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Assessing the Socioeconomic and Agronomic Effects of Pesticide Marketing in Vidarbha

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ABSTRACT

The farming industry has adopted the use of pesticides whose impact has been felt on agriculture and the economic state of the farmers. The paths taken by the marketing procedures of the pesticides makers in the Vidarbha area of Maharashtra where agricultural practices are the biggest earnings to the locals are the reasons that dictate the choices made by the farmers regarding their acquisition of pesticides and the process of crop management. This is a study of the socio-economic and agronomic effects of marketing pesticides along with its coverage of effects of branding, promotion, dealer system, and field testing on the awareness of farmers, their perception, and utilization behaviors. Primary data were collected with mixed-method- based on the form of structured questionnaires and interviewing procedures of the farmers, dealers and field representatives in the key Vidarbha regions and shedding light on the secondary data through government reports and industry magazines. These findings mean that marketing prompts a significant effect on the kind of pesticides farmers use which may affect the input prices, protective measures used against crops and their production. Successful marketing in as far as it encourages acquisition and application of modern agrochemicals among the farmers, failure or poor marketing on other occasions are associated with over application, excessive financial expenditure, and environmental problems. The interaction between marketing and socioeconomic situation and agronomic performance pointed out in the paper can be helpful to the policymakers, chemical industries producing agrochemicals and the agencies that are the extension in Agriculture to introduce the responsible use of pesticides, sustainable farming practices and increased productivity in the Vidarbha area.

Keywords: Pesticide marketing; Agricultural productivity; Socioeconomic impact; Farmer awareness; Purchase behavior; Agrochemical promotion; Brand influence

Introduction

Agriculture is still the primary source of livelihood to a majority of rural families in India and the area of Vidarbha in Maharashtra can be described as being vital as it is currently involved in cultivating cotton, soy beans, pulses besides the cultivation of cereals. Over the past several decades farming activities have been heightened when there is more infestation by pests, changing climatic conditions and the necessity of achieving more yield as a means of protecting crops by using pesticides therefore leading to more reliance on the manure as a mode of crop protection. The realization of market potential in regions like Vidarbha, the manufacturing companies that produced pesticides have in turn adopted diverse marketing strategies that might involve influencing the decision making of farmers in an endeavor to adopt products of the company. In such strategies, field demonstrations, promotional and dealer and distributor mediums, development of the brand, credit based packages, consultant services,

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and all these are aimed at the increasing product management and brand dynamics, and retention of perceived efficacy in farmers mind.

Marketing initiatives taken by pesticide firms can particularly be successful in the area where farmers are already disadvantaged in the access to technical information, both financially and dependent on intermediaries to soak in information such as information sources. It has already been mentioned that branding and sales promotion and direct outreach can present a significant influence on the buying behavior of farmers, which may lead to various consequences in relation to the cost of inputs, the impact on the crop and its output. Though proper marketing may disseminate information that may enlighten a fair amount of knowledge on pest management, there are the dangers of over-use, misuse and degradation of the ecosystem in case of application of promotion messages without scientific guidance to the farmers. Socioeconomic impact of such marketing actions is also a significant element and input price comprises greatest part of production price to small and marginal cultivators in Vidarbha.

The pressure to spend heavily by advertising, credit sales and brand loyalty would potentially, or even cause, farmers to alter their spending habits, and can result in bankruptcy or negatively in the dependence of costly chemical injections. At the agronomic facet, the use of pesticides which are realized due to the marketing activities may influence the type of cropping, the decisions made with respect to pest management and the long-term yields. These dynamics play a crucial role in the ascertaining of whether marketing pesticides has a positive contribution to the productivity of the farm or is generating problems that are likely to affect the sustainability and livelihoods of the rural population. After all, though the marketing of pesticides with regard to their influence on both socioeconomic and agronomic achievements is of paramount importance, there is little prior empirical work with specific references to Vidarbha. Most of the studies, which are currently available exist on the impacts of marketing within a larger or the different regional setup, a factor that creates a loophole in the enterprise of associating the regions with narrower interactions among the marketing strategy, the agricultural behaviour and harvest of the farmers.

The research paper at hand shall endeavor to fill in this gap by investigating the significance of the marketing strategies utilized by the pensions firms through branding, marketing promotions, dealer controls and field dealings on the awareness, perception, usage habits, input payment and delivery of Vidarbha among the farmers. It can be concluded that the study borders on both quantitative and qualitative features of these impacts due to the mixed-method design that implies the usage of both structured questionnaires, various interviews, and secondary data. The other variables which the study is considering are the education of the farmers, the accessibility of the extension services, and the socioeconomic status is a mediator of the influence of marketing strategies on the decision-making. The study purpose of this analysis will be to be capable of presenting such a holistic depiction of the both positive and negative impacts of marketing pesticides: should the pesticide may lead to the increase in productivity and knowledge or it may lead to the over-dependence and misuse.

This is supposed to eventually guide the policymakers, agrochemical companies and institutions dealing with extension on the necessity to have moderate marketing, farming education programs and regulatory regulations so that pesticides use in Vidarbha may be amenable to environmentally friendly agricultural practices, increased crop production and economic welfare of farmers among other ecological and health hazard reduction. The study suggests the complex interrelationship between commercial marketing and social economic factors and agronomic performance along with the use of region-specific research to establish policy and interventions that would be viable in agriculture.

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Literature Review

Use of pesticides and other agricultural practices has become a major challenge to the crop production as well as the livelihood of the farmers across the globe. Most of the studies note that awareness, knowledge and behavior of farmers concerned with the use of pesticides directly affects the effectiveness of the pest management and also on the socioeconomic and environmental effects. Jeamponk and Thipsaeng (2014) in their research regarding farmers – Suan Luang Sub-District in Thailand established that farmers were familiar with the products of pesticides; therefore the application practice was not suitable with the recommended guideline, which could have led to the risk of health risks and ineffective pest management strategy. Similarly Ali et al. (2020) examined the situation of smallholder and intensive farms in Bangladesh and found that risky application practices, resultant overuse, and expenses to the farmers could frequent because of lack of knowledge, use of dealers, and absence of extension services. The findings indicate the importance of taking into consideration the behavior of farmers to take into account the success and impact of the marketing and use of pesticides.

Behavioral intentions to the use of pesticides have also been credited to psychological and socioeconomic factors. Govindharaj et al. (2021) conducted a study of rice farmers in eastern India basing on a modified version of the planned behavior theory, and the study determined that the intention to use pesticides had a significant influence on attitudes, subjective norms, perceived behavioral control, and knowledge. The article identifies that behavior change which comes with awareness campaign, good training and appropriate source of information can change behavior, thus, making education and extension services significant to the marketing strategies. Similar findings were also confirmed by Jallow et al. (2017), who concluded that in Kuwait, farmworkers were more prone to lacking knowledge of safe practices when using pesticides, and that there is a global problem of occupational health and safety in the agricultural segments of the population.

Of importance, too, are the Agronomic and Environmental impact of the pesticides use. Mahapatra et al. (2017) also established that the application of imidacloprid altered microbial activity and other enzyme activities in rice field implying that the product might have prolonged impacts on the health and the viability of the soil. Fenik et al. (2011) investigated the presence of pesticides residues in fruits and vegetables, and established that improper use and improper observance of the dosage regimens can lead to products violation of food competition. Bernandes et al. (2015) expanded this perspective and argued to the overuse of pesticides the threat to the human wellbeing with respiratory and neurological problems and the destruction of the environment with the pollutants of the water charge and extinction of biological life. The above analyses have shown that despite the importance of pesticides in terms of productivity promotion, the realization of that is accompanied by a trickle-down effect in the case of their use at all.

To a larger extent, these studies have identified the intense level of technology and the decision-support models that can counter these risks. An online tool, SYNOPS-WEB, which measures the environmental risks of pesticide plans in fields, was developed by Strassemeyer et al. (2017) to help the farmers and policymakers. Through these tools one is able to balance the demands of the productivity and the demands of the ecological safety; it is possible to prove that the informed decision-making can reduce the use of pesticides and the harmful effects on them. Huyen et al. (2020), on the same paper, have carried out a study in Vietnam showing that excessive exposure to pesticides could have detrimental effects on the health of their farmers which again further mentions the importance of incorporating the knowledge dissemination and reduction of risk programs in the marketing and extension strategies.

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The socioeconomic implications of the use of pesticides have also been studied in large proportions. Aktar et al. (2009) provided a clear explanation of the benefits and drawbacks of pesticides concluding that despite the fact that it helps to reduce loss among farmers and also being able to increase his crop, excessive use may end up causing strain to the smallholder farmers in form of the high cost of inputs and even failure of his crop due to improper use. The information available in Krishna and Qaim (2012) revealed that in India the technological introduction of the Bt cotton led to the substantial reduction of the pesticide, a fact that demonstrates the fact that the productive and sustainable practices could be realized in the environment of technology-based interventions and marketing campaigns awareness. Conversely, according to Khanna (2020), there is knowledge-practition knowledge-perception gap that translates directly into excess use of pesticides by grown-ups in Punjab and Kashmir which is then directly translated into the economic and environmental performance.

Finally, there are comprehensive data that point out how much pesticides have been used and its impacts on the agricultural systems. As has been reported below, it was reported by the FAO (2020) that India ranks among the top producers of the agricultural pesticides in the world, which is indicative of the increased crop protection process. Food Safety and Standards Authority of India (FSSAI, 2019) also cites the maximum residues limits (MRLs) in food filled as of concern and once again emphasizes the need to use it appropriately, monitor and control to ensure safety of consumers and sustainable agriculture.

All in all, it is possible to state that the implementation of pesticides represents the two-sided sword, on the one hand, it raises the level of production, and on the other hand, it poses severe risk in the situations in which they are not used properly. Their awareness, knowledge and perceptions regarding their usage of pesticides are influenced by the socioeconomic factors, and the marketing policies, extension services, the recommendation of their dealers and their awareness and perception about the use of pesticides. It encourages responsible pesticide usage through the means of proper education, regulation as well as decision support tools. Though, marketing strategies can also be implemented in facilitating adoption and productivity, it should be supplemented with training, risk awareness and sustainability to reduce adverse agronomic, environmental and socioeconomic effects. This synthesis indicates that the region specificities, i.e., in Vidarbha, need to be studied in order to understand a subtle interaction of pest marketing, farmer behaviour, crop yield, and environmental safety.

Objectives of the Study

1. To examine farmers' awareness of pesticide marketing strategies in the Vidarbha region.
2. To analyze farmers' perceptions and behavior regarding pesticide use.
3. To assess the socioeconomic effects of pesticide marketing on farmers.

Hypothesis

H0: Pesticide marketing strategies do not have a significant impact on the socioeconomic conditions of farmers.
H1: Pesticide marketing strategies have a significant impact on the socioeconomic conditions of farmers.

Research Methodology

The study follows research design that is both descriptive and analytical because it needs to address socioeconomic and agronomic consequences of selling pesticides to farmers in the Vidarbha region. Primary and secondary data was utilized. The primary data would be collected through structured

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questionnaire and interviews with farmers, dealers and field representatives in major agricultural region of Vidarbha by a method of multistage sampling procedure. The secondary data was acquired using government publications and research articles and publications of the industry. Descriptive statistics, correlation, and regression statistics were the analyses completed on the data source to examine the relationships between the pesticides marketing strategies, farmer behaviour, socioeconomic performance and productivity of crops. This research approach will provide an in-depth understanding of how marketing operations will impact the financial conditions of the farmers and agronomic performance in the region.

Descriptive Statistics Table

Variable	N	Minimum	Maximum	Mean	Std. Deviation
Farmers' Income Effect Score	300	1.00	5.00	3.65	0.78
Farmers' Expenditure Effect Score	300	1.00	5.00	3.72	0.81
Overall Socioeconomic Impact Index	300	1.00	5.00	3.69	0.79

The descriptive statistics shows that marketing programs surrounding pesticides do affect the socioeconomic status of the farms in the Vidarbha region to a significant extent. The income effect (3.65) and expense effect (3.72) means are greater than the neutral (3) value in the Likert scale and this means that the farmers are moderately to highly influenced by the marketing strategies on their financial performance. It can also be observed based on the overall socioeconomic impact index of mean 3.69 and the standard deviation of 0.79 which show consistency of responses used in the sample. The implication of these findings is that advertisement practices by the pesticide companies such as promotional activities, dealer recommendation, and brand campaign determine how the farmers spend, invest in crop protection and household income face by the farmers. These standard deviations are relatively low enough to indicate that most of the farmers have experienced and hold the same perception and this is why these marketing methods are relevant. Overall, the analysis can give a hint at the fact that marketing of pesticides has an efficient impact on the socioeconomic status of farmers which can be taken as the first indication that the null hypothesis should be rejected and the alternative hypothesis can be accepted according to which the marketing strategies have an influential impact on the socioeconomic status of farmers.

Correlation Analysis – SPSS Output

Variable	Farmers' Income	Farmers' Expenditure	Overall Socioeconomic Impact
Exposure to Pesticide Marketing	**0.612****	**0.587****	**0.625****
Sig. (2-tailed)	0.000	0.000	0.000
N	300	300	300

**Correlation is significant at the 0.01 level (2-tailed)

The correlation analysis reveals that exposure of farmers to marketing strategies of pesticides has a positive correlation with their socioeconomic background which is statistically significant in the Vidarbha region. Income of the farmers (r = 0.612, p under 0.01), expenditure (r = 0.587, p under 0.01), and total socioeconomic impact index (r = 0.625, p under 0.01) have a positive relationship with marketing strategies. This means that the higher the farmers are exposed to promotional activities of their Nature, dealer advise and brand campaign, the higher they believe they are being influenced by

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adopting such measures affecting their financial performance. The large correlations indicate that marketing activities do not just have a shaping effect on the purchasing behavior, but they also bear a tangible change on the household income and expenditure on crop protection. This fact not only proves the alternative hypothesis (H1), that the marketing strategies of pesticides do have a definite and quantitative impact on the socioeconomic life of farmers. Overall, the findings reveal the importance of understanding the economic implications of marketing operations in farm decisions and formulates the possibilities of these solutions to impact on the economic wellbeing of farmers.

Discussion

The findings of the research states that the socioeconomic status of the farmers in the Vidarbha region is heavily influenced by the marketing strategies of the pesticides. The descriptive statistics and the correlation plot indicate that the exposure to the marketing campaigns- dealer recommendations, field demonstrations, promotional campaigns and the brand advertisement has a quantifiable effect in terms of its impact on the income, expenditure and financial well-being of the farmers. The positive as compared to the negative values of marketing exposure ($r = 0.612$), expenditure ($r = 0.587$), and the general index of socioeconomic impact ($r = 0.625$) means that increased exposure to such marketing practices is considered to have more financial implications on the farmers. This means that marketing activities play a very significant role in determining the buying decisions and the effect on the economy by determining the amount of money that farmers will use to protect their crops and other supplies.

These results fit within the previous studies, such as the research conducted by Ali et al. (2020) and Jeamponk and Thipsaeng (2014) who identified the power of dealers and its subsequent effects on the behaviour and expenditure patterns of farmers as of special interest. Marketing strategies can be taken as information systems and persuasion ones, which supply information to decisions especially in Vidarbha, where farmers are not frequently financial endowed, have low accessibility to extension services and most of them are mainly dependent on intermediaries. On the one hand, the awareness of products and purchasing under the influence of information is probably to be improved through sufficient marketing, but, conversely, current research suggests formulates potential challenges. The aggressive promotions, credit plans and brand influences can raise the prices of inputs, excessive reliance on chemical pesticide and the financial risk of small and marginal farmers.

The discussion reveals the two nature of the marketing of pesticides it has the capacity of providing increased knowledge, adoption, and greater productivity, but it poses a threat, in the economic front whereby the decision made by farmers as to the purchase decision is highly reliant on marketing and not on the agronomic appropriateness of the pesticide. Therefore, there is need that the marketing strategies should be put in balance with the educational and extending interventions. The companies that deal with agrochemicals, the agency which aid the farmers and the policy makers should ensure that the marketing practices are backed with training programs, proper product facts as well as sustainable pests control practices to maximize the productivity of the farm as well as the health of the farmers. Overall, the study demonstrates that pesticide marketing is a driving aspect of the socioeconomic performance and that there is a need to come up with responsible and resourceful marketing designs that would not hurt the income and economic of the farmers.

Overall Conclusion

The research food is the fact that marketing of pesticides has tremendous and measurable impact on socioeconomic lives of farmers in the Vidarbha area. The findings of the correlation analysis and the descriptive statistics reveal that marketing efforts like dealer recommendation, promotional efforts,

advertising using brand name and field demonstration help in improving the income of the farmers, expenses and general ability of the farmers. The further the farmers are subjected to such marketing ideologies, the more they will invest in the crop protection, make better purchasing decisions and even feel that they are obtaining better value using pesticides. This demonstrates that the economic behaviour and decision making in the agricultural fields are more central to the marketing activities.

However, another problem in the research is the challenges that can be associated with close marketing. The advantages of these strategies are that they would increase awareness, usage, but have the drawbacks of increasing the cost of inputs, overreliance on branded products, and financial exposure of small and marginal farmers. This two-fold effect brings to the fore the importance of peaceful coexistence between marketing requirements, as well as, marketing policy obliged to be harmonized further on with farmer education, extension, and control via regulations to demand a responsible pesticide usage. The agrochemical companies and the policymakers can ensure that farmers are able to reach the maximum productivity possible but not lose their positions of finances or the ability to control the natural environment through the integration of the marketing campaigns with the training of the safe usage of such practices and sustainable pest management.

In totality, the research work brings forth the fact that marketing of pesticides is not only a business activity, but it plays a important role in the economic and agronomic setting, as far as the agricultural activity of Vidarbha is related to. In their strong areas of interest, informed, ethical and sustainable marketing practices, the researchers provide empirical evidence that marketing strategies are relevant with regards to their influence in socioeconomic outcomes of farmers. These lessons can apply to the policymakers, extension agencies, and agrochemical companies to come up with interventions that have a high likelihood of enhancing the lives of local farmers, promotion of safe use of pesticides as well as ensure that the region has sustained agricultural development.

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