and water holding capacity, resulting in the usage of less water.

## DISCUSSION

All of the data acquired in the field work is analysed using the framework created. Starting with the five resources; for human resources such as workers employed in farms, farmers and their families collaborate to achieve the best results and earnings; for social assets, farmers use indigenous agricultural practises; for physical assets, farmers use ploughing tools and water pumps, as well as other water reservoirs; and for financial assets, farmers use cash and loans. These assets are now exploited in a sustainable way by vegetable growers using cultural organic farming practises that include gendered engagement throughout the production cycle. Plants require a large number of nutrients and minerals, resulting in nutritious veggies for customers. However, there are risks associated with the production cycle, such as climate change and post-production losses. The outcomes assist these farmers in a variety of vulnerable situations, including job opportunities, crop prices, sound investment, and soil and plant health. Furthermore, positive outcomes give farmers with more and better assets, allowing them to grow more crops, and so on. The framework for vegetable farmers' livelihood is successful because organic farming provides both well-being for the farmer's family and workforce as well as a healthy environment with a diverse ecology. Plants that ingest a sufficient number of nutrients and minerals produce nutritious vegetables for consumers. However, risks like as climate change and post-production losses exist in the production chain. The results assist these farmers in a variety of vulnerable situations, including job prospects, crop prices, sound investment, and soil and plant health. In addition, positive results offer farmers with more and better assets, allowing them to grow more veggies, and so on. The framework for vegetable farmers' livelihood is successful because organic farming provides both well-being for the farmer's family and workforce as well as a healthy environment with a biodiverse ecosystem. After speaking with the farmers, new ideas emerged that production outcomes are influenced by a variety of factors such as human neglect, transportation, customer performance, crop price, and climate change. If weeds are not removed in a timely manner, the growth of the roots of the plants is harmed, and they do not receive water from the soil. Also, plucking vegetables on time is important; if you wait too long, the vegetable will get old and tasteless. The performance of the vegetable on the market and its pricing can affect the farmers' income from production. For example, while organic vegetables are more expensive due to their higher cost, individuals are less likely to purchase them and prefer vegetables that are less expensive and grown using pesticides.

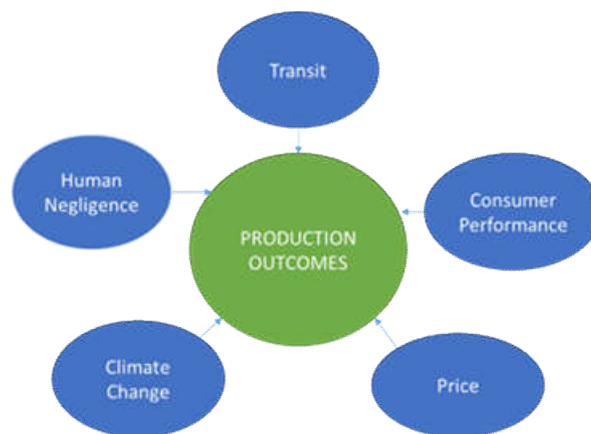


Figure 4. Impacts on Production Outcomes

It has an impact not only on farmers' income but also on people's health. In some farm scenarios, output is harmed by constant rain during the winter, and production is harmed by transportation; to minimise such losses, farmers employ hybrid vegetable seeds, which are more resistant to rotting than indigenous crops. A major issue among farmers is that, despite the fact that there are several government agricultural schemes and programmes, most farmers are unaware of them, indicating a lack of ground education by government authorities. Furthermore, only three farmers are aware of the soil testing laboratory.

## CONCLUSION

Organic farming has been discovered to be a long-term livelihood strategy that improves adaptive ability and environmental health. India is the world's largest producer of fruits and vegetables, according to the FAO, thus organic vegetable cultivation is the best strategy for the country to pursue. Organic vegetable production is a long-term source of revenue since it can endure and recover from stress and shocks, as well as retain or develop its current and future capabilities and assets. Organic farming decreases the need for synthetic inputs, maintains ecosystem health, and improves soil structure by providing more air space and water retention. Organic vegetable production contributes to SDG 12 Responsible Consumption and Production by providing farmers with certificates and recognition and SDG 3 Good health and wellbeing, SDG 2 Zero Hunger by providing nutrient food to people, and SDG 8 Decent Work and Economic Growth by avoiding chemicals that harm workers' lives. Organic vegetable production is the ideal technique for rural farmer's livelihood because it not only generates cash but also provides good health to humans, animals, and the environment. The entire study was conducted to determine whether organic vegetable growing is a viable livelihood approach that benefits both revenue generation and biodiversity in the ecosystem. Therefore, a conceptual framework was developed to determine the farmers' and employees' livelihoods in organic vegetable production in order to prove the point. The framework is divided into two parts, one for human livelihood outcomes and the other for environmental outcomes, and it is designed to work for farms with varying income, labour quantity, gender ratio, culture, land size, and resource availability. Potka and Golmuri cum Jugsali block, East Singhbhum, Jharkhand, was chosen for this study because it is home to numerous organic vegetable growers. Organic farming is a source of income for all nine farmers interviewed in five distinct villages. The resource mapping of five villages is first completed, which is extremely beneficial to farmers in terms of productivity and income. The findings revealed that the villages possess a wide range of resources required for organic vegetable cultivation and other non-farm activities. Each village has access to adequate water, manure, primary education, and other institute help. However, because the government does not provide ground level education, many farmers are unaware of numerous government agricultural initiatives and projects, as well as how to obtain them.

As a result, farmers must receive sufficient training and instruction. They all cultivate using traditional methods and do not use chemical fertilisers. Physical assets, such as ploughing equipment, water pumps, a delivery vehicle, and a small house shop, as well as institutional and community support, are just a few examples. Each farmer makes a good living, and the farm environment is also clean and varied. But climate change, pricing, and farmer neglect, however, can all have an impact on productivity. In the analysed farms, deiseal pumps for obtaining water from water sources were shown to be a main unsustainable method and need to be replaced by renewable resource of energy. The study proved that employing organic vegetable production as a sustainable livelihood approach in India has been discovered to benefit many farmers while both maintaining biodiversity and minimising climate change.

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