Impact of Agro Chemical Industries and Their Market Penetration Strategies on Farmers: An Evaluation

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Abstract

Products made by the agrochemical sector are vital to contemporary farming because they increase crop yields and shield plants from harmful insects and illnesses. The agrochemical industry's market penetration efforts and the subsequent effects on farmers' farming methods are the primary foci of this research. Quantitative surveys and qualitative interviews with farmers from different locations make up the research's mixed-methods methodology. The results show that agrochemical product acceptance and use patterns are greatly affected by market penetration methods, which include educational outreach, product quality, distribution channels, price policies, and brand loyalty. Brand loyalty was shown to be primarily driven by high-quality items and an effective impression of the brand, with price sensitivity varying across demographic groups. Important variables influencing market penetration also included product accessibility and availability. In order for farmers to make better decisions, the research stresses the need of individualised educational programmes that boost their knowledge and skills. These findings have important implications for the agrochemical industry. To effectively penetrate markets and support sustainable agricultural development, they must adopt a holistic approach that includes quality assurance, strategic pricing, robust distribution networks, and comprehensive educational initiatives. This study adds to our knowledge of how agrochemical firms may make their tactics more responsive to farmers' requirements, leading to stronger and more productive agricultural systems.

Keywords – agrochemical industry, market penetration strategies, farmers, crop productivity, product quality

Introduction

An essential part of contemporary farming, the agrochemical sector supplies farmers with a wide range of chemicals that help them maintain crop yields and protect their crops from biotic and abiotic stresses. Agrochemical firms have, over the years, adjusted their market penetration tactics to suit the varied demands of farmers and the intricacies of agricultural systems throughout the world. Fostering sustainable agricultural growth requires an understanding of how these tactics affect farmers.

Focusing on the effects of agrochemical companies' market penetration techniques, this article intends to investigate the complex nature of the interaction between agrochemical companies and farmers. Through exploring this connection, we want to provide light on how these methods impact farmers' habits, decision-making, and the long-term viability of agriculture.

To maximise crop yields and safeguard agricultural investments, the agrochemical business produces a wide range of goods, such as fertilisers, insecticides, and plant growth regulators. The yearly global market value of agrochemical businesses is in the billions of dollars, giving them tremendous influence on farming methods all over the globe.

Agrochemical firms use a wide variety of tactics, including price policies, distribution networks, branding, product innovation, instructional programmes, and more, to break into new markets. The methods are developed with the goal of increasing sales, strengthening customer loyalty, and making products available to farmers in different parts of the world, regardless of their socioeconomic status.

Everyone from agrochemical corporations to lawmakers to agricultural extension agencies to individual farmers stands to benefit greatly from this study's findings. More focused and long-term strategies for penetrating new markets may be shaped by the insights provided by this analysis of the dynamics between pesticide companies and farmers. In the end, these kinds of understandings are crucial for strengthening agricultural resilience, improving food security, and speeding up the shift to more sustainable farming practices.

This research aims to contribute to the broader discourse on sustainable agriculture and assist in making informed decisions that balance agricultural productivity, profitability, and environmental stewardship. It does this by conducting a comprehensive analysis of market penetration strategies and their impacts on farmers.

Literature review

Chemical fertilisers are a key component of agricultural productivity, which helps increase farmers' income and output while also guaranteeing the nation's food supply. However, significant non-point source pollution in China's agriculture has been caused by the excessive use of chemical fertilisers (Ren et al., 2021, Zhang et al., 2021). According to estimates, China's chemical fertiliser use skyrocketed from 88.94 kg/hm2 to 437.39 kg/hm2 between 1980 and 2014, much outpacing the safety standards established by industrialised nations (225 kg/hm2). Approximately 28.17% of farmers in the country continue to use fertiliser at levels above this standard (Tian et al., 2015). Toxic metals and elements, including phosphorus and zinc, are abundant in chemical fertilisers. Chemical fertilisers, when used for an extended period of time or in excess, enrich soil with harmful compounds and cause heavy metal contamination. This poses a long-term danger to the quality and safety of agricultural goods (Shuqin and Fang, 2018). Another issue is the red tides caused by eutrophication and algal blooms in almost half of China's lakes. This has reduced or killed off aquatic animals like fish because there isn't enough oxygen in the water (Bashir et al., 2013). Chemical fertiliser has leached into water supplies, threatening the health of millions of people in thirteen provinces (Chen et al., 2017). This is particularly true with well water.

Over the last several years, the Chinese government has focused heavily on encouraging the decrease of fertiliser use. Soil testing, formula fertilisation, and water and fertiliser integration are some of the scientific fertilisation technologies that have been promoted since 2015 when the "Action Plan for Zero Growth of Chemical Fertiliser Use by 2020" was issued by the People's Republic of China's Ministry of Agriculture and Rural Affairs. The plan mandates that all regions replace chemical fertilisers with organic ones by 2020. Reducing pesticide and fertiliser usage is crucial to achieving negative growth in chemical fertiliser use, according to China's 2019 No. 1 core document. The People's Republic of China Ministry of Agriculture and Rural Affairs published statistics showing that China has reached its zero growth objective by the end of 2020. An rise of 5% from 2015 to 2021 was recorded in the fertiliser utilisation efficiency for rice, wheat, and maize, which amounted to 40.2% (Ministry of agriculture and rural affairs of the people's Republic of China, 2021). Nonetheless, China has a long way to go before it can significantly cut down on fertiliser use. One of the most significant points made in China's No. 1 Central Document for 2021 was the need to keep pushing for less chemical fertilisers, with the goal of helping the agricultural sector become greener. Agricultural equipment subsidies, price subsidies, and direct subsidies are the primary forms of financial transfer payments used by the Chinese government for fertiliser reduction initiatives at the moment (Lu et al., 2022). First, there is a lack of intrinsic incentive for farmers to decrease chemical fertilisers due to the government's direct subsidy policy, which has encouraged opportunistic behaviour on the part of farmers. This means that farmers reduce fertiliser when subsidies are available and do not do so when subsidies are not (Takeshima and Nkonya, 2014); Conversely, the market plays a crucial role as an external motivator to encourage farmers to reduce their use of fertilisers, which in turn increases their production revenue and compels them to adopt green production practices (Liu et al., 2019). Subsidies for consumers' environmentally conscious purchases are now under-emphasized in policy.

So far, studies on the fertiliser use habits of Chinese farmers have mostly concentrated on four aspects. First, the impact of demographic variables on farmers' fertiliser usage habits, including age, gender, and degree of education (Sun et al., 2019; Hameed and Sawicka, 2017; Sawicka and Hameed, 2017; Sawicka and Sawicka, 2017). Fertiliser application intensification was more common among female farm labourers, according to Ji et al. (2016). Younger farmers,

according to Tian et al. (2015), are more inclined to choose for reduced use of chemical fertilisers in agricultural output. Fertiliser use could be affected by one's degree of education, according to Zuo (2015). Secondly, Volan (2016) found that factors such farm size, agricultural work force, and family income affected farmers' chemical fertiliser usage behaviour. According to Yan et al. (2010), farmers' choice and use of fertiliser may be affected by their family income. Fertiliser consumption per hectare in agricultural productivity by rice farmers decreases with increasing farm size, according to Zhu et al. (2017). Thirdly, the effect of farmers' degrees of risk perception and knowledge on their fertiliser application habits (Sun et al., 2019, Wu et al., 2021). According to Qiu et al. (2014), farmers that are risk-averse are more likely to use fertiliser to guarantee yields. Fertiliser reduction in agricultural productivity is associated with increased farmer knowledge of chemical fertiliser products (Tan, 2015), circular agriculture (Xu et al., 2010), and low-carbon agriculture (Tian et al., 2015). The fourth aspect is the effect of the agricultural policy and market environments on the fertiliser use habits of farmers. Fertiliser and green agricultural product markets make up the market environment (Kong et al., 2018; Yin et al., 2018; Sun, 2019; Xi and Zhang, 2021; Zhu et al., 2021). Funds, supporting facilities, technologies, and sales policies for promoting agricultural technology and reducing fertiliser use make up the policy environment (Yang and Li, 2017; Yang and Luo, 2018). It turns out that market revenues and government policies both have an impact on farmers' green producing behaviour. Market income and market cost significantly affected farmers' green production willingness, but government technical guidance had no significant effect, according to Lin et al. (2021), who employed a binary discrete choice model to measure the influence of market and government factors on this willingness. The primary barrier to the green transformation of agricultural output, according to Zhu and Deng (2022), is the slow growth of the market for green agricultural products. According to Wang and Li (2019), one way for the government to encourage farmers to use less fertiliser is via ecological transfer payments.

Objectives of the study

- To examine the key market penetration strategies employed by agrochemical industries.
- To assess the impact of these strategies on farmers' decision-making processes and agricultural practices.
- To identify opportunities for enhancing the effectiveness and sustainability of market penetration strategies in the agrochemical industry.

Research methodology

In order to thoroughly assess the effect of the market penetration techniques used by the agrochemical industry on farmers, this research uses a mixed-methods strategy, integrating quantitative surveys with qualitative interviews. Surveys that collect structured data on how farmers feel, what they do, and what they prefer in relation to agrochemical goods and the techniques that agrochemical corporations use to break into new markets. The survey tool was created to gather demographic data, evaluate farmers' knowledge and use of agrochemical goods, and gauge their degree of contentment with various techniques for penetrating new markets. The use of a stratified random sample approach was used to guarantee that all geographies, farm sizes, and cropping types would be captured. Statistical approaches including descriptive statistics, correlation analysis, and regression analysis were used to examine the survey data in order to find trends, patterns, and correlations between variables.

Data analysis and discussion

Table 1 Cropping Patterns

S. N	Kharif crop	Frequency	Percentage	Rabi crop	Frequency	Percentage
1	Wheat	134	45.42%	Wheat	11	3.73%
2	Cotton	36	12.20%	Cotton	112	37.97%
3	Soyabean	42	14.24%	Soyabean	121	41.02%
4	Vegetables	53	17.97%	Vegetables	25	8.47%
5	Fruits	30	10.17%	Fruits	26	8.81%

The table presents the cropping patterns observed among the surveyed farmers during both Kharif and Rabi seasons. Key observations and insights from the data are as follows:

Dominance of Wheat and Cotton: Wheat and cotton emerge as the predominant crops cultivated by farmers, with notable differences in their seasonal distribution. Wheat is primarily grown during the Rabi season, with a relatively lower frequency during Kharif, while cotton cultivation is more prevalent during the Kharif season.

Significance of Soyabean: Soyabean holds considerable importance in both Kharif and Rabi cropping patterns, with a substantial frequency observed in both seasons. This indicates the widespread cultivation of soyabean across the surveyed agricultural regions, reflecting its economic viability and agronomic suitability.

Diversity in Vegetable Cultivation: Vegetable cultivation shows a relatively diverse pattern, with a significant frequency observed during both Kharif and Rabi seasons. This diversity suggests the adaptability of vegetable crops to varied climatic conditions and market demands, potentially providing farmers with year-round income opportunities.

Fruit Cultivation Trends: Fruit cultivation, while less prevalent compared to other crops, still demonstrates a notable presence in both seasons. The cultivation of fruits may signify niche markets, agro-climatic suitability, or diversification strategies adopted by farmers to mitigate risk and enhance income streams.

Overall, the data highlights the dynamic nature of cropping patterns among surveyed farmers, influenced by factors such as agro-climatic conditions, market demand, and individual farmer preferences. Understanding these cropping patterns is essential for agrochemical companies to tailor their product offerings, marketing strategies, and educational initiatives to meet the diverse needs of farmers across different cropping systems and seasons.

Table 2. Impact of Agro chemical companies

Factors	Garrett score	Rank
Reliable distributor partnership	69	1
Robust collection of crop protection products	63.11	2
Expanding the use of advertising	52.75	3
Increased sales force	38.23	4
Specialised dealer	32.66	5

The table presents the impact of various factors associated with agrochemical companies, as perceived by surveyed farmers, based on Garrett scores and ranking.

Reliable Distributor Partnership (Rank 1, Garrett Score: 69): Farmers rank a reliable distributor partnership as the most impactful factor associated with agrochemical companies. A strong partnership with distributors ensures timely availability of agrochemical products, enhances trust, and fosters long-term relationships, contributing significantly to farmers' satisfaction and loyalty.

Robust Collection of Crop Protection Products (Rank 2, Garrett Score: 63.11): The availability of a diverse and comprehensive range of crop protection products is perceived as highly impactful by farmers. Agrochemical companies with a robust collection of products cater to the varied needs of farmers, enabling them to effectively manage pests, diseases, and weeds, thereby enhancing crop yield and quality.

Expanding the Use of Advertising (Rank 3, Garrett Score: 52.75): The expansion of advertising efforts by agrochemical companies is considered impactful, albeit to a lesser extent compared to distributor partnerships and product availability. Effective advertising campaigns can raise awareness, educate farmers about product benefits, and influence purchasing decisions, contributing to increased market penetration and brand recognition.

Increased Sales Force (Rank 4, Garrett Score: 38.23): While increasing the sales force is recognized as a relevant factor, its impact appears to be relatively lower compared to other strategies. A larger sales force can facilitate direct engagement with farmers, provide personalized support, and address specific needs, thereby potentially enhancing customer satisfaction and sales performance.

Specialized Dealer (Rank 5, Garrett Score: 32.66): The presence of specialized dealers ranks lowest in terms of perceived impact among surveyed farmers. While specialized dealers can offer tailored advice and expertise, their impact may be limited by factors such as geographic coverage and product diversity compared to broader distributor partnerships.

Conclusion

This research sheds light on the ways in which agrochemical corporations affect farmers by analysing their market penetration methods and the important aspects that shape farmers' attitudes and actions. The study has implications for sustainable agricultural development by illuminating the dynamic connection between agrochemical corporations and farmers using a mixed-methods methodology that includes quantitative surveys and qualitative interviews. In order to drive sustainable agricultural growth, it is crucial to comprehend the complex interaction between agrochemical corporations and farmers, as this research highlights. The findings of this study may help agrochemical businesses improve their tactics, which in turn helps farmers, increases their market share, and ensures the continued viability of agriculture throughout the world.

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