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Assessment of Major Constraints Affecting Vegetable Production and Marketing in Vaishali District of Bihar

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Abstract: The present study was conducted in Vaishali district of Bihar to identify and analyze the major constraints faced in production and marketing of vegetables inhibit the profitability of vegetable growers. The primary data was collected from 100 vegetable growers involved in the production and marketing practices in the district through a well-structured and pre-tested interview schedule. The constraints were determined individually at each of these stakeholders's level. The results revealed that the major production constraints were problem of wild and stray animals, lack of reasonable price, and high occurrence of insect pests and diseases. The most critical marketing constraints were high transportation cost, market price fluctuation and lack of proper storage facilities. The findings highlight the need for effective interventions such as ensuring protection against wild animals, stable market prices, improved input supply, and better marketing infrastructure for enhancing vegetable productivity and farmer income in Vaishali district.

Keywords: *Constraints, Vegetables, Garrett ranking, Production, Marketing*.

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I. INTRODUCTION

Vegetables constitute an integral component of Indian agriculture and play a vital role in ensuring food and nutritional security, generating rural employment, and enhancing the socio-economic status of farmers. They are an essential part of the human diet as they provide vital nutrients such as vitamins, minerals, antioxidants, and dietary fiber, which are indispensable for maintaining good health and preventing various diseases. In the context of India, vegetable cultivation has gained immense importance not only as a means of achieving nutritional balance but also as a profitable enterprise that contributes significantly to agricultural GDP and farm income.

India ranks as the second-largest producer of vegetables in the world, next only to China, contributing nearly 15–16% of the total global vegetable production. According to the latest data from the National Horticulture Board (NHB), the country produces over 200 million tonnes of vegetables annually from an area of approximately 11 million hectares. The wide range of agro-climatic zones in India—from tropical in the south to temperate in the north—facilitates the cultivation of a variety of vegetable crops throughout the year. The major vegetable crops grown in the country include potato, tomato, brinjal (eggplant), cabbage, cauliflower, okra, onion, peas, and cucurbits. Among these, potato, tomato, and onion occupy the top positions both in terms of area and production.

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The vegetable sector is particularly important because of its high productivity and profitability compared to cereal crops. Vegetables offer shorter crop cycles and higher returns per unit area, thereby providing a steady source of income and employment opportunities to small and marginal farmers. Furthermore, the growing urban population, rising income levels, and increasing health consciousness have led to a surge in domestic demand for fresh vegetables. This trend is expected to continue, offering immense potential for strengthening the horticultural economy of the country. However, despite this progress, the sector faces several challenges, including poor infrastructure, inadequate cold storage facilities, inefficient marketing systems, post-harvest losses (estimated at around 20–30%), and limited access to quality seeds and modern technologies. Addressing these issues is crucial for improving the overall efficiency and sustainability of vegetable production in India.

Within this national framework, Bihar holds a significant position as one of the leading vegetable-producing states. The state's fertile alluvial soils, abundant water resources, and favorable climatic conditions make it one of the most suitable regions for vegetable cultivation. Located in the Indo-Gangetic plains, Bihar enjoys a humid subtropical climate with distinct Kharif, Rabi, and Zaid seasons, which allow the cultivation of vegetables throughout the year. According to the Department of Agriculture, Government of Bihar, the state contributes substantially to India's total vegetable production, ranking among the top five states in the country.

Vegetable cultivation in Bihar is primarily concentrated in districts such as Vaishali, Patna, Nalanda, Samastipur, Muzaffarpur, and East Champaran, where farming communities have traditionally specialized in growing vegetables like potato, tomato, brinjal, cauliflower, cabbage, and onion. Among these, Vaishali and Patna districts are particularly known for intensive vegetable cultivation due to their proximity to major urban markets and availability of fertile land. Vegetable farming has emerged as an important source of livelihood for thousands of small and marginal farmers in these regions, providing them with an opportunity to earn higher returns compared to conventional cereal crops. In addition, vegetable production contributes significantly to employment generation, especially in harvesting, grading, packaging, and marketing activities, thereby supporting the rural economy.

Despite its potential, the vegetable sector in Bihar is not without challenges. Farmers often face constraints such as lack of irrigation facilities, high input costs, pest and disease incidence, inadequate access to improved seeds and technologies, and limited institutional support. Marketing constraints, including price fluctuations, lack of organized markets, and exploitation by middlemen, further reduce farmers' profitability. Moreover, the absence of proper cold storage and transportation facilities results in considerable post-harvest losses. These constraints collectively hinder the growth and sustainability of vegetable cultivation in the state. Promoting scientific crop management practices, providing access to quality inputs, developing rural infrastructure, and strengthening farmer–market linkages can play a pivotal role in improving the performance of the sector. Encouraging cooperative marketing and establishing producer organizations can also empower farmers to secure better prices for their produce. Additionally, government initiatives such as the National Horticulture Mission (NHM) and the Paramparagat Krishi Vikas Yojana (PKVY) have been instrumental in promoting vegetable cultivation through technical and financial support.

II. MATERIALS AND METHODS

The study was conducted in the state of Bihar, which was purposively selected due to its significant contribution to vegetable cultivation in eastern India. To represent both geographical regions of the state, Vaishali district was selected purposivelyt from North Bihar considering their prominence in vegetable production. From each district, two blocks were selected purposively based on the concentration of vegetable-growing farmers. Accordingly, Bidupur and Patepur blocks were chosen randomly. Further, from each selected block, two villages were chosen randomly to ensure adequate representation and minimize selection bias. The villages selected from Vaishali district were Saidpur Ganesh and Panapur Dharampur (under Bidupur block) and Harpur Hari and Afzalpur Puraina (under Patepur block). Similarly, From each selected village, 25 vegetable-growing farmers were randomly chosen for data collection, making a total of 50 farmers per block and 100 farmers in the given district.

- *Garrett's Ranking Technique*

To identify the major constraints faced by vegetable growers, Garrett's Ranking Technique was applied. In this technique, respondents were asked to rank the given constraints according to the sternness of the problem. Rank 1 was assigned to the most severe constraint, while higher rank i.e., 10 represents less significant problem. In the next step, the ranks assigned by each respondent were converted into per cent position by using the following formula:

$$\text{Percent Position} = 100\ (R_{ij} - 0.5)/Nj$$

Where:

R_{ij} = Rank assigned to the i^{th} factor by the j^{th} respondent

N_j = Total number of factors ranked by the j^{th} respondent

The calculated percentage positions were then converted into Garrett scores using a Garrett Ranking conversion table. The individual scores obtained from all respondents were summed up, and their mean values were calculated and finally, these mean scores were arranged in descending order to identify the major constraints.

III. RESULTS AND DISCUSSION

- *Production Constraints Faced by Farmers*

The various constraints identified at the farmer's level are presented in Table 1. The major problem reported by most vegetable growers was the problem of wild and stray

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animals, with the highest Garrett score of 75.61, which caused severe crop damage and yield losses. The lack of reasonable price ranked second (score 72.24), as farmers were unable to recover production costs due to low market prices during peak harvest periods. The high occurrence of insect pests and diseases (score 58.23) ranked third, followed by the highly fluctuating weather conditions (score 54.71) which adversely affected yield and quality and high cost of inputs (score 54.03). The lack of suitable vegetable varieties ranked sixth (score 53.00), while non-availability of labour during harvesting ranked seventh (score 45.75), leading to delayed harvests.Other problems included lack of credit facilities (score 37.72), lack of storage facilities (score 32.97), and high weed infestation (score 19.54), ranked eighth, ninth, and tenth respectively. Overall, vegetable production in Vaishali is mainly constrained by animal damage, price instability, pest incidence, and high input costs.

Table 1 Constraints Faced by Vegetable Growers in Production of Vegetables

S. No	Constraints	Garrett Score	Rank
1	Problem of wild and stray animals	75.61	I
2	Lack of reasonable price	72.24	II
3	High occurrence of insect, pests and diseases	58.23	III
4	High fluctuating weather conditions	54.71	IV
5	Highly cost of inputs	54.03	V
6	Lack of suitable varieties of vegetables	53.00	VI
7	Non-availability of labour during harvesting period	45.75	VII
8	Lack of credit facilities	37.72	VIII
9	Lack of storage facilities	32.97	IX
10	High infestation of weeds	19.54	X

➢ *Marketing Constraints Faced by Farmers*

The table presents the marketing constraints faced by vegetable growers in Vaishali district, as analyzed using the Garrett ranking method. The results indicate that the high transportation cost was identified as the most severe marketing constraint, with the highest Garrett mean score of 74.45, followed by market price fluctuation (score 71.82) ranked second. The lack of proper storage facilities ranked third (score 68.68), while the lack of suitable packaging materials and lack of market information were also major issues, ranked fourth and fifth, respectively. Other moderate constraints included heavy losses during the marketing process (rank 6) and an unorganized marketing system (rank 7). Constraints such as delay in payments (rank 8), poor infrastructure (rank 9), and distant markets (rank 10) were perceived as less severe. The findings reveal that transportation and price-related issues, along with inadequate storage and packaging facilities, are the major marketing challenges affecting vegetable growers in Vaishali district. These factors significantly influence farmers' profitability and highlight the need for better marketing infrastructure and institutional support.

Table 2 Constraints Faced by Vegetable Growers in Marketing of Vegetables

S. No	Constraints	Garrett Score	Rank
1	High transportation cost	74.45	I
2	Market price fluctuation	71.82	II
3	Lack of proper storage facilities	68.68	III
4	Unorganized marketing system	52.66	IV
5	Lack of market information	48.34	V
6	Heavy losses in marketing process	47.21	VI
7	Lack of suitable packaging materials	38.61	VII
8	Delay in payments	38.52	VIII
9	Poor infrastructure	31.53	IX
10	Distant markets	27.03	X

IV. SUGGESTIONS TO OVERCOME CONSTRAINTS

The findings of the study clearly indicate that vegetable growers in Vaishali district face a wide range of production and marketing constraints that significantly affect their productivity, profitability, and livelihood security. To overcome these challenges, a series of strategic and policy-oriented measures are required to strengthen both the production and marketing aspects of vegetable cultivation in the region.

At the production level, farmers encounter problems such as crop damage caused by wild and stray animals, pest and disease infestations, high input costs, climatic fluctuations, shortage of labour during peak periods, and lack of improved vegetable varieties. These issues can be mitigated through a combination of technological, institutional, and infrastructural interventions. Community-based initiatives for the control of wild and stray animals, such as the installation of solar or wire fencing around cultivated fields, can effectively reduce crop losses. Establishing a fair and stable pricing system, possibly through the introduction of a minimum support price for

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major vegetables, would protect farmers from market volatility and exploitation by intermediaries. Promoting farmer-producer organizations and cooperatives could further enhance collective bargaining and marketing efficiency.

Effective pest and disease management can be ensured through the adoption of Integrated Pest Management (IPM) and Integrated Disease Management (IDM) practices, supported by regular training and extension services. The timely supply of quality seeds, bio-pesticides, and resistant varieties should be facilitated through organized input supply systems. Similarly, the high cost of production inputs can be addressed through government subsidies, promotion of organic farming, and the use of low-cost, farm-based bio-inputs that improve soil health and sustainability. Climatic variability poses another challenge that can be managed through weather-based crop insurance schemes, dissemination of real-time weather forecasts, and the adoption of climate-resilient vegetable varieties suited to local conditions. Mechanization in key agricultural operations would help reduce labour dependency, while agricultural research institutions should focus on developing high-yielding and pest-resistant varieties. Furthermore, easy access to institutional credit through simplified procedures and the establishment of cold storage and warehouse facilities at the village level would minimize post-harvest losses and stabilize prices.

In terms of marketing, farmers in Vaishali district face several difficulties such as high transportation costs, price fluctuations, inadequate storage and packaging facilities, lack of market information, delayed payments, and unorganized marketing systems. To address these challenges, improvement in rural road connectivity and transportation networks is essential to reduce logistics costs and enhance market access. The development of a reliable market intelligence system would help farmers obtain timely information on market prices, demand trends, and buyer availability, thereby enabling better decision-making. Strengthening regulated markets and promoting electronic trading platforms such as e-NAM can help stabilize prices and ensure fair returns to farmers. Moreover, the establishment of cold storage units, grading and packaging centers, and value addition facilities at the block or panchayat level would reduce post-harvest losses and maintain product quality. Farmers should be trained in improved post-harvest handling and packaging techniques to enhance the marketability of their produce.

Encouraging the formation of marketing cooperatives, farmer-producer organizations, and contract farming arrangements can reduce the role of intermediaries and ensure direct linkages between producers and consumers or processors. Strengthening rural market infrastructure, modernizing existing haats, and promoting digital and mobile-based marketing platforms would help overcome constraints related to delayed payments and distant markets. Additionally, promoting transparent digital payment systems would ensure timely and secure transactions between farmers and buyers.

Institutional and policy support is crucial for the sustainable development of the vegetable sector. Strengthening agricultural extension systems to provide continuous training and awareness on modern production and marketing practices is necessary. Public–private partnerships should be encouraged for the development of infrastructure, input supply chains, and value addition units. Promoting cluster-based vegetable cultivation would enable economies of scale and attract private investment in processing, storage, and logistics. Enhanced coordination among research institutions, government departments, and farmer organizations is essential for the effective implementation of agricultural development schemes and technological innovations.

Overall, by implementing these measures, the major production and marketing constraints of vegetable growers in Vaishali district can be substantially reduced. Improving access to inputs, credit, technology, infrastructure, and organized markets will enhance both productivity and profitability. A comprehensive, integrated, and collaborative approach involving farmers, government agencies, research institutions, and private stakeholders is vital for transforming vegetable cultivation into a more resilient, competitive, and market-oriented enterprise. Such interventions will not only improve farmers' income and livelihood but also contribute significantly to the sustainable growth of the agricultural economy in the region.

V. CONCLUSION

The analysis of production and marketing constraints faced by vegetable growers in Vaishali district of Bihar provides a comprehensive understanding of the major challenges limiting vegetable cultivation and profitability in the region. The findings clearly indicate that farmers are constrained by a combination of biological, economic, technical, and infrastructural factors throughout the production and marketing process.

In terms of production constraints, the results based on Garrett mean scores revealed that the problem of wild and stray animals ranked as the most serious issue, as it leads to considerable crop damage and financial losses for the farmers. The lack of reasonable price for produce and high occurrence of insect, pest, and disease attacks were also identified as major problems, significantly affecting both yield and quality. In addition, the high cost of agricultural inputs, such as seeds, fertilizers, and pesticides, coupled with highly fluctuating weather conditions, were found to further increase the risk and cost of vegetable cultivation. Other notable constraints included the lack of suitable vegetable varieties, non-availability of labour during the harvesting period, and limited access to credit and storage facilities, all of which collectively hinder efficient production.Similarly, the analysis of marketing constraints showed that vegetable growers face several difficulties in selling their produce efficiently and profitably. The high transportation cost was ranked as the most severe constraint, followed by market price fluctuations, both of which directly reduce farmers' income. The lack of proper storage

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facilities and inadequate packaging materials further contribute to post-harvest losses and poor price realization. Farmers also reported insufficient market information, heavy losses during the marketing process, and unorganized market systems, indicating a lack of institutional support and coordination in the marketing chain. Additional problems such as delay in payments, poor infrastructure, and distant markets increase marketing inefficiency and financial insecurity for the farmers.

Overall, it can be concluded that vegetable production in Vaishali district is significantly affected by a combination of production-level challenges—such as crop damage, pest infestations, and high input costs—and marketing-level constraints, including poor infrastructure, high transaction costs, and price volatility. To overcome these challenges, there is a need for comprehensive policy interventions aimed at improving production efficiency, post-harvest management, and market linkages. Strengthening extension services, promoting affordable input supply systems, establishing organized markets, and improving transport and storage infrastructure would play a crucial role in enhancing the profitability and sustainability of vegetable cultivation in the district.

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