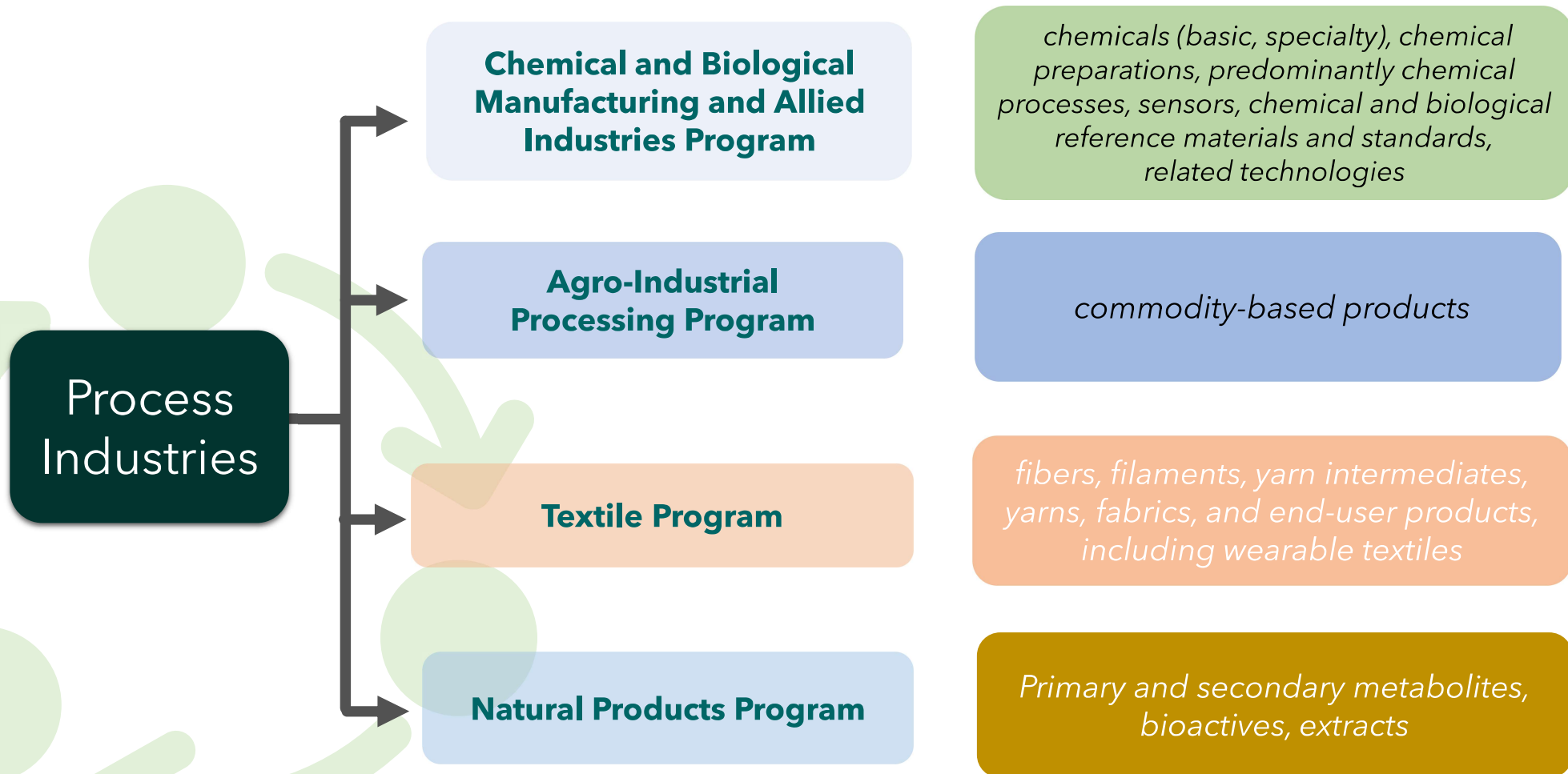




PROCESS SECTOR



The **process industries** are those **industries** where the primary production **processes** are either continuous, or occur on a batch of materials that is indistinguishable

PROCESS SECTOR: Agro-Industrial Processing Program (*Cacao & Sugarcane*)

Vision

A competitive industry (cacao and sugarcane) equipped with relevant technologies and innovative products

Overall Strategies:

Human Resource

- Training for sensory analysis for cacao and cocoa products
- Training on technical services for product development and refining technologies

R&D Technologies

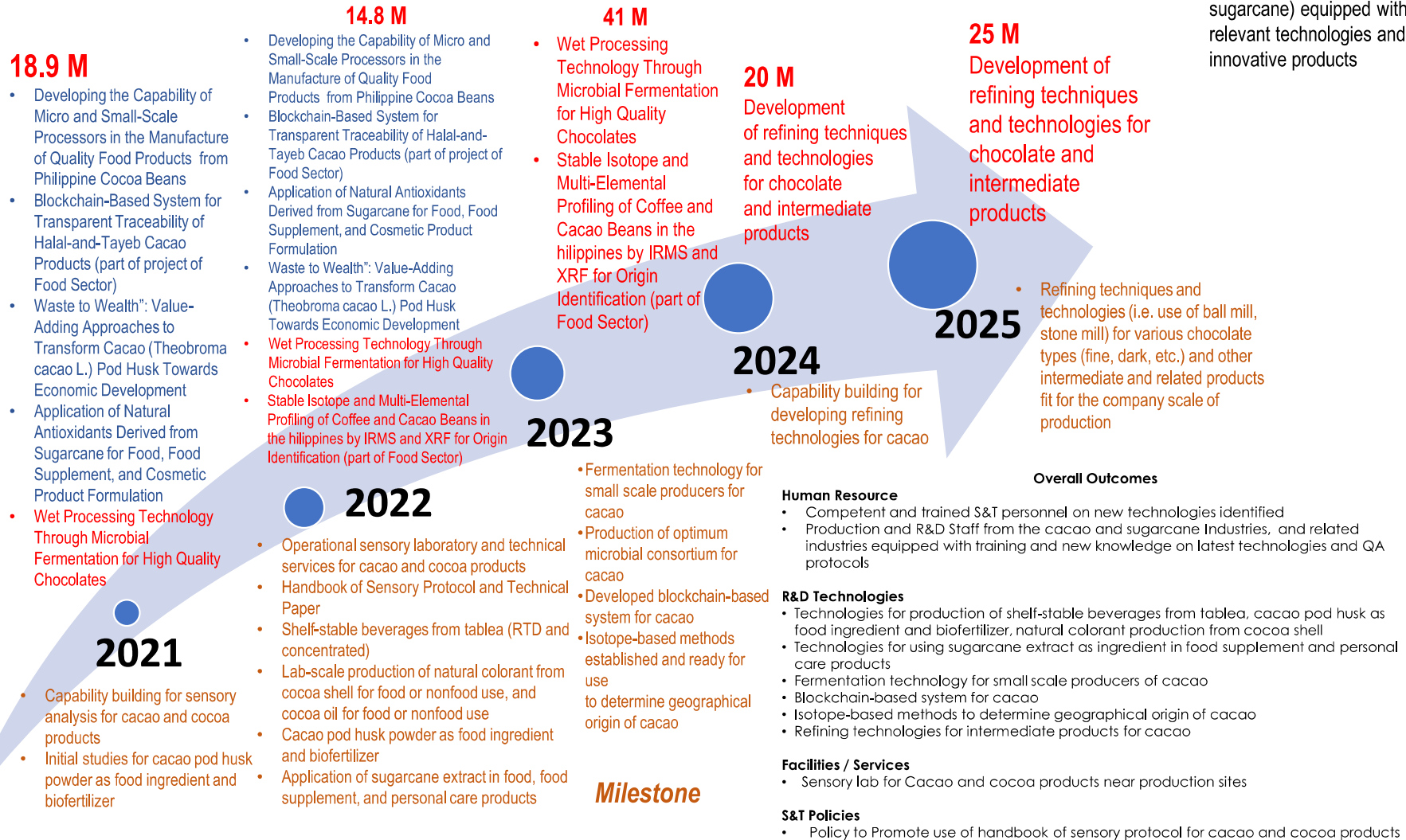
- Development of cost-effective technologies for shelf-stable beverages from tablea, cacao pod husk as food ingredient and biofertilizer, natural colorant from cocoa shell
- Technologies for use of sugarcane extract in as ingredient in food supplement and personal care products
- Development of fermentation technology for small scale producers of cacao
- Development of blockchain-based system for cacao
- Design of isotope-based methods to determine geographical origin of cacao
- Enhancement/improvement of refining technologies for intermediate products for cacao

Facilities/Services

- Establishment of Sensory lab for Cacao and cocoa products

S&T Policies

- Policy Recommendation to promote use of handbook of sensory protocol for cacao and cocoa products



PROCESS SECTOR: Agro-Industrial Processing Program (*Cacao & Sugarcane*)

Overall Strategies:

Human Resource

- Training for extraction, refinement of compounds such as pectins, fibers, and other valuable compounds from cacao pod husks and other parts of the fruit and tree.

R&D Technologies

- Development of cost-effective technologies for pectin and fiber extraction and processing
- Technologies for personal care products development using valuable compounds from wastes of cacao

S&T Policies

- Policy Recommendation as input to standards development of compounds such as pectin, fibers, etc.

35 M

- Extraction and processing of Pectin from Cacao Pod Husk
- Development of Cacao Pod Husk Leather
- Development of Personal Care Products from Waste Products of Cacao

2026

- Capability building for extraction processes and techniques

30 M

- Extraction and processing of Pectin from Cacao Pod Husk
- Development of Cacao Pod Husk Leather
- Development of Personal Care Products from Waste Products of Cacao

2027

- Preliminary processing for pectin, fibers and other valuable compounds
- Initial formulation of personal care products and conduct of preliminary tests

Milestone

35 M

- Extraction and processing of Pectin from Cacao Pod Husk
- Development of Cacao Pod Husk Leather
- Development of Personal Care Products from Waste Products of Cacao

2028

- Verified process for extraction and/or purification of pectin, fibers and other valuable compounds
- Personal care products tested

Overall Outcomes

Human Resource

- Competent and trained S&T personnel on new technologies identified
- Production and R&D Staff from the cacao industries, and related industries equipped with training and new knowledge on latest technologies and QA protocols

R&D Technologies

- Technologies for valuable compounds such as pectin, fiber extraction, refinement and processing
- Technologies for development of personal care products using valuable compounds from wastes of cacao

S&T Policies

- Policy Recommendation as input to standards development of compounds such as pectin, fiber, etc.

Vision

A competitive industry (cacao and sugarcane) equipped with relevant technologies and innovative products

PROCESS SECTOR: Natural Products Program

Overall Strategies:

Human Resource

- Training for technologies on extraction, grading, purification, stabilization and application studies for naturally derived products such as colorants, oils, ingredients, etc.

R&D Technologies

- Development and improvement of eco-friendly and cost-effective technologies for extraction, production and stabilization of naturally derived products such as colorants, oils, ingredients, etc.
- Application studies for naturally derived products
- Development of standardized protocol in the collection, processing and evaluation of dyestuff and dyed products.

Facilities/Services

- Establishment of R&D Lab for plant oils' extraction and characterization in the regions

S&T Policies

- Policy Recommendation to promote use of naturally derived products

55.4M

- Colorimetric and Performance Standardization of NatDyes Produced in Various NatDyes Hubs in the Philippines
- Scale-up Production, Stability and Other Applications of Natural Colorants for Cosmetics
- Valorization of Agri-food Waste: Ultrasound-assisted Extraction of Oil and Polyphenols from Green Cherry Rejects of Cordillera Grown Arabica Coffee
- Technology Intervention to Provide an Alternative Market for Sampaguita (Jasminum sambac) as Raw Material for Jasmine Oil Production
- Green Oil and Phytochemicals from Cashew

2021

- Upscale production of natural dyes
- Lab-scale production of jasmine oil
- Lab-scale production of oils from cashew nut and nut shell

47.1M

- Colorimetric and Performance Standardization of NatDyes Produced in Various NatDyes Hubs in the Philippines
- Scale-up Production, Stability and Other Applications of Natural Colorants for Cosmetics
- Valorization of Agri-food Waste: Ultrasound-assisted Extraction of Oil and Polyphenols from Green Cherry Rejects of Cordillera Grown Arabica Coffee
- Technology Intervention to Provide an Alternative Market for Sampaguita (Jasminum sambac) as Raw Material for Jasmine Oil Production
- Green Oil and Phytochemicals from Cashew
- Comparative GC-MS Profiling of wild and propagated seed-bearing plants and essential oil products
- Physico-chemical Characterization and Product Development from Essential Oils of Mindanao Ferns and Seed-bearing Plants

2022

- Grading and Evaluation/Certification protocol for indigo
- Nat Dyes powder testing protocol
- Characterized lab-scale extracted coffee cherry extracts
- Lab-scale production of components and application studies using oils and components for food, cosmetic and personal care products

85M

- Colorimetric and Performance Standardization of NatDyes Produced in Various NatDyes Hubs in the Philippines
- Comparison of Ultrasound and Conventional Extraction Methods on the Yield of Anthocyanin Pigments from Roselle and Cooked Ubi Peels
- Extraction, Characterization, and Standardization of Rubber Seed Oil for Application and Formulation in Cosmetics
- Comparative GC-MS Profiling of wild and propagated seed-bearing plants and essential oil products
- Physico-chemical Characterization and Product Development from Essential Oils of Mindanao Ferns and Seed-bearing Plants
- Green Oil and Phytochemicals from Cashew
- Development of Natural Dyes from Novel sources

2023

- Application studies using natural dyes for personal care and cosmetics
- Technology for oil extraction from cashew nut, shell and purification of components
- Technology for extraction of rubber seed oil
- Technology for extraction of Mindanao plant oils
- Conventional technology for extraction of natural dyes for food applications

70M

- Comparison of Ultrasound and Conventional Extraction Methods on the Yield of Anthocyanin Pigments from Roselle and Cooked Ubi Peels
- Extraction, Characterization, and Standardization of Rubber Seed Oil for Application and Formulation in Cosmetics
- Comparative GC-MS Profiling of wild and propagated seed-bearing plants and essential oil products
- Development of Natural Dyes from Novel source
- Valorization of Various Wastes for extraction of natural compounds for various industry applications

2024

- Application studies using rubberseed oil and mindanao plant oils for cosmetics
- Ultrasound technology for extraction of natural dyes for food applications
- Preliminary process for extraction of natural dyes from novel sources and natural compounds from wastes

2025

40M

- Comparison of Ultrasound and Conventional Extraction Methods on the Yield of Anthocyanin Pigments from Roselle and Cooked Ubi Peels
- Development of Natural Dyes from Novel sources
- Valorization of Various Wastes for extraction of natural compounds for various industry applications

Overall Outcomes

Human Resource

- Competent and trained S&T personnel on new technologies identified
- Production and R&D staff equipped from the Natural Products Industry and related industries (Cosmetics, Food, Personal Care) equipped with training and new knowledge on latest technologies

R&D Technologies

- Technologies for extraction, production, grading and stabilization of naturally derived products such as colorants, oils, ingredients, etc.
- Technologies for use of naturally derived products in various applications

Facilities / Services

- R&D Center for plant oils' extraction and characterization in the regions near sources

S&T Policies

- Policy Recommendation to promote use of naturally derived products such as the standardized protocol in the collection, processing and evaluation of dyestuff and dyed products.

Vision

A competitive industry equipped with relevant technologies and innovative products

- Advanced extraction techniques or methods for extraction of natural dyes for food applications
- Technology for natural dyes extraction from novel sources
- Technology for natural compounds extraction from wastes

PROCESS SECTOR: Natural Products Program

Overall Strategies:

Human Resource

- Training for technologies on extraction, grading, purification, stabilization and application studies for naturally derived products such as colorants, oils, ingredients, etc.

R&D Technologies

- Development and improvement of eco-friendly and cost-effective technologies for extraction, production and stabilization of naturally derived products such as colorants, oils, ingredients, etc.
- Application studies for naturally derived products
- Development of standardized protocol in the collection, processing and evaluation of dyestuff and dyed products.

Facilities/Services

- Establishment of Testing services for active components and other testing needs of personal care, cosmetics and pharmaceutical industries

S&T Policies

- Policy Recommendation to promote use of naturally derived products

165M

- Development of Natural Dyes from Novel sources
- Extraction, Characterization of Natural hydrocolloids for food applications
- Extraction, Characterization of Natural hydrocolloids for personal care applications
- Extraction, Characterization of Natural polymers for modified drug release in vivo for personal care applications
- Extraction, Characterization of Natural polymers for modified drug release in vivo for pharmaceutical applications
- Valorization of Various Wastes for extraction of natural compounds for various industry applications
- Establishment of Testing Services for Active components in Personal Care and Pharmaceutical products

2026

135M

- Extraction, Characterization, and Standardization of Natural Dyes for Pharmaceutical applications
- Extraction, Characterization of Natural hydrocolloids for food applications
- Extraction, Characterization of Natural hydrocolloids for personal care applications
- Extraction, Characterization of Natural polymers for modified drug release in vivo for personal care applications
- Extraction, Characterization of Natural polymers for modified drug release in vivo for pharmaceutical applications
- Extraction, Characterization of Natural polymers as binders, bulking agents and disintegrants for tablets
- Establishment of Testing Services for Active components in Personal Care and Pharmaceutical products

2027

- Technology for natural dyes production from novel sources
- Capability building for testing active components
- Capability building for extraction and downstream processing of hydrocolloids, natural polymers for modified drug release and natural compounds

- Lab-scale production of hydrocolloids, natural polymers for modified drug release and natural compounds
- Preliminary extraction process for natural dyes, binders, bulking agents and disintegrants for pharmaceutical applications
- Preliminary service provision for 1st set of tests for active components

115M

- Extraction, Characterization, and Standardization of Natural Dyes for Pharmaceutical applications
- Extraction, Characterization of Natural hydrocolloids for food applications
- Extraction, Characterization of Natural hydrocolloids for personal care applications
- Extraction, Characterization of Natural polymers for modified drug release in vivo for personal care applications
- Extraction, Characterization of Natural polymers for modified drug release in vivo for pharmaceutical applications
- Extraction, Characterization of Natural polymers as binders, bulking agents and disintegrants for tablets
- Establishment of Testing Services for Active components in Personal Care and Pharmaceutical products
- Upgrading of Testing Services to support Personal Care and Cosmetics Industry

2028

- Technology for production and application of hydrocolloids, natural polymers for modified drug release
- Service provision for 2nd set of tests for active components
- Capability building for new testing services for personal care and cosmetics industry
- Lab-scale production and safety tests conducted for binders

Overall Outcomes

Human Resource

- Competent and trained S&T personnel on new technologies identified
- Production and R&D staff equipped from the Natural Products Industry and related industries (Cosmetics, Food, Personal Care) equipped with training and new knowledge on latest technologies

R&D Technologies

- Technologies for extraction, production, grading and stabilization of naturally derived products such as dyes, colorants, oils, hydrocolloids, bulking agents, binders, disintegrants, and other ingredients
- Technologies for use of naturally derived products in various applications

Facilities / Services

- Testing services for active components and other testing needs of personal care, cosmetics and pharmaceutical industries

S&T Policies

- Policy Recommendation to promote use of naturally derived products

Vision

A competitive industry equipped with relevant technologies and innovative products