

## **Constraints in the oil palm economy of Andhra Pradesh: a multi-actor analysis using garrett ranking**

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### **ABSTRACT**

This study analyses the constraints faced by different stakeholders in the oil palm value chain in Andhra Pradesh, with emphasis on farmers' institutional affiliation and downstream market actors. Primary data were collected from 402 oil palm farmers (268 non-FPO and 134 FPO farmers) across five coastal districts of Andhra Pradesh, along with collection centres, mills, wholesalers, and retailers. Garrett's ranking technique was employed to prioritise perceived constraints. Results indicate that non-FPO farmers are primarily constrained by informational and behavioural factors, including lack of awareness about FPOs, weak extension services, high input costs, and delayed payments. FPO farmers experience relatively better access to technical support but remain constrained by poor road connectivity, market concentration, and payment delays, suggesting limited influence of FPOs over structural bottlenecks. Collection centres face irregular supply and quality issues, while mills are most affected by price volatility and labour shortages. Wholesalers and retailers report handling inefficiencies, delayed payments, low margins, and shifting consumer preferences. Overall, the findings highlight that institutional affiliation improves internal support but does not resolve broader infrastructural and market-level constraints.

**Keywords:** *Constraints, Garrett Ranking, Market functionaries, Oil Palm and Problems*

Palm oil and palm kernel oil together account for 45.93 per cent of global edible-oil consumption, making them the single largest source of dietary fats worldwide. Derived from *Elaeis guineensis* Jacq., a West African angiosperm introduced into global trade in the 1500s, oil palm remains the highest-yielding oil crop, with 45–55 per cent extractable oil in its fruit mesocarp and kernel. Its dominance is attributed to high oxidative stability during prolonged heating (Dian *et al.*, 2017), melting-point properties that enhance texture and shelf-life in processed foods (Siddique *et al.*, 2010), and versatility in blending. Historically used as a cosmetic ointment in the 16th–17th centuries (Henry, 1794), its modern applications extend to specialty esters with hydrating properties (Keng *et al.*, 2009). Its industrial significance is further reinforced by its suitability for biodiesel production, as trans-esterification produces fatty-acid esters with fuel characteristics comparable to fossil diesel (Darnoko and Cheryan, 2000).

Global demand continues to rise, driven largely by expanding consumption in developing economies, which house 80 per cent of the world's population. Production, however, is geographically concentrated: Indonesia and Malaysia contribute 84 per cent of global output, while countries such as Nigeria, Guatemala, Papua New Guinea, Thailand, Ecuador, and India provide smaller shares (Ritchie, 2024). Worldwide, 28.96 million hectares are under oil-palm cultivation (FAO, 2022). The crop's rapid expansion has generated substantial ecological and social challenges. Large-scale plantation development is linked to tropical deforestation, peatland degradation, altered hydrological systems, and biodiversity loss. For instance, 43 per cent of Tesso Nilo National Park in Sumatra has been converted to illegal plantations, threatening species such as the Sumatran tiger and Riau pale-thighed surili (Supriatna *et al.*, 2014; WWF, 2023). At the same time, unequal land control, labour exploitation, and rights violations

have been repeatedly documented within the sector (Obidzinski *et al.*, 2012; Mason and McDowell, 2020; Thijs, 2021). These pressures have spurred global sustainability standards, notably NDPE (No Deforestation, Peat and Exploitation) frameworks, which are expected to alter future supply trajectories and reshape sourcing networks.

India, the world's largest importer of palm oil, faces an acute dependence on external supplies, prompting a series of policy interventions including the Oil Palm Area Expansion programme (2011) and the National Mission on Edible Oils – Oil Palm. Yet, systemic challenges persist, including restricted processing capacity (Ghosal, 2023) and emerging climatic risks associated with monsoon weakening driven by Indian Ocean warming (Mathew *et al.*, 2015).

Andhra Pradesh forms the core of India's oil-palm sector, with 1.85 lakh ha under cultivation and an average productivity of 19.81 tonnes fresh fruit bunches (FFBs) per ha. (NMOOP, 2023). Its coastal districts offer highly suitable agro-ecologies, and the state has been designated a priority expansion zone for achieving national self-reliance. Institutional innovations such as Farmer Producer Organizations (FPOs) have been promoted to strengthen collective capacity, improve access to inputs, and facilitate technology dissemination. Yet, despite their expanding presence, comprehensive evidence on the constraints faced by growers, whether organizational, agronomic, infrastructural, climatic, or institutional, remains scarce.

In this landscape of rising demand, environmental scrutiny, and state-led expansion, the central challenge lies not merely in increasing area or yields, but in systematically identifying the constraints faced by farmers and other market actors within Andhra Pradesh's oil palm economy. Understanding these constraints is essential for designing effective interventions, strengthening value-chain resilience, and ensuring sustainable sectoral development.

## MATERIAL AND METHODS

### Sampling Design

A total of 402 farmers were chosen purposively from five coastal districts of Andhra Pradesh, namely West Godavari and East Godavari for their higher acreage and production levels over other districts, Visakhapatnam and Vizianagaram districts for their expansion potential and agro-

ecological diversity, and Srikakulam district to represent one that has the least acreage. The districts were also chosen for the presence of FPOs that cater to Oil Palm farmers. In total, 134 FPO farmers and 268 non-FPO farmers were chosen for this study. This disproportionality could be attributed to the fact that those farmers who band under FPOs are so few, even negligible, in comparison to non-FPO farmers. The numerosity of the non-FPO farmers was to minimize the bias and reduce skewness towards FPO farmers, giving the averages obtained a greater legitimacy.

The data was also collected from 11 palm collection centers, 8 palm oil mills, 5 refineries, 9 distributors, 24 wholesalers and 48 retailers.

### Tool

To find out the most significant factor which influences the respondent, Garrett's ranking technique was used, as outlined by Garrett H.E., 1926. As per this method, the respondents have been asked to assign the rank for all factors and the outcomes of such ranking have been converted into score value with the help of the following formula:

$$PP = 100(R_{ij} - 0.5) \div N_j$$

where,

PP = Percentage Position

R<sub>ij</sub> = Rank given for the *i*th variable by *j*th respondent

N<sub>j</sub> = Number of variables ranked by *j*th respondent

This technique was used in this study to understand the severity of constraints faced by farmers and other market stakeholders in cultivation and marketing of oil palm and derivative products.

## RESULTS AND DISCUSSION

From farmers struggling with agronomic and systemic uncertainties to millers grappling with procurement volatility, from refineries navigating global price shocks to traders hurdled with distribution issues, the system's efficiency is deeply interwoven with its pain points. Therefore, this turns attention to the specific constraints encountered by the various stakeholders across the oil palm value chain, drawing on primary field evidence to contextualize the numbers and reveal the lived realities beneath them.

Table 1 identifies the key constraints perceived by Non-FPO oil palm farmers in joining

**Table 1. Constraints of non-FPO oil palm farmers to join FPOs**

S.No.	Constraint	Per cent Position	Rank
1	Bad past experiences with FPOs	45.38	8
2	Excess political interference/Elitism	62.31	5
3	Fear of losing autonomy	50.16	7
4	High dependency on local intermediaries	69.58	4
5	Lack of active FPOs	40.25	9
6	Lack of awareness about FPOs	90.12	1
7	Poor governance	55.77	6
8	Resistance to change	83.47	2
9	Unclear Perception of benefits	76.89	3

Farmer Producer Organizations (FPOs), ranked using the Garrett method based on per cent positions. The most pressing constraint, as reflected by the highest Garrett score of 90.12, is a lack of awareness about FPOs. This underscores a significant informational gap among non-member farmers: many are simply unfamiliar with the existence, functioning, or potential benefits of FPOs, making awareness-building an essential first step for institutional outreach. Closely following is resistance to change (83.47), which highlights the psychological and behavioural inertia among farmers, particularly in contexts where traditional buyer-seller relationships with intermediaries have persisted for years. The third-ranked constraint, unclear perception of benefits (76.89), reinforces the idea that even when FPOs are known, their value proposition remains vague or poorly communicated to non-members. Additional barriers include high dependency on local intermediaries (69.58), which often translates to social and financial entanglements that farmers are reluctant or unable to break. Excess political interference or elitism (62.31) and poor governance (55.77) reflect concerns about internal functioning, suggesting that some farmers perceive FPOs as being co-opted by powerful local interests. Further down the list, fear of losing autonomy (50.16) and bad past experiences with FPOs (45.38) point to trust deficits, rooted either in personal histories or in negative peer experiences. Finally, lack of active FPOs in the area (40.25) ranks lowest, indicating that proximity or access is not the most critical barrier.

Taken together, the findings highlight that the primary constraints to FPO membership are cognitive and trust-based, not logistical. It is not simply a matter of forming more FPOs; rather, institutional credibility, transparency, clear communication of benefits, and

behavioural nudges are needed to overcome the deep-rooted scepticism that currently limits wider farmer participation.

Table 2 highlights the primary constraints experienced by Non-FPO and FPO oil palm farmers, based on Garrett Ranking. The most prominent issue for Non-FPO farmers is weak extension services (per cent position: 90.42), underscoring the severe lack of technical and institutional support available to individual farmers. This suggests that non-FPO farmers are often left without agronomic guidance, input management advice, or updates on good cultivation practices: factors critical to oil palm productivity. Following this, high input costs (85.07) and delayed payments from mills (78.63) rank second and third, respectively. These reflect the financial vulnerability faced by these farmers, both in terms of upfront investment and the uncertainty of cash flows. The problem of fluctuating market prices (72.24) further adds to this risk environment, making income planning difficult. Constraints such as labour shortages (65.89), low technical knowledge (59.51), and monopsonistic/oligopsonistic market structures (53.26) indicate deeper structural limitations: weak bargaining power, limited skill capacity, and high dependency on a small number of buyers. Lower-ranked issues include poor road connectivity (48.03) and high maintenance costs (41.97), though these still point to logistical and cost-related stress points. In totality, Non-FPO farmers face a highly uncertain and unsupported production environment, shaped by weak institutional presence, volatile prices, and inadequate financial flows, making them particularly vulnerable to systemic shocks and market failure.

In contrast, a different pattern for FPO-affiliated oil palm farmers is observed. Their top-

**Table 2. Constraints faced by oil palm farmers**

S.No.	Constraint	Non-FPO		FPO	
		Per cent Position	Rank	Per cent Position	Rank
1	Delayed Payment from mills	78.63	3	71.45	3
2	Fluctuating market prices	72.24	4	64.88	5
3	High Input Costs	85.07	2	54.91	8
4	High maintenance costs	41.97	9	68.23	4
5	Labour shortages	65.89	5	61.54	6
6	Low technical knowledge	59.51	6	58.27	7
7	Monopsony/Oligopsony	53.26	7	74.91	2
8	Poor road connectivity	48.03	8	78.63	1
9	Weak Extension Services	90.42	1	51.62	9

ranked concern is poor road connectivity (per cent position: 78.63), suggesting that even though they are institutionally connected, logistical infrastructure remains a binding constraint. Access to mills, input supply points, or collection centers may be hampered by inadequate rural transport networks. The second-highest concern is monopsony or oligopsony in the market (74.91), indicating that FPOs, despite offering collective bargaining, still operate within a highly concentrated buyer landscape. Delayed payments from mills (71.45) continues to be a major concern, reflecting that institutional affiliation does not shield farmers much from mill-level liquidity issues. Issues like high maintenance costs (68.23), fluctuating market prices (64.88), and labour shortages (61.54) further reinforce the operational challenges farmers face even within FPO structures. Notably, weak extension services ranks the lowest (51.62), suggesting that FPO farmers benefit from at least some degree of knowledge transfer or advisory support compared to their Non-FPO peers. Overall, FPO farmers seem to benefit from improved access to technical support, but still struggle with infrastructural and market structural issues, particularly where FPO power does not extend into mill-level finance or public investment domains.

Overall, table 2 reveals that while institutional affiliation through FPOs alleviates certain challenges, such as weak extension services and technical knowledge gaps, it does not resolve deeper structural or infrastructural constraints. Non-FPO farmers are more vulnerable to information deficits and financial bottlenecks, with weak extension services and high input costs ranking highest. FPO farmers, in contrast, face more systemic constraints, such as poor road infrastructure, delayed payments, and concentrated

buyer power, suggesting that even collective marketing arrangements have limited influence over logistical and market-level risks. This divergence highlights a critical insight: FPOs improve internal institutional support but do not transform external value chain conditions. Farmers may benefit from marginal improvements in information access and coordination, but remain subject to logistics, market structure, and payment cycles that are shaped by miller-refinery dynamics and public infrastructure investment: factors beyond the reach of most FPOs.

Table 3 highlights the constraints faced by collection centers and millers. The most significant constraint faced by the collection centers, with a per cent position of 79.46, is the irregular supply of Fresh Fruit Bunches (FFBs). This inconsistency in volume disrupts planning, affects capacity utilization, and leads to downstream bottlenecks. It reflects both farmer-side delivery unpredictability and possible mismatches in harvesting coordination. Closely following is poor FFB quality (76.18), suggesting that even when supplies do arrive, they often fail to meet desired industrial specifications. This affects grading, pricing, and potentially invites penalties or rejection from mills. The third-ranked issue is price volatility (71.92), which places financial stress on collection centers attempting to maintain margins while coping with fluctuating procurement and selling prices. Other significant constraints include uncertainty stemming from industrial management decisions (68.37), indicating that collection centers operate within an unstable institutional environment, where last-minute policy shifts or procurement delays disrupt operations. Poor road connectivity (63.84) and lack of skilled personnel (58.29) round out the list, reflecting infrastructural and human resource limitations. Together, the findings

**Table 3. Constraints faced by collection centers and millers**

S.No.	Constraint	Per cent Position	Rank	Per cent Position	Rank
1	Irregular supply of FFBs	79.46	1	60.41	6
2	Lack of skilled personnel	58.29	6	69.12	4
3	Poor FFB Quality	76.18	2	74.28	2
4	Poor road connectivity	63.84	5	71.53	3
5	Price volatility	71.92	3	77.64	1
6	Uncertainty with industrial management decisions	68.37	4	64.87	5

suggest that collection centers bear the brunt of both upstream and downstream unpredictability, acting as fragile intermediaries between farmers and mills, with little institutional cushioning.

For millers, the top concern is price volatility (per cent position: 77.64). This reflects the fact that mills operate under tight financial margins and are highly exposed to fluctuating crude palm oil (CPO) prices, which dictate FFB prices as well. These fluctuations affect their ability to maintain stable procurement rates and pass on consistent prices to farmers or refineries. The second-ranked constraint is poor FFB quality (74.28), highlighting the difficulties mills face in processing low-grade or immature produce: issues that directly affect oil recovery rates and product consistency. Poor road connectivity (71.53) and lack of skilled personnel (69.12) follow closely, indicating that even large processing entities struggle with both logistics and workforce quality. Interestingly, uncertainty with industrial management decisions (64.87) and irregular supply of FFBs (60.41) have lower severity for millers than for collection centers. These constraints show that mills function under high volatility, quality risk, and infrastructural stress, making their role in the value chain operationally demanding and financially exposed.

Table 4 outlines the major constraints faced by wholesalers in the oil palm economy. Topping the list is handling and packaging issues, with the highest per cent position score of 56.46. This indicates that logistical and physical management of oil palm

products, perhaps due to inadequate mechanization, poor handling infrastructure, or inconsistent packaging standards, constitutes the most pressing problem at the wholesale level. Following closely are delayed payments from downstream buyers (52.08), which reflects liquidity constraints caused by extended payment cycles from distributors and retailers. This disrupts working capital flow and limits the wholesaler's capacity to maintain consistent supply. The third-ranked constraint is delays in procurement (51.46), revealing upstream coordination challenges, including lag in supply from refineries or collection centers.

Lower down the ranking are limited storage infrastructure (48.33) and low profit margins (41.67), both pointing to cost-side inefficiencies. Wholesalers thus operate in a tight margin environment, where capital turnover is frequently delayed and physical infrastructure fails to match commercial volume. Altogether, the data portrays wholesalers as operating under moderate logistical stress and financial uncertainty, bridging upstream and downstream inefficiencies without sufficient buffer mechanisms.

Retailers in the oil palm value chain face a distinctly different set of constraints, as shown in Table 5. Their top-ranked issue is a shift in consumer preferences (per cent position: 56.35), suggesting a growing demand for alternative oils or health-conscious substitutes. This evolving consumer behaviour challenges the stability of palm oil retail markets and pressures sellers to adapt or diversify.

**Table 4. Constraints faced by Wholesalers**

S. No.	Constraint	Per cent Position	Rank
1	Delayed Payments from Downstream Buyers	52.08	2
2	Delays in procurement	51.46	3
3	Handling and packaging issues	56.46	1
4	Limited storage infrastructure	48.33	4
5	Low profit margins	41.67	5

**Table 5. Constraints faced by retailers**

S. No.	Constraint	Per cent Position	Rank
1	Consumer preference shift	56.35	1
2	Delays in Procurement	47.92	6
3	Handling and Packaging issues	51.21	2
4	Irregular supply from wholesalers/Distributors	50.15	4
5	Losses from price drops	48.81	5
6	Low profit margins	45.81	7
7	Upfront Payment pressure	50.75	3

The second major issue is handling and packaging challenges (51.21), which aligns with wholesaler concerns, but is further complicated at the retail level by presentation standards, customer-facing storage, and potential spillage or spoilage risks. Upfront payment pressure (50.75) ranks third, highlighting the capital risk that retailers bear when purchasing inventory in advance, often without guaranteed turnaround time.

Other concerns include irregular supply from wholesalers/distributors (50.15) and losses from price drops (48.81), which reflect volatility and inconsistent delivery across the supply chain. Delays in procurement (47.92) and low profit margins (45.81) round out the list, again pointing to both operational and profitability challenges. In sum, retailers are caught in a space shaped by shifting demand, tight margins, and unreliable supply, with little room to manoeuvre financially or strategically.

## CONCLUSION

The oil palm value chain in Andhra Pradesh is shaped by multiple, interconnected constraints that weaken system performance at every stage. Non-FPO farmers face primarily informational and behavioural barriers, weak extension services, unclear institutional benefits, and dependency on intermediaries, indicating that scepticism and lack of awareness are stronger deterrents than physical access. FPO members fare better in knowledge access but remain constrained by structural issues such as poor infrastructure, delayed payments, and concentrated buyer power, showing that institutional affiliation improves internal support but does not change external market conditions.

Downstream actors face their own vulnerabilities: collection centres struggle with irregular supply and poor fruit quality; mills operate under price volatility and labour shortages; wholesalers and

retailers confront handling inefficiencies, delayed payments, low margins, and shifting consumer preferences. These frictions compound across the chain—supply inconsistency feeds processing inefficiency, which later manifests as market uncertainty and retail volatility. The evidence shows that improving the sector is not only a matter of increasing production but of addressing systemic bottlenecks that link farm-level decisions to market-level risks. Strengthened extension systems, credible farmer institutions, better rural logistics, and more transparent market mechanisms are essential.

In sum, the oil palm economy's performance and sustainability depend on recognizing that its weakest links, whether informational, infrastructural, or structural, shape outcomes for all actors. Identifying and resolving these constraints is therefore fundamental to building a more resilient and efficient value chain in Andhra Pradesh.

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