

Initiatives of City Government of Calamba and Awareness of City on Plastic Dependency Reduction: Basis for Action Plan

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Abstract. This study aimed to determine and understand the implementation and level of awareness regarding plastic dependency reduction initiatives by the City Government of Calamba. These initiatives were developed to decrease plastic usage and manage its disposal through public awareness and behavioral changes toward plastic usage and disposal. The study sought to explore the significant difference between the assessments of Barangay Residents and Calamba City Local Government on these initiatives and to evaluate the significant relationship between the implementation and the level of awareness of plastic dependency reduction in Calamba City. A total of 242 surveys were collected through a random sampling method utilizing a researcher-made survey form. The data were interpreted using composite mean, a Four Point Likert Scale, and Pearson Product-Moment Correlation. The results revealed a difference between the assessments of Barangay Residents and Calamba City Local Government on the City Government initiatives. Furthermore, the findings showed a significant relationship between the assessments of Barangay Residents and Calamba City Local Government authorities on the implementation of these initiatives and the level of awareness of plastic dependency reduction. Based on these findings, the researcher proposed an action plan and activities to be initiated by the City Environment and Natural Resources Office. These activities focus on public involvement and environmental awareness to improve the ongoing initiatives on plastic dependency reduction in the City of Calamba.

Keywords: Plastic dependency; Plastic pollution; Sustainability; City Government Initiatives, Environmental Awareness.

1.0 Introduction

Preservation of the planet has been a substantial issue for the past couple of decades because of rapid development, increasing demand for resources, a surging population, and rising solid waste management problems. It is of utmost importance that Governments and civil societies take the necessary actions to address the stated problem. Subject to these circumstances, the United Nations has promulgated seventeen Sustainable Development Goals that aim to transform the world towards more sustainable progress. Seven of those development goals focus on the conservation of the planet explicitly on plastic usage and its management, such as SDG3: Good Health and Well-being, SDG 6: Clean Water and Sanitation, SDG 11: Sustainable Cities and Communities, SDG 12: responsible consumption and production, SDG 13: Climate action, SDG 14: Protection of seas and oceans and SDG 15: Repair ecosystems and retain biodiversity which enables an environment of harmony, security, and public inclusion.

Acknowledging the challenge, governments around the world are contemplating an effective way to address the growing problem of plastic, particularly as it is revealed in many studies that one of the most effective courses of action is its prevention through raising information, concern, and empowerment of the society in the use, reduction, and recycling which ultimately lead to enhancing Circular economy. It is an unnerving truth that eight million tons of mishandled waste are dumped yearly, potentially leaking into the environment in between 0.8 and 30 million tons of plastic waste entering the aquatic environment yearly.

2.0 Methodology

2.1 Research Design

The study utilized the quantitative descriptive-correlational research design to establish the relationship between the implementation of initiatives of the City Government of Calamba as an independent variable and the level of awareness of plastic dependency reduction as the dependent variable. Descriptive analysis was employed as the researcher explained the present extent of the determined variable; in conjunction with correlational analysis, it was pursued to assess the degree of a relationship among variables by using statistical data. As mentioned by McCombes (2020), the purpose of applying the descriptive correlational method was to examine and indicate the variables and correlations that fundamentally occurred. It involved acquiring information on particular groups or situations. A personal information and survey questionnaire were applied to collect data using the descriptive correlational method.

2.2 Research Locale

The study ensued at Calamba City Hall, located at Bacnotan Road, Barangay Real, Calamba City, Laguna. It was an appropriate place to explore and conduct the study since it was considered the core of the city and its government, from which different levels of society were in the area for possible survey conduct.

2.3 Research Participants

To determine the relative number of interviewees, a simple random sampling method was utilized by the researcher, representing the Calamba City Local Government Authorities, opted by the researcher to include all 54 Barangay Officials from different Barangays and twelve (12) personnel from CENRO in the technical position, making it sixty-six (66) respondents. Accordingly, the researcher selected respondents from different Barangays in Calamba City using a simple random technique. A total of 176 respondents comprised the barangay residents. The sampling size was confirmed and verified with the assistance of proficiency from the researcher's statistician, utilizing G* Power with an effect size of .50, confidence level of .95, and margin of error of .05.

2.4 Research Instrument

This study used a researcher-made and validated survey questionnaire as the main instrument to attain primary information from each respondent and data source to answer the research questions. This study followed ethical guidelines, and the respondents participated voluntarily. Different measures are considered and employed as a means to validate the instruments. The researcher-made questionnaires were verified and approved by the experts who had put effort into providing their thoughts on all the essential information that needed to be clarified and expounded in the research process reviewed. Second, a pilot test with a small sample of respondents randomly selected Calamba City Government employees and barangay residents excluded from the sample of respondents. Finally, the reliability and consistency assessment was measured using Cronbach's Alpha. Given the set of variables in the study, the test resulted in items consistently measuring the same characteristics.

2.5 Data Gathering Procedure

In the underpinning of the research, the data-gathering procedure was fundamentally based on the questionnaire and was accomplished by the selected respondents. First, the support of the adviser and statistician was essential for the precision, extensiveness, and originality of the instruments of the study. Second, a request letter was forwarded to the Office of the City Mayor of Calamba through the City Human Resource and Management Office to seek permission to conduct data gathering. Finally, the researcher communicated with each Calamba City Barangay for the availability of Barangay officials qualified to be respondents instead of their respective chairperson through various forms, including email, text messages, and personal requests, in connection with the residents the researcher worker utilized the opportunity presented, as an employee of the City Government of Calamba, residents of Calamba who are transacting and availing assistance, were requested and persuaded by the

researcher to be one of the respondents for the study. The researcher also asked for the help of some CENRO personnel to help in the meticulous process involved in the survey.

2.6 Ethical Considerations

Distinguish as one of the most significant parts of the study. Ethical principles of the Laguna College of Business and Arts ethics and moral standards were meticulously adhered to during data-gathering to protect the dignity, welfare, and rights of the respondents in the study. As previously stated, the researcher also ensured that pertinent data privacy standards conformed with the Republic Act No. 10173, also known as The Data Privacy Act of 2012, were observed throughout the study.

3.0 Results and Discussion

3.1 Level of Implementation of Initiatives on Plastic Dependency Reduction

In terms of Policies

Table 1. Descriptive statistics of the level of implementation of initiatives on plastic dependency reduction in terms of policies

Indicators	LGU		Barangay		Composite	
1. The public is fully aware of the City Ordinance 10-481, a Plastic regulation and Ban on Styrofoam.	2.80	Implemented	2.27	Implemented	2.54	Implemented
2. Plastic bags are utilized once as primary packaging for wet goods.	2.62	Implemented	2.53	Implemented	2.58	Implemented
3. No business establishments offer plastic bags as secondary packaging on dry goods.	2.59	Implemented	2.45	Implemented	2.52	Implemented
4. The use of Styrofoam for food packaging is prohibited in Calamba City.	2.85	Implemented	2.80	Implemented	2.83	Implemented
General Assessment	2.72	Implemented	2.51	Implemented	2.62	Implemented

The results in Table 1 indicated that the City Government of Calamba had implemented the policies on Plastic Dependency Reduction. The indicator “The use of Styrofoam for food packaging was prohibited in Calamba City” yielded the highest mean score of 2.83, interpreted as Implemented. On the other hand, “no business establishments offer plastic bags to be utilized as secondary packaging on dry goods” received the lowest mean score of 2.52, interpreted as Implemented. It expresses that Calamba City Barangay Residents and Calamba City Local Government Authorities recognized the implementation of the prohibition of Styrofoam for food packaging and discerning it as a non-sustainable product was a notable policy that residents have to adhere to decrease plastic dependency. Styrofoam or polystyrene is a non-biodegradable material. Considerable amounts of the materials are constantly discarded inappropriately and mismanaged, potentially leaching contaminants and pollutants that endanger our health and environment. It was usually considered and perceived as customary disposable dishware by contrast to a multitude of greener substitutes that are readily available, making it easier to implement, unlike plastic bags that are predominantly availed and utilized for packaging various goods aside from food items.

To reinforce the study, Wagner (2020) mentioned that permissive measures to decrease Styrofoam usage are perceptible and comprehensible in terms of its purpose, particularly as global and influential companies are adopting sustainable plates and cups. Likewise, it was regarded as potent and motivational, as individuals were slowly adopting Zero polystyrene campaigns and efforts, provided governments were banning the distribution of Styrofoam containers for food and beverages. As asserted by Sharma (2021), polystyrene contains harmful chemicals such as benzene and styrene, which are known to be carcinogenic and can be transmitted into food and drinks, especially while the meals are hot or through reheating. Moreover, the Global Alliance for Incinerator Alternatives (2020) study found that Filipinos had an optimistic opinion on banning the use of single-use plastics, particularly Styrofoam, a fact which 56% of Filipinos, according to the survey agreed to its regulation if not to be banned. Besides, according to Crowley (2020), the Philippines was a case of a Nation in the Global South, striving with the direct consequences of plastic bag usage and challenges related to enforcement of its regulation, given that plastic bags were convenient and remarkably cheaper.

In terms of Mobilization of Alternatives

Table 2. Descriptive statistics of the level of implementation of initiatives on plastic dependency reduction in terms of mobilization of alternatives

Indicators		LGU		Barangay		Composite
1. The local government encourages the Public to use reusable bags.	3.14	Implemented	2.69	Implemented	2.92	Implemented
2. The City Government sees the community use reusable bags and alternative packaging for gifts and food packages.	2.98	Implemented	2.81	Implemented	2.90	Implemented
3. Grocery stores and similar businesses must use alternative packaging materials (cartons, paper bags, reusable bags).	3.27	Fully Implemented	2.86	Implemented	3.07	Implemented
4. The City Government encourages the use of reusable water bottles.	2.91	Implemented	2.41	Implemented	2.66	Implemented
5. Restaurants, fast food, and similar businesses are prohibited from using single-use plastics for utensils.	3.05	Implemented	2.45	Implemented	2.75	Implemented
General Assessment	3.07	Implemented	2.64	Implemented	2.86	Implemented

As shown in Table 2, the City Government of Calamba had implemented the mobilization of alternatives. The indicator “Grocery stores and other similar businesses are required to use alternative packaging materials (cartons, paper bags, reusable bags)” accumulated the highest mean of 3.07, interpreted as Implemented, whereas “restaurants, fast food, and similar businesses are prohibited from using single-use plastics for utensils” had the lowest mean of 2.75, interpreted as Implemented. The result signifies that businesses, consumers, and authorities were trying to adopt a sustainable ecological approach toward greener packaging. Hence, the policy allows a more ecologically friendly process enhancing recyclability and waste reduction towards the same goal of reducing environmental impact and carbon footprint. This implies that businesses often show strong social and environmental consciousness and values to gain recognition from the local government and the buying public. However, the use of plastic utensils by food businesses is still in practice because people are concerned about disease transmission as they have gone through the COVID-19 pandemic. People are still reluctant to avoid the usage of plastic utensils as they perceive it as a cleaner and safer way of eating. Likewise, it may account for the fact that people are continuously attracted to the convenience and practicality of plastic utensils as opposed to conventional utensils.

To reinforce this, in the study by Vicente et al. (2022), they said that the public, including store owners, were willing to follow the green policy made by the local government to save the environment, given that the authorities should extend support and alternatives to address concerns, prevent confusion and enhance collaboration between agencies and the public. In addition, Gomez and Escobar (2022) stated that public perception of single-use plastics is a consequence of the end-of-life aspects of plastic materials. Thus, the government should review the policies and increase recyclability to decrease environmental impact.

Moreover, the research made by Farvazova (2020) stated that market decisions and choices were frequently influenced by the understanding of social factors towards eco-friendly packaging, which allows them to remain competitive in greening initiatives. Accordingly, Fan et al. (2020) suggested that the pandemic had brought challenges to waste management, particularly in the use of single-use plastic utensils; it brought about a significant increase in its utilization along with takeaway orders and meal deliveries. Likewise, Kitz et al. (2021) deduced that consumer behavior toward disposable plastic changed, including the public’s engagement in waste management, as a consequence of the outbreak. There was a significant change in behavior as more people were hesitant to use traditional utensils due to health concerns, instead compelled and forced them to revert to “throw away living” practice in the modern single-use lifestyle, which people usually were accustomed to, mentioned in the study made by Parker (2019).

In terms of Strategies to Reduce the Usage of Plastics

As shown in Table 3, the City Government of Calamba has implemented the strategies to reduce the usage of plastics. “Training, livelihood programs, and seminars provided to the community” had the highest mean score of 2.89, interpreted as Implemented; conversely, “the City and Barangays conduct dialogue to monitor the implementation of the Ordinance” had the lowest score of 2.62, interpreted as Implemented. Consistent with the result, training, workshops, and livelihood programs provide an opportunity to generate comprehensive educational experience in the least amount of time.

Table 3. Descriptive statistics of the level of implementation of initiatives on plastic dependency reduction in terms of strategies to reduce the usage of plastics

Indicators		LGU		Barangay		Composite
1. City ENRO and Barangay personnel often monitor plastic usage restrictions.	2.80	Implemented	2.83	Implemented	2.82	Implemented
2. Information materials are placed strategically to remind the public to reduce plastic usage.	2.70	Implemented	2.74	Implemented	2.72	Implemented
3. Recycling Facilities/ Eco-centers exist in every barangay.	2.98	Implemented	2.71	Implemented	2.85	Implemented
4. Seminars and other information campaigns are provided by authorities to reduce plastic dependency and anti-littering.	2.94	Implemented	2.79	Implemented	2.87	Implemented
5. Businesses that support the campaign on plastic usage reduction are recognized and appreciated.	2.73	Implemented	2.83	Implemented	2.78	Implemented
6. The City and Barangays conduct dialogue to monitor the implementation of the Ordinance.	2.70	Implemented	2.54	Implemented	2.62	Implemented
7. Training, livelihood programs, and seminars are provided to the community.	3.14	Implemented	2.63	Implemented	2.89	Implemented
General Assessment	2.85	Implemented	2.72	Implemented	2.79	Implemented

It introduces new concepts and motivates participants to practice environmental initiatives that could minimize plastic dependency. Authorities are assertive in conducting capacity building. Contrary, the public was eager to gain the knowledge and skills necessary to enable individuals to apply effective and practical abilities associated with environmental concerns. The result also exhibits that a greater extent of environmental consciousness significantly correlates with ecologically friendly behavior. Consistent with the result, trainings, workshops, and livelihood programs provide an opportunity to generate comprehensive educational experience in the least amount of time. It introduces new concepts and motivates participants to practice environmental initiatives that could decrease plastic dependency. Authorities are assertive in conducting capacity building. Conversely, the public was eager to gain the knowledge and skills necessary to enable individuals to apply effective and practical abilities associated with environmental concerns. The result also exhibits that a greater extent of environmental consciousness significantly correlates with ecologically friendly behaviour. Relative to the conduct of training, workshops, and livelihood programs, Anderson et al. (2020) concluded that discussion groups and training raise a person's confidence concerning their capabilities, boost esteem and self-actualization as it helps individuals to identify risk factors and perform strategies in reducing such risks.

Castellanos et al. (2020) inferred that education promoted positive attitudes toward environmental awareness, sought natural conservation behaviors, and generated synergies among ideas and solution-pursuing processes. Adequate information and livelihood encourage a greener inclination toward decisions consistent with environmental problem-solving techniques. In addition, Shawe et al. (2019) asserted that training, workshops, and livelihood must continually adapt to the unique challenges posed and be aligned with the ever-evolving needs of the environment. It was significant that research on environmental education and streamlining of updates and sustainable development processes. Facilitators and individuals should be guided and well-versed in the transfer of ideas as part of effective communication. Ettinger (2023) asserted that skills in conversation in pursuit of dialogue-driven approaches for public engagement always have room for improvement. Opportunities should be accessible to help practitioners, researchers, and advocates expedite communication amidst various environmental issues and political polarization.

In terms of Social Empowerment

As shown in Table 4, the City Government of Calamba had implemented the social empowerment. The indicator “The community participates in regular clean-up drives and other environmental activities” had the highest score of 3.14, interpreted as Implemented, while “Environmental Groups and associations organized in the community for plastic and waste reduction” had the lowest composite mean score of 2.73, interpreted as Implemented. The result implies that strong community engagement in the city's programs and initiatives in the effort to support and sustain ecological conservation has an enormous impact on feasibility and sustainability. Comprehension of issues, a sense of control, and satisfaction among the project, essentially those that affect the community, was considerable. Through active participation in the program, people gain a better understanding of the needs and aspirations of their community and involvement in the Government. Likewise, it also provides diversity in the ideas and opinions, in which real-life experiences are pondered and considered to form an informed decision.

Table 4. Descriptive statistics of the level of implementation of initiatives on plastic dependency reduction in terms of social empowerment

Indicators		LGU		Barangay		Composite
1. Environmental groups and associations are organized for plastic and waste reduction in the community.	2.95	Implemented	2.50	Implemented	2.73	Implemented
2. Junkshops and waste pickers are considered recycling partners.	3.05	Implemented	3.08	Implemented	3.07	Implemented
3. There is a public and private partnership in the city, and it encourages environmental consciousness.	3.36	Fully Implemented	2.56	Implemented	2.96	Implemented
4. The community participates in regular clean-up drives and other environmental activities.	3.33	Fully Implemented	2.94	Implemented	3.14	Implemented
General Assessment	3.17	Implemented	2.77	Implemented	2.97	Implemented

To validate the above statement, Kaiser et al. (2020) cited that residents facing environmental challenges were deeply concerned. Community perceptions were vital in addressing environmental and health issues. Their participation was impactful, as individuals became aware of the undertaking that reinforced a positive psychological impact on behavior. It could also be perceived and regarded that each experience was unique in creativity, inspired innovation, and drove cognitive development. In addition, community engagement must be approached and accepted with reciprocity, as expressed in the study by Baba et al. (2021). The reciprocity framework extended the potential perspective of community engagement beyond three conventional strategies as a transaction, transitional, and transformational through augmenting transparency, development of a protocol for a two-way collaboration based on the needs and mutually agreed upon; such examples were the regular clean-up drives and green projects initiated by the Local Government to enhance social empowerment.

Fundamentally, communities harnessed the idea of placemaking, which meant proactively managing their place to make it more suitable for living comfortably. Sen and Nagenda (2020) concluded that environmental placemaking created strong motivations and drove transformative changes toward urban stewardship. In addition, Wang et al. (2020) presumed that public participation was a vital portion of environment conservation, and Non-governmental organizations involving environmental groups that take part in a significant role in enhancing social empowerment as well as mobilizing and coordinating the public in persistent ecological activities.

3.2 Difference Between the Assessments of the Barangay Residents and Calamba City Local Government

Table 5. Analysis for the difference between the assessments of the barangay residents and Calamba city local government

Variables	T-test	P value	Remarks	Decision
Policies	2.465	0.014	Significant	Reject Ho
Mobilization Of Strategies	6.060	0.000	Significant	Reject Ho
Strategies to reduce the usage of plastics	2.073	0.039	Significant	Reject Ho
Social Empowerment	5.133	0.000	Significant	Reject Ho

There was a significant difference between the assessments of the Barangay Residents and Calamba City Local Government Authorities on the City Government of Calamba's initiatives. The probability values of .014, .000, and .039 were all less than the significance level at .05, rejecting the null hypothesis. In analysing the data, it was undoubtedly an emerging consensus that public participation in concurrence with the local government was advantageous in the outcome of environmental initiatives. However, in practice, there are differences between them. In Chung's study (2023), there was a fundamental difference between governmental assessment and application in the community. Deviation occurred since local government members had political motivation and bias in their decisions. Likewise, Rouhanizadeh and Kermanshachi (2021) affirmed that different assessments and viewpoints occurred since there were disparities in their observations and methods, in addition to prioritizing different barriers based on their assumption of its success. Considering that environmental challenges, predominantly initiatives dealing with a decrease in plastic dependency, were dynamic and involved political, technical, and economic considerations, not to mention political will associated with the circular economy, as mentioned in the study of Corvellec et al. (2021). Correspondingly, Cowan et al. (2021) said that objectives are usually can only be comprehended if local realities are reviewed, while policies and initiative integration must be established through stakeholders' perception conforming with this concept are the differences with the Barangay Residents and Calamba City Local Government should be resolved to create symmetry on ideas, feelings, and actions which in turn constituted positive balance between social groups and their social context. The difference in assessment results indicated a discrepancy in point of view. In the study by Vidiiasova et al. (2020), issues such

as this emanated from the local government limiting the features of participation of the stakeholders while the people defined their involvement in all dimensions. Consequently, it was crucial to be mindful of the discrepancies and consider them to have a better result.

3.3 Level of Awareness on Plastic Dependency Reduction

In terms of Behavioural Intention

Table 6. Descriptive statistics of the level of awareness on plastic dependency reduction in terms of behavioural intention

Indicators		LGU		Barangay		Composite	
1. Adhere religiously to the policies made to protect our environment.	3.05	Aware	3.19	Aware	3.12	Aware	
2. Concern about reducing my plastic usage for policy adherence.	3.45	Fully Aware	3.15	Fully Aware	3.30	Fully Aware	
3. Willingness to use alternatives instead of plastic bags and other single-use items.	3.48	Fully Aware	3.28	Fully Aware	3.38	Fully Aware	
4. Practicing reusing plastic bags and other materials to help the environment.	3.20	Aware	3.34	Aware	3.27	Aware	
5. Attending seminars and information campaigns attentively is important to reduce plastic dependency.	2.91	Aware	3.14	Aware	3.03	Aware	
General Assessment	3.22	Aware	3.22	Aware	3.22	Aware	

As depicted in Table 6, the Calamba City Barangay was aware of the behavioural intention of plastic dependency reduction in Calamba City barangays. The indicator “Willingness to use alternatives instead of plastic bags and other single-use items” had the highest composite mean of 3.38, interpreted as Fully Aware. On the other hand, “attentively attending seminars and information campaigns are important to reduce plastic dependency” had the lowest composite mean of 3.03, interpreted as Aware. The result suggests that people nowadays are mindful of the numerous disadvantages of using plastic in everyday life. There is a consciousness of public choice in supporting the initiatives. Reducing the usage boasts plenty of interest, such as environmental protection and conservation. Subsequently, less plastic waste is likely to be generated, and a decrease in the necessity to produce plastics reduces oil consumption through its life cycle: production, consumption, and disposal.

To support this, in the study conducted by Bergmann et al. (2019), plastic pollution caused by excessive usage and mismanagement of plastic was well-recognized across the globe. People acknowledged the dangers of unrestrained dependency on materials. In addition, Herrmann et al. (2022) concluded that consumers were leaning toward alternatives as they understood it as sustainable and ecologically viable material instead of plastic. Indeed, people’s behavior changed through the introduction of substantial information. In addition, the public desired to reduce unnecessary packaging and preferably use paper bags, cartons, and reusable alternatives. Nevertheless, the government should constantly establish consciousness and awareness in the public, granted that it was always a challenge to entice the public to attend seminars and training, including the management for effective and efficient information drives. Based on the study of Kautushi et al. (2021), perceived consumer efficacy thoroughly affected behavior. Therefore, the local government should include accomplishments and encouraging words in seminars and information drives to inform the public of the success and positive outcomes it realized.

In terms of Attitudes

As shown in Table 7, the Calamba City Barangays were aware of the plastic dependency reduction in terms of Attitude. The indicator “Plastic reduction is the responsibility of everyone” had the highest composite mean of 3.40, interpreted as Fully Aware, while “Reducing plastic dependency will NOT reduce plastic pollution problem” had the lowest composite mean of 1.95, interpreted as Partially Aware. The result indicates a profound realization of individuals on the importance of the involvement of stakeholders and authorities who are equally responsible for plastic reduction. Conversely, the result verifies the insight of Calamba city residents as they support plastic dependency reduction and understand its extensive impact on the environment. To decrease plastic dependency, the government and society are working together and accepting their responsibility to achieve a common goal. It was mentioned in the study by Ahsan (2020) that the government should empower businesses to use alternatives and decrease their dependency on plastic.

Table 7. Descriptive statistics of the level of awareness on plastic dependency reduction in terms of attitudes

Indicators		LGU		Barangay		Composite
1. Policies and city ordinances should be adhered to and respected by the public.	3.42	Fully Aware	3.22	Aware	3.32	Fully Aware
2. Reducing plastic usage decreased waste management problems in the city.	3.11	Aware	3.23	Aware	3.17	Aware
3. Plastic reduction is the responsibility of everyone.	3.56	Fully Aware	3.23	Aware	3.40	Fully Aware
4. It is right to reduce plastic usage to help the government and our environment.	3.24	Aware	3.17	Aware	3.21	Aware
5. Reducing plastic dependency will NOT reduce the plastic pollution problem.	1.91	Partially Aware	1.95	Partially Aware	1.93	Partially Aware
General Assessment	3.05	Aware	2.96	Aware	3.01	Aware

However, citizens should avoid using and taking plastic from stores to discourage them from purchasing. Likewise, dealing with plastic dependency requires a complex action that is achievable through collective efforts. As mentioned in the study by Aradoin et al. (2023), responsibility, when shared, increases in effectiveness as resources are rationalized and waste lessened, not to mention the enhancement of innovative ideas that are introduced due to cumulative exertion of the individual to achieve the group's endeavour. Pollution was a consequence of mismanaged plastic; it was a repercussion of an increase in plastic dependency emanating from an overwhelming number of plastics. However, with proper management, through efficient recycling and waste reduction, awareness of the public and ecologically viable materials as substitutes for plastic can decrease pollution, as expressed in the study of Suleman et al. (2022). Furthermore, to supplement the result, Imran and Abbas (2020) indicated that people were well aware of its advantages and technological innovations but not its hazards until substantial negative consequences and people attributed pollution to it. In addition to reusing plastic bags, it had little impact on the pollution problem since it just delayed the inevitable, as asserted in the study by Cho (2020).

In terms of Subjective Norms

Table 8. Descriptive statistics of the level of awareness on plastic dependency reduction in terms of subjective norms

Indicators		LGU		Barangay		Composite
1. Participating in plastic dependency reduction is easier with the involvement of my relatives, friends, and community.	3.27	Fully Aware	3.30	Fully Aware	3.29	Fully Aware
2. The behavior and practices of the community affect my habit of plastic dependency.	3.35	Fully Aware	3.18	Aware	3.27	Fully Aware
3. Expectations from my colleagues and friends will urge me to reduce plastic dependency.	3.15	Aware	3.18	Aware	3.17	Aware
4. Social media encourages me to participate in environmental drives, including reducing plastic dependency.	3.35	Fully Aware	3.22	Aware	3.29	Fully Aware
5. Products that are perceived by others as green products are environmentally friendly.	3.11	Aware	3.32	Fully Aware	3.22	Aware
General Assessment	3.25	Fully Aware	3.24	Aware	3.25	Fully Aware

As depicted in Table 8, Calamba City barangays regarding subjective norms were fully Aware of plastic dependency reduction. Notably, the indicators "Participating in plastic dependency reduction is easier with the involvement of my relatives, friends, and community" and "Social Media influences me to participate in environmental drives including plastic dependency reduction" both had the highest composite mean of 3.29 interpreted as Fully Aware, while "Expectation from my colleagues and friends will urge me to reduce plastic dependency" had the lowest composite mean of 3.17 interpreted as Aware. The result suggests that people are highly affected by others' opinions and acceptance, which implies that the greater the number of people engaged in the activity, the easier it is for others to recognize its importance. In addition, the result shows that social media profoundly influences people's initiative to undertake activities, particularly environmental initiatives. Consistently, expectations can motivate people to achieve the required standards set by others.

To emphasize the statement, in a study by Linh et al. (2019), the behaviour and actions of friends, peers, and celebrities had a tremendous impact on using plastic materials; individuals increased their intention to minimize plastic usage more when a peer exhibited the same behaviour. Numerous studies reaffirmed the social value and acceptance of such behavior. Ganak et al. (2020) stated that just like any decisions influenced by others, family and peers significantly impacted a person's sustainable behaviour, for instance, recycling and waste reduction.

According to Chi et al. (2021), people were not just influenced by the actions and insights made by their peers and family. Instead, they were motivated by their profound inclination toward sustainability. They also emphasized that people often researched their actions. Therefore, it was contingent on one's sustainability values, which were then determined by one's knowledge, moral values, and attraction. Likewise, it was clearly expressed that pro-environmental behaviour, such as adherence to green initiatives, represented an altruistic outlook; people were to help, not because of pressure but as an obligation towards unselfishness.

In terms of Perceived Behavioral Control

Table 9. Descriptive statistics of the level of awareness on plastic dependency reduction in terms of perceived behavioral control

Indicators	LGU		Barangay		Composite	
1. Reducing waste, plastic usage, and recycling is very important to preserve our environment.	3.61	Fully Aware	3.37	Fully Aware	3.49	Fully Aware
2. Using alternative packaging and bags instead of plastic bags makes a lot of difference to our environment.	3.35	Fully Aware	3.41	Fully Aware	3.38	Fully Aware
3. Incentives for businesses, institutions, and communities should be included in the campaign to lessen plastic dependency.	3.50	Fully Aware	3.35	Fully Aware	3.43	Fully Aware
4. Individual action through strict compliance can minimize pollution and environmental concerns.	3.62	Fully Aware	3.31	Fully Aware	3.47	Fully Aware
5. People believe that they can make a difference.	3.48	Fully Aware	3.35	Fully Aware	3.42	Fully Aware
General Assessment	3.51	Fully Aware	3.36	Fully Aware	3.44	Fully Aware

As shown in Table 9, Calamba City Barangays were Fully Aware regarding Perceived Behavioural Control assessed by residents. For the indicators, “Reducing waste, plastic usage, and recycling is very important to preserve our environment” had the highest composite mean of 3.49, interpreted as Fully Aware, while “Using alternative packaging and bags instead of plastic bags makes a lot of difference to our environment” had the lowest composite mean of 3.38, interpreted as Fully Aware. The results strongly suggest that Calamba City residents have good environmental knowledge. Therefore, they can recognize their control and responsibility in plastic reduction and their intention to recycle and reduce their waste, albeit the country's plastic recycling rate was just about nine (9) per cent. Predominantly, the community wants to recycle, although it may be impeded by the practical reality of the lack of available recycling facilities and its ease of doing rather than outright disposal. It expresses that Calambeños are motivated to perform green initiatives and lessen their environmental impact. In addition, it also suggests that their intention to use reusable bags rather than single-use plastic bags is the outcome of social responsibility and motivation towards sustainability.

To reinforce the result, an individual who can acknowledge the control of their behavior is more likely to have a higher level of environmental knowledge, as stated in the study by Wu et al. (2021). As also indicated, knowledge creates moral motives in waste-reducing behavior. Moreover, recycling and waste reduction should be encouraged with less complicated and more convenient methods, resulting in considerable potential support for enticing recycling and reduction initiatives. In light of communities committed to a cleaner and greener environment as an indicator of the quality of life, Jonek-Kowalska et al. (2023) stated the concept of urban quality of life, consisting of both objective attributes such as external attributes of environment and urban space while subjective attributes pertain to person's observations, control and perceptions. Having control over the actions of the urban environment was a key issue in people's lives, mostly a positive one. Zambrano-Monserrate and Ruano (2020) analyzed household plastic consumption, and they concluded that knowledge and perceived control created the willingness to participate in initiatives and observed lower plastic usage. Moreover, it was notable that urban areas were more likely to use plastic than rural areas. Furthermore, the indication of their extent of control over plastic dependency has the potential to have a definitive impact on the success of initiatives to decrease plastic dependency in the city. Accordingly, in the study made by Lekavičius (2023), based on the socioeconomic impact analysis, the transition could result in remarkable improvements in production and economy besides the pragmatic result of decreasing greenhouse gases. There was a significant relationship between the implementation of initiatives of the City Government of Calamba and the level of awareness of plastic dependency reduction in Calamba City barangays. The probability values of .017, .047, .001, .000, .000, .006, .000, .017, .047, and .001 respectively were lesser than the level of significance at .05. Thus, rejecting the null hypothesis. On the other hand, the r-value of .048 signified a small positive correlation, while the r-value of .301 meant a medium positive correlation.

3.4 Relationship Between the Level of Implementation and Level of Awareness of Plastic Dependency Reduction

Table 10. Analysis for the relationship between the level of implementation and level of awareness of plastic dependency reduction

Initiatives	Theory of Planned Behaviour	r value	p-value	Remarks	Decision
Policies	Behavioural Intention	.154*	.017	Significant	Reject t Ho
	Attitudes	.128*	.047	Significant	Reject t Ho
	Subjective norms	.222**	.001	Significant	Reject t Ho
	Perceived behavioural control	.050	.440	Not Significant	Accept
Mobilization of Alternatives	Behavioural Intention	.301**	.000	Significant	Reject t Ho
	Attitudes	.288**	.000	Significant	Reject t Ho
	Subjective norms	-.077	.236	Not Significant	Accept
	Perceived behavioural control	.176**	.006	Significant	Reject t Ho
Strategies to reduce the usage of plastics	Behavioural Intention	.266**	.000	Significant	Reject t Ho
	Attitudes	.281**	.000	Significant	Reject t Ho
	Subjective norms	-.135*	.036	Significant	Reject t Ho
	Perceived behavioural control	.048	.461	Not Significant	Accept
Social Empowerment	Behavioural Intention	.154*	.017	Significant	Reject t Ho
	Attitudes	.128*	.047	Significant	Reject t Ho
	Subjective norms	.222**	.001	Significant	Reject t Ho
	Perceived behavioural control	.050	.440	Not Significant	Accept

*. Correlation is significant at the 0.05 level (2-tailed)

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

These results imply that the greater the implementation of initiatives, the more significant the level of awareness of plastic dependency reduction increases. It further suggests that optimizing initiatives can heighten the understanding and motivational drive of the public to adhere to and support government activities. In addition, an improvement in the delivery of initiatives provides a significant increase in the extent of success and sustainability, which in turn allows the growth of ideas, public perception, and acceptance. Relatively, in the study by Bhutto et al. (2023), factors of the theory of planned behaviour related to attitudes, subjective norms, intention, and perceived behavioural control were notable predictors of adherence to the initiatives. Based on the result, there was a positive link between the initiatives and the theory of planned behavior. According to Baiardi (2022), promoting initiatives enriched pro-environmental behaviors, and personal factors form an individual's perception and adherence to government initiatives.

Initiatives of Calamba City on plastic dependency and behavior have an immense influence on the success of initiatives and vice versa. To further discuss this, the public was aware of environmental problems, specifically plastic dependency, and they recognized the effort of the local government to decrease the city's dependency on plastic. Relative to this, the government should be more stringent in the regulation and implementation of policies, as a result, showed a significant relationship among all the factors of the theory of planned behavior except perceived behavioral control.

As discussed by Moshood et al. (2020), recognized as a significant factor influencing the success of initiatives, businesses, and establishments was the adaption of legal standards, as the community accepted the implementation of the policies. Furthermore, on the initiative to mobilize alternatives to plastics, the commitment and belief of a person based on the study by Jakučionytė-Skodiene and Liobikienė (2022), were spurred a great sense of responsibility in which the concept of felt responsibility was in play.

In addition, the scale to which a person discerned to be persuaded and capable of partaking in pertinent action about the desired result was in play. The government should capitalize on this advantage by encouraging the community to use alternative packaging to lessen the dependency on plastic. The success of initiatives towards plastic dependency reduction was highly attainable based on the survey since residents recognized and supported the idea. It was evident that the actions of their peers, likewise, the social media platform, were very persuasive.

The government should utilize this as part of the strategy to intensify the positive effect, entice the public, and strengthen the predisposition towards lessening plastic usage.

Latkin et al. (2022) identified that new forms of communication with interesting content can easily reach individuals. In addition, according to Rapada et al. (2021), social media can usher opportunities to have a positive involvement in collective action in social life to exchange opinions and deliberate situations similar to the case of initiatives of Calamba City on plastic dependency reduction. Furthermore, D'Amato et al. (2019) analyzed that Pro-environmental behaviors toward government initiatives are predominantly determined and influenced by information sources, notably the Internet. The provenance of details in stimulating environmental actions while traditional media platforms gradually become insignificant in plastic reduction information dissemination.

Focusing on the significance of subjective norms and behavior intention on initiatives of plastic dependency reduction, Tonder et al. (2023) stated that norms and intentions were reliant on the reference group and were deemed significant by individuals. Moreover, it was imperative to encourage numerous people to be interested in sustainability relevant to the adoption or performance concept of environmental societal expectations. Indeed, Signori et al. (2019) stated that shared experience from government authorities, non-governmental organizations, and individuals, if strategically utilized and integrated during awareness drives, can increase success and create a new mindset oriented to respect and sustainability of the environment.

Recognition and social inclusion of waste pickers and informal recyclers were a few solutions to lessen plastic pollution, as they segregate the uncollected waste and increase the recycling rate. According to Williams et al. (2019), many studies considered it a rapid and cost-effective solution to plastic pollution. To support the statement, Lau et al. (2020) have estimated that there are 27.4 million tons of plastic currently collected by waste pickers, which otherwise should have leaked into the environment. The government could increase the capacity and development of their welfare and protection, employing them to set a transitional stage from a linear to a more sustainable circular economy. Experiences had a potent influence on the formation of positive behavior and social empowerment. The perception of effortlessness and advantages or adversity of performing the behavior of interest varied transversely on situations and actions. According to Sun et al. (2020), extra opportunities and resources increase the intention to adhere. The government should plan to identify barriers and facilitate the activity, promotion, opportunity, and ability along with sufficient resources to partake in such initiatives.

3.5 Proposed Action Plan

A proposed action plan (see Table 11) based on the result of the study is to decrease the usage of plastic, improve plastic waste management, and incorporate new activities that could help increase public awareness and participation in the plastic dependency reduction initiatives of the City Government of Calamba. To have a consistent and aligned goal for the City Government of Calamba, an executive order is needed to create a review committee consisting of personnel from the CENRO with selected City Government Offices and Barangay Officials.

It is imperative to initiate the Environmental Law Summit and Barangay Solid Waste Management plan review, which includes DENR and LLDA, and to assimilate national perspectives during the summit. Integrating NGOs, businesses, and institutions during the planning phase increases public awareness, improving communication and coordination between the public and private sectors. CENRO, in coordination with Barangays, Sangguniang Panlungsod, and the Public Affairs Office, should be able to recognize appropriate sectors to include. Improving the effectiveness and efficiency of green initiatives requires reinforcement of a sense of responsibility and support of green initiatives, particularly for young minds. Hence, it is paramount to include the Department of Education-Calamba City during the conduction of the Environmental Awareness Forum and Waste Exchange programs.

Table 11. Proposed Action Plan

Key Areas	Objectives	Strategie	Frequency	In-charge	Funding	Success Indicators
Devise adequate plans and programs aligned with the implementation of policy.	To have a consistent and aligned goal of the government	Executive Order regarding the creation of a review team/ committee	Annual February	CENRO with selected offices and barangay officials	Mayor's Office and Barangay general fund (Php 5,000-10,000)	Submission of proposal for revision and update; 50% reviewed
	Sustainable review committee and monitoring team	Environmental Law Summit and Barangay Solid Waste Management Plan Review	Quarterly March, June, September, December	CENRO , DENR, LLDA and Liga ng Barangay	CENRO General fund and Liga ng Barangay Budget (Php 60,000)	80% of the personnel involved are competent and engaged
Understand the challenges and ways to enhance public involvement	To increase public awareness	Conduction of Recyclers forum and Enhancement of capability	Quarterly February, May, August	CENRO, DENR, LLDA and Barangays	CENRO General fund (Php 25,000)	One seminar per quarter conducted with at least 70% of total registered junkshop owners attended
	To improve communication between public and private sectors	Incorporate NGOs, businesses, and institutions during the planning phase	Semi-annual April and October	CENRO, Barangays, Sangguniang Panlungsod, Public Affairs Office	CENRO and Mayor's Office general fund (Php 15,000)	20-30% of council members are from the private sector
	To increase coordination efforts	Organize clean-up drives Acknowledgement and registration of informal waste pickers and junkshops as partners	Twice a month Annual January	CENRO, DENR,Barangay and Junkshop owners	CENRO General fund (Php 5,000 per clean-up drive) CENRO general fund	Two clean-up drives per month with 50% of attendees from the private sector 80% of junkshops are registered and waste pickers are acknowledged
Improved effectiveness and efficiency of green initiatives	Reinforcement of sense of responsibility	Environmental Awareness Forum	Monthly Jan-Dec	CENRO, DENR, LLDA,	CENRO General fund	25% of schools are visited and conduct an environmental awareness campaign
		Support Green Projects Organizations (Waste exchange)	Monthly Jan-Dec	Barangays and Schools	DepeEd General fund (Php 30,000) CENRO general fund (Php 5,000 per school)	

4.0 Conclusion

The City Government's plastic dependency initiatives are accepted and appreciated by Calamba residents and Calamba City Local Government Authorities, as they find it beneficial and practical for sustainable ecology and environmental conservation and protection. The Barangay residents require additional involvement, participation, and interaction in different activities, including the initiation of policies and programs of the City Government of Calamba on solid waste management and plastic dependency reduction in particular. Moreover, they are willing to pursue the initiatives currently implemented by the government. It is essential to empower and organize collaborative efforts among stakeholders throughout the formulation in addition to its implementation of policies, strategies, and alternatives for plastic dependency initiatives. At the same time, the level of implementation of initiatives increases the awareness among residents of plastic dependency reduction further improved. When the level of implementation of initiatives decreases, residents' awareness also decreases. As the outcome of this research, a proposed action plan is necessary to increase plastic dependency reduction, integrate additional actions and approaches, support the current initiatives of the City Government of Calamba on plastic dependency reduction, and enhance awareness.

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The Author declares no conflict of interest about the publication of this research

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