



Marketing, Communication and Production Constraints Faced by Vegetable Growers in Western Uttar Pradesh

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HIGHLIGHTS

- Price fluctuation and lack of remunerative prices emerged as the most severe marketing constraint among vegetable growers (CSI = 87.78%).
- Lack of technical and market-related information ranked first among communication constraints (CSI = 83.15%).
- High cost of fertilizers and nutrient management inputs were the leading production constraint (CSI = 87.04%).
- Economic motivation and information-seeking behaviour significantly reduced the overall constraint level.

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ABSTRACT

Vegetable cultivation played a vital role in farm income, employment and nutritional security in India. Growers, however, faced multiple production and marketing challenges, yet evidence on their relative severity in Western Uttar Pradesh remained limited. The study was undertaken during 2025 to analyse marketing, communication and production constraints among vegetable growers and to examine factors influencing their overall constraint level. An ex post facto design was employed in Meerut and Bulandshahr districts of Western Uttar Pradesh. Data were collected from 180 growers through multistage sampling using a pre-tested interview schedule of established validity and reliability. Constraint Severity Index (CSI), Pearson correlation and stepwise regression were used. Price fluctuation and lack of remunerative prices was the most severe marketing constraint (CSI = 87.78%), lack of technical and market-related information the leading communication constraint (CSI = 83.15%) and high cost of fertilizers and inputs the foremost production constraint (CSI = 87.04%). Economic motivation, information-seeking behaviour, annual income and landholding significantly influenced the overall constraint level, jointly explaining 44.10 per cent of the variation. Stronger extension support, reliable market information and timely access to quality inputs are recommended.

INTRODUCTION

Vegetables contribute substantially to food and nutritional security, employment and farm income in India, and their high yield and profitability have drawn farmers towards vegetable-based diversification. India is the world's second-largest producer, and with growing health awareness and urbanisation, demand continues to rise (Noopur et al., 2023). Vegetable enterprises are

internationally regarded as a high-value route out of rural poverty, though their profitability rests on functioning input, information and marketing institutions (Schreinemachers et al., 2018). Uttar Pradesh is a leading producing state, supplying urban centres across northern India.

Expansion in area has not been matched by improvement in profitability. Perishability makes growers dependent on reliable transport, storage, market infrastructure and timely price

information; lacking these, produce is sold immediately after harvest at unfavourable prices. Kumar et al. (2019) reported inadequate market information, high transport costs, delayed payments, poor storage and price fluctuation as major constraints, and Anamika et al. (2023) reported price instability and lack of cold storage among tomato growers.

The difficulties extend well beyond marketing. Distant markets, trader exploitation and want of storage depress marketing performance (Raina et al., 2011; Mishra et al., 2012; Das et al., 2014), while low harvest prices, poor seed quality and rising labour costs are leading production constraints (Pandit & Basak, 2013; Yadav et al., 2018; Gireesh et al., 2019). Shah and Ansari (2020) show that lengthy channels and weak price information reduce marketing efficiency. Gupta et al. (2020) trace production shortfalls to inadequate technical knowledge and weak extension services, while Sahoo et al. (2023); Verma et al. (2025) and Chaudhary et al. (2025) report high input costs, labour shortage and limited information access. Institutional and digital correctives are proposed. Producer organisations are expected to shorten value chains and improve bargaining position, though thin capital and small scale limit their performance (Trebbin, 2014; Kumar et al., 2023), while uptake of information and communication technologies is itself conditioned by education, landholding and social participation (Mittal & Mehar, 2016; Panda et al., 2019). Tripathi et al. (2025) similarly report that limited awareness and poor price information restrict farmers' participation in electronic marketing platforms.

Such studies are numerous, yet the three domains are almost always examined separately, and communication has rarely been placed alongside marketing and production in a single severity framework. Evidence from elsewhere is also not readily transferable to the Western Plain Zone, whose setting is distinctive: assured canal and tubewell irrigation sustain near year-round supply, fragmented holdings keep marketable surplus low, and proximity to the Delhi National Capital Region gives access to large terminal markets reached mainly through dense layers of commission agents rather than organised aggregation. Severity in such a peri-urban, market-integrated setting is therefore likely governed by mechanisms different from those in interior and hill regions, where most comparable studies are located.

METHODOLOGY

The study was conducted during 2025 in the Western Plain Zone of Uttar Pradesh, using an ex post facto design, since the constraints investigated had already manifested and were not amenable to manipulation. A multistage sampling procedure was adopted. Meerut and Bulandshahr districts were selected purposively from Meerut Division for their area under vegetables, 20.98 thousand hectares in Bulandshahr and 18.00 thousand hectares in Meerut, the highest in the division (Directorate of Horticulture and Food Processing, 2025). Two blocks with the highest vegetable area were selected purposively per district, and three villages drawn randomly from each block's list of vegetable-growing villages, totalling twelve villages. From the village-wise list of growers marketing vegetables at the time of the survey, fifteen were selected randomly per village, giving 180 growers.

Data were collected through personal interviews using a structured interview schedule. Content validity was established through a panel of judges from agricultural extension education and vegetable science, and the schedule was pre-tested on thirty growers of a non-sample village, its internal consistency being satisfactory (Cronbach's $\alpha=0.82$). Participation was voluntary, prior informed consent was obtained, and responses were kept anonymous. Data were obtained on selected socio-economic, communication and behavioural characteristics and on the constraints experienced. Annual income was recorded in lakh rupees per annum. Occupation was scored as farming alone (1), farming with allied enterprises (2) and farming with business or service (3). Annual expenditure denotes the cost of vegetable cultivation during the reference year, covering seed, fertiliser, plant protection chemicals, irrigation, hired labour, transport and market charges, and not total household consumption expenditure. Constraints were classified into marketing, communication and production dimensions and their severity measured on a three-point continuum of severe, moderate and minor, scored 3, 2 and 1 respectively. The Constraint Severity Index (CSI) was worked out as:

$$CSI = \frac{\text{Obtained score}}{\text{Maximum possible score}} \times 100$$

where obtained score is the cumulative score assigned by respondents and maximum possible score that attainable if all rated the constraint as severe.

Frequency, percentage, mean and standard deviation were used for descriptive analysis and Pearson's correlation coefficient for relationships with the overall constraint level. Stepwise regression was preferred because the analysis was exploratory and no theoretical ordering existed among the fourteen inter-correlated predictors; it yielded a parsimonious model rather than a test of a pre-specified causal structure. Only variables meeting the entry criterion ($p \leq 0.05$) were retained.

RESULTS

Constraints perceived by vegetable growers

The marketing, communication and production constraints perceived by the respondents, ranked on the basis of their CSI values, are presented in Table 1. Among the marketing constraints, price fluctuation and lack of remunerative prices ranked first (CSI = 87.78%; Mean = 2.63), followed by exploitation by middlemen and long marketing chains (CSI = 85.74%) and lack of cold storage and storage facilities (CSI = 83.70%). High cost and inadequacy of transportation facilities (CSI = 81.30%) and financial difficulties with delayed credit access (CSI = 76.85%) occupied the fourth and fifth positions, whereas lack of timely and reliable market information was placed last in this domain (CSI = 64.44%). In the communication domain, lack of technical and market-related information ranked first (CSI = 83.15%; Mean = 2.49), followed by inadequate extension contact and advisory support (CSI = 79.26%) and language barrier with technical complexity of information (CSI = 75.93%). Low literacy level hampering information uptake recorded the lowest severity in this domain (CSI = 61.30%). Among the production constraints, high cost of

fertilisers and nutrient management inputs ranked first (CSI = 87.04%; Mean = 2.61), followed by non-availability of farm labour at critical crop stages (CSI = 84.07%) and non-availability of quality seeds and planting material (CSI = 81.48%). Weather and climate-related risks were perceived as the least severe (CSI = 59.63%). Severity values of the remaining constraints in each domain are given in Table 1.

Determinants of overall constraint level

The correlation analysis, Table 2 revealed that education ($r = -0.452$, $p < 0.01$), landholding ($r = -0.415$, $p < 0.01$), annual income ($r = -0.432$, $p < 0.01$), economic motivation ($r = -0.601$, $p < 0.01$), information-seeking behaviour ($r = -0.459$, $p < 0.01$) and marketing behaviour ($r = -0.580$, $p < 0.01$) all exhibited significant negative relationships with the overall constraint level. Social participation ($r = -0.255$, $p < 0.05$), mass media exposure ($r = -0.371$, $p < 0.01$), information processing behaviour ($r = -0.343$, $p < 0.01$) and information sharing behaviour ($r = -0.277$, $p < 0.01$) also showed statistically significant negative associations. Age, occupation, family size and annual expenditure on vegetable cultivation did not exhibit significant relationships with the overall constraint level.

Stepwise regression analysis, Table 3 identified four characteristics as significant predictors of the overall constraint level. Economic motivation emerged as the strongest predictor ($\beta = -0.392$), followed by information-seeking behaviour ($\beta = -0.197$), annual income ($\beta = -0.140$) and landholding ($\beta = -0.132$). Together, these variables accounted for 44.10 per cent of the variation in the

Table 2. Relationship of respondents' characteristics with overall constraint level

Characteristics	Correlation coefficient (r)	p-value	Significance
Age	-0.112	0.133	NS
Education	-0.452	<0.001	**
Land holding	-0.415	<0.001	**
Occupation	0.108	0.148	NS
Family size	0.097	0.197	NS
Social participation	-0.255	0.016	*
Annual income	-0.432	<0.001	**
Annual expenditure	0.091	0.225	NS
Economic motivation	-0.601	<0.001	**
Mass media exposure	-0.371	<0.001	**
Information-seeking behaviour	-0.459	<0.001	**
Information processing behaviour	-0.343	<0.001	**
Information sharing behaviour	-0.277	<0.001	**
Marketing behaviour	-0.580	<0.001	**

Note: ** Significant at $p < 0.01$; * Significant at $p < 0.05$; NS = Non-significant.

overall constraint level ($R^2 = 0.441$, Adjusted $R^2 = 0.425$; $F(4, 175) = 34.556$, $p < 0.001$).

DISCUSSION

Price uncertainty and structural weakness in the marketing chain dominate what growers in the zone experience as severity. Price

Table 1. Marketing, communication and production constraints faced by vegetable growers

S.No.	Constraint	Mean Score	SD	CSI (%)	Rank
A. Marketing constraints					
1	Price fluctuation and lack of remunerative prices	2.63	0.60	87.78	I
2	Exploitation by middlemen and long marketing chain	2.57	0.65	85.74	II
3	Lack of cold storage and storage facilities	2.51	0.68	83.70	III
4	High cost and inadequacy of transportation facilities	2.44	0.74	81.30	IV
5	Financial difficulties and delayed credit access	2.31	0.79	76.85	V
6	Poor market infrastructure (weighment, space, delays)	2.17	0.80	72.41	VI
7	Low and unstable market demand	2.07	0.79	68.89	VII
8	Lack of timely and reliable market information	1.93	0.82	64.44	VIII
B. Communication constraints					
1	Lack of technical and market-related information	2.49	0.71	83.15	I
2	Inadequate extension contact and advisory support	2.38	0.77	79.26	II
3	Language barrier and technical complexity of information	2.28	0.79	75.93	III
4	Limited access to media and digital communication platforms	2.12	0.83	70.56	IV
5	Poor mobile and internet network connectivity	1.98	0.81	65.93	V
6	Low literacy level hampering information uptake	1.84	0.81	61.30	VI
C. Production constraints					
1	High cost of fertilisers and nutrient management inputs	2.61	0.61	87.04	I
2	Non-availability of farm labour at critical crop stages	2.52	0.68	84.07	II
3	Non-availability of quality seeds and planting material	2.44	0.72	81.48	III
4	Capital shortage and limited access to credit	2.31	0.79	76.85	IV
5	Irrigation problems and erratic water supply	2.19	0.80	72.96	V
6	Lack of technical knowledge and modern farming skills	2.06	0.82	68.52	VI
7	Pesticide-related issues (availability and application)	1.91	0.82	63.70	VII
8	Weather and climate-related risks	1.79	0.81	59.63	VIII

Note: CSI = Constraint Severity Index = (Obtained Score / Maximum Possible Score) $\times$ 100; Severity scale: Severe = 3, Moderate = 2, Minor = 1.

Table 3. Stepwise regression analysis of predictors of overall constraint level

Predictor variable	B	SE	Beta (β)	t-value	p-value
Economic motivation	-0.379	0.068	-0.392	-5.542	<0.001
Information-seeking behaviour	-0.184	0.060	-0.197	-3.045	0.002
Annual income	-0.018	0.008	-0.140	-2.136	0.033
Land holding	-0.389	0.190	-0.132	-2.043	0.041

Note: Stepwise forward regression (p-entry = 0.05). $R^2 = 0.441$; Adjusted $R^2 = 0.425$; $F(4, 175) = 34.556$; $p < 0.001$.

fluctuation and the absence of remunerative prices (CSI = 87.78%) stand highest because supply arrives seasonally, the produce will not wait, and a smallholder bargaining alone has little to bargain with. Pandit and Basak (2013) and Mishra et al. (2012) report the same ordering, with low harvest prices and trader exploitation as dominant concerns. The severity attached to middlemen and long marketing chains follows from the same dependence, and Shah and Ansari (2020) note that lengthy channels cut sharply into net returns. That cold storage, transport cost and market infrastructure cluster near the top points to a post-harvest deficit rather than three separate difficulties. Kaur et al. (2022) and Mohan et al. (2023) trace substantial post-harvest losses to weak cold-chain facilities, and More et al. (2021) place transport and storage among the most pressing grower concerns, a pattern the present data reproduce for the Western Plain Zone.

Communication constraints, led by want of technical and market information (CSI = 83.15%) and thin extension contact (CSI = 79.26%), point to a knowledge gap that has proved durable. Vegetable cultivation asks for frequent and time-bound decisions on variety, pest management, irrigation and market timing; when the advice comes late, or not at all, decisions suffer and severity rises. Islam et al. (2019) find better-informed growers less constrained, and Gupta et al. (2020) treat weak extension contact as a central obstacle. Literacy ranks lowest in this domain (CSI = 61.30%), which suggests the difficulty lies on the supply side of extension rather than in what farmers can absorb, much as Mittal and Mehar (2016) argue that relevance of content, not receiving capacity, decides whether a channel delivers usable advice.

High fertiliser and input costs (CSI = 87.04%) and labour scarcity (CSI = 84.07%) reflect the input-intensive character of commercial vegetable growing and the steady movement of rural labour into non-farm work, felt most at transplanting, weeding and harvest. Shah and Ansari (2020) and Pandit and Basak (2013) report the same pressures. Difficulty in obtaining quality seed (CSI = 81.48%) compounds them, since the variety chosen settles both yield and market acceptability, as Kundu et al. (2020) and Saikia et al. (2024) also observe.

How severely growers feel these constraints appears to depend on what they command, what they know and what they are inclined to pursue. Economic motivation is the strongest predictor ($\beta = -0.392$): growers working to income targets negotiate the same environment more successfully, and that disposition can be cultivated. Information-seeking behaviour ($\beta = -0.197$) works alongside it, bringing growers to solutions already within reach. Annual income ($\beta = -0.140$) and landholding ($\beta = -0.132$) matter less, in keeping with Pandit and Basak (2013). That behaviour outweighs endowment is the useful finding, since extension can change orientation but not the size of a holding. Three implications

follow: aggregation through producer collectives with adequate working capital, to shorten the marketing chain (Trebbin, 2014; Kumar et al., 2023); block-level advisory calendars carried by mobile and group media, the deficit being one of content supply; and entrepreneurship training treated as core rather than peripheral extension work. Three qualifications apply. The study covers two districts and growers already active in vegetable marketing, so it describes that population rather than the state; its cross-sectional design supports association but not causation; and stepwise selection, being statistical rather than theoretical, leaves the model exploratory until confirmed on an independent sample with formal diagnostic testing.

CONCLUSION

Vegetable cultivation in Western Uttar Pradesh is constrained simultaneously on the marketing, communication and production fronts. Price instability, dependence on intermediaries and the absence of storage depress realized returns; scarce and untimely technical and market advice weakens the quality of farm decisions; and rising input costs together with labour scarcity raise the cost of cultivation. Growers who are economically motivated, who actively seek information and who command larger holdings and incomes carry a visibly lighter constraint burden, which indicates that behavioural orientation matters as much as resource endowment. Extension strategy for the zone should therefore combine market-oriented advisory support and dependable price intelligence with measures that improve access to quality inputs and shorten the marketing chain, so that vegetable cultivation becomes more remunerative and resilient for the smallholder.

DECLARATIONS

Ethics approval and consent to participate: The study involved no invasive procedure on human participants as such the committee of Department of Agricultural Extension, Sardar Vallabhbhai Patel University of Agriculture and Technology, Meerut-250110, Uttar Pradesh, India waived the ethical approval. The purpose of the study was explained to every respondent, prior informed consent was obtained, participation was voluntary and the responses were kept anonymous and used solely for research purposes.

Consent for publication: All the authors have read the manuscript, approved its contents and consented to its publication.

Conflict of interest: The authors declare that they have no conflict of interest, financial or non-financial, in relation to the subject matter of this manuscript.

Data availability statement: Data is available upon reasonable request from the first author as well as corresponding author.

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