

## Annex 1

### TEMPLATE FOR THE I.S.I.P. COMPETITION PROGRAM PROPOSAL

Program Profile	
Institute/Organization/Office Name	Science Society
Institute Dean/Immediate Supervisor/Organization Adviser	Frienchie Ann B. Yamauchi
Email address	frienchie.yamauchi@mcc.edu.ph
Program Name / Title	Balakat NutriBar: One Local Nutrition Snack, One Healthy Community
Category (Please mark (x) just one)	<input type="checkbox"/> 1. Industrial Application <input type="checkbox"/> 2. Entrepreneurial Spirit <input type="checkbox"/> 3. Ethical Value <input type="checkbox"/> 4. Student Mobility and Openness <input checked="" type="checkbox"/> 5. Crisis Management <input type="checkbox"/> 6. Progress in the Fourth Industrial Revolution
Abstract of Program (200-300 words)	
<p>Hunger and lack of access to good health are just two of the most prominent issues of the Philippines. Due to this reason, the Science Society Organization under Mabalacat City College proposed a program that may contribute to fighting against hunger and lack of access to good health through the <i>Balakat NutriBar</i>. This research proposal targets to address four SDG goals to provide affordable and nutritious food for the community. This will serve as a potential essential source of nutrients to promote good health for the inhabitants in the chosen communities. Specifically, these are SDG Nos: 2 (Zero Hunger), 3 (Good Health and Well Being), 12 (Responsible Consumption and Production), and 17 (Partnerships for the Goals).</p> <p>The present findings indicate that there are minimal variations in the Balakat NutriBar dimensions. Although present in small amounts, adjustments on the sizes and density must be performed as part of quality control, and to maintain consistency. On the other hand, the organoleptic evaluation shows that consumers generally prefer the control group, closely followed by the NutriBar with 5%, then 10% Balakat leaves. Although interestingly, the 5% concentration of Balakat leaves had the highest value in terms of taste. These assessments are important in creating adjustments for the NutriBars which are needed for Phase 2 (chemical and nutritional assessment), and Phase 3 (intervention) of the ISIP Project.</p>	
Planning	
Background	<p>The Philippines is amidst the campaign against poor nutrition. According to findings of the Nutritional Assessment and Monitoring Division (NAMd) headed by DOST-FNRI in 2019, the problem of undernutrition has made little headway, and now overnutrition has also become a major worry. According to the report, about four million children under the age of five suffer from stunting, which makes it unlikely that they will develop to their full mental and physical potential. Over the past 20 years, the percentage of adults who are overweight or obese has nearly doubled, greatly worsening public health issues. These nutritional</p>

dilemmas in turn affect the country's potential for social and economic progress (UNICEF, 2019; Gumaru, 2019).

The prevalence of nutritional dilemmas among children in the Philippines is of "very high" public health concern. According to the 2015 national nutrition survey, a substantial portion of Filipinos continue to experience chronic malnutrition issues such as protein-energy malnutrition and micronutrient deficiencies, anemia, vitamin A insufficiency, and iodine-deficiency illnesses (Capanzana & Aguila, 2019). In addition, about 11% of adult women were deemed to be chronically underweight and energy deficient in 2015. Among young teenagers (18 to 20 years old), the prevalence of underweight was close to 28%, with notable variations across socioeconomic class. On another note, according to the strategic review of Briones et al. (2017), the prevalence of obesity has also become a health issue, which has increased from 1.1% in 1990 to as much as 5.1% in 2013. Although it decreased to 3.1% in 2016, this level of concern still exists.

The nutritional status of children is also strongly predicted by maternal height in addition to maternal undernutrition. Due to the mother's physical restrictions, which limit fetal growth in gestation, short maternal height is connected with low birthweight and eventually child stunting. Shorter mothers may also have lower macronutrient (protein) and energy storage as well as smaller reproductive organs, which could provide less capacity for fetal growth (Addo et al. 2013). Furthermore, stunting, which causes children to be underweight for their age, affected one in three children (29%) under the age of five in 2019.

In addition to under- and overnutrition, acute nutrient deficiencies are also a problem more pronounced in young children. The physical and intellectual development of young children, especially those under five, is affected by a number of conditions, including iron deficiency anemia (IDA). The frequency of anemia cases for instance, has significantly decreased over the past two decades across all age categories, but in 2013, the IDA levels for children under three, particularly infants, remained alarmingly high.

The determinants of poor nutrition fall into three categories: immediate, underlying, and basic. A child can experience undernutrition on an immediate level

due to poor or improper nutritional intake, illness, or both—these two factors frequently interact negatively. These immediate risks result from inadequate care and feeding practices for women and children, insufficient access to health and environmental services, and deficiencies in household or community food security (Acayan, 2021).

Like many other regions in the country, problems in nutrition are also experienced by the residents of Pampanga. According to Cuyco (2020), five out of ten homes (51%) of households suffer acute food insecurity. This was particularly pronounced in lower-income households, while three out of ten (31.9%) households experienced chronic food insecurity. In the province, the prevalence of stunting was 21.2% among children under five and for underweight was 17.4% among infants and children aged 0 to 5 months. These problems with public health were substantially more prevalent in poor households than in non-poor households. According to the WHO cut-offs, 5.0% of wasting/thinness was considered poor. It should not be taken for granted that they will not be at risk for NCDs later in life because the prevalence of obesity was 6.7%, which is much higher in the province than the national estimate. Additionally, non-poor households have much greater rates of overweight than poor households. Anemia prevalence, on the other hand, was 8.0% in children aged 6 months to 5 years, which is regarded as a "mild" public health issue. With the rates being substantially lower than national predictions, malnutrition did not spare school-age children, who ranged in age from 5 to 10. In Pampanga, the prevalence of underweight is 18.8%, whilst the prevalence of stunting is 15.2%. The ENNS showed that every two (2) out of ten school-age children were underweight (18.8%), stunted (15.2%), and wasted (9.2%), while only nine out of one hundred were. Children of school age who were underweight and wasted were more prevalent among males and in low-income homes.

Infants and females are also highlighted in the nutritional crises of the province. Generally, in the case of infants, five out of every ten (53.8%) started nursing within an hour of birth. In 4 out of 10 of these situations (44.2%) infants were exclusively breastfed for the first six months of life. Only a tiny portion of young children (6-23 months) (6.8%) had a little amount of nutritional diversity (18.6%) in their diets. Among women of

reproductive age (15 to 49 years old), over nutrition (40.0%) was a more common problem among non-pregnant/non-lactating women. Two in every 10 (23.0%) pregnant women were nutritionally-at-risk in Pampanga. Breastfeeding mothers in Pampanga were nutritionally at-risk or had Chronic Energy Deficiency at a rate of 13.3%, which had a "medium" impact on public health. Over nutrition (31.1%) was also a new issue for this population. Anemia was of 'mild' public health significance among non-pregnant/non-lactating women (11.5%) and lactating mothers (13.6%) in the province.

Currently, shifting to plant-based foods has become a global trend that has been mainly observed during the COVID-19 pandemic (NCC, 2022). Plant-based nutrition products promote environment friendly consumption and campaign for healthier eating lifestyles. This is due to the natural compounds, vitamins, minerals and also phytochemicals that supplement nutrition. Adoption of plant-base also enhances the economic well-being in the sustainable food system since plants are everywhere and readily available.

Plant-based foods contain a lot of dietary fiber, protein, fatty acids, and phytochemicals that has been related to a lower incidence of chronic diseases and a changed gut microbiota makeup. In order to improve global human health and sustainable food systems, the EAT-Lancet Commission advises increasing the consumption of fruits and vegetables. Plant-based diets are also advised in order to lessen environmental harm from nitrification, climatic change, deforestation, 7 and other factors. According to the Cahiles-Magkilat (2023), the board of investment in the Philippines wants to establish an investment promotion in conducting an appraisal study to develop a Philippine plant-based food industry road map. Together with the University of the Philippines through the College of Home Economics Department of food Science and nutrition presented a series of webinars which presented the overview of the local and global plant-based food industry and the opportunities for its further development. They all agree that because of the pandemic people in the Philippines invest widely on plant-based products because of the health benefits they can provide. Furthermore, it also gives a forecast on the

	<p>opportunities people can get in terms of business and economics in the plant-based products.</p> <p>A 2021 survey by the Statista Research Department reveals that Filipinos said that they often consumed plant-based milk such as soy, rice and almond. The survey also found out that the majority consume plant-based food often times in a week. As of November 2021, 77% consumed plant-based milk (soy, rice, almond, oat milk, etc.), 51% had dairy product substitutes (vegan ice-cream, soy, yogurt, vegan cheese, etc.), 45% had plant-based meat alternatives (plant-based burgers, mock meats, plant-based 'chicken' nuggets, etc.), and 31% consumed egg substitutes and/or vegan 'egg'. In line with this, Filipinos are continuously urged by DENR to adopt a plant-based diet in order to lessen their impact on the environment and fight climate change. Reduced water use, factory farming, and greenhouse gas emissions can all be attributed to plant-based diets (Miguel, n.d.).</p> <p><i>Ziziphus talanai</i> with the common name of Balakat Tree, is an endemic plant found in Mabalacat City, Pampanga. The plant has been studied and found out to contain various phytochemicals such as flavonoids, tannins, phenols, and alkaloids which are associated with the plant's therapeutic properties (Reyes et al., 2016). These secondary metabolites are found to exhibit antibacterial, antifungal, and antioxidant properties (David, 2018; Aquino, 2018), as well as potentials for neuroprotection (Nolasco et al., 2022; Tejano, 2017), reprotection (Reyes, 2016), and cardioprotection in mice models (Yamauchi, 2019).</p> <p>This study aims to integrate the therapeutic potentials of the Balakat tree in a nutrition-packed snack bar to address the common nutritional problems experienced by the residents of Mabalacat City. The study is directed as a potential intervention to solve local nutrient crises in chosen barangays within the city.</p>	
Subject (Names & titles)	Initiator(s)	Ally Julian Liwanag, Biene Kiana Mie B. Julian, Frienchie Ann B. Yamauchi
	Leader(s)	Frienchie Ann B. Yamauchi
	Team members	Jhovel Clyre G. Abuan Krisa Marie Jose Kintaro G. Kawabe Anthoinette D. Lavarias

Environment	Nature/society	Selected Barangays within Mabalacat City (Marcos Village, Macapagal Village, and Calumpang)
	Industry/market	N/A
	Government/others	City Health Office, LGU- Mabalacat City
Resources	Human requirements	Science Society Officers and Members IAS Teaching and Non-Teaching personnel CHO Personnel
	Financial requirements	Funding support from MCC/LGU
	Technological/other requirements	Laboratory Services; DOST R3; FDA
Mechanism	Strategic options available	Process Phase Management Project
	Their relative importance	This mechanism will provide a schematic progression of the project.
	Their sequences for execution	Phase 1 - Preliminary assessment and Formulation, Phase 2 - Implementation and Intervention, Phase 3 - Sustainability
Content		<p><b>Objectives</b></p> <p>This project aims to create a nutritional bar with the Balakat tree leaves as primary ingredient to help address the nutritional problems of selected barangays in Mabalacat.</p> <p>Specifically, this project targets to meet the following objectives:</p> <p>PHASE 1</p> <ol style="list-style-type: none"> <li>1. What are the organoleptic values of the nutribars in terms of: <ol style="list-style-type: none"> <li>a. Texture profile analysis</li> <li>b. Color profile analysis</li> <li>c. Appearance</li> <li>d. Taste, and</li> <li>e. Aroma?</li> </ol> </li> <li>2. What are the physical analysis values of the Balakat Nutribar in terms of: <ol style="list-style-type: none"> <li>a. Weight (g)</li> <li>b. Length (cm)</li> <li>c. Width (cm)</li> <li>d. Thickness (cm), and</li> <li>e. Density (g/ml)?</li> </ol> </li> </ol> <p>PHASE 2</p> <ol style="list-style-type: none"> <li>3. What is the proximate composition of Balakat Nutribar in terms of: <ol style="list-style-type: none"> <li>a. Moisture content</li> <li>b. Crude fiber</li> </ol> </li> </ol>

	<ul style="list-style-type: none"> <li>c. Crude protein</li> <li>d. Crude lipid</li> <li>e. Calorific Value, and</li> <li>f. Ash content?</li> </ul> <p>4. What are the hydration properties of the Balakat Nutribar in terms of:</p> <ul style="list-style-type: none"> <li>a. Swelling capacity (SWC)</li> <li>b. Water holding capacity (WHC), and</li> <li>c. Oil Holding Capacity (OHC)?</li> </ul> <p>PHASE 3</p> <p>5. Are there any significant differences between the baseline and 2-week consumption anthropometric measurements of the respondents from the selected barangays in terms of:</p> <ul style="list-style-type: none"> <li>a. Height</li> <li>b. Weight</li> <li>c. MUAC</li> <li>d. Head circumference</li> <li>e. Skinfold</li> <li>f. Systolic blood pressure (mmHg)</li> <li>g. Diastolic blood pressure (mmHg)</li> <li>h. Waist circumference, and</li> <li>i. Hunger score?</li> </ul> <p>6. Are there any significant differences between the baseline and 2-week consumption biochemical measures of the respondents from the selected barangays in terms of:</p> <ul style="list-style-type: none"> <li>a. Lipids,</li> <li>b. hsCRP, and</li> <li>c. glucose metabolism?</li> </ul>
Target SDGs	<ul style="list-style-type: none"> <li>1. SDG No. 2: Zero Hunger</li> <li>2. SDG No. 3: Good Health and Well Being</li> <li>3. SDG No. 9: Industry, Innovation and Infrastructure</li> <li>4. SDG No. 12: Responsible Consumption and Production</li> </ul>
Key points	<ul style="list-style-type: none"> <li>● Nutritional Source</li> <li>● Local Sourcing</li> <li>● Sustainable Community</li> <li>● Health Benefits</li> <li>● Awareness and Education</li> <li>● Unique Flavor Profile</li> </ul>

	<ul style="list-style-type: none"> <li>• Versatility as an Alternative Food/Meal/Snack</li> </ul>
Differences from traditional approaches	<p>The facets of this study differ from traditional approaches in terms of: (1) Collaborative effort with LGU and CHO; (2) The project is linked to a Community Extension Program of the Institute of Arts and Sciences; (3) This is the first product-based project in Mabalacat that utilizes Balakat leaves as main component for a snack and is directed to address the nutritional dilemmas of the locality; (4) Project is centered around SDGs that taps both societal and environmental aspects for community sustainability; (5) Strategies revolve around not just interventions, but also economic and developmental programs for the local community.</p>

**Annex 2**

**TEMPLATE FOR THE I.S.I.P. COMPETITION PROGRAM**

Program Profile	
Institute/Organization/Office Name	Science Society
Institute Dean/Immediate Supervisor/Organization Adviser	Frienchie Ann B. Yamauchi
Email address	frienchie.yamauchi@mcc.edu.ph
Program Name / Title	Balakat NutriBar: One Local Nutrition Snack, One Healthy Community
Category (Please mark (x) just one)	<input type="checkbox"/> 1. Industrial Application <input type="checkbox"/> 2. Entrepreneurial Spirit <input type="checkbox"/> 3. Ethical Value <input type="checkbox"/> 4. Student Mobility and Openness <input checked="" type="checkbox"/> 5. Crisis Management <input type="checkbox"/> 6. Progress in the Fourth Industrial Revolution
Abstract of Program (200-300 words)	
<p>Hunger and lack of access to good health are just two of the most prominent issues of the Philippines. Due to this reason, the Science Society Organization under Mabalacat City College proposed a program that may contribute to fighting against hunger and lack of access to good health through the <i>Balakat</i> NutriBar. This research proposal targets to address four SDG goals to provide affordable and nutritious food for the community. This will serve as a potential essential source of nutrients to promote good health for the inhabitants in the chosen communities. Specifically, these are SDG Nos: 2 (Zero Hunger), 3 (Good Health and Well Being), 12 (Responsible Consumption and Production), and 17 (Partnerships for the Goals).</p> <p>The present findings indicate that there are minimal variations in the Balakat NutriBar dimensions. Although present in small amounts, adjustments on the sizes and density must be performed as part of quality control, and to maintain consistency. On the other hand, the organoleptic evaluation shows that</p>	



consumers generally prefer the control group, closely followed by the Nutribar with 5%, then 10% Balakat leaves. Although interestingly, the 5% concentration of Balakat leaves had the highest value in terms of taste. These assessments are important in creating adjustments for the Nutribars which are needed for Phase 2 (chemical and nutritional assessment), and Phase 3 (intervention) of the ISIP Project.

### Planning

#### Background

The Philippines is amidst the campaign against poor nutrition. According to findings of the Nutritional Assessment and Monitoring Division (NAMD) headed by DOST-FNRI in 2019, the problem of undernutrition has made little headway, and now overnutrition has also become a major worry. According to the report, about four million children under the age of five suffer from stunting, which makes it unlikely that they will develop to their full mental and physical potential. Over the past 20 years, the percentage of adults who are overweight or obese has nearly doubled, greatly worsening public health issues. These nutritional dilemmas in turn affect the country's potential for social and economic progress (UNICEF, 2019; Gumaru, 2019).

The prevalence of nutritional dilemmas among children in the Philippines is of "very high" public health concern. According to the 2015 national nutrition survey, a substantial portion of Filipinos continue to experience chronic malnutrition issues such as protein-energy malnutrition and micronutrient deficiencies, anemia, vitamin A insufficiency, and iodine-deficiency illnesses (Capanzana & Aguila, 2019). In addition, about 11% of adult women were deemed to be chronically underweight and energy deficient in 2015. Among young teenagers (18 to 20 years old), the prevalence of underweight was close to 28%, with notable variations across socioeconomic class. On another note, according to the strategic review of Briones et al. (2017), the prevalence of obesity has also become a health issue, which has increased from 1.1% in 1990 to as much as 5.1% in 2013. Although it decreased to 3.1% in 2016, this level of concern still exists.

The nutritional status of children is also strongly predicted by maternal height in addition to maternal undernutrition. Due to the mother's physical restrictions, which limit fetal growth in gestation, short maternal height is connected with low birthweight and eventually child stunting. Shorter mothers may also have lower macronutrient (protein) and energy storage as well as smaller reproductive organs, which could provide less capacity for fetal growth (Addo et al. 2013).

Furthermore, stunting, which causes children to be underweight for their age, affected one in three children (29%) under the age of five in 2019.

In addition to under- and overnutrition, acute nutrient deficiencies are also a problem more pronounced in young children. The physical and intellectual development of young children, especially those under five, is affected by a number of conditions, including iron deficiency anemia (IDA). The frequency of anemia cases for instance, has significantly decreased over the past two decades across all age categories, but in 2013, the IDA levels for children under three, particularly infants, remained alarmingly high.

The determinants of poor nutrition fall into three categories: immediate, underlying, and basic. A child can experience undernutrition on an immediate level due to poor or improper nutritional intake, illness, or both—these two factors frequently interact negatively. These immediate risks result from inadequate care and feeding practices for women and children, insufficient access to health and environmental services, and deficiencies in household or community food security (Acayan, 2021).

Like many other regions in the country, problems in nutrition are also experienced by the residents of Pampanga. According to Cuyco (2020), five out of ten homes (51%) of households suffer acute food insecurity. This was particularly pronounced in lower-income households, while three out of ten (31.9%) households experienced chronic food insecurity. In the province, the prevalence of stunting was 21.2% among children under five and for underweight was 17.4% among infants and children aged 0 to 5 months. These problems with public health were substantially more prevalent in poor households than in non-poor households. According to the WHO cut-offs, 5.0% of wasting/thinness was considered poor. It should not be taken for granted that they will not be at risk for NCDs later in life because the prevalence of obesity was 6.7%, which is much higher in the province than the national estimate. Additionally, non-poor households have much greater rates of overweight than poor households. Anemia prevalence, on the other hand, was 8.0% in children aged 6 months to 5 years, which is regarded as a "mild" public health issue. With the rates being substantially lower than

national predictions, malnutrition did not spare school-age children, who ranged in age from 5 to 10. In Pampanga, the prevalence of underweight is 18.8%, whilst the prevalence of stunting is 15.2%. The ENNS showed that every two (2) out of ten school-age children were underweight (18.8%), stunted (15.2%), and wasted (9.2%), while only nine out of one hundred were. Children of school age who were underweight and wasted were more prevalent among males and in low-income homes.

Infants and females are also highlighted in the nutritional crises of the province. Generally, in the case of infants, five out of every ten (53.8%) started nursing within an hour of birth. In 4 out of 10 of these situations (44.2%) infants were exclusively breastfed for the first six months of life. Only a tiny portion of young children (6-23 months) (6.8%) had a little amount of nutritional diversity (18.6%) in their diets. Among women of reproductive age (15 to 49 years old), over nutrition (40.0%) was a more common problem among non-pregnant/non-lactating women. Two in every 10 (23.0%) pregnant women were nutritionally-at-risk in Pampanga. Breastfeeding mothers in Pampanga were nutritionally at-risk or had Chronic Energy Deficiency at a rate of 13.3%, which had a "medium" impact on public health. Over nutrition (31.1%) was also a new issue for this population. Anemia was of 'mild' public health significance among non-pregnant/non-lactating women (11.5%) and lactating mothers (13.6%) in the province.

Currently, shifting to plant-based foods has become a global trend that has been mainly observed during the COVID-19 pandemic (NCC, 2022). Plant-based nutrition products promote environment friendly consumption and campaign for healthier eating lifestyles. This is due to the natural compounds, vitamins, minerals and also phytochemicals that supplement nutrition. Adoption of plant-base also enhances the economic well-being in the sustainable food system since plants are everywhere and readily available.

Plant-based foods contain a lot of dietary fiber, protein, fatty acids, and phytochemicals that has been related to a lower incidence of chronic diseases and a changed gut microbiota makeup. In order to improve global human health and sustainable food systems, the EAT-Lancet

Commission advises increasing the consumption of fruits and vegetables. Plant-based diets are also advised in order to lessen environmental harm from nitrification, climatic change, deforestation, 7 and other factors. According to the Cahiles-Magkilat (2023), the board of investment in the Philippines wants to establish an investment promotion in conducting an appraisal study to develop a Philippine plant-based food industry road map. Together with the University of the Philippines through the College of Home Economics Department of food Science and nutrition presented a series of webinars which presented the overview of the local and global plant-based food industry and the opportunities for its further development. They all agree that because of the pandemic people in the Philippines invest widely on plant-based products because of the health benefits they can provide. Furthermore, it also gives a forecast on the opportunities people can get in terms of business and economics in the plant-based products.

A 2021 survey by the Statista Research Department reveals that Filipinos said that they often consumed plant-based milk such as soy, rice and almond. The survey also found out that the majority consume plant-based food often times in a week. As of November 2021, 77% consumed plant-based milk (soy, rice, almond, oat milk, etc.), 51% had dairy product substitutes (vegan ice-cream, soy, yogurt, vegan cheese, etc.), 45% had plant-based meat alternatives (plant-based burgers, mock meats, plant-based 'chicken' nuggets, etc.), and 31% consumed egg substitutes and/or vegan 'egg'. In line with this, Filipinos are continuously urged by DENR to adopt a plant-based diet in order to lessen their impact on the environment and fight climate change. Reduced water use, factory farming, and greenhouse gas emissions can all be attributed to plant-based diets (Miguel, n.d.).

*Ziziphus talanai* with the common name of Balakat Tree, is an endemic plant found in Mabalacat City, Pampanga. The plant has been studied and found out to contain various phytochemicals such as flavonoids, tannins, phenols, and alkaloids which are associated with the plant's therapeutic properties (Reyes et al., 2016). These secondary metabolites are found to exhibit antibacterial, antifungal, and antioxidant properties (David, 2018; Aquino, 2018), as well as potentials for neuroprotection

		(Nolasco et al., 2022; Tejano, 2017), reprotection (Reyes, 2016), and cardioprotection in mice models (Yamauchi, 2019).  This study aims to integrate the therapeutic potentials of the Balakat tree in a nutrition-packed snack bar to address the common nutritional problems experienced by the residents of Mabalacat City. The study is directed as a potential intervention to solve local nutrient crises in chosen barangays within the city.
Subject (Names & titles)	Initiator(s)	Ally Julian Liwanag, Biene Kiana Mie B. Julian, Frienchie Ann B. Yamauchi
	Leader(s)	Frienchie Ann B. Yamauchi
	Team members	Jhovel Clyre G. Abuan Krisa Marie Jose Kintaro G. Kawabe Anthoinette D. Lavarias
Environment	Nature/society	Selected Barangays within Mabalacat City (Marcos Village, Macapagal Village, and Calumpang)
	Industry/market	N/A
	Government/others	City Health Office, LGU- Mabalacat City
Resources	Human requirements	Science Society Officers and Members IAS Teaching and Non-Teaching personnel CHO Personnel
	Financial requirements	Funding support from MCC/LGU
	Technological/other requirements	Laboratory Services; DOST R3; FDA
Mechanism	Strategic options available	Process Phase Management Project
	Their relative importance	This mechanism will provide a schematic progression of the project.
	Their sequences for execution	Phase 1 - Preliminary assessment and Formulation, Phase 2 - Implementation and Intervention, Phase 3 - Sustainability
Content		<b>Objectives</b>  This project aims to create a nutritional bar with the Balakat tree leaves as primary ingredient to help address the nutritional problems of selected barangays in Mabalacat. Specifically, this project targets to meet the following objectives:  PHASE 1  1. What are the organoleptic values of the nutribars in terms of: f. Texture profile analysis g. Color profile analysis h. Appearance

- i. Taste, and
- j. Aroma?

2. What are the physical analysis values of the Balakat Nutribar in terms of:

- f. Weight (g)
- g. Length (cm)
- h. Width (cm)
- i. Thickness (cm), and
- j. Density (g/ml)?

#### PHASE 2

3. What is the proximate composition of Balakat Nutribar in terms of:

- g. Moisture content
- h. Crude fiber
- i. Crude protein
- j. Crude lipid
- k. Calorific Value, and
- l. Ash content?

4. What are the hydration properties of the Balakat Nutribar in terms of:

- d. Swelling capacity (SWC)
- e. Water holding capacity (WHC), and
- f. Oil Holding Capacity (OHC)?

#### PHASE 3

5. Are there any significant differences between the baseline and 2-week consumption anthropometric measurements of the respondents from the selected barangays in terms of:

- j. Height
- k. Weight
- l. MUAC
- m. Head circumference
- n. Skinfold
- o. Systolic blood pressure (mmHg)
- p. Diastolic blood pressure (mmHg)
- q. Waist circumference, and
- r. Hunger score?

6. Are there any significant differences between the baseline and 2-week consumption biochemical measures of the respondents from the selected barangays in terms of:

- d. Lipids,

	<p>e. hsCRP, and</p> <p>f. glucose metabolism?</p>
Target SDGs	<ol style="list-style-type: none"> <li>1. SDG No. 2: Zero Hunger</li> <li>2. SDG No. 3: Good Health and Well Being</li> <li>3. SDG No. 9: Industry, Innovation and Infrastructure</li> <li>4. SDG No. 12: Responsible Consumption and Production</li> </ol>
Key points	<ul style="list-style-type: none"> <li>● Nutritional Source</li> <li>● Local Sourcing</li> <li>● Sustainable Community</li> <li>● Health Benefits</li> <li>● Awareness and Education</li> <li>● Unique Flavor Profile</li> <li>● Versatility as an Alternative Food/Meal/Snack</li> </ul>
Differences from traditional approaches	<p>The facets of this study differ from traditional approaches in terms of: (1) Collaborative effort with LGU and CHO; (2) The project is linked to a Community Extension Program of the Institute of Arts and Sciences; (3) This is the first product-based project in Mabalacat that utilizes Balakat leaves as main component for a snack and is directed to address the nutritional dilemmas of the locality; (4) Project is centered around SDGs that taps both societal and environmental aspects for community sustainability; (5) Strategies revolve around not just interventions, but also economic and developmental programs for the local community.</p>
<b>Doing</b>	
Launch date	August 24, 2023
Responsible organization	Science Society
Progress as of today	Phase 1 of the Research which includes the Physical Parameters of the Nutribar and its Organoleptic analysis.
Problems in implementation	<p>(1) Limited funding is one factor to be addressed. Specifically for this phase, ingredients are the most crucial items to be acquired. Resources for this phase were generated from the Organization funds; (2) time is also another factor to be considered, as student researchers and instructors have limited time in performing the research simultaneously with their academic responsibilities; (3) workforce is required</p>

	in creating the Nutribar samples for testing, as well as preparing the research writeups. This is also true for advertising the product and presenting it to school events.
Approaches to solve the problems	In order to address the aforementioned problems, the Science Society (1) has conducted fund-raising activities within MCC in order to generate funds. (2) Officers also plan to apply under the City Youth Development Office (CYDO) of Mabalacat City for funding and networking support. (3) Lastly, the organization is preparing the necessary requirements to tap also the Community Extension Services for further support especially for transition towards phases 2 and 3. This is crucial for ensuring the safety of the experiments to the locals of the selected Barangays within Mabalacat City.
Completion date, if completed	Phase 1 Preliminary Testing and Formulation of the Nutribar has been completed this September 14, 2023 (See attached document for the results and discussion). Phases 2 and 3 are expected to be completed within 2 years.
<b>Seeing</b>	
Impacts on students	(1) Community Engagement; (2) Environmental Awareness; (3) Develop critical thinking to the students concerning Environmental issues;  With this project, (1) community services of the students under the Institute of Arts and Sciences were achieved by collaborating with school administration and LGU Offices such as CHO and its RHUs. The study also focuses on the alleviation of nutritional problems of Mabalacat City residents; (2) incorporating the SDGs allows for inculcating environmental awareness, in the case of promoting the endemic Balakat tree and cultural identity; and (3) student critical thinking and research skills are also strengthened as students are exposed to practical skill-building and continuous writing
Impacts on Instructors and Institute	Community Engagement; (2) Community extension project of the MCC-IAS to the community of Mabalacat; (3) Introduce the waste management protocol to the personnel of IAS; (4) Professional growth.  This project will be limited to the students and the Professors of the Institute of Arts and Sciences. To provide professional growth and extension services to the faculty, leaders will tap the Kayantabe Office to officially convert this project into community extension. Moreover, this project also provides knowledge to the faculty of IAS about the methods and protocols used in



	nutrition as they involved themselves during the conduction.
Responses from industry/market	Industry and market involvement will be considered. With this, (1) assessment of physical, chemical, and nutritional components are essential in addressing the nutrient problems of the community. This is to be accomplished with collaboration with DOST; (2) compliance with the FDA regulation for safety consumption;
Responses from government	Since this research centers around the promotion of health using local products and the Balakat tree, (1) collaboration with the City ENRO and Barangays for the collection of leaves is required; (2) RHUs and CHO have aided in data collection to determine the barangays with the most nutritional and health dilemmas; and (3) for Phase 3, collaboration with CHO and RHUs will be needed to relay the messages and ask for participation among the residents of Brgy. Marcos Village, Macapagal Village, and Calumpang.
Measurable output	<p>The Phase 1 of the project yielded the following outputs:</p> <ol style="list-style-type: none"> <li>1. Organoleptic values of the nutribars in terms of: <ol style="list-style-type: none"> <li>a. Texture profile analysis</li> <li>b. Color profile analysis</li> <li>c. Appearance</li> <li>d. Taste, and</li> <li>e. Aroma</li> </ol> </li> </ol> <p>-Determination of these organoleptic values can help infer consumer acceptance towards a product.</p> <ol style="list-style-type: none"> <li>2. Physical analysis values of the Balakat Nutribar in terms of: <ol style="list-style-type: none"> <li>a. Weight (g)</li> <li>b. Length (cm)</li> <li>c. Width (cm)</li> <li>d. Thickness (cm), and</li> <li>e. Density (g/ml)</li> </ol> </li> </ol> <p>-Determination of these physical analysis values can aid in describing the physical characteristics of the Nutribar. This can aid in identifying the desired dimensions to be produced, as well as aid in cost estimation.</p> <p>(See attached document for the results and discussion)</p>
Cost-benefit analysis for effectiveness	(PHASE 1)

Purchase of Ingredients: This includes the price of buying regional ingredients.

COSTS: 785.00 php.

Quinoa 500 g 160.00php

Honey 250 ml 100.00php

Raisins 500 g 160.00php

Almonds 250 g 145.00php

Chocolate Chips 1 kg 200.00php

Malunggay Powder 0.00php

Balacat Leaves Powder 0.00php

Processing and Manufacturing: Charges for the manufacture, packaging, and processing of Balakat nutribars. Costs related to personnel, machinery, and facilities are included.

COSTS: 335.00php

Butane 120.00php

Aluminum Foil 35.00php

Wax Paper 120.00php

Tape 60.00php

(PHASE 2 and 3)

Laboratory tests and people are used for quality control and testing. (Estimated costs: 40,000 PHP)

Regulatory Compliance: The expenses related to adhering to laws governing food safety and labeling, including getting the required licenses (Estimated costs: 30,000 PHP)

Benefits (in PHP):

Revenue from Product Sales: The sale of the Nutribars provides the main benefit.

Reputation of the Brand: Making a nutritional bar using sustainably harvested local resources, such as the Balakat tree, can improve the perception of Your Brand as being socially and environmentally responsible.

Consider the advantages for nearby farmers and towns where the ingredients were sourced when evaluating the local economic impact. The local economy can be stimulated by aiding local agriculture.

	<p>Health Benefits: Potentially higher sales due to the draw of health-conscious customers.</p> <p>Sustainability: Encouraging the use of regional, sustainable ingredients can appeal to consumers who are concerned about the environment and promote sustainability over the long run.</p> <p>Market Expansion: If there is a need for distinctive and regional food items, Balakat NutriBar may be able to enter a niche market and grow its clientele.</p>
<b>Future Planning</b>	
Where does the project go from here?	<p>(1) Proceed with Phase 2, wherein chemical parameters and nutritional components are to be assessed; (2) Proceed with Phase 3, wherein testing on selected participants from target communities will be performed; (3) Interventions and promotion of the product to other residents with identified nutritional difficulties; (4) Permit security and patents for the sustainable production of the Balakat Nutribars.</p>
<b>Miscellaneous</b>	
Exhibits, pictures, diagrams, etc.	See the attached Document and Appendices
Reports, mimeos, monographs, books, etc.	See the attached Document and Appendices
Others which may help explain the project	See the attached Documents and Appendices