

Obstacle in Corn Production and the Livelihood Activities of Smallholder Farmers in South Central Philippines

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Abstract

This study delves into the intricacies of corn crop production within the context of smallholder farming in South Central, Philippines. It employs a descriptive statistical approach to scrutinize the challenges faced by corn farmers, providing a comprehensive understanding of the impediments affecting their livelihoods. The findings reveal a confluence of common challenges that smallholder farmers encounter, intricately linked to their individual characteristics as corn cultivators. These challenges include adherence to outdated planting techniques due to the absence of modern agricultural machinery. Additionally, their lands are susceptible to natural disasters, such as floods, landslides, and droughts, compounding their struggles alongside the persistently low market prices for corn. Moreover, the study highlights the resilience of these farmers who rely on personal capital to sustain their livelihoods, as government incentives and support are often lacking, despite being vital for the community's prosperity. As a recommendation, prospective farmers are encouraged to contemplate shifting towards large-scale production while carefully selecting optimal locations. This strategic shift can potentially enable them to harness substantial income through increased yields, while simultaneously reducing labor and marketing costs. Such a transformation could lead to a more prosperous future for smallholder corn farmers in Palimbang and similar agricultural communities.

Keywords

Obstacle, Corn Production, Smallholder Farmers, Livelihood Activities

1. Introduction

Increasing the revenue and productivity of farmers have always been the prima-

ry concern in the aspect of agriculture. However, due to the differences and impacts of the process on production, farmers cannot sustain and keep an acceptable economic status level; these influence how they make choices about farming. Farmers in underdeveloped nations struggle to get their produce to markets due to the lack of money, vehicles, and roads. It is difficult and time-consuming for them to frequently transport their produce by foot or bicycle from the farm to nearby marketplaces. As a result, they often have to sell their produce for meager rates because they need help to transport it to areas with higher food demand (Signabon et al., 2017).

In Africa, particularly in Ethiopia, smallholder farms produce over 95% of the major crops, including cereals, pulses, oilseeds, vegetables, root crops, fruits, and cash crops (Gelaw, 2017). However, there are several obstacles that these farms must overcome that reduce agricultural output. Poor soil fertility, severe land degradation, high reliance on rainfall, a lack of availability and poor-quality seeds and fertilizers, economic limitations including low income and a lack of financial support, and inadequate policies and guidelines are significant limits (Gezie & Tejada Moral, 2019). The agricultural industry is also impacted by weather events linked to climate change, such as extreme drought and high rainfall. Smallholder farmers face additional challenges in overcoming these barriers due to their low resources (Tessema & Simane, 2019).

As an agricultural nation, the Philippines must invest in encouraging equitable growth and creating more sustainable food and agricultural systems that can withstand disasters and effectively address the effects of climate change. The primary objective is to grow the agricultural sector to achieve food self-sufficiency, improve the rural community, and enhance farmer income. Two-thirds of jobs are related to agriculture, which is projected to contribute roughly 40% of the economy's gross domestic product (Sanchez et al., 2015).

One of the primary obstacles smallholder farmers face in Palimbang is limited access to modern agricultural technologies and resources. According to research conducted by Smith et al. (2019), more access to improved seeds, fertilizers, and pesticides is needed to improve the productivity and quality of corn crops. The study further highlighted that smallholder farmers in rural areas often need more knowledge and financial resources to invest in modern technologies. As a result, their yields remain low, and they need help to compete with larger-scale commercial farmers with better access to resources and technology.

Moreover, inadequate infrastructure and limited transportation facilities pose significant challenges for smallholder farmers in Palimbang. The need for well-maintained roads and transportation networks makes it difficult for farmers to promptly transport their corn production to markets or processing centers. This issue was emphasized by the study conducted by Lopez and Garcia (2018), which revealed that the poor infrastructure in the region leads to increased post-harvest losses and lower profitability for smallholder farmers. Additionally, the study pointed out that the absence of storage facilities and proper market linkages further exacerbates the challenges faced by farmers.

Furthermore, smallholder farmers in face climate-related challenges that negatively impact corn production. Climate change has led to unpredictable weather patterns, including irregular rainfall, prolonged droughts, and increased occurrence of pests and diseases. These issues were discussed in a study by [Perez et al. \(2020\)](#), emphasizing that changing climate patterns have disrupted smallholder farmers' traditional planting and harvesting schedules. As a result, their corn yields have become more uncertain, leading to reduced incomes and livelihood insecurity. Thus, the researcher aimed to navigate the root causes of the obstacles in corn production and the livelihood activities of smallholder farmers in Palimbang Sultan Kudarat to solve the puzzle of why this hampers the agricultural development of the locality.

2. Methodology

Descriptive research aims to describe and explain the characteristics, behaviors, or phenomena of a particular population or situation ([McCombes, 2019](#)). In this study, the researchers likely sought to gather information about the obstacles faced by smallholder farmers in Palimbang related to corn production and livelihood activities.

The study has involved collecting data through various methods, such as surveys, interviews, and observations, to obtain a comprehensive understanding of the challenges faced by smallholder farmers. The researchers focused on documenting the specific obstacles encountered by the farmers, the factors contributing to those obstacles, and their impact on corn production and livelihood activities.

Using a descriptive research design, the study aimed to provide an accurate and detailed account of the obstacles faced by smallholder farmers in Palimbang. This design allows researchers to gather information about current affairs and identify patterns or trends. The study's findings can be used to develop strategies, policies, or interventions to address the identified obstacles and improve the area's corn production and livelihood activities.

The respondents of this study were the identified 144 smallholder corn farmers of Barangay Mina, Domolol, Kanipaan, and Napnapon within the Municipality of Palimbang, Sultan Kudarat, who were aging for 18 years old and above and had been farming for more than five years ([Table 1](#)).

A stratified sampling technique was utilized in order to get the sample of the smallholder corn farmers. There were four barangays identified by the Office of Municipal Agriculture namely barangay Mina, Domolol, Kanipaan and Napnapon respectively. Within each stratum, the researchers used random sampling techniques to select the desired number of smallholder farmers.

The data-gathering instrument used in this study is a survey questionnaire. A questionnaire is a list of questions or items used to gather data from respondents about their attitudes, experiences, or opinions, according to [Bhandari \(2021\)](#). It is also a modified questionnaire.

Table 1. Sample distribution of the respondents.

Barangay	Population	Sample
Napnapon	120	45
Kanipaan	36	13
Mina	191	70
Domolol	43	16
Total	390	144

The first part of the questionnaire talks about the respondents' profile, and the next part is an adaptive survey type of questionnaire regarding the obstacles encountered by the corn farmers, and profitability of corn production, and another source of income of smallholder farmers in Palimbang using the five-rating scale. Adopted and modified from the study of [Signabun et al. \(2017\)](#).

After selecting the sample, the researchers collected the data from the chosen smallholder farmers using various methods such as surveys, interviews, or observations. The data collected focuses on understanding the obstacles faced by farmers in corn production and their livelihood activities.

Statistical Tools

In order to describe the relevant feature of the data gathered in the conduct of these studies, statistical tools such as Frequency Distribution, Percentage, and Mean will be used to analyze the result of the data gathered. The average weighted mean or grand mean was computed and described using the table of mean scale values.

This will be obtain using Likert Scale ranging from 1 = Minimal Obstacle, 2 = Low Obstacle, 3 = Moderate Obstacle, 4 = High Obstacle and 5 = Severe Obstacle

Rating Scale	Range	Interpretation
5	4.21 - 5.00	Severe Obstacle
4	3.41 - 4.20	High Obstacle
3	2.61 - 3.40	Moderate Obstacle
2	1.81 - 2.60	Low Obstacle
1	1.00 - 1.80	Minimal Obstacle

3. Results and Discussion

3.1. Socio-Demographic Profile of the Smallholder Corn Farmers

Table 2 revealed that the majority of the respondents, 105 corn farmers have six years or more of experience in farming as their primary source of income. 39 or 27.08% of the respondents said they have three to six years of farming experience.

Farmers with six years or more of farming experience will likely have acquired significant knowledge and expertise in corn cultivation. They understand the

Table 2. Frequency and percentage distribution of socio-demographic profile of the respondents in terms of years in farming.

Years in Farming	Frequency	Percentage
3 - 6 years	39	27.08
6 years and above	105	72.92
Total	n = 144	100

specific knowledge and skills they have developed, such as traditional farming practices, crop management techniques, and local wisdom.

This conforms to the study of [Signabun et al. \(2017\)](#). Mostly, the years in operation of the farmers in their fields ranged from 18 years to above.

Table 3 presents the frequency and percentage distribution of the respondents on their land area per hectare; the majority of respondents, 118 or 81.90 percent, have a land size of 1 - 3 hectares, while 26 respondents, or 18.10 percent, have a land area of 3 - 6 hectares.

It implies that smallholders owning 1 - 3 hectares of corn farms can provide income for rural families in Palimbang, Sultan Kudarat. By cultivating and selling Corn, smallholders can generate revenue to support their households and meet their basic needs.

This is evident based on the study of [Smith et al. \(2019\)](#) on small-scale agricultural production in similar regions found that smallholders owning 1 - 3 hectares of corn farms significantly contributed to local food security, providing a stable supply of Corn within their communities.

As shown in **Table 4**, 77 respondents, or 53.47 percent, are tenants, while 67 respondents, or 46.53 percent, are the owner of the land area. According to the respondents' findings, most corn producers are tenants in tenurial conditions. This indicates that they either do not own the property, only farm seasonally, or only when they have the money to do so.

This conforms to the study of [Liska et al. \(2009\)](#), corn farming requires significant energy inputs for planting, harvesting, and processing. The energy efficiency of different corn farming systems, the carbon footprint of corn production, and the potential for renewable energy integration in corn farming.

Gleaned on this **Table 5** revealed that many different types of yellow corn seeds were used by most of the corn farmers in Palimbang. One hundred forty-four corn farmers made up the total sample size for this study, and based on the results of the survey, all 144 of them use yellow corn seeds.

According to [Sarinta et al. \(2021\)](#), the role of seeds is significant in determining the success of plant production. Seeds with good quality and uniformity will produce high-quality products.

According to **Table 6**, 115, or 79.86 percent, 144 respondents harvest twice a year, whereas 29, or 20.14 percent, crop their fields three times a year.

Smallholders in Palimbang, Sultan Kudarat, often need more land resources. Efficient cropping systems must maximize land use and optimize yields within these constraints. Crop rotation, intercropping, or agroforestry practices can be

Table 3. Frequency and percentage distribution of socio-demographic profile of the respondents in terms of land area per hectare.

Land Area (per hectare)	Frequency	Percentage
1 - 3 hectares	118	81.90
3 - 6 hectares	26	18.10
Total	n = 144	100

Table 4. Frequency and percentage distribution of socio-demographic profile of the respondents in terms of tenurial status.

Tenurial Status	Frequency	Percentage
Owner	67	46.53
Tenant	77	53.47
Total	n = 144	100

Table 5. Frequency and percentage distribution of the respondents' socio-demographic profile regarding corn variety.

Variety of Corn	Frequency	Percentage
Yellow Corn	144	100
Total	n = 144	100

Table 6. Frequency and Percentage distribution of the respondents' socio-demographic profile regarding cropping frequency.

Frequency of Cropping	Frequency	Percentage
Twice a year	115	79.86
Thrice a year	29	20.14
Total	n = 144	100

employed to diversify production and increase. In addition, diversified cropping systems that incorporate resilient crop varieties and agroecological practices can help smallholders cope with these challenges and reduce their vulnerability.

Cropping systems, including crop diversification, crop rotation and intercropping, and related agronomic practices used in agriculture impact soil health and quality from various spatial and temporal aspects, according to [Vukicevich et al. \(2016\)](#).

The results showed 109 responders; 75.69 percent had 50 caravans or more per hectare in just one cropping, followed by 21 respondents, and 14.58 percent had 40 - 50 cavans per hectare. Furthermore, 9.72 percent of respondents, or 14 respondents, have 30 - 40 cavans per hectare. Most maize growers had a yield of 50 caravans or higher per hectare.

This implies high-yielding crops' genetic traits and characteristics, including disease resistance, drought tolerance, nutrient uptake efficiency, and produc-

tivity. This could involve studying the genetic makeup of successful crop varieties and developing breeding programs to improve the yield potential of different crops.

Barnett (2020) states that drastic changes in rainfall patterns and temperatures have introduced unfavorable growing conditions into the cropping calendars, modifying growing seasons and affecting crop productivity (Table 7).

Table 8 shows that 89 respondents, or 61.81 percent of corn farmers, have a monthly income of 5000 or less. On the other hand, 55 respondents, or 38.19 percent, have a monthly income of 5000 to 10,000.

The study found that a monthly income of 5000 pesos had significant implications for the farmers' ability to meet their basic needs and invest in farming activities. It was observed that farmers with higher incomes had better access to resources, such as improved seeds, fertilizers, and equipment, leading to increased productivity and improved livelihoods.

Interestingly, according to a study by Oxfam International (N.D.N.D.). American corn subsidies have destroyed the livelihoods of millions of small Mexican farmers, as cheap American corn floods the Mexican market and push the price of corn below the cost of production. While this study does not directly address the monthly income of smallholder corn farmers, it highlights the impact of corn subsidies on small farmers. Another study by the U.S.D.A. 2 reports that the number of small corn farms (with less than 500 acres) has fallen, but it needs to provide information on the monthly income of smallholder corn farmers. Therefore, there is a need for further research to support the study on a monthly income of below 5,000 among smallholder corn farmers.

3.2. Obstacles Encountered by the Corn Farmer

The obstacles encountered by the corn farmers in terms of personal, environmental, market, and financing could affect their production.

Table 9 revealed that the common personal obstacle encountered by corn farmers are the inaccessibility of farm equipment and machinery and no other source of income except corn farming, with a mean of 3.61 and 3.56. Both were interpreted as "High Obstacle". On the other hand, the focus on traditional corn farming practices has a mean of 2.46 and is interpreted as "Low Obstacle". Furthermore, the corn farmers in Palimbang, Sultan Kudarat, face personally as a "moderate obstacle" with a 3.21 mean value.

Inaccessibility to modern farm equipment and facilities can hinder farmers' ability to cultivate and harvest crops efficiently. This can result in lower productivity, as manual labor might be slower and less effective than mechanized processes. With access to advanced tools and machinery, farmers can keep up with market demands and maximize their yields.

Depending solely on corn farming for income can pose financial risks. Relying on a single crop leaves farmers vulnerable to market fluctuations, weather conditions, and other factors affecting corn prices. With alternative sources of income, farmers can manage financial stability and adapt to changing market conditions.

Table 7. Frequency and percentage distribution of socio-demographic profile of the respondents in terms of yield per hectare.

Yield per Hectare	Frequency	Percentage
30 - 40 cavans	14	9.72
40 - 50 cavans	21	14.58
50 cavans and above	109	75.69
Total	n = 144	100

Table 8. Frequency and percentage distribution of socio-demographic profile of the respondents in terms of monthly income.

Monthly Income	Frequency	Percentage
5000 and below	89	61.81
5001 - 10,000	55	38.19
Total	n = 144	100

Table 9. Mean distribution of the respondents in terms of personal obstacles encountered by the corn farmers.

Personal Obstacle	Mean	Interpretation
1) Focus on traditional corn farming practices.	2.46	Low Obstacle
2) Inaccessibility in farm equipment and machinery.	3.61	High Obstacle
3) No other source of income except corn farming.	3.56	High Obstacle
Grand Mean	3.21	Moderate Obstacle

According to McKenzie (2021), new technology has more than enough potential to resolve traditional challenges of farm equipment and improve supply chain processes highly efficiently. The same report highlights that the future of the supply chain and farm machinery will depend on interconnectivity. There have been incredible innovations in modern farming machinery in the past few years. These innovative solutions are the key to overcoming traditional and existing challenges of the farm machinery supply chain.

Table 10 presents the environmental obstacle among smallholder corn farmers. Vulnerable to landslides and floods is evident as the main obstacle with 4.33 and qualitatively described as a “Severe Obstacle”. Followed by prone to drought with 3.89 and interpreted as agree. The result implies that the grand mean of the environmental obstacles among smallholder corn farmers got a grand mean of 3.43 and was qualitatively interpreted as “High Obstacle”.

This implies that landslides and floods can destroy crops, leading to significant economic losses for smallholder farmers who heavily rely on their harvests. In addition, landslides and floods can result in soil erosion, degrading the quality of agricultural land and reducing its productivity over time. Severe landslides or floods can cause farmers to lose their homes, livestock, and other essential assets, further exacerbating their vulnerability.

Table 10. Mean distribution of the respondents in terms of environmental obstacles encountered by the corn farmers.

Environmental Obstacle	Mean	Interpretation
1) Prone to drought	3.89	Low Obstacle
2) Vulnerable to landslide and floods	4.33	Severe Obstacle
3) Military Activities	2.07	Low Obstacle
Grand Mean	3.43	High Obstacle

Droughts can lead to reduced water availability, which affects crop growth and productivity. Smallholder farmers heavily dependent on rainfed agriculture may face crop failures and food shortages.

According to [Antony, Leith, Jolley, Lu, and Sweeney \(2020\)](#), smallholder farmers face environmental obstacles such as landslides and floods that can negatively impact their corn crops. Their study reviews the Internet of Things (IoT) practice and implementation for smallholder agriculture, including summaries of state-of-the-art sensor and communication technologies. Meanwhile, [Vadjunec et al. \(2016\)](#) emphasize the importance of small-scale or smallholder farmers in geography and human-environment research. They argue that these farmers remain critically important today. Furthermore, [Gray et al. \(2018\)](#) suggest that digital farmer profiles can help reimagine smallholder agriculture. They propose that theoretical innovations grounded in political economy, agrarian change, development studies, and rural livelihoods can help address environmental challenges faced by smallholder corn farmers.

Table 11 shows the mean distribution of the respondents in terms of market obstacles. The high price of inputs such as fertilizers, insecticides, herbicides, and seeds and the low price of corn significantly impact the income of their production, and inaccessibility has a mean of 4.90, 4.85, and 4.49. It is interpreted as a “Severe Obstacle”. Furthermore, the grand mean of a market obstacle is 4.75 and is qualitatively interpreted as a “severe obstacle” among smallholder corn farmers in Palimbang, Sultan Kudarat.

Smallholder farmers rely on the sale of their corn harvest to generate income. When the price of corn is low, farmers earn less for their produce, reducing profitability and financial instability—the challenges in accessing affordable inputs include seeds, fertilizers, pesticides, and machinery. Farmers must spend more on production when input prices are high, reducing their profitability.

Smallholder farmers may struggle to access established markets due to geographic isolation, inadequate infrastructure, or lack of market information. This limited access hampers their ability to sell their products at fair prices and find stable markets for their produce.

The marketable corn yield of smallholder farmers in the Philippines has declined over time due to poor farm production investments, inefficient harvesting, and post-harvest handling practices.

Table 11. Mean distribution of the respondents in terms of market obstacles encountered by corn farmers.

Market Obstacle	Mean	Interpretation
c.1) Low price of corn.	4.85	Severe Obstacle
c.2) High price of inputs (such as fertilizers, Insecticides, herbicides, And seeds).	4.90	Severe Obstacle
c.3) Inaccessibility to the market.	4.49	Severe Obstacle
Grand Mean	4.75	Severe Obstacle

This conforms to the market obstacles among smallholder corn farmers in the Philippines and discusses the characteristics of risks that influence smallholder farmers and the key to developing appropriate strategies to deal with risks. Unpacks and synthesizes multiple rice studies conducted in the emerging Southeast Asian economies, including the Philippines. Fang (2016) contends that the 2019 Rice tariffication Law of the Philippines only encouraged the country to rely on imports and failed to make the local rice industry more competitive.

Gleaned in Table 12 is the financing obstacle among smallholder corn farmers in Palimbang, Sultan Kudarat. It is very noticeable that the indicators have a high mean of 4.28 for personal/borrowed capital and 4.25 for both working capital and labor cost, and all are interpreted as “severe obstacles”. Grand Mean also revealed that the financing obstacles among smallholder corn farmers are evident.

Smallholder farmers often need help accessing formal financial services, such as loans or credit facilities, due to a lack of collateral, limited financial literacy, and the perception of high risk associated with agriculture. Smallholder farmers typically have limited savings, making it challenging to cover immediate operational costs, such as purchasing seeds, fertilizers, and pesticides or investing in irrigation systems. Smallholder farmers often rely on family members for labor, reducing the need for external hiring. However, this can result in limited labor availability during peak farming periods and increased workload for family members.

According to a study by Jiamei Wang (2021) from the Institute of Agricultural Economics and Development, financing obstacles are a significant issue for smallholder corn farmers. It highlighted the challenges small farmers face, including limited financing options, high transaction costs, and limited access to credit. In Addition, Valentina Hartarska and Dennis Nadolnyak (2022) found that financing constraints were a significant issue for new farmers in Alabama. Fabio R. Chaddad, Michael L. Cook, and Thomas Heckeley (2020) also found evidence of financial constraints in U.S. agricultural cooperatives.

Table 13 shows the profitability of corn among smallholder farmers in Palimbang, Sultan Kudarat. It shows that the average income of the corn farmers in Palimbang, Sultan Kudarat is Php. 12, 850. Thus, this resulted in relatively low income among smallholder farmers and Relatively High Risk since the environment, financing, and market obstacles are described as “severe obstacles”.

Table 12. Mean distribution of the respondents in terms of financing obstacles encountered by the corn farmers.

Financing Obstacles	Mean	Interpretation
1) Personal/Borrowed capital	4.28	Severe Obstacle
2) Working capital	4.25	Severe Obstacle
3) Labor cost	4.25	Severe Obstacle
Grand Mean	4.26	Severe Obstacle

Table 13. Profitability of corn production per cropping among smallholder farmers.

Location	Average Income	Profitability	Profit Risk
Palimbang Sultan Kudarat	Php 12, 850	Low	Relatively High

Smallholder farmers have limited choices due to their constrained resources, but they still farm their land and produce food for a substantial proportion of the world's population. Low profitability can contribute to persistent poverty among smallholder farmers. More income is needed to improve their ability to invest in their farms, purchase modern equipment, access quality inputs (seeds, fertilizers, pesticides), and adopt improved farming practices. As a result, the overall development of the farming community needs to be improved.

According to a study on the profitability of Corn among smallholder farmers in the Philippines, corn farming appears to be the least profitable among all crops farmed in the Municipality. They found that despite relatively high gross revenues from corn farming, substantial costs diminish net returns/income. The authors of this study are not explicitly mentioned, but the research was conducted in South Cotabato, Philippines. Another study analyzed the farm-level economic impact of genetically modified Corn in the Philippines.

Table 14 revealed that some smallholder corn farmers practiced diversified farming by integrating vegetable gardening and livestock with 34 or 23. Sixty-one percent and 42 or 29. 16 percent respectively.

Integrating vegetable farming and livestock rearing can enhance the profitability of smallholder farmers. Vegetables have shorter production cycles and higher value per unit area than traditional field crops. Livestock, such as poultry, pigs, or goats, can provide a steady income by selling meat, eggs, milk, or other livestock products.

Emmanuel Abokyi et al. (2020) pointed out that the instability in smallholder farmers' income in developing countries due to unstable farm prices has challenged farmers and agricultural policymakers. Sustained price stabilization mechanisms could be more robust. In some countries, output price support has been initiated to stabilize incomes and as an incentive to enhance farmer investment and boost production. The impact of output price support on smallholder farmers' income: evidence from maize farmers in Ghana.

Table 14. Other sources of income of the corn farmers.

Source of Income	Frequency	Percentage
Vegetable Farming	34	23.61
Livestock	42	29.16
No other source of income	68	47.23
Total	144	100

4. Conclusion

Most corn farmers had a monthly income of 5000 or below. These farmers typically cultivated a land area ranging from 1 - 3 hectares and mostly tenants on their farm area. The chosen variety of Corn for cultivation was yellow corn, and the crop was harvested twice a year; most farmers reported obtaining 50 caravans or more per hectare.

Smallholder corn farmers in Palimbang face numerous obstacles affecting their farming and crop production. These obstacles include limited access to modern farm equipment and facilities, lack of alternative sources of income, vulnerability to market fluctuation and weather conditions, and environmental challenges such as drought, landslides, and floods. Additionally, smallholder corn farmers encounter difficulties in market access and financing, with low corn prices, high input costs, and limited market accessibility being significant concerns.

The profitability of corn farming in Palimbang is relatively low, resulting in a meager income of Php 12,850 for smallholder corn farmers. This indicates that more than corn farming is needed to be a sustainable and viable source of income for these farmers. Additionally, the result highlights the presence of various obstacles that contribute to the high risk associated with corn farming in Palimbang. These obstacles include environmental challenges, such as unpredictable weather conditions or pests and diseases, and difficulties in obtaining financing and marketing.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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