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# DEALERS PERSPECTIVES ON NANO FERTILIZERS AND THEIR ROLE IN PRODUCT POSITIONING

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## ABSTRACT

This study explores dealers' perceptions about nano fertilizers in Guntur district, Andhra Pradesh. The study was conducted in 2024. The study employed a sample of 35 dealers and percentage analysis, mean scores and chi square technique were employed to analyse the data. The findings revealed that dealers perceived nano fertilizers as cost-effective and efficient. These were viewed as having high ease of use owing to their effective storage, dissolution and application characteristics. Dealers, as first point of contact, shape farmers input choices, thereby making their perceptions as proxy for positioning and perceived effectiveness of nano fertilizer. Recommendations from agricultural departments and fellow farmers identified as crucial for adoption among farmers and promotions by company representatives and media influence were found less impactful. The chi-square analysis highlighted that dealers prioritized affordability for lower customer footfall (fewer than five customers), while ease of use was emphasized for higher footfall (more than five customers). The demand for nano fertilizers is expected to grow, with adoption likely to increase due to their ease of use and reduced perceived risks through farmer education. Enhancing product benefits and implementing focused media promotions could further accelerate adoption among farmers.

**Keywords:** Cost effective, Nano fertilizers, Perception, Promotion

## INTRODUCTION

Agriculture provides livelihood to over half of Indian population and employment to more than 50 % of work force. With the population projected to 1.70 billion by 2050, the food grain demand is estimated at nearly 400 million tonnes, posing significant challenges. The green revolution and subsequent technological interventions substantially increased food grain production but they also created many challenges. Some of these include indiscriminate use of fertilizers, pesticides, depletion of natural resources and environmental degradation (Pingali, 2012; FAO, 2021). These practices have contributed to soil health deterioration, nutrient runoff, water pollution and vulnerability to weather uncertainties.

These concerns highlight the need for adoption of sustainable agricultural practices, particularly in fertilizer management. Approaches such as neem-coated urea, balanced nutrient application, nutrient-efficient genotypes, bio fertilizers, water soluble fertilizers and others have been promoted to address these issues. In recent years,

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technological innovations have shown potential to transform agriculture, with nanotechnology emerging as a promising solution. Nano fertilizers, engineered to enhance nutrient delivery and minimize environmental impact, represent a breakthrough in sustainable fertilizer management (Iqbal *et al*., 2024).

Despite their potential, adoption of nano fertilizers in India remains limited, largely due to a significant knowledge gap among key stakeholders, including dealers, manufacturing companies and farmers (Kumar *et al.,* 2020). Agricultural input dealers, serving as crucial link between manufacturers and farmers, play a pivotal role in the dissemination and acceptance of this (Kumar, 2021). Their awareness, understanding of benefits and limitations of nano fertilizers, ability to communicate these aspects to farmers and their strategies for positioning these products in the market significantly impact the adoption among farmers. If dealers are well informed of nano fertilizers and confident in their benefits, they are more likely to promote them effectively to the farming community. Thus, the current study undertaken to examine dealers' perceptions towards nano fertilizers and propose strategies for enhancing their integration into Indian agriculture.

## MATERIAL AND METHODS

Erstwhile Guntur district of Andhra Pradesh was selected purposively for the present study as the district is the hub for commercial and cash crops with majority of farmers adopting intensive agricultural practices. The list of dealers in Guntur district was obtained from Agriculture Development Office(ADO).From the list, a separate list of dealers selling the nano fertilisers was prepared and 35 dealers were selected randomlyfor study.The sample size was limited to 35 due to the relatively low number of dealers selling nano fertilizers in the study area. Consequently, a sample of 35 respondents was selected for the study. To accomplish the above objectives, primary data pertaining to socio-demographic, other information particulars and dealers perception of nano fertilizers were collected through survey method with the help of well-structured schedule. To study the dealers perception on nano fertilizers, the schedule developed comprised of 20 statements, developed on 5 point Likert scale with scale agreements ranging from strongly disagree to strongly agree. Later, for better understanding, these statements were grouped into six factors namelyproduct benefits, perceived ease of use, perceived risk factor,influential factors, media factorand nano usage Tech – savvy dealers. The information collected was analysed using mean, ranking,index scoring and chi-square tests.

**Chi-square analysis:**

Chi-square test was employed to examine the association between dealers' product perspectives and customer footfall. This signifies whether differences in customer engagement are significantly linked to the way nano fertilisers are positioned by dealers. P value of less than 0.01 indicates the significant association between variables. While Cramer's value ranges between 0 to 1 indicating no association to strong association. Values of above 0.5 signifies indicative of strong association

It is computed through the formulae

$$\chi^2 = \sum_{i=1}^{k} \frac{(O_i - E_i)}{E_i} (or) \sum \frac{(O-E)^2}{E}$$

(D.F = K-1)

Where, $O_i$ = Observed number of cases in the $i^{th}$ category

**Table 1. Profile characteristics of sample dealers** **n =35**

| S.No | Profile Characteristics | Frequency | Percentage |
|---|---|---|---|
| 1 | **Age** | | |
| | Upto 30years | 3 | 8.57 |
| | 31-40years | 7 | 20.00 |
| | 41- 50years | 16 | 45.71 |
| | Morethan 50years | 9 | 25.71 |
| | Total | 35 | 100 |
| 2 | **Education level** | | |
| | Primary Education | 02 | 05.71 |
| | Secondary Education | 18 | 51.43 |
| | Intermediate | 10 | 28.57 |
| | Graduation and above | 05 | 14.29 |
| 3 | **Market experience** | | |
| | Upto 5years | 05 | 14.28 |
| | 6 to 10years | 09 | 25.71 |
| | 11to15years | 13 | 37.14 |
| | >15years | 08 | 22.85 |
| 4 | **Credit sales( in '000 Rs.)** | | |
| | Upto 25 | 06 | 17.14 |
| | 26 to 50 | 20 | 57.14 |
| | 51 to 75 | 07 | 20.00 |
| | 76 to 100 | 02 | 05.71 |
| 5 | **Source for inputs** | | |
| | Company Representative | 24 | 68.57 |
| | Other dealers | 06 | 17.14 |
| | Digital platforms | 03 | 08.57 |
| | Government agencies | 02 | 05.71 |
| 6 | **Purchase of inputs** | | |
| | Directly from the company | 20 | 57.15 |
| | Third party | 09 | 25.71 |
| | Both | 06 | 17.14 |
| | Total | 35 | 100 |
| 7 | **Channel for inputs** | | |
| | Online | 02 | 05.71 |
| | Offline | 28 | 80.00 |
| | Both | 05 | 14.29 |

| S.No | Profile Characteristics | Frequency | Percentage |
|---|---|---|---|
| 8 | **Sales through online** | | |
| | Less than 5 % | 28 | 80.00 |
| | 5 -10% | 03 | 08.57 |
| | 10 - 15% | 02 | 05.71 |
| | Greater than 15 % | 02 | 05.71 |
| 9 | **Main products selling** | | |
| | Agro chemicals | 23 | 65.71 |
| | Fertilisers | 08 | 22.86 |
| | Seeds | 04 | 11.43 |
| 10 | **Since how long you have been selling nano fertilisers** | | |
| | Since 1 year | 14 | 40.00 |
| | Since 2 years | 15 | 42.86 |
| | Since 3 years | 06 | 17.14 |
| 11 | **Channel for nano fertilisers** | | |
| | Directly from company | 24 | 68.57 |
| | Third party | 07 | 20.00 |
| | Both | 04 | 11.43 |
| 12 | **Average footfall for nano fertilisers (per day)** | | |
| | Less than 5 | 15 | 42.86 |
| | 5 to 10 | 17 | 48.57 |
| | Greater than 10 | 03 | 08.57 |
| 13 | **Perspective of nano fertilisers** | | |
| | Premium | 03 | 08.57 |
| | Affordable product | 13 | 37.14 |
| | Ease of use | 17 | 48.57 |
| | Eco friendly | 02 | 05.71 |
| 14 | **Aware of digital platforms** | | |
| | Yes | 14 | 40 |
| | No | 21 | 60 |
| 15 | **Willing to continue recommendation of nano fertilizers** | | |
| | Yes | 26 | 74.29 |
| | No | 9 | 25.71 |

**Table 2. Product perspective Vs Customer footfall for nano fertilisers (Chi-square Tests)**

| | | Product Perception | | | | |
|---|---|---|---|---|---|---|
| | | **Premium** | **Affordable** | **Ease Of Use** | **Eco Friendly** | **Total** |
| Average Footfall Per Day | Less than 5 | 1 | 1 | 12 | 1 | 15 |
| | 5 To 10 | 0 | 11 | 5 | 0 | 17 |
| | More Than 10 | 2 | 1 | 0 | 2 | 3 |
| | Total | 3 | 13 | 17 | 3 | 35 |

| Chi-square Tests | value | df | Asymp.Sig.(2-sided) |
|---|---|---|---|
| Pearson Chi-Square | 26.562[a] | 6 | **< 0.01** |
| Likelihood Ratio | 23.588 | 6 | < 0.01 |
| Linear-by-Linear Association | 10.183 | 1 | 0.001 |
| Cramer's V ( Effect size) | 0.616 | Strong association | |
| N of Valid Cases | 35 | | |

a. 8 cells (66.7%) have expected count less than 5. The minimum expected count is .17.

$E_i$ = Expected number of cases in the category $i^{th}$ when is true.

K = Number of categories

If the value of $\chi^2$ is greater than the table value of $\chi^2$ at specified level of significance for (K-1) degrees of freedom, it will be significant and then we shall be justified in suspecting significant divergence between the fact and theory and rejecting the null hypothesis of equality of two sets of observed and expected frequencies.If the value $\chi^2$ of is non-significant, it justifies the agreement between the observed fact and the theory or hypothesis.

On the basis of the mean scores, rank order was calculated. The item securing highest mean score was given first rank and the next higher second rank and so on.

## RESULTS AND DISCUSSION

The information pertaining to profile characteristics of sample dealers were collected and the results are presented in Table1.

Table 1. revealed that the majority of dealers (45.71 percent) were between 41 and 50 years old, possessed secondary education (51.43 percent), with a significant proportion of dealers having 11 to 15 years of market experience (37.14 percent). Most of dealers were obtaining information related to inputs from company representatives (68.57 percent) and around 80 per cent of dealers were purchasing inputs through offline channel. Around 42.86 percent of dealers were selling nano fertilizers from past two years. Most of the dealers (48.57 percent) perceived that

**Table 3. Dealers perception on nano fertilizers** **n =35**

| Factors | Statement | Mean score | Rank |
|---|---|---|---|
| Product benefits | Nano are priced less over traditional fertilizers | 4.17 | 1 |
| | Nano fertilizers are more effective than traditional fertilizers | 3.62 | 2 |
| | Nano fertilisers reduces the input cost of farmers | 3.34 | 3 |
| | Nano fertilizers reduces the reliance on traditional fertilizersby farmers | 3.28 | 4 |
| | Nano fertilizers leads to improvements in Yields | 3.11 | 5 |
| | Nano fertilizers are eco friendly | 2.91 | 6 |
| Ease of usage | Nano fertilizers are easy to store | 4.05 | 1 |
| | Nano fertilizers dissolve easily for spraying | 3.71 | 2 |
| | Nano fertilizers are easy to apply on the farm | 3.54 | 3 |
| Perceived risk factor | Farmers are reluctance to shift from routine farm operations | 3.71 | 1 |
| | Farmers has limited knowledge on nano fertilizers | 3.57 | 2 |
| | Potential of increasing costs due to additional equipment and labour | 3.31 | 3 |
| Influential Factors | Advices from Agri Dept & other institutions facilitates the adoption of nano fertilizers among farmers | 4.11 | 1 |
| | Advices from fellow farmers facilitates the adoption of nano fertilizers nano fertilizers among farmers | 3.71 | 2 |
| | Advices from Agri input dealers facilitates the adoption of nano fertilizers nano fertilizers among farmers | 3.22 | 3 |
| | Promotions by company persons facilitates the adoption of nano fertilizers among farmers | 2.91 | 4 |
| Media Factor | Promotion through mass media platforms facilitates the adoption of nano fertilizers nano fertilizers among farmers | 3.48 | 1 |
| | Promotion through social media platforms facilitates the adoption of nano fertilizers nano | 3.11 | 2 |
| Nano usage demand | The Demand for nano fertilizers will continue in the near future | 3.97 | 1 |
| | More farmers are willing to use nano fertilizers in the near future | 3.77 | 2 |

nano fertilizers are easy to use. A significant number of dealers (60 per cent)were not aware of digital platforms,74.29 percent of dealers expressed their continuous willingness of recommending nano fertilizers to farmers. The average footfall for nano fertilizers was observed to be ranging between 5 to 10 number by 48.57 percent of sample respondents.

**Product Positioning of nano fertilisers by dealers in the study area**

Chi-square test was employed to identify whether there exists any significant association between product positioning of dealers and customer footfall for nano fertilisers and the results are presented below:

**Null Hypothesis (H0):** There exists no significant association between product perspective vs customer footfall for nano fertilisers

**Alternate Hypothesis (H1)**: There exists a significant association between product perspective vs customer footfall for nano fertilisers

The results presented in Table 2. indicated that, there exists a significant association between dealers perspective about nano fertilizers and footfall of customers for nano fertilisers (Vishakha *et al.* 2023) as indicated from thechi-square values for the average footfall of customers less than 0.05 (<0.01). This indicated that majority of dealers were perceiving nano fertilizers as affordable and easy to use in agriculture. Dealers construct their perceptions of nano fertilizers from information disseminated by agro-input companies and governmental agricultural agencies at both state and central levels. Acting as intermediaries, they transmit and position these perceptions at farmer level, thereby shaping the promotion of nano fertilizers in the market, rather than reflecting farmers' independent assessments.Dealers who experienced a footfall of lower than five customers per day predominantly emphasized on the ease of use of nano fertilizers. In contrast, those with higher customer footfall were more likely to focus on their affordability relative to conventional fertilizers.Thus, rejecting null hypothesis stating that there exists significant association between product perspective of dealers and footfall of customers for nano fertilisers.

The constraint in sample size is primarily due to difficulty in identifying dealers selling nano fertilisers, as it is still a relatively new product in the market. Despite the limitations arising from the small sample size (n = 35) and the presence of low expected frequencies in several cells, the effect size was measured through Cramer's V (0.616) and this indicated a strong association between dealers' product perspectives and customer footfall for nano fertilisers. Cramer's V value in chi square test ranges from 0 (no association) to 1 (strong association). Value of 0.616 for the current study reflects a strong association, suggesting that dealers' perspectives on nano fertilisers are strongly linked with the level of customer footfall.

**Dealers' perception on nanofertilizers**

The information pertaining to dealers perception of nano fertilisers were collected on a schedule developed with 20 statements on a five point Likert scale,with scale agreements ranging from strongly disagree to strongly agree and were assigned scores from 1 to 5, with one being strongly disagree and five being strongly agree. The mean scores were computed and ranks were given accordingly and the results are presented in Table 3 & Table 4

The results presented in Table 3 shows that, with regard to product benefits sample dealers strongly perceived that nano fertilisers

are less costly over traditional fertilizers (4.17) and more effective than traditional fertilizers (3.62). However, they hold neutral views regarding whether nano fertilizers reduces farmers' input costs (3.34) and decreases reliance on traditional fertilizers (3.28) or lead to yield improvements (3.11). Findings align with results of Kumar *et al.* (2021), who noted that various intermediaries expressed uncertainty about the economic returns of nano inputs in the absence of large-scale demonstrations. Additionally, the sample dealers disagreed with the notion that nano fertilizers are eco-friendly (mean score: 2.91), as they still perceive them as another form of fertilizer, similar to Mahapatra *et al.* (2022) that highlighted the scepticism among stakeholders regarding the environmental concerns for nano-based products.With regard to perceived ease of use for nano fertilizers, sample dealers strongly perceived that they can be easily stored (4.05), get dissolved easily while spraying (3.71) and are easy to apply on farm field (3.54).

With regard to perceived ease of use for nano fertilizers, sample dealers strongly perceived that they can be easily stored (4.05), get dissolved easily while spraying (3.71) and are easy to apply on farm field (3.54). Raliya *et al.,* (2018), also emphasized the advantages of nano formulations in terms of storing, handling and application compared to bulk fertilizers.

With regard to influential factors, sample dealers strongly perceived that advice from agricultural departments and other institutions facilitates the adoption of nano fertilizers among farmers (4.11) followed with advices from fellow farmers is influential (3.71). However, they were neutral about the influence of advice from agricultural input dealers (3.22) and disagreed with the influence of promotions by company representatives (2.91). With regard to media factors, sample dealers perceived that promotion through mass media (3.48) and social media platforms (3.11) had less influence in increasing the adoption of nano fertilizers. With regard to demand for nano urea, sample dealers perceived that the demand for nano fertilizers will continue in the near future (3.97) and more farmers willing be using nano fertilizers soon (3.77). However, Ganiger (2012) highlighted that addressing challenges such as technical skill gaps and communication issues is crucial to improving dealers' effectiveness in promoting new products like nano fertilizers.However, addressing the training needs of input dealers is crucial for enhancing their knowledge while also ensuring effective dissemination of various technologies as highlighted by Waghmode *et al*.,(2014).

## CONCLUSION

This present study aims to understand the perception of nano fertilizers among dealers in Guntur district of Andhra Pradesh, how these fertilizers are positioned and strategies to increase their adoption. The study reveals that sample dealers view nano fertilizers as both cost-effective and more efficient than traditional fertilizers and do not consider them eco-friendly. Dealers strongly believe in the ease of use of nano fertilizers, particularly in terms of storage, dissolution and application. Advice from agricultural departments and fellow farmers was identified as crucial for adoption while promotions by company representatives and media influence are less impactful. While chi square results indicated that, dealers in the study area were positioning nano fertilizers as affordable and easy to use, emphasizing affordability for lower footfall (fewer than 5 customers) and ease of use for higher footfall (more than 5 customers). Results implicate that the demand for nano fertilizers is expected to grow, with more farmers likely to adopt them in the near future. Sample dealers anticipate growing demand for

nano fertilizers, primarily due to their ease of use, including application, dissolution, and storage. Reducing perceived risks through farmer awareness and education could further encourage adoption. State agricultural department promotions and peer advice are influential, while enhancing product benefits and targeted media promotions could also drive wider adoption among farmers.

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