



Communication and Marketing Behaviour of Tomato Growers in Southern Odisha, India

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HIGHLIGHTS

- Mobile phones and TV were the most used agricultural information; newspapers, radio, and extension publications were rarely used.
- Over half of the respondents showed medium planning and marketing; education, farm size, and extension contact positively influenced performance.
- Strengthening digital extension services and providing marketing training can enhance decision-making and profitability for tomato growers.

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ABSTRACT

The study investigated the communication and marketing behaviour of tomato growers in southern Odisha during the 2023–24 cropping season. The study employed a multi-stage random sampling technique to select 120 farmers from twelve villages in Gajapati and Rayagada districts. Data were collected using a structured interview schedule, focusing on mass media exposure, information seeking, information sharing, planning, decision making, and post-marketing review. Descriptive statistics, Pearson's correlation and multiple regression analyses were used to analyse the data. The results revealed that 55.8 per cent of growers had medium planning ability and 64.2 per cent displayed medium overall marketing behaviour. Mobile phones and television were always used by about three-quarters of respondents, while newspapers, radio, farm magazines and extension publications were seldom consulted. Extension officials and local leaders were important but infrequently contacted sources of information. Positive correlations were found between communication behaviour and marketing behaviour, and variables such as education, farm size and participation in extension activities significantly influenced both. Enhancing digital extension services, improving farmer training on market planning and expanding market infrastructure could substantially improve tomato growers' decision-making and profitability.

INTRODUCTION

Tomato (*Solanum lycopersicum* L.) is among the world's most important vegetable crops, widely cultivated for its nutritional value and economic significance (Kumar et al., 2020). India ranks second in tomato production, yet productivity remains below the world average due to myriad constraints, including limited access to quality

seed, inadequate market infrastructure, high post-harvest losses and insufficient extension support (Emana et al., 2017). Southern Odisha, comprising districts like Gajapati and Rayagada, has favourable agro climatic conditions for tomato cultivation, but farmers often face low yields and poor market realisation (Kumar, 2024). One critical factor influencing the adoption of improved technologies and market participation is farmers' communication

behaviour—how they seek, process and disseminate information (Anamika et al., 2024). Against this backdrop of favourable conditions but suboptimal outcomes in South Odisha, understanding how farmers communicate and market becomes pivotal. These behavioural dimensions often determine whether improved technologies are noticed, trusted, adopted, and translated into better prices.

Communication behaviour encompasses information input, processing and output. Effective communication enables farmers to access technical knowledge, perceive innovations accurately, and make informed decisions about management practices. Likewise, marketing behaviour refers to the planning, decision making, implementation and post marketing review associated with producing, packaging and selling agricultural products. According to Kotler and Armstrong (2010), marketing involves a social and managerial process through which individuals and groups obtain what they need and want by creating and exchanging products and value. These marketing behaviour can be mapped (Gupta et al., 2021). When farmers possess strong communication skills and sound marketing strategies, they are better positioned to adopt new technologies, access markets efficiently and secure higher returns (Chandra et al., 2023).

Previous research has underscored the importance of communication and marketing behaviours in agricultural development. Leagans (1961) defined behaviour as a composite of knowledge, mental and physical abilities and attitudes. Kumar and Mishra (2018) emphasised that farmers' communication behaviour is shaped by their exposure to mass media, interpersonal channels and extension systems. Sonare et al. (2020) highlighted how the adoption of improved tomato varieties and technologies narrows productivity gaps. Studies have found that marketing behaviour among vegetable growers is influenced by market access, infrastructure, and information availability (Samajder et al., 2016; Kowsalya et al., 2021). However, there is limited empirical evidence about how tomato growers in southern Odisha use communication channels and plan their marketing activities. Such knowledge is vital for designing effective extension programmes and market interventions (Godara et al., 2024a; Godara et al., 2024b).

The present study aimed at assessing the communication and marketing behaviour of tomato growers in selected districts of southern Odisha with specific objectives to identify the mass media and interpersonal channels used by farmers to obtain agricultural information; examine their information seeking and information sharing behaviour; assess their planning, decision making and post marketing practices; and determine the relationship between communication behaviour and marketing behaviour, including factors that influence these behaviours. Insights from this study will help extension workers and policymakers tailor interventions that strengthen communication networks, enhance marketing skills, and ultimately boost tomato productivity and profitability in the region.

METHODOLOGY

The study was conducted in Gajapati and Rayagada districts of Odisha during the 2023–24 cropping season. These districts were purposively selected due to their prominence in tomato cultivation and their representative agro-ecological conditions. From each

district, three blocks with substantial tomato production were identified in consultation with local agricultural officers. Two villages were randomly selected from each block, resulting in a total of 12 villages. A list of tomato growers was obtained from village leaders, from which 10 respondents per village were randomly chosen. This multistage random sampling yielded a total sample size of 120 farmers, deemed sufficient for meaningful analysis.

Primary data were collected through personal interviews using a structured and pre-tested schedule. The communication behaviour of respondents was measured based on three key dimensions. The first dimension, mass media exposure, captured the frequency of using newspapers, farm magazines, radio, television, and mobile or internet platforms to access agricultural information. Respondents rated their frequency of use as "always," "sometimes," or "never." The second dimension, information-seeking behaviour, assessed how often farmers consulted extension agents, block development officers, agricultural assistants, various media, and peer networks to obtain agricultural advice. The third dimension, information-sharing behaviour, examined the extent to which farmers shared agricultural knowledge and experiences with fellow farmers, relatives, neighbours, and members of farmer groups (Billah et al., 2024).

Marketing behaviour was evaluated across four dimensions. The planning component involved actions such as setting production goals, selecting tomato varieties, estimating input needs, and budgeting resources. The decision-making component included selecting appropriate sowing dates, cultivation practices, input combinations, marketing channels, and pricing strategies. Implementation behaviour focused on the actual execution of planned activities, including input procurement, crop management, harvesting, grading, packaging, and transportation. The post-marketing review dimension involved assessing marketing outcomes, calculating profit margins, obtaining feedback from buyers, and drawing lessons for future seasons (Rhamya, 2024). Each component was measured using a three-point response scale and scored accordingly. Composite indices were developed for both communication and marketing behaviours by summing relevant item scores and converting them into percentage values.

Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to summarise communication and marketing behaviour levels among respondents. Pearson's correlation coefficients were computed to assess relationships between different communication behaviour components and marketing performance. Multiple regression analysis was employed to identify socio-economic variables that significantly influenced both communication and marketing behaviours. All data were analysed using SPSS version 23.0.

RESULTS

Mass media play a vital role in transmitting agricultural information. Table 1 presents the distribution of respondents based on their use of different media. Approximately 81 per cent of farmers reported always using mobile phones/internet for agricultural information, and 72 per cent reported always watching television. These media were preferred for their accessibility, visual appeal and real-time updates. In contrast, only 31.7 per cent of

Table 1. Distribution of the respondents based on Mass Media Exposure

Mass Media	Extent of Use (%)		
	Always	Sometimes	Never
Newspaper	31.67	46.67	21.67
Farm magazines	0.00	30.83	69.17
Extension publication	0.00	24.17	75.83
Radio	0.00	30.00	70.00
Television	71.67	22.50	5.83
Internet / Mobile	80.83	14.17	5.00

respondents regularly read newspapers, and none reported always reading farm magazines or extension publications. Radio usage was negligible. The dominance of digital media reflects the rapid expansion of mobile networks and affordable smartphones in rural Odisha. The minimal use of extension publications indicates a gap in the dissemination of formal research outputs to farmers.

Farmers seek information from various sources depending on availability, accessibility and perceived usefulness. A notable pattern is the reliance on personal cosmopolite sources such as extension officers, block development officers and agricultural assistants. For instance, Table 2 shows that 50.8 per cent of farmers sometimes consulted agricultural extension officers, 42.5 per cent sometimes consulted block development officers, and 31.7 per cent sometimes sought advice from agricultural assistants. Very few farmers always consulted these officials (11.7%, 6.7%, and 11.7%, respectively), and a significant proportion never consulted them (37.5%, 50.8%, and 56.7%, respectively). These findings suggest that although extension personnel are recognised as credible sources, their interaction with farmers is sporadic. Reasons may include limited field staff, heavy workloads or farmers' perception that extension services focus more on crop production than marketing.

Mass media sources were also used for information seeking. About 19.2 per cent of farmers always consulted newspapers, 9.7

Table 2. Distribution of respondents based on information-seeking behaviour

Information Sources	Extent of Use (%)		
	Always	Sometimes	Never
<i>Personal cosmopolite</i>			
Agri. Ext. Officer	11.67	50.83	37.50
Block Dev. Officer	6.67	42.50	50.83
Agri. Assistant	11.67	31.67	56.67
<i>Mass Media</i>			
Newspaper	19.17	53.33	27.50
Radio	9.67	71.67	19.17
T.V.	74.17	22.50	3.33
Kisan Call Centre	4.17	66.67	29.17
Internet	35.00	45.00	20.00
<i>Participation in Extension Activities</i>			
Meetings	26.67	71.67	1.67
Demonstration	0.83	25.83	73.33
Field Visit	8.33	57.50	34.17
Farmers' Rally	0.00	9.17	90.83
Agri. Campaign	0.00	5.00	95.00
Workshops	0.00	3.33	96.67

per cent always listened to the radio, and 74.2 per cent always watched television programmes related to agriculture. Newspapers and radio were more commonly used sometimes or never, indicating that they serve as supplementary channels rather than primary sources. Digital media, particularly mobile-based applications and social media groups, were increasingly used to access weather forecasts, market prices, pest management tips and government schemes (Table 2).

Interpersonal communication, especially discussions with fellow farmers, input dealers and village leaders, remained an important channel. Focus group discussions revealed that farmers trusted information obtained from experienced peers and community elders. These interpersonal networks often shaped decisions about varieties to plant, input purchasing and market timing. Extension agencies can leverage these networks by training lead farmers as paraprofessionals to disseminate information.

Information sharing among farmers promotes collective learning and adoption of best practices. Table 3 presents the extent of sharing among respondents. Approximately 48 per cent of respondents reported always sharing information about cultivation techniques with neighbours and relatives, 36 per cent sometimes shared, and 16 per cent never shared. Sharing was more prevalent among farmers who were members of self-help groups or farmer-producer organisations (FPOs), suggesting that group membership fosters the exchange of knowledge. Farmers who attended training programmes were more likely to share information, perhaps because they valued the benefits of collective learning. Some respondents were reluctant to share information due to fear of competition or time constraints. Extension programmes should encourage participatory learning and create platforms where farmers regularly exchange experiences.

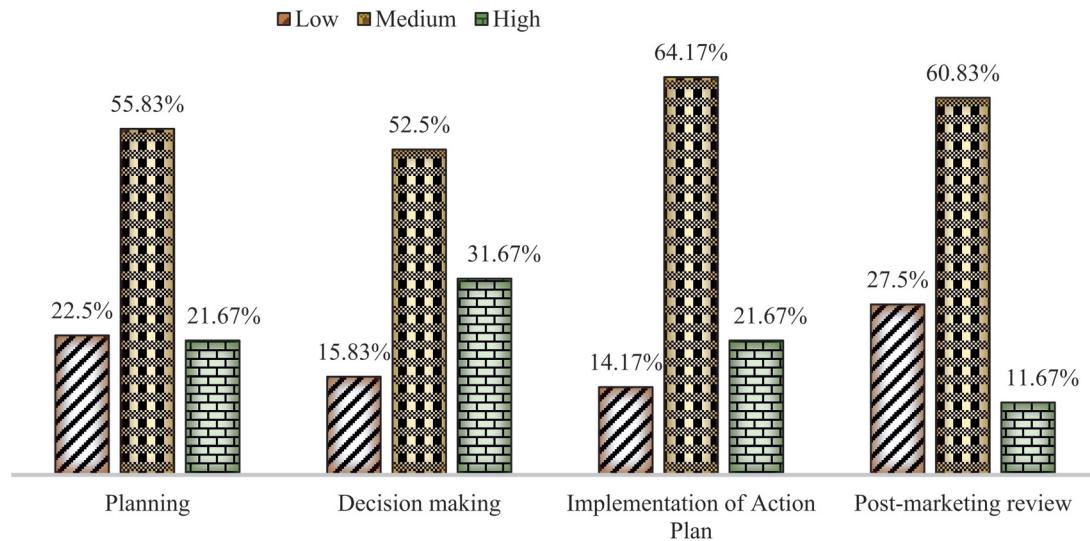
Table 3. Distribution of respondents based on information-sharing behaviour

Information Sources	Extent of Use (%)		
	Always	Sometimes	Never
Friends	35.00	49.17	15.83
Neighbours	14.17	45.83	40.00
Relatives	9.17	42.50	48.33
Progressive Farmers	22.50	48.33	29.17
Local Leaders	6.67	44.17	49.17

Planning involves setting objectives and allocating resources. Analysis of planning scores revealed that 55.8 per cent of farmers exhibited medium planning ability, 22.5 per cent had low planning and 21.7 per cent high planning (Figure 1). Medium planners generally prepared a planting schedule, identified suitable varieties and estimated input requirements, but did not prepare detailed budgets or risk mitigation plans. High planners performed comprehensive planning, including financial budgeting, yield estimation and risk management, whereas low planners made ad hoc decisions without systematic preparation.

Education level, farm size and training participation were positively associated with planning scores ($p < 0.05$). Farmers with secondary education or above and larger landholdings tended to plan better, possibly because they had more resources and knowledge. Participation in training programmes was also linked to higher

Figure 1. Distribution of the respondents based on stages of marketing behaviour



planning scores, suggesting that training equips farmers with planning skills. Regression analysis identified education ($\beta = 0.31$), farm size ($\beta = 0.24$) and extension contact ($\beta = 0.19$) as significant predictors of planning behaviour.

About 58 per cent of respondents belonged to the medium decision-making category, 24 per cent fell into the low category and 18 per cent into the high category (Figure 1). Medium decision makers considered several factors, such as soil fertility, availability of family labour, market price trends and input costs, but often lacked comprehensive information on improved practices. High decision makers sought multiple sources, compared information and consulted extension agents before deciding on variety selection, planting time, spacing, fertiliser doses and pest management. Low decision makers relied mainly on traditional practices and instinct.

Table 4 reveals that information seeking had a strong positive correlation with decision-making behaviour ($r = 0.62$, $p < 0.01$). Regression results showed that education ($\beta = 0.28$), extension contact ($\beta = 0.26$), training ($\beta = 0.23$) and farm size ($\beta = 0.21$) significantly influenced decision making (Table 5).

Implementation scores indicated that 60% of farmers were in the medium category, 23% in the low category and 17% in the high category (Figure 1). Medium performers carried out most of their planned operations but faced challenges in pest management, timely harvesting and quality grading due to labour shortages or resource constraints. Implementation behaviour was positively correlated with planning ($r = 0.55$) and decision making ($r = 0.59$) ($p < 0.01$). Regression analysis identified planning score ($\beta = 0.33$), decision score ($\beta = 0.29$), education ($\beta = 0.21$) and training ($\beta = 0.18$) as significant determinants of implementation (Tables 4 and 5).

Only 45 per cent of farmers always conducted a post marketing review, while 35 per cent did so sometimes and 20 per cent never. Regression analysis indicated that education ($\beta = 0.27$), extension contact ($\beta = 0.22$) and training ($\beta = 0.25$) significantly influenced post-marketing review behaviour. Determinants of marketing behaviour included communication behaviour, education, farm size and training. Regression analysis confirmed these relationships, aligning with Table 5. Table 4 shows significant positive relationships between each dimension of communication behaviour

Table 4. Pearson correlation coefficient analysis of the independent variable with the communication and marketing behaviour

Independent Variables	Communication behaviour (r)	Marketing behaviour (r)
Age	0.625**	0.241**
Education	0.423**	-0.181*
Family Size	0.030 ^{NS}	0.304**
Social Participation	0.631**	0.362**
Total Agricultural Land Holding	0.262**	0.146 ^{NS}
Area Under Tomato Cultivation	0.144 ^{NS}	0.338**
Secondary Occupation	0.233*	0.219*
Annual Income	0.377**	0.662**
Farming Experience	0.726**	0.758**
Training Exposure	0.701**	0.200*
Socio-Economic Status	0.263**	0.159 ^{NS}
Economic Motivation	0.460**	0.648**
Innovativeness	0.351**	0.363**
Risk Preference	0.059 ^{NS}	0.295**
Market Orientation	0.241**	0.756**

** Significant at 0.01 level, * Significant at 0.05 level, NS: Non-significant

and marketing behaviour. Multiple regression results confirmed that communication behaviour was a significant predictor of marketing behaviour, explaining 32 per cent of the variance. This underscores the critical role of communication channels in shaping marketing decisions.

DISCUSSION

The dominance of mobile phones and television in information access, as per the results of the study, highlights the growing importance of digital extension services in rural areas. Farmers use mobile-based platforms to access weather forecasts, pest advisories, market prices and government scheme updates. Smartphones enable farmers to join social media groups where they exchange experiences, ask questions and receive timely feedback from extension agents and agribusiness companies (Das et al., 2025). The high penetration of television and mobile phones suggests that extension agencies should produce more agriculture-related programmes and develop

Table 5. Linear multiple regression analysis of independent variables with the communication and marketing behaviour

Independent Variables	Coefficients of multiple regression			
	Communication behaviour		Marketing behaviour	
	'b' Values	't' Values	'b' Values	't' Values
Age	0.459	3.884	-0.017	-0.217
Education	0.200	4.271	-0.079	-1.893
Family Size	-0.084	-0.813	0.012	0.128
Social Participation	0.337	5.253	-0.029	-0.702
Total Agricultural Land Holding	0.111	0.864	-0.016	-0.165
Area Under Tomato Cultivation	-0.161	-1.316	0.176	1.900
Secondary Occupation	0.033	0.384	0.004	0.059
Annual Income	-0.093	-1.201	0.317	4.606
Farming Experience	0.621	4.589	0.305	2.564
Training Exposure	0.320	2.713	-0.004	-0.051
Socio-Economic Status	0.012	2.503	0.002	0.617
Economic Motivation	0.058	1.560	0.076	2.491
Innovativeness	0.172	2.644	0.126	2.505
Risk Preference	-0.031	-1.032	0.036	1.518
Market Orientation	0.031	0.763	0.119	3.359
$R^2 = 0.829$		$R^2 = 0.783$		
Adjusted $R^2 = 0.804$		Adjusted $R^2 = 0.752$		

mobile applications tailored to farmers' needs (Mapiye et al., 2023; Lahiri et al., 2024). These digital tools can complement traditional face-to-face extension, particularly in areas where extension staff are scarce.

The low use of newspapers, farm magazines and extension publications in the study area suggests that printed media are either inaccessible or perceived as less relevant. Farmers may find printed materials too technical or may lack literacy skills to interpret them. Ensuring that printed materials are written in local languages, use simple language and include visual aids could increase their utilisation (Lahiri & Mukhopadhyay, 2013; Singh et al., 2014). Alternatively, extension services can focus on audio visual media and participatory approaches where farmers learn by doing (Raina et al., 2011; Das et al., 2014; Kumari et al., 2024). The sporadic consultation of extension officers underscores the need to strengthen public extension systems. Inadequate staffing, insufficient mobility and competing responsibilities often limit extension officers' field visits (Saha et al., 2024). Improving the extension workforce, providing incentives for fieldwork and using ICT tools could enhance interaction (Nirmalkar et al., 2022). Encouraging private and community-based extension can also widen the outreach.

This study shows that farmers' medium level of planning behaviour suggests room for improvement. Many rely on experience rather than formal planning. To enhance planning, extension agencies should train farmers in basic business skills, such as budgeting, cost-benefit analysis and risk management. Farmer field schools and participatory rural appraisal techniques can help farmers plan collectively (Nolan et al., 2024). Financial institutions and government programmes offering credit and insurance can support farmers in planning for inputs and mitigating risks. Decision-making behaviour was influenced by education and information. Educated farmers with regular access to information were more confident and systematic in making production and marketing decisions (Raghavendra et al., 2023). Tailored training that integrates technical

knowledge with decision support tools can improve farmers' decision-making skills. Peer-to-peer learning and mentoring programmes may also enhance confidence (Shil et al., 2022).

The medium level of implementation and post-marketing review points to challenges in translating plans into action and evaluating outcomes (Vanacharla et al., 2024). Labour shortages during peak periods, limited access to quality inputs and a lack of storage and grading facilities hamper effective implementation. Strengthening supply chains for inputs, promoting mechanisation and establishing community storage and grading centres can help farmers implement their plans effectively (Sims & Kienzle, 2017). Market inaccessibility and lack of training among the top constraints and urges capacity building and better market access, aligning with your infrastructural remedies (Suman et al., 2025). Encouraging record keeping and developing simple tools for profit calculation and market analysis can improve post-marketing review behaviour.

The positive relationship between communication and marketing behaviour, as found in this study, implies that improving communication channels could enhance marketing outcomes. When farmers access diverse information sources and share experiences, they are more likely to adopt best practices, identify profitable markets and negotiate better prices. Extension services should therefore emphasise interactive communication methods, such as farmer discussion groups, on-farm demonstrations and learning videos, to facilitate knowledge exchange. Policy initiatives that invest in rural internet infrastructure, promote farmer organisations and integrate ICTs into extension programmes will enable farmers to make informed marketing decisions.

CONCLUSION

This study explored the communication and marketing behaviour of tomato growers in southern Odisha. Most farmers exhibited medium levels of planning and marketing, and digital media

were the primary sources of agricultural information. Low engagement with extension publications and sporadic contact with extension officers point to gaps in formal information dissemination. Education, farm size, training and extension contact significantly influenced both communication and marketing behaviours. The positive association between communication and marketing underscores the need for effective communication strategies to enhance marketing performance. Policymakers and extension agencies should focus on strengthening digital extension services, providing managerial and marketing training, promoting farmer organisations and improving market infrastructure. These measures will improve farmers' access to timely information, enable better planning and decision making and ultimately increase the productivity and profitability of tomato cultivation in Odisha.

DECLARATIONS

Ethics approval and informed consent: Informed consent was sought from the respondents during the course of the research.

Conflict of interest: The author declares that there is no conflict of interest related to the publication of this article. The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

The authors declare that during the preparation of this work, thoroughly reviewed, revised, and edited the content as needed. The authors take full responsibility for the final content of this publication.

Data Availability Statement: The data that support the findings of this study are available upon reasonable request.

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