

Original Research Paper

Betel vine (*Piper betle* L.) farmers' marketing behaviour: An analysis using the com-b model and multiple linear regression technique

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ABSTRACT

Betel leaf, known as the 'Green Gold of India', has significant commercial potential, poised to boost foreign exchange reserves. The present study aims to understand marketing dynamics and improve farmers' incomes. A mixed method survey, employing sociogram analysis and the COM-B model included 400 randomly selected farmers from Kumbakonam, Thanjavore district. Findings reveal a predominant reliance on village-level traders (43.08%), followed by commission agents (31.12%), export organizations (17.38%) and consumers (8.42%). Analysis of the COM-B model underscores the crucial roles of extension personnel and family support in marketing endeavours in highlighting challenges *viz.*, market price awareness deficiency (31.80%) and ad-hoc selling practices driven by immediate cash needs (29.80%). Multiple Linear regression analysis indicates that COM factors account for 40.60% of the variance in marketing behaviour. The study emphasizes state intervention to enhance betel vine growers' marketing strategies, including training, demonstrations, policy formulation, and storage facilities, to boost income.

Keywords: Betel vine, COM-B model, marketing behaviour, multiple linear regression model, sociogram

INTRODUCTION

Betel vine (*Piper betle* L.) is a lucrative crop with high nutritional value. Major producing states in India include West Bengal, Maharashtra, Karnataka, Andhra Pradesh, Orissa, Tamil Nadu, and Kerala. Traditionally cultivated by small and marginal farmers, betel vine farming is gradually incorporating scientific methods through the All India Coordinated Research Project on Betel vine, sponsored by the Indian Council of Agricultural Research (ICAR) (Maity, 1989; ICAR, 1997; ICAR, 2000).

Known as the 'Green Gold of India', betel leaves are a promising commercial crop that significantly contributes to India's foreign exchange earnings. In 2021-22, India exported 6517.26 MT of betel leaves, earning 45.97 crores (Biswas et al., 2022). Betel leaves significantly impact India's economy, with 15-20 million regular consumers contributing 7,000 to 10,000 million annually to the national income (Biswas et al., 2022).

Despite its economic benefits, the betel vine industry faces the key problems, lack of quality planting

material, inadequate marketing facilities, insufficient capital, and price fluctuations (Dikshit et al., 2021). Farmers also struggle with storage, market information, high commission fees, and transportation costs (Mandal & Mandal, 2016).

Tamil Nadu is a leading state in betel leaf cultivation, with over 70,000 tonnes produced annually on approximately 9000 acres. Thanjavur district is the second largest betel leaf producer (Vincent, 2023). The Tamil Nadu government plans to establish a betel vine centre near Kumbakonam with a Rs. 3 crore budget for research, farmer training, market exploration, and trader awareness.

Kumbakonam betel leaves, grown in the fertile Cauvery delta region, including Ayyampettai, Rajagiri, Pandaravadai, and Swamimalai in Thanjavur district, are mainly cultivated by small and marginal farmers. They yield 60-80 lakh leaves per hectare annually, with cultivation costs ranging from Rs. 10,000 to 50,000 per acre.

Phytochemical analysis has revealed the presence of flavonoids, tannins, steroids (Prakash et al., 2014).



Trials have shown promising results for tannin and cardiac glycoside content in *Kumbakonam* and *Banarasi* cultivars (Sweatha et al., 2019).

In this study, sociogram was used to understand the disposal points preferred by betel vine growers for selling their produce. Previous studies on marketing behaviour focused on timing, location, and type of sales, categorized into planning, decision-making, implementing, and reviewing (Anusha & Padma, 2022). The COM-B model, which stands for capability, opportunity, motivation, to analyze and influence the marketing behaviour (Michie et al., 2015) employed in the study.

Yu et al. (2020) recommended developing green human resource management practices that provide training (ability), incentives (motivation), and a conducive environment (opportunity) to foster behaviour change. COM-B in psychology where Willmott et al. (2021) mentioned that it explained 31% of the variation in physical activity and 23% in eating behaviour. In physical activity, motivation mediated the relationship between capability, opportunity, and behaviour. In eating, capability influenced behaviour through motivation and relationship between opportunity and motivation was mediated by capability.

Therefore, the following study focused on elucidating the marketing behaviour of betel vine growers using the COM-B model, supported by sociometric scores.

MATERIALS AND METHODS

Mixed-method research was drafted using sociograms to understand the disposal points (to whom the betel vine growers want to sell their produce) preferred by the betel vine growers and the COM-B model was used to study the marketing behaviour. About 400 farmers were randomly selected from Kumbakonam

block of Thanjavore district, Tamil Nadu. Four disposal points commission agents, consumers, export organizations, and village-level traders were identified. Focus group discussions determined growers' preferences, ranking them as first, second, and third choices.

The sociometric score (SS) = $(3*N1) + (2*N2) + (1*N3)$

Where,

N1, N2 and N3 = number of respondents preferred as 1st, 2nd, 3rd choice

Frequency and percentage tabulations were followed by multiple regression analysis to determine the model's influence.

RESULTS AND DISCUSSION

Categorization of disposal points preferred by the betel vine farmers

Respondents were asked about their disposal point preferences identified from FGDs. Table 1 categorizes these points as low (0-25%), medium (26-75%), and highly preferred (76-100%) based on sociometric scores (Rajapandi et al., 2021), depicted in Fig. 1 (Northway, 1940).

Village-level traders scored 1034, showing a strong preference among growers. Following it was commission agents (747), export organizations (417), and consumers (202). This indicates betel vine growers' significant reliance on village-level traders, especially as small and marginal farmers often depend on loans from them, reinforcing reliance on intermediaries (Kaleeswari et al., 2013).

Commission agents play a multifaceted role such as negotiating prices, managing logistics, and identifying

Table 1 : Disposal points preferred by respondents using socio metric scores (n=400)

Disposal points preferred	Preference by number of respondents			Sociometric scores	Sociometric (%)	Cumulative (%)	Category
	1 st	2 nd	3 rd				
Consumers	31	42	25	202	8.42	8.42	Low
Export organizations	82	55	61	417	17.38	25.80	Moderate
Commission agents	120	114	159	747	31.12	56.92	Moderate
Village level traders	167	189	155	1034	43.08	100.00	High
Total	400	400	400	2400	100.00		

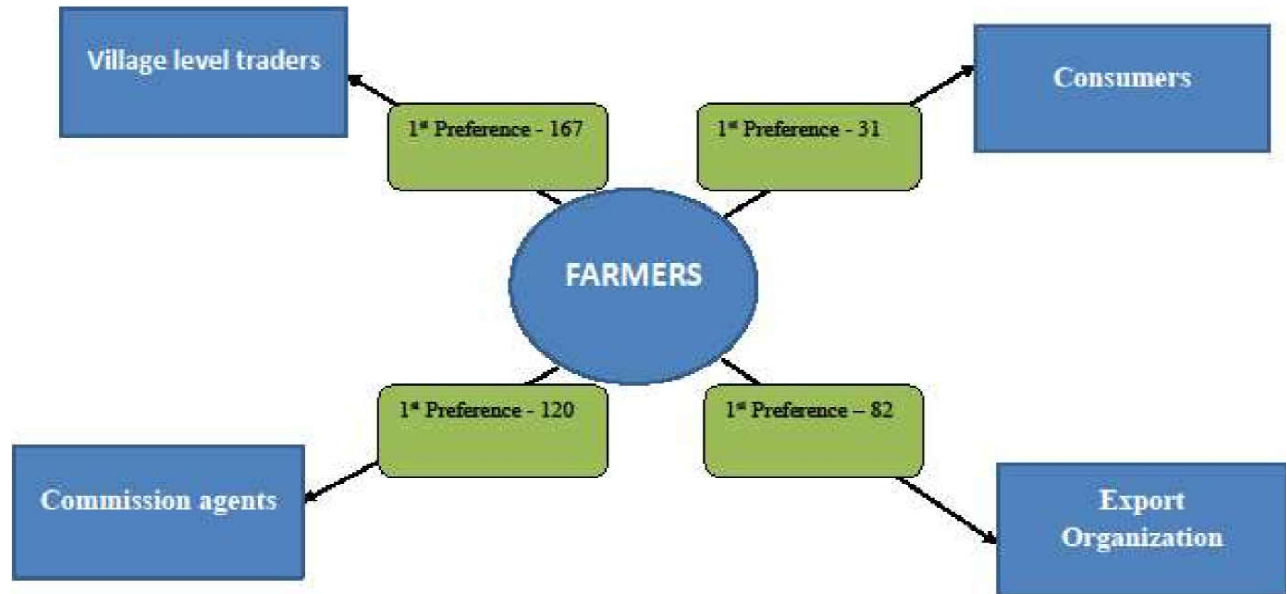


Fig. 1 : Top Preference of the Betel vine growers based on Socio metric scores

markets. Data presented in Table 1 showed a moderate dependency on commission agents, while, the farmers-to-consumer link is less favoured, as growers prefer bulk disposal of their produce.

COM-B model

The marketing behaviour of the betel vine growers was studied using the COM-B model. From Table 2, it could be observed that, respondents agreed that they had means for transportation to sell produce at far-off marketplaces (30%) but did not have facilities to get the market price (33%) even after being aware of price trends (31.50%). Higher disagreement (28%) to the statement 'I can decide where to sell my produce without the involvement of family and extension officials' expresses their need for social and formal relationships to strengthen their capability.

Regarding opportunity, having no means to know the market price (31.80%) was highlighted. The social opportunity gave out the role of socio-cultural influence (26.20%) in selecting the crop over the resource availability and how gender prejudices inhibit the women from engaging in marketing aspects (25.80%).

In motivation components under reflective aspects, Table 2 confirms the hesitation of the respondents about storage (34.50%) and disagreed (25.20%) that intermediaries had a lighter role in the price obtained by them. The automatic motivation displayed

respondents' feelings towards price uncertainty even when practicing contract farming (30.20%) and storage (26%).

Putting together, the marketing behaviour of betel vine growers (Table 2), grading the produce (28%) and selling when in need of money (29.80%) only to the sellers who could deposit immediate cash (27%). About 27.50% agreed, whereas 23.80% disagreed regarding the ease of transportation with existing marketing infrastructure, displaying an ambiguous response.

Multiple liners regression model

It is observed that two statements *viz.*, when the price of produce is not appealing, I can sell it later as I have storage facilities in my area, and Betel vine cultivation has become a sociocultural practice under physical capability and social opportunity, respectively had significant influence over the marketing behaviour at 1% level of significance.

While four statements *viz.*, I am aware that produce can be sold directly to consumers without the need for intermediaries, produce storage; It is not a smart idea because it could lower the produce's quality due to the malfunction in the machinery; I worry that high incidence of pests and diseases would lower my produce yield and it is challenging for me to sell the produce as soon as it is harvested because of the distant market, reflective motivation, automatic

Table 2 : COM B model to study the marketing behaviour and the extent of influence of farmer’s capability, opportunity, and motivation towards the marketing behaviour (n=400)

Sl. No.	Components	Response					Regression		
		Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree	Regression co-efficient	Standard error	t-value
A	Capability								
	Physical capability								
	I have the means of transportation to sell the produce in far-off market places also.	28 (7.00)	79 (19.80)	61 (15.20)	112 (28.00)	120 (30.00)	-0.076	0.094	0.453
	When the price of produce is not appealing, I can sell it later as I have storage facilities	54 (13.50)	68 (17.00)	65 (16.50)	121 (30.20)	92 (23.00)	0.088	0.029	0.006**
	I don’t have access to the facilities that provide market price of the produce	46 (11.50)	74 (18.50)	71 (17.80)	132 (33.00)	77 (19.00)	0.015	0.168	0.850
	Psychological capability								
	I am aware of the price trend of the produces	30 (7.50)	84 (21.00)	71 (17.80)	125 (31.20)	90 (22.50)	0.033	0.074	0.694
	I am aware that produce can be sold directly to consumers without the need of intermediaries	66 (16.50)	89 (22.20)	59 (14.80)	108 (27.00)	78 (19.50)	0.151	0.180	0.020*
	I can decide where to sell my produce without the involvement of family and extension officials	45 (11.20)	112 (28.00)	67 (16.80)	94 (23.50)	82 (20.50)	0.078	0.132	0.545
B	Opportunity								
	Physical opportunity								
	I’m skilled enough to sell my produce	46 (11.50)	96 (24.00)	79 (19.80)	109 (27.20)	70 (17.50)	0.073	0.094	0.486
	I don't have any storage or transportation facilities	35 (8.80)	83 (20.80)	67 (16.80)	126 (31.50)	89 (22.20)	0.023	0.082	0.751
	There is no means for me to know the actual market price	36 (9.0)	81 (20.20)	67 (16.80)	127 (31.80)	89 (22.20)	0.051	0.102	0.556
	It is challenging for me to sell the produce as soon as it is harvested because of the distant market	41 (10.20)	96 (24.00)	77 (19.20)	104 (26.00)	82 (20.50)	0.079	0.091	0.037*
	Social opportunity								
	I communicate with extension agents who provide me with information about the actual market value	46 (11.50)	83 (20.80)	71 (17.80)	117 (29.20)	83 (20.80)	0.075	0.054	0.358
	In my area, betel vine cultivation has become a sociocultural practice	41 (10.20)	93 (23.20)	71 (17.80)	105 (26.20)	90 (22.50)	0.027	0.086	0.001**
	Gender prejudice makes it difficult for women to market the produces.	47 (11.80)	98 (24.50)	69 (17.20)	103 (25.80)	83 (20.80)	0.023	0.082	0.751
C	Motivation								
	Reflective motivation								
	Produce storage, in my opinion is not a smart idea because it could lower the produce’s quality due to the malfunction in the machineries	43 (10.80)	84 (21.00)	56 (14.00)	138 (34.50)	79 (19.80)	0.089	0.055	0.035*
	In my opinion, middlemen’s involvement has little	43 (10.80)	101 (25.20)	80 (20.00)	92 (23.00)	84 (21.00)	-0.050	0.079	0.506

bearing on the price that farmers earn								
Automatic motivation								
When I store my produce in anticipation of a price increase, I worry that price might not increase but drop	45 (11.20)	100 (25.00)	65 (16.20)	104 (26.00)	86 (21.50)	-0.117	0.089	0.173
I hesitate to involve in contract farming as produce's price is not guaranteed	30 (7.50)	90 (22.50)	59 (14.80)	121 (30.20)	100 (25.00)	0.075	0.054	0.358
I worry that a high incidence of pests and diseases would lower my produce yield	40 (10.00)	68 (17.00)	76 (19.00)	119 (29.80)	97 (24.20)	0.214	0.023	0.023*
D Marketing behaviour								
It's easy to transport produce to the market using the existing marketing infrastructure	41 (10.20)	95 (23.80)	68 (17.00)	110 (27.50)	86 (21.50)		*significant at 5%, **significant at 1%	
I will only sell the produce when they have necessary cash in hand readily	44 (11.00)	97 (24.20)	65 (16.20)	108 (27.00)	86 (21.50)			
When I need money, I would want to sell the produce	41 (10.20)	82 (20.50)	70 (17.50)	119 (29.80)	88 (22.00)			
Prior to selling produce, I would like to grade and sort it	43 (10.80)	91 (22.80)	68 (17.00)	112 (28.00)	86 (21.50)			
R ² = 0.406; F= 2.234								

motivation and physical opportunity respectively had significant influence over their marketing behaviour at 5% level of significance.

On the perusal of data presented in Table 2 showed that R-square value was 0.406, which reveals that capability, opportunity, and motivation factors contributed 40.60% towards the marketing behaviour shows extraneous factors influenced the marketing behaviour. The F value was 2.234, which is higher than the table value and implies the factors' significant influence over the farmers' marketing behaviour.

From the aforementioned observations, it becomes apparent that the Betel leaf cultivation is integral to the socio-cultural practices of small and marginal farmers. Growers with strong physical capabilities capitalize on favourable market prices.

CONCLUSION

This study highlighted the marketing behaviour of betel vine growers using a comprehensive approach combining socio-metric analysis and the COM-B model. The multiple regression analysis highlights specific statements that significantly influence marketing behaviour. These findings underscore the complex interplay of factors shaping the marketing

landscape for betel vine growers. Overall, the study provides valuable insights into the challenges and the opportunities faced by the betel vine growers in marketing their produce. Addressing these challenges can enhance the economic prospects of betel vine cultivation and contribute to sustainable livelihoods for small and marginal farmers.

The policy implications that could be drawn from the present study are as follows:

1. **Enhanced infrastructure:** Investment in transportation and storage infrastructure is crucial for betel vine growers' market access. Improved connectivity to distant markets can mitigate selling challenges.
2. **Empowerment initiatives:** Empowering farmers with knowledge and resources reduces dependence on intermediaries. Training and extension services should enhance farmers' direct marketing capabilities.
3. **Market information systems:** Real-time market information empowers farmers to negotiate better and make timely decisions, fostering transparency and efficiency.

4. Pest and disease management: Integrated pest management safeguards yield and quality, boosting farmers' confidence in marketing their produce.

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REFERENCES

- Anusha, V. V. S. S., & Padma, S. R. (2022). Strategies for upscaling the marketing behaviour of vegetable growers of Ranga Reddy district. *Economic Affairs*, 67(2), <https://doi.org/10.46852/0424-2513.2.2022.16>
- Biswas, P., Anand, U., Saha, S. C., Kant, N., Mishra, T., Masih, H., Bar, A., Pandey, D. K., Jha, N. K., Majumder, M., & Das, N. (2022). Betel vine (*Piper betel* L.): A comprehensive insight into its ethnopharmacology, phytochemistry, and pharmacological, biomedical and therapeutic attributes. *Journal of Cellular and Molecular Medicine*, 26(11), 3083–3119. <https://doi.org/10.1111%2Fjcmm.17323>
- Dikshit, A., Dwivedi, S., & Mishra, B. (2021). Status of betel vine cultivation in Bundelkhand region of Uttar Pradesh: problems and prospects. *Indian Journal of Arecanut, Spices & Medicinal Plants*, 21(4), 24–28.
- ICAR (1997). Annual Report of All India Coordinated Research Project on Betelvine (ICAR), Indian Institute of Horticultural Research, Hessarghatta, Bangalore, India.
- ICAR (2000). Annual Report of All India Coordinated Research Project on Betelvine (ICAR). National Research Centre for Medicinal and Aromatic Plants, Boriavi, Gujarat, India.
- Kaleeswari V., & Sridhar, T. (2013). A study on betel vine cultivation and market crisis in Karur District. *Indian Journal of Applied Research*, 3(10). doi:10.36106.ijar
- Maity, S. (1989). The Betelvine. All India Coordinated Research Project on Betelvine, *Extension Bulletin*. Indian Institute of Horticultural Research, Hessarghatta, Bangalore, India.
- Mandal, A., & Mandal, S. (2016). Financial feasibility and constraints of betel vine cultivation in coastal areas of Sundarbans, West Bengal. *Journal of the Indian Society of Coastal Agricultural Research*, 34(1), 148–155.
- Michie, S, Atkins L., & West, R. (2015). The behaviour change wheel: A guide to designing interventions, Great Britain: Silverback Publishings.
- Northway, M. L. (1940). A method for depicting social relationships obtained by sociometric testing. *Sociometry*, 144-150.
- Prakash, U. N. K., Smila, K. H., Priyanka, J. D., Srinithya, B, & Sripriya N. (2014). Studies on phytochemistry and bioefficacy of cultivars of *Piper betle* Linn. *International Journal of Research Pharmaceutical Science*, 5(2), 94 98.
- Rajapandi, P., Karthikeyan, C., & M. Nirmala Devi. (2021). Role of key communicators in disseminating agricultural information in Nilayur village of Thiruparankundram block in Madurai district, *Asian Journal of Agricultural Extension, Economics & Sociology*, 39(11), 146-149. <https://doi.org/10.9734/ajaees/2021/v39i1130735>
- Sweatha, R., Vinitha, V., Thilagavathy, D., Yuvasri, L., Subhashini, S., & Sakthivel, R. (2019). A study on phytochemical analysis and antibacterial activity of *Piper betel* varieties (Kamar and Kumbakonam Vetrilai). *Eureka*, 2582, 1571.
- Vincent A.R. (2023). Government to set up special centre for betel vine in Kumbakonam. *The Times of India*, Sep., 20, 2023.
- Willmott, T. J., Pang, B., & Rundle-Thiele, S. (2021). Capability, opportunity, and motivation: an across contexts empirical examination of the COM-B model. *BMC Public Health*, 21(1). <https://doi.org/10.1186/s12889-021-11019-w>
- Yu, W., Chavez, R., Feng, M., Wong, C. Y., & Fynes, B. (2020). Green human resource management and environmental cooperation: An ability-motivation-opportunity and contingency perspective. *International Journal of Production Economics*, 219, 224–235. <https://doi.org/10.1016/j.iipe.2019.06.013>

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