The impact of the Commercialization Ban of Bt Eggplant to the Consumption of Eggplant of Agriculture Students in Laguna State Polytechnic University – Siniloan

Key words

Bt Eggplant – A genetically modified eggplant with increased pest resistance due to the incorporation of the Bt gene

Commercialization – process of bringing products to the market for financial gains.

Consumption – The use or utilization of a good in order to satisfy a want or need

GMO – Genetically modified organisms are organisms that undergone artificial genetic modifications in order to increase a certain trait of its non genetically modified counterpart

Knowledge – The understanding and access of information on a certain subject

Perception – refers to the interpretation and organization of individuals to a certain subject

Abstract

Bt eggplant is a GMO that contains the Bt gene which makes the plant resistant against pests under the order *Lepidoptera*. Despite its benefits, its commercialization was banned in the Philippines due to its possible risks. Data was collected from 114 agriculture students in Siniloan, Laguna in order to assess their consumption behavior with relation to the ban, as well as their knowledge and perception on GMOs and Bt eggplant. Results showed that the absence or presence of the commercialization ban did not have a significant effect in terms of consumer behavior. The respondents also has a moderately high knowledge and perception on GMOs and Bt eggplant, but was found to have a minimal relationship with the respondents' spending behavior. Therefore, the absence of a change in consumer behavior despite the commercialization ban is likely affected by other factors aside from the knowledge and perception of the respondents on Bt eggplant.

Introduction

Biotechnology has contributed to food production since the early ages by increasing food quality and shelf life. It is as ancient as the civilization, and is involved in applications like fermentation, artificial selection of crops, and vaccines. (Ranjha et. al., 2022) As the technology improved, more applications were discovered. Although the novelty of technology does indeed attribute a whole different set of benefits than its predecessor, the number of unknown factors

rises along with it. These uncertainties in these subjects present risks. Accounting these risks then contributes to the adaptation of the technology, as well as consumption of its products.

A controversial subject for many years now is the production of genetically modified organisms (GMO), especially when it comes to food production. The contributions of GMO includes but not limited to increased quality, production, and development of resistance. As it is labeled as an organism that was artificially made by man, questions regarding its safety and side effects arises. Issues related to ethics, environment, and health are common. The consumer acceptance is affected by the risks perceived, especially in a technology without their sufficient understanding (Bawa & Anilakumar, 2012)

Whether an individual accepts GMOs have many factors including their knowledge on the subject, the personal situations, backgrounds, and individuality. Thus the opinion on the matter may differ. Another point of acceptance would also be whether if the benefits gained from the new technology outweighs its risks. As the different types of GMOs have different benefits and risks, it is also a good point to investigate individually. Thus, collective perception of GMOs may differ to that of a specific GMO. Nevertheless, the term genetically modified organism is controversial and is often bundled by its side effects in medicine and the environment. (Zhang et. al. 2016)

The Bt eggplant is a GMO which is an eggplant that contains Bt toxin which makes it resistant to pest under the order *Lepidoptera*. Although previously accepted in the country, it is now banned due to the lack of independent risk assessment and safety tests. The ban of the Bt eggplant is done due to the said inability to disprove of potential harmful impacts. (MASIPAG National Office, 2024) The prohibition of its production suggests that there will also be none of the said eggplant in the market. Hence, this event may affect the behavior of consumers when it comes to spending for the said commodity.

Due to the controversy associated with GM crops, its societal acceptance is required for a successful commercialization. (Medani et. al. 2024) The consumer behavior of agriculture students regarding this change in policy is important in the production of GMOs. Not only that these students are part of the consumers, they are also the future agriculturists who may opt to adapt or reject the production of GMOs. There are many researches in new technologies including the development new GMOs in the making. Its release in the future will be for naught if it would not be adapted. Thus, analyzing their spending habits with relation to the policy not only assesses its effect, but also validates their perceptive on the subject.

The aim of the study is to identify whether the ban on the commercialization of Bt eggplant has an effect on the spending behavior of agriculture students on eggplant related products. Additionally, the study aims to know whether this change in behavior was influenced by their knowledge and perception regarding GMOs, and Bt eggplant.

Materials and Methods

Respondents for the research were 114 randomly selected agriculture students of the Laguna State Polytechnic University, Siniloan Campus. Data was collected using a questionnaire and all respondents signed the research consent form. Information collected includes their spending on eggplant products before and after the ban, as well as their perception and knowledge on GMOs and Bt eggplant. The likert scale was used in order to assess the knowledge and perception of the respondents.

The Kolmogorov-Smirnov test for normality was used. As per the test, all of the data was not normally distributed. Hence, the Wilcoxon Signed Ranks Test was used to test the significant difference of the before and after spending behavior of the students, while the Spearman's Correlation was utilized to identify the relationship between variables.

Results and Discussion

The behavior can be an indicator as to the values and beliefs of an individual. Thus, the possible change in behavior of a group of individuals can be a basis as to the effect of a certain rule that is imposed.

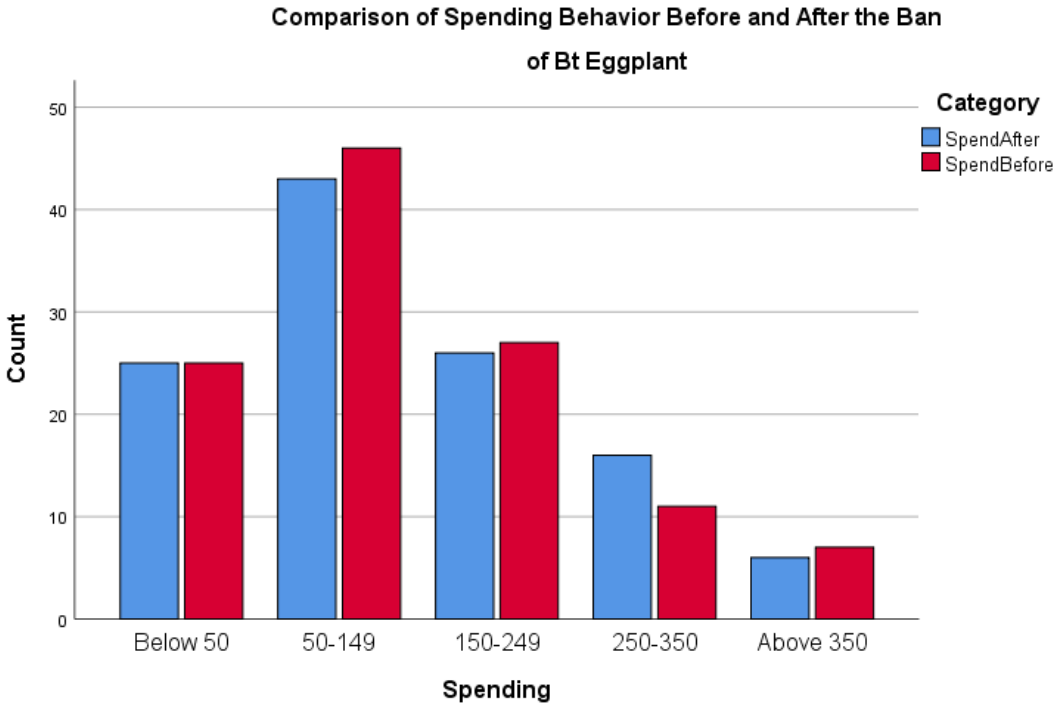

Figure 1 Graph on the comparison between spending behavior of agriculture students before and after the ban of Bt eggplant

Information as to how much the students are willing to spend on eggplant before and after the ban of Bt eggplant was collected. As per the graph above, there are minor changes between their spending behavior. Although there is an increase in the spending of above 350 pesos after the ban, there is also an increase in 50-149 pesos which is on the lower side of the graph. Upon using the Wilcoxon Signed Ranks Test, the resulting value is .322, which suggests that there is no significant difference in the spending behavior of the students.

Considering the clamor when is comes to GMOs, a possible result would be the increase of their willingness to spend after the ban. It is because the ban would be an assurance that the GM eggplant would not reach the market, more so their tables. Yet as per the analysis, there is no

significant difference in the behavior, which suggests that the respondents had a somewhat indifferent reaction to the policy.

According to a research by Persson M. (2021) Biases are often found in policy responsiveness, with the opinions of those in the advantaged group being more reflected in policy changes. It is due to the fact that actions of representatives are often of the interest of the more advantaged groups. Hence, the lack of concern or appreciation to commercialization ban might indicate that most of the respondents do not belong to the more privileged group. This may also suggest that the motion to ban the commercialization of the product does not necessarily represent the intent of the other groups.

The intention to purchase is increased by the perceived value of the consumers (Wang et. al. 2023). It would mean that the absence of change of the consumer could also be related that in their point of view, the value of the product did not change. This would mean that despite the change in policy, the value of the product available in the market did not change in the consumer's perspective. GMOs are aimed to be as safe as its non-GMO counterpart. The improvement in Bt eggplant is in its production. Hence, to be viewed as of similar value as its non-GM counterpart can be interpreted as a positive information for the side of GMOs.

A large component of an individual's behavior is on their knowledge and perception on a certain subject. According to Schrader and Lawless (2004), the knowledge of an individual relays the information to the attitude, and the reaction of the attitude can be a determinant on the behavior. Hence a deeper look on the knowledge and perception of the individuals can give more details with regards to their actual behavior.

Table 1 Test of Significant Difference and Correlation of Knowledge and Perception between GMOs and Bt Eggplant

	Median	Wilcoxon Signed Ranks Test P-value	Interpretation	Spearman Correlation Coefficient	Interpretation
Knowledge on GMOs	3.75	.005	Significantly Different	.688	Strong Positive Relationship
Knowledge on Bt Eggplant	3.71				
Perception on GMOs	3.5	.592	Not Significantly Different	.736	Strong Positive Relationship
Perception	3.5				

on Bt Eggplant					

The data gathered includes the level of knowledge and perception of the students in terms of the subject. The parameters for GMOs and Bt eggplant was evaluated separately as they are related, but not necessarily the same. Specific GMOs are evaluated in a case to case basis due to the fact that there are variations in their traits, organisms used, and probably the specific technology utilized. Nevertheless, the information regarding GMOs in general was collected in order to further analyze their knowledge and perception regarding Bt eggplant.

The level of knowledge on GMOs was significantly higher compared to the level of knowledge on Bt eggplant. It is understandable as genetic modification is a more broad and general topic in comparison with Bt eggplant which is on the more specific application of the technology. The two parameters also showed a strong positive relationship. This suggests that the level of knowledge of the students in terms of Bt eggplant increases as their level of knowledge in terms of GMOs also rises.

Yakup (2011) stated that the basic human instinct is to survive, and this instinct unconsciously affects our decisions. Hence the acceptance of consumers to a certain product would mean that they trust that the said product would not be a threat to their safety. Despite the difference in the level of knowledge, there was no significant difference in the perception of the respondents between GMOs and Bt eggplant. This shows that despite their differing levels of knowledge, the level of acceptance were the same. It can be said that the respondents assessment of Bt eggplant in terms of the risks that comes along with it is the same for their assessment for GMOs in general. Therefore increasing the level of acceptance of GMOs in general can also help the increase in acceptance of the Bt eggplant.

Although there is no significant difference between GMOs in general and Bt eggplant in this study, it is not always the case. On the study of Ardebeli and Rickertsen (2020), respondents were more against GM soybean oil in comparison to that of GM salmon. This is evidence that despite being both labeled as GM, the reception of these GMs vary. Therefore, this is a proof that GM products should still be reviewed and analyzed individually.

Table 2 Test of Significant Difference and Correlation of Knowledge and Perception on GMOs and Bt Eggplant

	Median	Spearman Correlation Coefficient	Interpretation
Knowledge on GMOs	3.75	.630	Strong Positive Relationship
Perception on GMOs	3.5		
Knowledge on Bt Eggplant	3.71	.669	Strong Positive Relationship
Perception on Bt Eggplant	3.5		

According to Ariantini and Solehah (2021) The level of knowledge affects the trust of individuals to a certain subject. That trust then results to a possible change in behavior. In addition, the trust of a consumer is a high indicator of intention to buy (Hong, 2015). This is evident in both GMOs and Bt eggplant which is shown by the strong positive relationship between knowledge and perception. This would mean that increasing the knowledge regarding GMO and Bt eggplant would likely increase its acceptance. This can also be interpreted that the attitude of the respondents with relation to Bt eggplant is a decision made with a moderately high knowledge on the subject.

A study by Ladwig et. al. (2012) provided evidence that factual knowledge and perceived familiarity is only slightly correlated. The research only evaluated the perceived knowledge, and no test was done in order to assess the actual level of knowledge of the respondents. Hence it would be imperative to assess their actual knowledge in future researches in order to establish a more solid relationship between knowledge and perception.

Although knowledge is a strong influence in perception, there are also other aspects that can be the cause of the varying attitudes. Ardebeli and Rickertsen (2020) showed in their study that personality traits influenced the preferences for certain GM products. Therefore the results of studies in perception of products are likely to change depending on the characteristics of the respondents. Hence, the result only shows the perception of the agriculture students in Laguna State Polytechnic University, and does not necessarily represent the perception of those of other backgrounds.

Table 3 Relationship of the Perception on Bt Eggplant and the Spending Behavior in Eggplant Products

	Median	Spearman Correlation Coefficient	Interpretation
Perception on Bt Eggplant	3.75	.112	Very Weak Positive Relationship
Spending on Eggplant Products before the commercialization ban	2		

Despite the moderately high acceptance for Bt eggplant, it is shown that there is a very weak positive relationship between perception and spending of eggplant products. This suggests that the acceptance of Bt eggplant has minimal effect to the buying behavior of the respondents in terms of eggplant products. This could be due to the fact that acceptance of the product is not the only determinant for the buying behavior.

According to Schrader and Lawless, (2004) knowledge and attitude is not necessarily a strong predictor of behavior alone. Ramya and Ali (2016) stated that the purchasing behavior of an individual consumer is affected by their culture, subculture, social class, membership groups, family, personality, psychological factors, cultural trends, environment, and others. Hence the differences in these determinants probably have played a role in the variation in spending behavior which resulted to a weaker relationship between perception and spending behavior.

Despite the relatively low score in spending behavior, it must still be taken note of that the spending behavior did not change before and after the commercialization ban. This suggests that the low spending behavior is not due to the potential presence and absence of Bt eggplant in the market, but a product of the other different factors that affect consumer behavior. This lack of aversion to the GM eggplant can also be interpreted as their receptiveness to the technology.

Conclusion

The commercialization ban on Bt eggplant did not produce a significant impact in terms of buying behavior on eggplant products for agriculture. The knowledge and perception of the respondents on GMOs and Bt eggplant was moderately high and has a strong positive correlation with each other. Despite the moderately high acceptance level, it has a very weak relationship with the consumer buying behavior. It shows that the presence or absence of the commercialization ban of Bt eggplant has no to minimal impact in the buying behavior of agriculture students in Siniloan, Laguna. This would suggest that the door for GMOs is not necessarily closed for the future

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