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Factors influencing farmers' purchase decisions and constraints in the adoption of farm implements in selected districts of Gujarat

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Abstract

This study analysed the factors affecting and problems faced by farmers in the purchase of farm implements across three selected districts of Gujarat - Junagadh, Kachchh and Surendranagar. The study was conducted from December 2025 to March 2026 using a descriptive research design. Primary data were collected from 600 tractor-owning farmers (200 per district) through structured personal interviews across 60 villages in 12 talukas, supplemented by secondary data. Percentage and tabular analyses described the socio-economic profile and ownership patterns, while the Weighted Average Mean (WAM) technique identified key purchase factors, effective promotional tools and major barriers. The findings show that farmers across all three districts are predominantly middle-aged males, small or marginal with modest annual incomes, and exhibit universal tractor ownership concentrated in the 41-50 HP range. Ownership of implements is dominated by basic primary and secondary tillage equipment. Price/Affordability (WAM = 4.75) was the most critical purchase factor, followed by Durability and Quality (4.61) and Performance in Field (4.52). Field Demonstrations (WAM = 4.29) and Word of Mouth (4.25) were the most effective promotional tools, outperforming conventional media. High Initial Cost (4.31), Lack of Finance/Credit Facility (4.18) and High Repair and Maintenance Cost (4.08) were the most severe barriers. The study recommends improving credit access, strengthening after-sales service and prioritising demonstration-based promotion to deepen implement adoption across Gujarat.

Keywords: Farm implements, purchase behaviour, influencing factors, promotional tools, agricultural mechanisation

1. Introduction

Agriculture is one of the most critical sectors of the Indian economy, providing livelihoods to more than half the country's workforce and contributing a significant share to national Gross Value Added. India's agriculture sector supports more than 1.4 billion people, yet its mechanisation level remains only around 45-55 per cent - substantially lower than in developed economies such as the USA, Europe and China. With declining farm labour availability, shrinking and increasingly fragmented landholdings, and rising input costs, traditional farming methods can no longer sustain the productivity improvements required to ensure food and nutritional security (FICCI, 2015; Deekshithulu *et al.*, 2024) ^[1, 3]. Farm mechanisation has emerged as a key driver of productivity improvements, capable of increasing farm productivity by approximately 30 per cent and reducing cultivation costs by nearly 20 per cent (Barman and Toor, 2017; Verma *et al.*, 2024) ^[2, 12]. Over the last six decades, India has witnessed a marked transition in farm power from human and animal sources towards mechanical power. However, this transition has been characterised more by tractorisation than by comprehensive mechanisation;

adoption of implements beyond primary tillage - for sowing, intercultural operations, crop protection, harvesting and post-harvest handling - remains uneven across regions, farm sizes and cropping systems (Department of Agriculture and Farmers Welfare, 2022; Kale and Nupur, 2025) ^[8, 4]. National-level assessments show that India's average farm power availability at approximately 2.49 kW/ha is much lower than that of developed countries (Deekshithulu *et al.*, 2024) ^[3], indicating considerable scope for further deepening and diversification of mechanisation.

Gujarat, as one of India's agriculturally progressive states, presents a diverse mosaic of farming systems and agro-climatic zones. Districts such as Junagadh, Kachchh and Surendranagar are characterised by semi-arid conditions and support crops including groundnut, cotton, castor, wheat, bajra and cumin, where mechanised operations are increasingly vital, but implement adoption beyond primary tillage remains partial. The government has played an important role through schemes such as the Sub-Mission on Agricultural Mechanisation and Custom Hiring Centres, but challenges of high initial investment, limited credit access, inadequate service networks and regional disparities persist

(Patoliya *et al.*, 2025) ^[11].

The purchase and use of farm implements is shaped by a complex set of economic, technical and institutional factors, including price and affordability, expected performance, durability, availability of spare parts and service, access to credit and the nature of promotional efforts by manufacturers and dealers (Kumar and Moorthy, 2014; Grainger, 2019) ^[9, 7]. Earlier studies in different states have identified various combinations of these factors for tractors and selected machinery, but systematic evidence on how farmers prioritise different attributes and perceive constraints specifically for farm implements, especially in semi-arid regions, remains relatively limited (Agrawal, 2016; Farkade, 2014) ^[1, 5]. Since focused, multi-district studies on farmers' purchase behaviour towards farm implements in Gujarat are limited, a field investigation was undertaken across three districts. The specific objectives of the study were to examine the socio-economic profile of farmers, identify the key factors influencing the purchase of farm implements, determine the most effective promotional tools affecting purchase decisions, and analyse the constraints faced by farmers during the purchase of farm implements.

2. Materials and Methods

2.1 Study Area

Three districts of Gujarat, namely Junagadh, Kachchh, and Surendranagar, were purposively selected for the study. These districts are characterised by semi-arid agricultural conditions where tractor-based mechanisation is well established; however, the adoption of diverse farm implements remains limited.

In Junagadh district, the study was conducted in the talukas of Vanthali, Manavadar, Bheshan, and Keshod talukas, where groundnut, cotton, wheat and pearl millet are the dominant crops. In Kachchh district, Anjar, Bhuj, Bhachau, and Mundra talukas were selected, with wheat, bajra, cotton, castor, and groundnut cultivated under semi-arid conditions. In Surendranagar district, Lakhtar, Limbdi, Vadhavan, and Dhrangadhra talukas were included, where cotton, castor, cumin, wheat, bajra, and groundnut constitute the major cropping pattern. Agriculture and animal husbandry serve as the primary livelihood activities across all three study areas.

2.2 Sampling Procedure

Primary data were collected through a multi-stage purposive sampling technique. Initially, four talukas were selected from each district. Subsequently, five villages were selected from each taluka, resulting in a total of 20 villages per district and 60 villages across the three districts.

From each selected village, 10 tractor-owning farmers possessing at least one farm implement were purposively selected as respondents. Thus, the final sample comprised 200 farmers from each district, resulting in a total sample size of 600 farmers.

Primary data were collected during December 2025 to March 2026 through personal interviews using a pre-tested and structured interview schedule. Secondary data relating

to district profiles and agricultural characteristics were obtained from published reports and official government sources. The collected data were coded, tabulated, and analysed using Microsoft Excel. Descriptive statistical tools such as percentages and tabular analysis were employed to examine the socio-economic characteristics of farmers and the ownership pattern of tractors and farm implements.

2.3 Analytical Tool: Weighted Average Mean (WAM)

Weighted Average Mean (WAM) was employed to identify the key factors influencing farmers' purchase decisions, assess the relative importance of promotional tools, and quantify the severity of constraints encountered during the purchase of farm implements.

The responses obtained from all respondents were tabulated, and the weighted average mean was calculated using the following formula:

$$\text{Weighted Average Mean (X)} = (F_1X_1 + F_2X_2 + F_3X_3 + F_4X_4 + F_5X_5) / X_t$$

Where;

F = Weight given to each response;

X = Number of responses;

X_t = Total number of responses.

For analysis, weighted scores obtained from all three districts were aggregated and divided by the total sample size (n = 600) to generate WAM values representing the overall priority and perception of respondents across the study area.

3. Results and Discussion

3.1 Socio-economic Profile of Farmers

The socio-economic profile of the 600 sampled respondents revealed broadly similar characteristics across all three study districts. Agricultural decision-making related to farm machinery was entirely male-dominated, as all respondents (100%) were male, indicating that decisions regarding the purchase of farm implements are predominantly undertaken by male members in the study area.

With respect to age distribution, the majority of respondents (55.17%) belonged to the middle-age group (36–50 years), followed by older farmers (22.67%) and young farmers (22.17%). This suggests that farm management and machinery purchase decisions are primarily undertaken by experienced and economically active farmers.

Regarding educational attainment, primary-school-educated farmers constituted the largest proportion (34.33%), followed by respondents educated up to secondary level (21.17%) and higher secondary level (18.50%). Illiterate farmers accounted for 11.17 per cent of the sample, while only 5.83 per cent had attained graduate-level education, and none possessed postgraduate qualifications. These findings indicate comparatively low levels of higher education among purchasers of farm implements in the study area.

Table 1: Socio-economic profile of sample farmers (n = 600)

Sr. No.	Particulars	Respondents	Percentage (%)
1	Gender		
	Male	600	100.00
	Female	-	-
	Total	600	100.00
2	Age Group		
	Less than 35 years (Young)	133	22.17
	36-50 years (Middle)	331	55.17
	51 years and above (Old)	136	22.67
	Total	600	100.00
3	Education Qualification		
	Illiterate	67	11.17
	Illiterate but can read and write	54	9.00
	Primary school	206	34.33
	Secondary school	127	21.17
	Higher secondary	111	18.50
	Graduate	35	5.83
	Postgraduate and above	-	-
	Total	600	100.00
4	Annual Income		
	Less than ₹2,50,000	214	35.67
	₹2,50,001 - ₹5,00,000	244	40.67
	Above ₹5,00,000	142	23.67
	Total	600	100.00
5	Total Land Holding		
	Marginal (< 1 ha / < 2.5 acres)	103	17.17
	Small (1-2 ha / 2.5-5 acres)	211	35.17
	Semi-Medium (2-4 ha / 5-10 acres)	127	21.17
	Medium (4-10 ha / 10-25 acres)	99	16.50
	Large (> 10 ha / > 25 acres)	60	10.00
	Total	600	100.00

Source: Field survey

The economic profile showed that 40.67 per cent of respondents belonged to the medium annual income category (₹2,50,001–₹5,00,000), followed by 35.67 per cent earning below ₹2,50,000 and 23.67 per cent earning above ₹5,00,000 annually. Overall, nearly three-fourths of the respondents (76.34%) reported annual farm income below ₹5,00,000, highlighting relatively moderate economic capacity and suggesting that affordability plays an important role in farm implement purchase decisions.

Landholding distribution indicated the predominance of small farmers (35.17%), followed by semi-medium (21.17%), marginal (17.17%), medium (16.50%), and large farmers (10.00%). Collectively, small and marginal farmers constituted more than half of the sample (52.34%), suggesting that limited resource availability and financial considerations continue to influence the adoption and purchase of farm machinery in the study area.

3.2 Tractor and Implement Ownership Pattern

Tractor ownership was universal among the sampled respondents (100%), indicating a very high level of tractorisation in the study area. Among tractor brands, TAFE (Massey Ferguson) emerged as the most preferred brand, accounting for 20.00 per cent of total ownership, followed by Mahindra & Mahindra (15.17%) and Swaraj (13.50%). Collectively, these three brands represented nearly half of all tractors owned by respondents. Their dominance across all three study districts suggests strong market penetration supported by suitability to local agro-

climatic conditions and established sales and service networks in Gujarat. Farmtrac (9.83%), Sonalika (8.50%), and John Deere (6.67%) constituted the second tier of ownership preference, while Kubota, New Holland, Powertrac, and Eicher each accounted for approximately 5–6 per cent of the sample.

Table 2: Tractor ownership pattern (n = 600)

Sr. No.	Tractor Brand	Respondents	Percentage (%)
1	TAFE (Massey Ferguson)	120	20.00
2	Mahindra & Mahindra	91	15.17
3	Swaraj	81	13.50
4	Farmtrac	59	9.83
5	Sonalika	51	8.50
6	John Deere	40	6.67
7	Kubota	35	5.83
8	New Holland	35	5.83
9	Powertrac	34	5.67
10	Eicher	33	5.50
11	Others	21	3.50
	Total	600	100.00

Source: Field survey

The distribution of tractor horsepower (HP) categories revealed a clear preference for medium-capacity tractors in the 41–50 HP range, which accounted for 57.00 per cent of the sample, followed by the 31–40 HP category (19.67%) and tractors above 50 HP (11.00%). Ownership of tractors below 30 HP was comparatively limited. The predominance of the 41–50 HP category may be attributed to its

operational versatility in performing multiple agricultural activities, including primary tillage, secondary tillage, transport, and custom hiring services. The consistency of this ownership pattern across Junagadh, Kachchh, and Surendranagar indicates that this preference reflects a broader regional trend rather than district-specific variation.

Table 3: Distribution of tractor horsepower (HP) among sample farmers (n = 600)

Sr. No.	Tractor HP	Respondents	Percentage (%)
1	Less than 20 HP	25	4.17
2	20-30 HP	49	8.17
3	31-40 HP	118	19.67
4	41-50 HP	342	57.00
5	Above 50 HP	66	11.00
	Total	600	100.00

Source: Field survey

Concerning farm implement ownership (multiple responses), the cultivator emerged as the most widely owned implement (94.17%), followed by MB Plough/Disc Plough (62.83%) and rotavator (46.17%), indicating substantial investment in land preparation activities. In contrast, ownership levels of specialised and post-harvest implements remained relatively low, including Seed Drill (17.83%), Thresher (15.50%), Mulcher (2.50%), Sprayer (2.00%), Harrow (1.83%), and Reaper (1.17%). These findings suggest that mechanisation in the study area remains concentrated in primary and secondary tillage operations, whereas adoption of mechanisation technologies for sowing, crop protection, and post-harvest management continues to be limited. This reflects a partial and uneven pattern of mechanisation across different stages of agricultural production.

Table 4: Farm implement ownership pattern (n = 600)

Sr. No.	Farm Implements Owned	Respondents	Percentage (%)
1	Cultivator	565	94.17
2	MB Plough / Disc Plough	377	62.83
3	Rotavator	277	46.17
4	Seed Drill	107	17.83
5	Thresher	93	15.50
6	Mulcher	15	2.50
7	Sprayer	12	2.00
8	Harrow	11	1.83
9	Reaper	7	1.17
	Total (multiple responses)	1,464	-

Source: Field survey

*Percentages are based on 600 respondents with multiple responses permitted. Mulcher was recorded primarily in the Junagadh district.

3.3 Factors Influencing the Purchase Decision of Farm Implements

The factors influencing farmers' purchase decisions for farm implements were analysed using the Weighted Average Mean (WAM) method, and the results are presented in Table 5. Among all factors, Price/Affordability emerged as the most influential determinant with the highest WAM score of 4.75, indicating that economic considerations play a central role in purchase decisions. The consistent ranking of this factor across all three districts suggests that affordability remains a common concern among farmers and

strongly influences investment in farm machinery.

Price/Affordability was followed by Durability and Quality (WAM = 4.61) and Performance in Field (WAM = 4.52), indicating that farmers not only consider the initial purchase cost but also place significant importance on reliability, operational effectiveness, and expected service life. These findings suggest that purchase behaviour is guided by a value-oriented approach that balances affordability with long-term utility and performance.

Spare Parts Availability (WAM = 4.43) also ranked among the most influential factors, emphasising the importance of uninterrupted machine operation and access to replacement components during peak agricultural seasons. Farmers appear to consider serviceability and maintenance support as important aspects of machinery selection.

Table 5: Factors influencing purchase decision (n = 600)

Sr. No.	Factors Influencing Purchase Decision	Total Score	WAM Score	Rank
1	Price / Affordability	2850	4.75	1
2	Durability & Quality	2768	4.61	2
3	Performance in Field	2712	4.52	3
4	Spare Parts Availability	2660	4.43	4
5	After-Sales Service	2552	4.25	5
6	Ease of Operation	2520	4.20	6
7	Fuel Efficiency / Power Req.	2520	4.20	7
8	Brand Reputation / Trust	2450	4.08	8
9	Dealer's Recommendation	2368	3.95	9
10	Peer Influence / Word of Mouth	2180	3.63	10
11	Warranty / Guarantee Terms	2084	3.47	11
12	Resale Value	2064	3.44	12
13	Innovative Features	1994	3.32	13

Source: Field survey

A second group of moderately important factors included After-Sales Service (WAM = 4.25), Ease of Operation (WAM = 4.20), and Fuel Efficiency/Power Requirement (WAM = 4.20). These results highlight that the convenience of operation, access to technical support, and operating efficiency also contribute to farmers' purchasing decisions. Brand Reputation/Trust (WAM = 4.08) ranked comparatively lower, indicating that practical and economic considerations generally outweigh brand preference. Lower influence was observed for Dealer's Recommendation (WAM = 3.95) and Peer Influence/Word of Mouth (WAM = 3.63), while Warranty/Guarantee Terms (WAM = 3.47), Resale Value (WAM = 3.44), and Innovative Features (WAM = 3.32) received the lowest rankings. The relatively lower importance assigned to these factors suggests that farmers prioritise immediate operational suitability and affordability over future resale benefits or advanced technological features. Overall, the findings indicate that price, durability, and field performance collectively constitute the primary determinants of farm implement purchase decisions across the selected districts of Gujarat, reflecting a predominantly utility-oriented purchasing behaviour among farmers.

3.4 Influence of Promotional Tools on Farmers' Purchase Decisions

The influence of promotional tools on farmers' purchase decisions was analysed using the Weighted Average Mean (WAM) method, and the results are presented in Table 6.

Among the promotional approaches evaluated, Field Demonstrations/Field Days emerged as the most effective tool, securing the highest WAM score of 4.29. This finding suggests that practical exposure and direct observation of machinery performance under local field conditions play an important role in influencing purchase decisions. The consistent preference for demonstrations across all three districts indicates that farmers place considerable importance on experiential evaluation before making investment decisions.

Field Demonstrations were followed closely by Word of Mouth from Friends and Peers (WAM = 4.25) and Dealer Recommendations (WAM = 4.11), highlighting the influence of interpersonal communication, local social networks, and technical guidance in shaping purchase behaviour. The strong ranking of these channels suggests that farmers rely substantially on trusted information sources and direct interactions while evaluating farm implement options.

Table 6: Influence of various promotional tools on farmers' purchase decisions (n = 600)

Sr. No.	Promotional Tools	Total Score	WAM Score	Rank
1	Field Demonstration / Field Days	2571	4.29	1
2	Word of Mouth (Friends/Peers)	2547	4.25	2
3	Dealer Recommendation	2465	4.11	3
4	Exhibition / Krushi Melas	2354	3.92	4
5	Social Media / Mobile / Internet	2206	3.68	5
6	Television Advertisements	2100	3.50	6
7	Posters / Banners	1824	3.04	7

Source: Field survey

Exhibitions and Krushi Melas (WAM = 3.92) emerged as moderately influential promotional platforms, contributing mainly to product awareness and exposure to available machinery options. Such events may serve as an important interface between manufacturers, dealers, and farmers by facilitating information exchange and initial product evaluation.

In comparison, digital and mass communication channels exerted relatively lower influence on purchase decisions. Social Media/Mobile/Internet (WAM = 3.68), Television Advertisements (WAM = 3.50), and Posters/Banners (WAM = 3.04) ranked lower than interactive promotional methods. These findings indicate that although access to digital media may be increasing in rural areas, passive communication channels currently appear less influential than direct and experience-based promotional approaches in the context of farm implement purchases. Overall, the results suggest that experiential and trust-based promotional methods are more influential than conventional mass advertising in shaping farmers' purchase decisions regarding agricultural machinery. These findings provide useful implications for manufacturers, dealers, and agricultural extension agencies in designing more effective promotional strategies targeted towards farmers.

3.5 Key Barriers Faced by Farmers in the Purchase of Farm Implements

The barriers faced by farmers in the purchase of farm

implements were analysed using the Weighted Average Mean (WAM) method, and the results are presented in Table 7. Among the identified constraints, High Initial Cost emerged as the most severe barrier, ranking first with the highest WAM score of 4.31. This indicates that the substantial upfront investment required for purchasing farm implements remains the principal challenge limiting adoption. The consistency of this finding across all three study districts suggests that financial affordability represents a common and persistent constraint.

Lack of Finance/Credit Facility (WAM = 4.18) ranked second, indicating that barriers to adoption extend beyond implement pricing and are also associated with limited access to institutional finance and credit support. This challenge appears particularly relevant in a sample dominated by small and marginal farmers, whose investment capacity may be comparatively constrained.

High Repair and Maintenance Cost (WAM = 4.08) ranked third, reflecting farmers' concern regarding recurring expenditure associated with machinery ownership and use. When considered alongside the relatively high importance assigned to Spare Parts Availability and After-Sales Service among purchase decision factors, the findings suggest that farmers evaluate not only acquisition costs but also ongoing operational and maintenance expenses while making purchase decisions.

Table 7: Barriers faced by farmers in the purchase of farm implements (n = 600)

Sr. No.	Barriers Faced in Purchase	Total Score	WAM Score	Rank
1	High initial cost	2586	4.31	1
2	Lack of finance / Credit facility	2508	4.18	2
3	High repair & maintenance cost	2448	4.08	3
4	High fuel consumption / Operating cost	2342	3.90	4
5	Non-availability of timely after-sales services	2334	3.89	5
6	Unsuitability to local soil / Crop type	2216	3.69	6
7	Unavailability in the local market	1896	3.16	7

Source: Field survey

High Fuel Consumption/Operating Cost (WAM = 3.90) and Non-availability of Timely After-Sales Service (WAM = 3.89) ranked fourth and fifth, respectively, indicating that operational efficiency and service support also influence machinery adoption. Unsuitability to Local Soil/Crop Type (WAM = 3.69) emerged as a moderately important constraint, suggesting that implement compatibility with local production conditions remains relevant for some farmers.

In contrast, Unavailability in Local Market (WAM = 3.16) received the lowest ranking, implying that physical access to machinery is comparatively less restrictive than economic and operational concerns. Overall, the findings indicate that economic barriers, particularly high initial investment requirements and inadequate access to finance, constitute the most significant constraints affecting farmers' purchase of farm implements across the selected districts of Gujarat. These results further highlight that affordability and ownership-related costs continue to play a decisive role in shaping machinery adoption behaviour.

4. Conclusion

This study, conducted across Junagadh, Kachchh, and Surendranagar districts of Gujarat with 600 tractor-owning farmers, highlights key factors influencing farm implement purchase behaviour and the constraints affecting adoption. The findings indicate that farmers are predominantly middle-aged, small and marginal landholders with moderate income levels, which significantly influence machinery investment decisions. Although tractor ownership is universal, implement ownership remains concentrated in tillage operations, indicating partial mechanisation. Price/Affordability emerged as the most important purchase factor, followed by durability, quality and performance in the field, reflecting a strong preference for economically viable and reliable machinery. Among promotional tools, field demonstrations and word of mouth were found to be the most effective in influencing purchase decisions. Major barriers included high initial cost, limited access to credit, and high repair and maintenance costs. The study suggests that improving affordability, expanding access to agricultural finance, strengthening after-sales support, and promoting demonstration-based extension activities can enhance the adoption of farm implements and support broader agricultural mechanisation in Gujarat.

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