



FOOD SYSTEMS SOLUTIONS

FSM R&D Division of Trade

Funded by the United States Department of Commerce

Economic Development Administration



Developing a Food Innovation System for Pohnpei State: *Local Food Processing for Increased Health* *Economic Growth and Job Creation*

Pohnpei State Food Systems Solutions Framework

Table of Contents

Governor's Foreword	i
Research Partnerships and Collaboration Acknowledgments	ii
Executive Summary: Food Systems Solutions for Pohnpei State	1
Project Overview: Food Systems Solutions	4
Food Systems Solutions Data Collection Methods and Results	14
Part I: Pohnpei State Evidence Based Multi-Stakeholder Goals for Local Food Production and Processing	15
Part II: Developing a Food Systems Mobile App for Pohnpei	37
Part III: Pohnpei Food Processing Implementation Framework	43
Part IV: Management and Organizational Structure for Food Innovation Center and Food Innovation Facilities	72
Part V: Proposed Budget for Tiered Food Innovation Facilities and FDA Compliant Food Innovation Center	87
References and Works Cited	133



FOREWORD

For Pohnpei State, food security, sustainable economic growth and increased livelihoods are among our top priorities. This Pohnpei State Food Systems Solutions Framework is a road map, built from the voices of our people and the hard data gathered by our partners and local enumerators, designed to help us meet these critical objectives. The result of careful, community-based research and two-days of stakeholder convenings, this detailed framework was prepared to facilitate the implementation of our 2025 Pohnpei State Food Security Policy and Food Production Master Plan.

Today our state faces a clear challenge. Too many families spend a significant portion of their income on imported, processed foods. We have become reliant on food grown and processed overseas that is then transported thousands of miles to us by cargo ship. This food is the result of food production and processing work that should be done in Pohnpei to support local jobs and build our own resilient food system.

We also see a clear opportunity. Pohnpei is rich in staple crops and marine foods that can be transformed into nutritious, convenient, and marketable products. Surveys with our people show a strong demand for locally processed foods such as taro, breadfruit and coconut flour, banana chips, coconut oil, coconut milk, salted and dried fish, and more. Producers and consumers are expressing their preference for local foods and our restaurants and markets share the public demand for local products that support Pohnpeian livelihoods, health and culture.

This framework charts a practical path forward. It proposes a tiered network of village, community, and state level food processing facilities that will add value, extend shelf life, and create market linkages. It sets out training priorities including poultry and animal feed production, food preservation and product marketing, along with the information systems we need to coordinate supply and demand across our state.

Leadership matters. As Governor I support increased public procurement of local foods for use at government functions and schools and hospitals to develop a reliable market for our farmers. We will pursue sensible incentives such as tax waivers for essential food production equipment and agriculture inputs. Our goal is to develop new, resilient markets for local produce, while strengthening food processing and preservation techniques, and building climate-resilient value chains. Together we will create income and productivity opportunities for farmers and entrepreneurs through the growth of the local food system while increasing our health and nutrition.

I thank our people, the Conservation Society of Pohnpei, Island Food Community, the FSM Department of Resources and Development, the Rutgers University Food System Science team, our municipal leaders, and the many women and men who contributed their time and knowledge to this process. Let us move forward with urgency, with respect for our traditions, and with pride in what Pohnpei can produce.

Honorable Stevenson Joseph
Governor, Pohnpei State, Federated States of Micronesia
September, 2025

A handwritten signature in black ink, appearing to read "Stevenson Joseph", is written over the printed name and title of the Governor.

Acknowledgements:

This Food Systems Solutions Framework is funded by the United States Department of Commerce Economic Development Administration (EDA) to the national government of the Federated States of Micronesia by way of:
“Food Systems Solutions: Strengthening Food Security in the Federated States of Micronesia: An Innovative Approach to Enhancing Information Systems, Establishing an FSM Food Innovation Center and Supporting Local Capacity Building” (Grant # ED22SEA3070014).

This report includes the results of the 10 stakeholder specific surveys and extensive in-state food system development meetings and convenings used to capture the voices of the widest range of community members and ensure that this framework was co-designed and developed with each FSM state. Particular attention was given to ensure voices of those from the outer islands were included in their respective state discussions.

Key Food Systems Solutions Project Leadership and Research Collaborators:

Federated States of Micronesia (FSM), Department of Resources and Development
Honorable Secretary Elina Akinaga and Assistant Secretary Menoleen Jacob-Oswalt

FSM Department of Resources and Development, Division of Trade:
Assistant Secretary FJ Yatilman, Stanley Raffilman, Keenen Weirlangt, Danielle Worswick

Rutgers School of Environmental and Biological Sciences and Collaborating Science Partners
Dr. James E. Simon, Dr. Ramu Govindasamy, Dena K. Seidel, Dr. Yariv Ben-Naim, Dr. Michael Balick
Tori Rosen, Dr. Surendran Arumugam, Erin Quinn, Dr. Arend-Jan (A.J.) Both, Guazabara Rivera,
Roland Hagan, Dr. David Bushek, Dr. Nissim Ozer, Lauren Koo, Tony Tan, Iris Arbogast

FSM In-State Partnering NGOs, Organizations and Enumerators involved in Data Collection:

Yap Catholic High School (YCHS)

Michael Wiencek, Mark Hartman, Constantine Yowbalaw, Mercedes Tiningmow
Stephenia E.T. Gilsowuth, Barbara Gorfich, Janice R. Tamangided

Chuuk Women’s Council (CWC)

Mary Rose Nakayama, Gracelyn Mary Poll Serious, Sally Poll, Petricia Tesime,
Christine Grace Robert, Nely Mori, Fredrick Andrew, Dehelalynn Robert, Saram Salle

Chuuk State Departments of Agriculture

Charlie Tommy and Harmen Mailo

Conservation Society of Pohnpei (CSP)

Diosticka Hairens, Rickyes Ikins, Engly Ioanis, Drake Lawrence, AJ Lorens, Francisca S. Obispo,
Jay Lise Orlando, Jeffrey Peniknos, Jasmine Remoket, Rosendo Roland, Semes Silbanuz,
Jerry Route, Michaela Saimon, Gyron Samuel, Kanio Torres, Shawn Walter, Bryan Wichep

Kosrae Conservation and Safety Organization (KCSO)

Faith Esahu, Nicholas Abraham, Andy George, Robert Richard George, Rollinson Jackson, Senolyn
Joe, Mixon Jonas, Stacey Kilafwasru, Maiyalisa N. Mike, Sepe A. Obet, Moro Lenton Palik,
Sylvia Salik, Masayuki Skilling, Trenton Skilling, Reed Tilfas

We acknowledge and extend our appreciation to members of the National Food Systems Taskforce with whom we meet over the course of the project's implementation for their input and appreciated the strategic counsel and advice provided. Taskforce members included Menoleen Jacob (Assistant Secretary of Agriculture, FSM R&D), Mark Kostka (Director of Pohnpei State R&D), Lomalita Jibemai (SDG Coordinator, FSM R&D), X. Ner Luther (NCD Chief, FSM Department of Health), Selma Primo (NCD Coordinator, FSM Department of Health), John P. Wichep, Lucille Apis-Overhoff, and Delihda Waltu (Accreditation Specialist, FSM Department of Education).

From the national government, we also thank Secretary Andrew Yatilman, DECEM; Assistant Secretary Camille Inatio, Assistant Secretary Brihmer Johnson, Assistant Secretary Bermance Aldis, FSM R&D and Augustine Kohler (FSM Office of National Archives, Culture, & Historic Preservations – Director) for his fruitful insights and counsel. Special thanks is extended to FSM National Senator Perpetua Konman for her championing improving health and nutrition with local nutrient-rich foods. We thank Darlynn H. Leben, Anthony Jude, Stephen Yarofalig, and Faustino Yarofausug of FSM R&D: Division of Energy.

Additional thanks to collaborating community members for facilitating stakeholder meetings and convenings and providing key FSM food system development data to support this project in each state:

In Yap

We thank and deeply appreciate the support and leadership of Yap including the Honorable State Governor Charles Chieng and Lt. Governor Francis Itimai, Chief of Agriculture Tamdad Sulog and Director of R&D Bernard Gorong and Assistant Director Alex Yowblaw. We recognize and thank the Council of Tamol including Mathew Yarofalmal, Ifelmel, Ignatius M., Mike Hasurmai, Jesse X. Haglelfeg, Andy Tatileichig, Paul Marlul, Walter M. Pairiu, Santiago Palemai and Faustino Yangmog. We recognize and thank the Council of Pilung including Bernard Yoruw, Cyril Yinnifel, James Limar and Abbigail Tun. We thank Jessica Fas and Margaret Lefagochog; and give thanks to Yap State Legislature and Speaker Nicholas Figirlaarwon and Yap Senators Yap Senators Victor Bamog, John Mafel, Ted Rutun and Gabriel Ramoloilug, Anne-Marie Laamar, Terrence R. Fong, John Masiosen, Liyon Sulos, Jesse Raglmar-Susolmar with whom we met at project initiation for their counsel and guidance and then again during the course of the research as results were generated to share with them. We also thank the Yap Fishing Authority, FSM Telecom-Yap State, Lubuw Falanruw; Yap iBoom!, Jeff Figir, Maria Laaw, YAP FSM Development Bank and the Yap utilities with whom we met. We thank the Yap FSMTC Peter Gilinug, Genevieve Gilmar, Cyril Rebeuluch, Chris Chingyan, Carmen Gipthey, James F. Chon.

We thank Serphin Ilesiyalo, and members of the Yap State Office of Agriculture including Tamdad Seilog, Val Othaitil, Margie Falanrow and Francis Ruegorog. We thank the faculty and leadership at COM-CRE Yap including Dr. Murukesan Krishnapillai and Paige Zamora, Jacqueline Loomrang, Viviancella Ken, Jeffrey Falag, Perkins G. Waayan. James Limar of Yap Small Business and Development Center (SBDC); and Vitt Faneg, Amanda G. Wichilfil from Yap Statistics Officer,

We recognize the assistance and participation of the Yap Neighboring Islands Women's Association and members Anna Itimai, Melliana L. and Arlene Falurag.

We recognize the participation of the Satawal Community who participated in this project including Alex Raimon, Richard Ligi, Leo Racheilug, Gabriel Ramololug, Scheao Seutoud, Nancy, Harry Rapsilug, Florence Sermangrung, Cleotilda Lafchireng, Lorita Lewoailup, Liza Epulolmar, Marlina Lairlug, Doris Laeiurmaeng, Toiza Hernis, Xyrene Noamurhonig, Terilyn Lesalugmarg, Christen Raus, Jackline Latiwelman, Domeita Lamorengman, Xavier Lamorengman.

We recognize the participation of the Ablul Community who participated in this project including Mark Yelingmai, Ali Haleyelur, Mark Pekalmul, Sadsina Ileshibeyang, Roselyn Talimemai, Vennisiana Itemalyang, Cathy Laumwoai, Hubertha Ilerigibe, Grace Lafeireyal, Gaty Lafeireyal, Augustina Legasugfil, Angela Layarofsiug, Liandra Yecheluw, Jayeah Yechelpiy, Lanisha L. Ileragyango, Rosina L., Konita Jegay, Juan Yasmai, Chaman Fagolig, Maysin Pujeluw and Hilary Yalomong.

We recognize the following individuals for their participation in the discussions and more: Marialyn Tiningmaw, Mercedes Timingmow, Mercy Iebian of iBoom, Dr Marjorie Falanrow, Jim Ruetamngig, Justina Guchol, Jesse Ruenigol, Serphin Ilesiyualo, Justin Yechelpiy, Sam Ilesugam, Xavier Lamorengman, Florencio Ligmai, Philip Raffilpiy, Sabino Sauchomal, Justin Gaon, Alexander Yoblaw, Marvin Yud, Jaylene L. Ruemgol, Janice Tamangided, Gina Rae F. Tun, James C. Untaman, Carnelita Lenaimg.

In Chuuk

We thank and deeply appreciate the support and leadership of Chuuk, including Chuuk State Governor the Honorable Alexander Narruhn and Lt. Governor Honorable Mekeioshy William, Mr. Roger Arnold, Chuuk State's Chief Economist, Director Tos Nakayama, Senator Perpetua S. Konman, Myjolyne Kim (Chuuk State Governor's Office: Chief of Staff); Renados K. Kiyoshi (Chief of Planning, Department of Administrative Services - DAS), Mr. Enjoy Rain, Division Chief Chuuk State Dept. of Marine Resources; Kirisos Victus (Director of the Chuuk State Department of Marine Resources), Mondale Tim (Director of Chuuk State Department of Agriculture) Charlie Tommy of Chuuk State Department of Agriculture, Harmen Mailo (Department of Agriculture Coordinator), Deanna Aizawa (Chief of Planning, Department of Education), Ana Akira (Mayor of Parem and Public Relations Officer at the Governor's Office), Christopher Eustaquio, Chuuk Governor's Office, Peter L. Aten (Division Chief, Chuuk State Division of Commerce & Industry); Mackleen Shomour, Chuuk State Statistics Office, JJ Fritz, Chuuk FSMMTC, and Ketsen Haregaichig and Cassandra K. Dereas, Chuuk Small Business Development Center (SBDC).

We give recognition and thanks to members of the Chuuk State legislature including Atanasio Hetiback (Acting President of the Senate/Floor Leader), Sekap Esah (Chairman of R&D at the Senate), Trifonovitch Jay Sound (Member of the R&D Senate Committee), Timothy Ruda (Vice Chairman of the R&D House of Representatives Committee), Narciso Sebastian (Member of the R&D House of Representatives Committee), Arthur Irons II, Chirisha Kofot and Tiara Williander (Legal Aid). We thank those from the Chuuk College of Micronesia who contributed to the discussions and concepts particularly about the Food Innovation Center and Facilities and training needs. This included Calvin Assito (Director of CRE), Genevy Samuel (IC/Acting Dean) and Hattie Raisom (Field Agent, Health and Nutrition) and

Curtis Graham, COM-Land Grant Extension Agent. We thank the members of the Chuuk Chamber of Commerce Cindy S. Mori, William Stinnett, H-Ann Ruben, Jovian J. Rousan and Minoru Mori (Vice President, Chuuk Telecom) and Joyce Sewell, Chuuk EPA. We also recognize and thank the municipal councils and the Council of Mayors and meetings with the Chuuk Department of Transportation and Communication (Division of Public Works) and the Chuuk Public Utility Corporation (CPUC) and the Chuuk Department of Planning (infrastructure) with Renados Kiyoshi, Wilfred Soumwei and Aser Nifon.

We recognize the following individuals for their participation in the discussions and more: Roger Mori, A.S. Ichin, Sanaila Kurabui, Salfator Elis, Edita Robert, Froella Francis, Merie Polle, H-Ann Ruben, Sidney Mori, Bendon Nema, Ana Akira, Marcus Dipwek, Barbara Nachuo, Maria Andono, Makpima Tisa, Lurelta Maipi, Sally Poll, TR Reuney, Werson Winco, Hiroyuki Mori, Dominic Always, Valentine Martin, Judy Robert, Wilfred Soumwei, Turcy Stephen, Sophie Esah, Curtis Graham, Brigid Oconna, Erlip Mose, Joyce Sewell, Rentia Francis, Konrat Joseph, Norfy Sapore, Shana Lee Ling, Chris Eustaquio, Branlomera Enlet, Marcus Depick, Nowell Petrus, Erefin Siren, Sanfator Elias, Atriko Hewin, Richiosi Rudolph, Filmur T. Kisam, Akostin Taro, Weson Tinoty, Brigid Ocanno, Cruz Paulus, Mana Atonio, Curtis Graham, Mana Atonio, Sifumy Sino, Cruz Paulus, Fabro Andrew and Faustina Francis (President of the UFO Association), Turcy Stephen (Northwest Association), Batsipa Sarafin (Weno), Bantomera Enlet (Oneisom).

Field visits to Parem and Fefan were graciously arranged by the Chuuk Women's Council and the Department of Agriculture with assistance by Mayor of Parem, Ana Akira and those that came to conduct assessments included Mary Rose Nakayama (Chuuk Women's Council), Harmen Mailo (Department of Agriculture Coordinator), Charlie Tommy (FSM R&D based in Chuuk, Coordinator at Department of Agriculture), Clarice Graham (Chuuk Conservation Society Marine Program Coordinator), Utamina K. Dereas (President of the Parem Association), and Parem Association Members Andenina Samuel, Lynda Dereas, Srenty Antonio and Luciano Dereas as well as Keenen Weirlangt (FSM) and Jim Simon, Dena Seidel, Ramu Govindasamy, and Yariv Ben Naim. We thank Faustina Francis (President of the UFO Association), Fabro Andrew (UFO Conservation Society), Andonia Andrew, Tomasa Sepety, Elias Taro, Avoid Andrew, Dorcy Andrew, Dory Andrew, Adrella Andrew, Donia Andrew, Dj Welle, Berenanto Reim, Sinferio Angken, Billy Angken, Misante Xymoon, Reyes Antonio, Henry Francis, Penes Dereas, Keth Francis, Norsiana Welle Akira, Chimres Teresio, Amu Akira, Hakku Akira for hosting our site visit to see local production of coconut oil and their farms. We also thank Hattie Raisom COM Chuuk (Training) and Faustina Francis Chuuk (Food Producer) for sharing their expertise and foresight relative to Chuuk through additional recorded interviews for primary data collection and use in this project.

In Pohnpei

We thank and deeply appreciate the support and leadership of Pohnpei, including the Pohnpei State Governor Honorable Stevenson Joseph and the late Lt. Governor Hon. Francisco Ioanis. We are indebted to Mark Kostka, Pohnpei State Director of R&D, and thank Pohnpei State Communications and Information Officer Patrick Pedrus.

We give recognition and thanks to members of the Pohnpei State legislature including Pohnpei State Senator and Chair of the Pohnpei R&D Bill E. Edward, Vice-Chair Senator Cassidy Shoniber, Senator

Francisco Simram, Senator Tendy Liwy, Senator Benjamin Ludwig. We thank and recognize the contributions of Speaker Marvin Yamaguchi, Hudson Abraham, Eugene Joseph, Eugene Eperiam, Don David, Smiter Edgar, Mary Immanuel, Francisco Simram, and Rusen Eliou. We give thanks to Danson David, Patrick Pedrus, and the Governor's Cabinet members including Microenterprise incubators and public policy survey including Peteriko Hairens, Mark Kostka, Jorg Anson, Bellarmine Ioanis, Thomas P., Samuel Anson Jr., Stanley S. Etse, Welsin Helgenberger, William Ioanis, Samuel D. Orejudos, Nixon Anson, Belsipa Mikel Isom, Henry Saimon Jr., Fransisco Celestine, Alpino Kerman, Shirley Ligoehr, and Grilly Jack. We recognize and thank Genautry Samuel, Ricky Windy, Michsane Tilipen, Zelnick Moses, Stanley Ernest, Joshua Gabriel, Marfin Route, Joe Ehram, Krecy Nayor, Raylor Sehpin, Eugene Joseph, and Tommy Lucios of the local Municipal Pohnpei Governments and Mayors Smithy Clark and Lenard Leopold.

We also acknowledge and thank former Governor Reed Oliver for his insights on trade and local processing opportunities with local foods. From the public:private sector special thanks to Fredy Perman, Pamela Joseph, Kenneth Kephass, Gloria Yamada, and Minoru Mori of FSM Telecom; The Pohnpei Chamber of Commerce Rich Adams, Chris Alfonso, Yvonne Hawkins, Carolyn Peter Keller, and discussions with Eugene Joseph, Michaela Saimon; Peterson Anson of Vital Energy and Coconut Oil Processing; the Pohnpei Export Committee, Peterson Sam, Tommy Lucios, Aspen Apis, Maverick Mikel, Evel Pelep, Vandela Warren, JR Gallen, Marina Ioanis, and Marvin Termado and Samuel Orejudos of Pohnpei State T&I and Dickson Wichep of FSM Department of TC&I.

We thank faculty at the College of Micronesia and COM-Pohnpei Phyllis Silbanuz, Campus Dean, Mr. Engly Ioanis, Timothy Mamangon, Trisdey Elias, Ben Voltain and Joyce Roby. We worked closely with and thank the Pohnpei Women's Council, Pohnpei Fisheries Clay Hudson, the Island Food Community (Emihner Johnson) and thank Phyllis Silbanuz, Engly Ionis, Ivenglynn Andon, Angie Peter, and Tommy Lucios of the Pohnpei Farmers Cooperative Association and appreciated the long discussions with Dr Manoj Nair, Engly Ioanis, Saimon Mix.

We recognize and greatly appreciate discussions with Gienah Narruhn, Tommy Lucios and Mercedes Tiningmow working with the Micronesian Conservation Trust in the GCF work in concert with national FSM.

We recognize the following individuals for their participation in discussions and/or convenings: Tenny Leopold, Lenard Leopold, Smithy Clark, Zelnick Moses, James Dim, Regina Moyn, Joe Ehram, Eric Defan, Drinnette James, Tromainne Joab, Molly Ryan, Silverina Pretrick, Victor Pinga, Vara B, Pamela Joseph, Stezia Aldis, Denson David, Peterson Anson, Kiomy Albert, Rich Adams, John Weber, Tiffany Ngo, Lauren Dunch, Nat Tuivardy, Syed Shah, Valentine Martin, Stanley Ernest, Justin Route, Garvey Spencer, Trisden Elias, Martin Route, Detrickson A., Nanako Koe, Don David, Neilynn Walter, Francisca Obispo, Romeo Joel, Benter Sehpin, Semenson Ehpel, Engly Ioanis, Jeffrey Peniknus, Yuhki Susaia, Mason Albert, Kinsiro Boaz, Kordy Carl, Michaela Saimon, Brihmer Johnson, Tendy Liwy, Tamaa G. Alefaio, Sal Salvador, Gienah Narruhn, Juity Hainrich, Riehard Abraham, Eugene Joseph, Dr. Helentina Gustang, Emerson Eperiam, Ricky Muduy, Wendolin, AJ, Michsane Tiapen, Rickyes Ikin, Emihner, Jorg Anson, Bermance Aldis, Pam Joseph, Gibson S., Angie Peter, R.S., Douglas Kusto, Walby Hadley, Kyle Helgenberger.

We also thank the following individuals for sharing their expertise and foresight relative to aspects of the

FSS project through additional recorded interviews for primary data relative to Pohnpei: Engly Ioanis (Food Innovation Center); Reed Oliver (Commercial Store Owner) Fredy Perman (Activity 1, Information).

In Kosrae

We thank and deeply appreciate the support and leadership of Kosrae, including the Kosrae State Honorable Governor Tulensa Palik and Lt. Governor Arthy Nena. We also thank Bob Skilling, Arston Tally, Moses Thomsin, Yamado Melands, Ruth Jonah, Semeon Phillip, Paul Tosie, Andy Greg, Kenya Luey, Kiara Esahu, Kenya K. Mike, Lynde Jackson, Shra F. Skilling, Keslyn Joshua, Reneye R. Mike, Yoshiro A., Yuna M. Jonas, Reusley Thomsow, and Alik S. Isaac of the Kosrae State Legislature for welcoming us to present the project's objectives and then working with us to assist in the project implementation. We thank Jessica Isaac and Jacob John of Kosrae Telecom, Casey Freddy, Hairon Livaie, Renton Isaac, and Fred Skilling of Kosrae Utility Authority, Catherine Alfons, Shrew Jonas, Smith Sigrah, and Maria Fanow of the Kosrae Chamber of Commerce, and the Kosrae staff that provides logistical support for commercial import/exports at the airport and by ocean freight shipping.

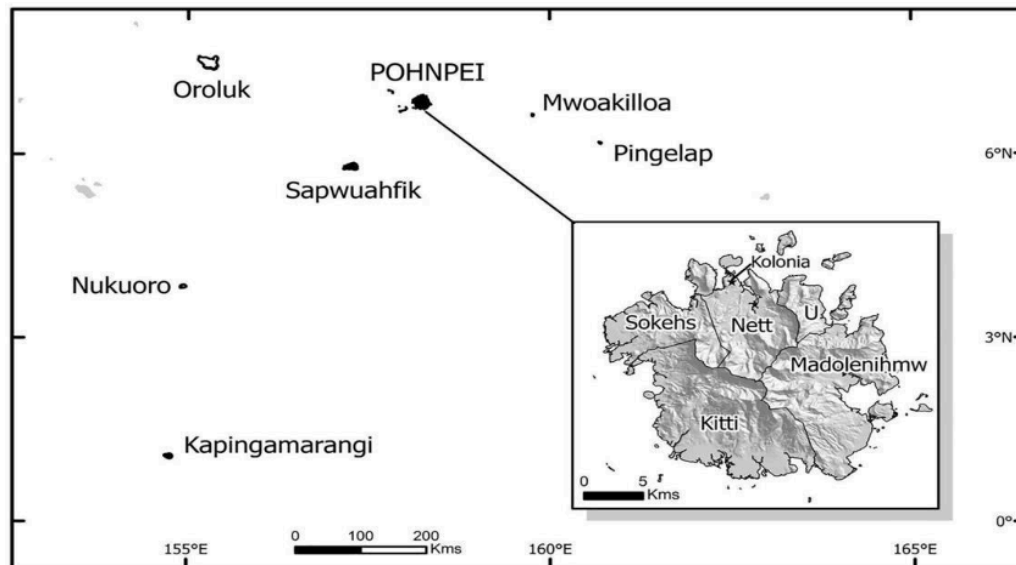
We thank Maver Jonathan, Yosiro Anton, Lani John, and Nixon Jonas of the Kosrae State Statistics Office, Reed Tilfes, Kenye S. Timothy, Gennevieve Masao, Bruno Ned, Ken Tulensa, Suesin George, Jeffrey Nelson, and Skiller Jackson of the Kosrae Department of Resource and Economic Affairs (DREA) and Director Rolner Joe, DREA.

We thank the Kosrae Farmers' Organization, the Kosrae Women's Association, the Gargey Women's Group and Weloy Cooperative Farmers, the fishing associations of Kosrae and the COM-FSM Cooperative Research and Extension Program for their participation. Special thanks is extended to Nora and Robert Sigrah of Lelu Farms for their continued support in local foods production and for allowing us to record interviews with them as primary data. Additionally, we thank Martin and Delphia Selch of the FSM National Aquaculture Center in Kosrae for their extensive interviews.

We recognize the following individuals for their participation in discussions and/or convenings: Espil Tulensru, Juslinda W. Thomas, Morris Geim, Maxmillon M., Keti William, Shrue T. Edwin, Hanlin Leh, Jacob C., Carson Nena, Jason Selo, Bolly Andrew, Jesse Tulensru, Marbe Martin, Palmer Seymour, Tulensa Palik, Faith A. Esahu, Emily O'steen, Emily Nena, Martin Selch, Kyle Helgenberger, Molly Ryan, Lucas Cupps, Shanalin Lee Ling, Fred Taulung, John Alokoa, Trenton Skilling, Austin Tilfas, Skillor Jackson, Mixon Jonas, Maxson Nitmon, Delpha Martin, Likiaksa Elsha, Max, Marke Martin, Morris George, Keuge Espil, Kavin Jonithan, Jack G. Nedlic, Harland Tilfas, Austin E. Tilfas, Betty K. Phillip, Moses Thompson, Yamado Melander, Asha Aoh, Reed Tilfas, Sepe Hadik, Rolner Joe, Ruthsina Jonah, and Emily Stokes. We thank farmers and producers Trenton Skilling, John Alokoa, Andy George, Stacey Kilafwasru, Bolly Andrew, Lee Elesha, Shrae T. Edwin, Keti William, and Yosiro Anton of the Kosrae Nautilus Resort and fishermen Sidney Jesse, Dalson Palsis, Haulin L. Charley, Jim J. Edward, Tonnie S., Zackilyn George, Stacey Kilafwasru, Jester Paulino, Krystle Yam, Sepeh Benjamin, Anrube Salik, Singeo Jackson, Kun I. Jonathan, and Suzie Benjamin of the Kosrae Nautilus Resort.

Executive Summary

Food Systems Solutions Framework for Pohnpei State, Federated States of Micronesia



Map of Pohnpei state including surrounding atolls, courtesy of The New York Botanical Gardens.

Pohnpei State, the largest island in the Federated States of Micronesia (FSM), is renowned for its extraordinary biodiversity and long-standing traditions of agroforestry.

For generations, Pohnpeians have cultivated multi-layered forest gardens of taro, breadfruit, banana, and coconut that protect watersheds, enrich soils, and yield food throughout the year. These agroforestry systems are deeply integrated with cultural practices, from ceremonial offerings to community exchange, and represent one of the most sophisticated examples of sustainable land use in the Pacific. Endemic crops such as the nutrient-rich karat banana highlight the nutritional and cultural value of this biodiversity, while the island's outer atolls, mangroves, upland forests, lagoons, and coral reefs support diverse fisheries, marine harvests, and aquaculture. Together, these land and marine resources form the backbone of a food system that, if strengthened, can enhance food security, drive economic growth, and preserve cultural resilience.

Despite these strengths, Pohnpei remains heavily dependent on imported foods and associated supplies. Infrastructure for processing and storage is limited, outer islands face freshwater scarcity, and farming is often undervalued as a source of income. To address this, the FSM Department of Resources and Development, in partnership with Rutgers University, local stakeholders, and with the support of the United States Economic Development Administration within the Department of Commerce, launched the Food Systems Solutions project, the most comprehensive effort to date to strengthen FSM's food sovereignty. Building upon prior recent studies funded by the Green Climate Fund SAP020 examining FSM family farms impacted by climate change as well as the 2021 FSM Food System Summit, this project engaged farmers, fishers, traditional leaders, entrepreneurs, civil society, and policymakers by way of surveys, focus groups, community convenings, and workshops to design a food processing framework

rooted in community priorities. This **Food Systems Solutions Framework** addresses each state's food system development goals by integrating ecological stewardship, cultural heritage, and innovation through four enabling growth activities.

Enabling Growth Activity 1: Creation of Food Innovation and Processing Facilities

The first enabling growth activity centers on the creation of food innovation and processing facilities. A tiered system will support processing at every level, beginning with community centers on the main island and outer atolls to prepare coconuts, bananas, taro, and breadfruit for immediate use and sale. Regional hubs will specialize in coconut products and staple crop flours or chips, while state-level centers will oversee advanced processing and food safety. The Terrestrial Food Innovation Center in Kolonia will focus on staple crops and fruits, while a Bycatch and Animal Feed Processing Center will transform waste and fishing byproducts into poultry and swine feed, as well as fertilizer. These facilities are designed to reaffirm the importance of traditional crops while reducing reliance on imports, and they will promote innovative uses of biodiversity, from *karat* banana baby food to coconut sugar and breadfruit flour.

Enabling Growth Activity 2: Improved Information Systems to Support Decision-Making

The second enabling growth activity emphasizes improved information systems. A Food Systems App will serve as a digital hub to connect producers, processors, and policymakers across Pohnpei. Recognizing the state's geographic challenges, the app will include satellite-based connectivity and offline functionality to ensure participation from remote atolls. By linking agroforestry farmers, fishers, and processors through a shared platform, the app modernizes traditional systems of exchange and strengthens coordination without displacing cultural practices. Content for such an app can be housed for free public access in the state's web platform.

Enabling Growth Activity 3: Education, Training, and Technical Support

Human capacity development is essential to sustain food system transformation. Surveys revealed that more than half of producers requested training in crop production, timing, soil improvement, and sustainable land management, invasive species management. Livestock producers emphasized the need for training in feed formulation using local starches, fish byproducts, and copra cakes. Aquaculture stakeholders requested training in safety, preservation, and rescue at sea. Respondents also called for stronger training in food preservation, packaging, product marketing, and financial management. Stakeholders stressed that without training, past investments in equipment and infrastructure often failed when breakdowns occurred and there was no capacity to repair and local expertise was lacking. The Framework therefore prioritizes training programs that are continuous, culturally grounded, and inclusive of both producers, trainers and educators. Capacity building in these areas will ensure that agroforestry knowledge is complemented by modern techniques, enabling farmers to improve yields while protecting biodiversity. Training will also strengthen the ability of fishers and coastal communities to manage reef ecosystems sustainably, preserving resources for future generations.

Enabling Growth Activity 4: Enhanced Community Management and Policy Advocacy

Food and farming in Pohnpei remain deeply intertwined with cultural practices such as yam festivals, breadfruit offerings to chiefs, and the exchange of pigs for ceremonial purposes. Stakeholders emphasized that the new food economy *must reinforce, not undermine*, these traditions. Policy measures identified by leaders include requiring schools, hospitals, and government events to source at least 50% of their food locally, with gradual increases over time. Stakeholders also proposed taxes on unhealthy imports such as packaged chips, coupled with school policies restricting junk food and promoting local fruits. Incentives such as tax waivers on the importation of supplies to facilitate growth of local food production such as seeds, fertilizers, and equipment were recommended to support local producers. Community managers and policymakers see these measures as essential to creating reliable markets, fair prices, and an enabling environment for producers and processors. This approach is also welcomed by the private sector who promote increased food collection, production and processing yet need enabling state policies to support a

private sector focus. The framework ensures that modernization is aligned with tradition. Policy advocacy will further elevate farming and fishing as respected livelihoods, positioning them as central to both cultural identity and economic security.

The Pohnpei State Food Systems Solutions Framework offers a community driven blueprint to transform the island's food economy, redirecting millions spent on imports into local value chains that create enterprises, reliable markets, and steady employment in farming, fishing, processing, and distribution and strengthening shift from a linear to circular economy. The Framework also revitalizes cultural traditions, positions staple crops at the center of the modern economy, and provides youth with opportunities in farming, food enterprises, and technology. With \$12.26 million in investment, it sets measurable targets including higher yields, increased local consumption, job creation, micro enterprise growth, import reduction, and better nutrition outcomes, aligning with national policies and global sustainability goals to build a resilient, culturally grounded, and self-reliant food system that benefits local communities and strengthens communities across the state and the nation.

In conclusion, Pohnpei's Food Systems Solutions Framework leverages its rich biodiversity, its globally significant agroforestry heritage, and its vibrant cultural traditions to build a resilient and self-sufficient food system. Through investment in innovation, communication, training, and community leadership, Pohnpei can reduce import dependence, enhance livelihoods, and protect the ecological treasures that define its identity. This approach demonstrates how Micronesia island states can thrive by drawing on the strengths of their ecosystems and traditions, creating a food system that is at once modern, sustainable, and deeply rooted in tradition and place.



children row to rabbit fish pilot aquaculture project in Pohnpei's lagoon

FOOD SYSTEMS SOLUTIONS

FSM R&D Division of Trade

Funded by the United States Department of Commerce
Economic Development Administration

PROJECT OVERVIEW

The Federated States of Micronesia (FSM) Department of Resources and Development (R&D) initiated the Food Systems Solutions (FSS) project, funded by the United States Economic Development Administration (EDA). This ambitious initiative aims to establish a sustainable national food system that strengthens supply chains and facilitates trade linkages both within and across the four states of the FSM. Through this project, FSM seeks to build a resilient and coordinated food system that enhances national food security by improving information systems, developing strategic plans for the creation of Food Innovation Centers in each state, building the capacity of local stakeholders, and empowering community-based management, and advocacy efforts.

Recognizing the complexity and interdependence inherent in food system development, the Food Systems Solutions project has been designed to promote inclusive engagement across all sectors of FSM society. It acknowledges that achieving sustainable food system growth requires collaboration among farmers, fishers, consumers, sellers, entrepreneurs, policymakers, educators, and civil society leaders. Through strengthening communication channels and encouraging cross-sectoral decision-making, the project aims to significantly enhance the efficiency, resilience, and effectiveness of FSM's local and national food systems.

This FSS project is intended to strengthen food security across the nation through an innovative approach focused on improving and coordinating food systems through enhancing information systems, developing plans for Food Innovation Centers in each state, increasing local capacity, and community management and advocacy. The Rutgers Food System Science team was contracted to supervise the Food Systems Solutions project in partnership with FSM state partners and local NGOs.

This Food Systems Solutions (FSS) project evolved from the 2021 United Nations Food System Summit and the corresponding Federated States of Micronesia Food System Summit Dialogue.



The objective of the FSS project is **Economic Growth through Local Food Production.**

Economic Growth through Local Food Production

71% of FSM Household Expenditure goes to food, primarily imported food (GCFSAPO20 Baseline Assessment 2024). This means the majority of FSM families' income is supporting companies outside our country.



If we took just 20% of the money we spend on imported food and use it to buy locally produced food, cooking oil and drinks, we would have an additional **5 million dollars** circulating in our economy each year (2016 FSM Agriculture Policy).



Producing and buying locally-grown and processed food generates local jobs and keeps our money in our states and our nation, making us more independent, wealthier and healthier.

Local Food Processing **strengthens the economy by replacing imported foods** with locally processed foods to support local jobs and businesses to keep money within the states.

ECONOMIC GROWTH FRAMEWORK

FSS project is designed to support community-led food system development through the building and sustaining of the local food market. The project does this by focusing on four identified mutually reinforcing enabling growth activities.



FOUR ENABLING GROWTH ACTIVITIES SUPPORT LOCAL FOOD PRODUCTION:

First, the project seeks to expand food supply with a **tiered network of Food Innovation Centers**, supported by training for farmers and that boosts volumes and quality and provides central food hubs for processing and value-addition. Second, it enables matching between buyers and sellers and cuts search costs by way of a **user-friendly mobile communication platform** offering buyer–seller chat, live inventories of surplus produce, and a map of delivery points, linking farmers and buyers. Third, it seeks to develop education and technical training to support Food Innovation Centers and a local food system supply chain. Finally, it embeds robust **improved local governance** through democratically managed cooperatives and public-private partnerships that set quality standards **and policy advocacy** to implement transparent profit-sharing rules, ensuring trust, compliance, and long-term market resilience while also stimulating demand through targeted policy measures, such as state-led local food procurement mandates.

Enabling Growth Activity 1: Development of Flexible Food Innovation Centers

1ST Enabling Growth Priority Area:

**Development of Food Innovation Centers (FIC)
Processing of Local Foods for Import Substitution**

Dried local papaya, mango & pineapple

Smoked fish

**Local Baked Goods:
Example, banana bread and coconut cookies**

Local Coconut Milk & Coconut Water

**Local Flour:
Breadfruit, Coconut and Taro**

**Local Chips
Banana, Breadfruit, Taro, Yam**

Local Juice Drinks

Enabling Growth Activity 2: Improved Information Systems to support Decision-Making

2nd Enabling Growth Priority Area:

**Develop FSM's Shared Information Systems
Linking Food System Stakeholders
Connecting Farmers and Markets**

Pacific Pests, Pathogens & Weeds

Identify Pests, Diseases & Weeds

Launch the interactive Key

Full Fact Sheets

Access the full detailed fact sheets

Mini Fact Sheets

ICT and Mobile Apps Drive Global Agriculture

Source: SourceTrace Systems, 2017. Pacific Pets Pathogens Weeds Phone App, 2023.

Enabling Growth Activity 3: Improved Education, Training and Technical Support

3rd Enabling Growth Priority Area:

Develop Education, Training and Technical Support Plan for Food Innovation Center Jobs and Supply Chain



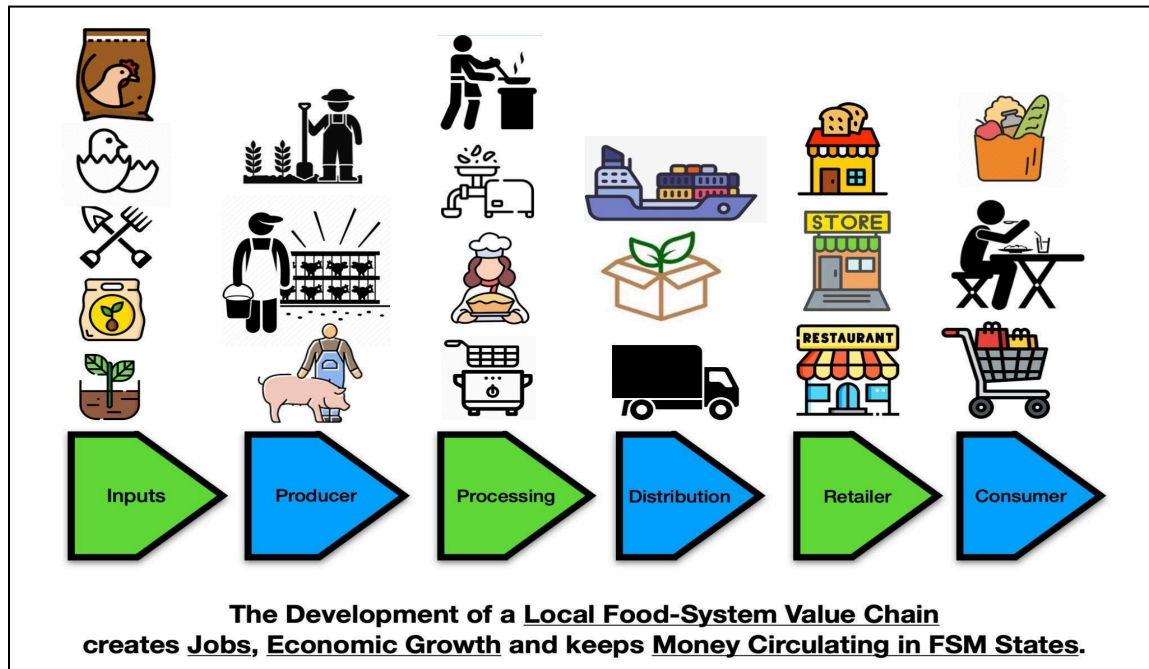
Enabling Growth Activity 4: Enhanced Community Management and Policy Advocacy

4th Enabling Growth Priority Area:

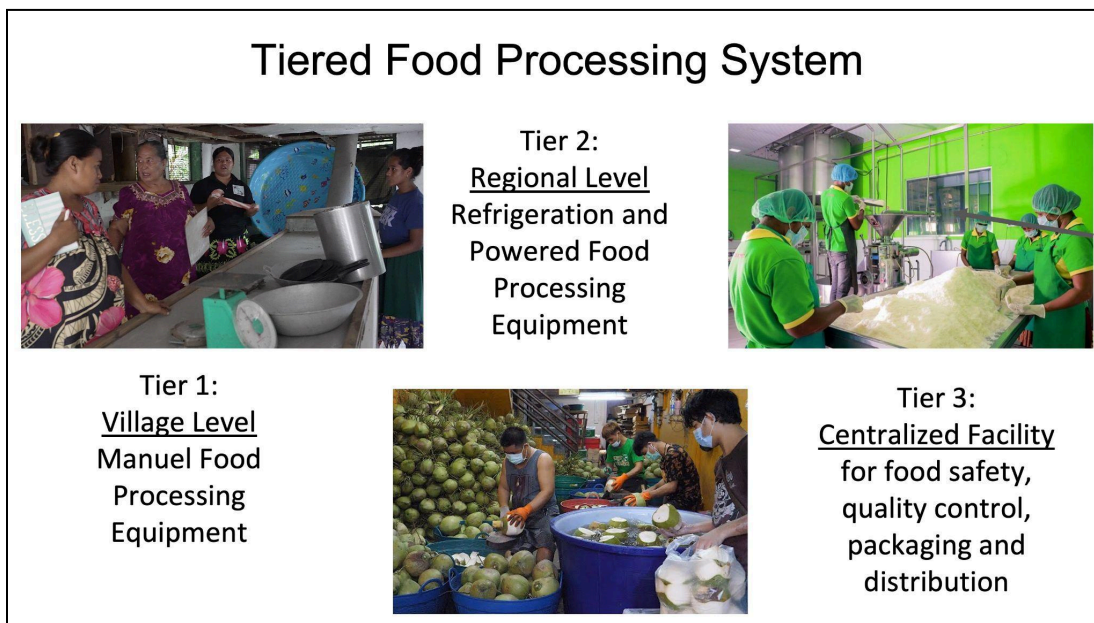
Support Community Management and Policy Advocacy Capabilities for Effective Local Governance



The Food Systems Solutions project seeks to support community-based food system development that builds each step of the **Local Food System Value Chain** by addressing four enabling growth pillar activities in a holistic interacting manner that when brought together facilitates short and longer-term sustainable growth. We consider sustainability to be grounded and guided by cultural, environmental and economic considerations.



A tiered food processing system offers **Value Addition Job Opportunities** throughout the community. This project stimulates the local economy through the use of a decentralized food system development approach to include as many people in the supply chain with a Food Innovation Center at the top tier for food safety, packaging, and distribution.



By strengthening and sustaining local food markets and raising farm productivity, this initiative lays the foundation for reliable access to affordable, nutritious food across all four states. The creation of value-adding processing hubs and support for smallholder agribusinesses generates new employment opportunities and broadens economic participation in rural communities. This integrated approach not only builds resilience against supply shocks and price volatility but also fosters sustainable growth, higher household incomes, and long-term food security for the Federated States of Micronesia.

An example from Pohnpei State: Imported foods that can be replaced with locally grown and locally processed foods. The amount of money spent on these food imports can be redirected to support local food producers and food processors. In 2021 alone, the people of Pohnpei spent more than 4.5 million US dollars on imported chicken meat and chicken/pig feed.

HS Codes-6 Digits	Import Items-Pohnpei(CIF\$)	2019	2020	2021
070490	Chinese Cabbage	\$44,384	\$30,436	\$40,710
070960	Bell Peppers	\$44,316	\$88,318	\$62,086
080450	Mango	\$14,235	\$5,542	\$24,848
080430	Pineapple	\$9,793	\$10,227	\$13,955
080711	Watermelon/Cantaloupe	\$42,299	\$42,348	\$30,102
070511	Lettuce	\$150,561	\$173,877	\$130,626
091011	Ginger	\$13,524	\$19,199	\$21,078
071420	Yam	\$25,805	\$31,283	\$52,673
080550	Lemons	\$4,443	\$3,839	\$6,731
151190	Vegetable Oils	\$3,116	\$33,558	\$50,328
040110	Milk (Fresh)	\$80,829	\$80,548	\$70,319
200410	Potato Chips	\$6,185	\$557	\$128,199
020714	Chicken (Frozen)	\$38,188	\$20,130	\$2,252,174
040721	Chicken Eggs (In Shell)	\$113,930	\$143,077	\$170,188
230990	Chicken and Pig Feeds	\$1,127,671	\$1,819,351	\$2,372,130
Total		\$1,871,278	\$2,622,984	\$5,732,255

As a nation, FSM imported \$5.64M in poultry meat in 2023 according to the Observatory of Economic Complexity (The Observatory of Economic Complexity, n.d.).

A Community-Based, Participatory Approach to Food System Development:

Community-engaged research is critical to addressing food insecurity, health disparities and empowering communities to meet their own needs. Community-engaged food systems research involves community members in the research process and helps ensure projects are relevant, practical, and widely accepted by the community. This approach also fosters trust and strengthens relationships between researchers and the community, ultimately enhancing the sustainability of projects.

A community-based participatory mixed methods approach was chosen to ensure inclusion of

the local food production aspirations of FSM's farmers and fishers and all other relevant stakeholders. Building upon the United Nations "Rethinking our Food Systems: Guide for Multi-Stakeholder Collaboration" and working in close collaboration with local NGOs and community groups in each FSM state, ten FSS survey tools were developed to collect data from food system stakeholders in each FSM state that included quantitative as well as open-ended questions. The below surveys were conducted in each FSM.

Food System Stakeholder Groups Surveyed in each FSM State:

Producer Survey: 65 per state minimum

Consumer Survey: 65 per state minimum

Community Management Leader Survey: 10-12 per state minimum

Food Distributors and Retailers: 24 per state minimum

- **Local markets** 11-12, minimum per state
- **Restaurants** 10-12, minimum per state, 4 for Kosrae

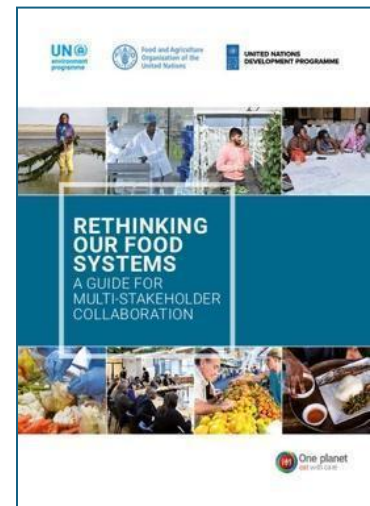
Trainer Surveys: 10-12 per state minimum

Information Content Providers Survey: 8 per state minimum

Information Infrastructure Provider Survey: 3 per state minimum

Technical IT Survey: 3 per state minimum

Policymaker Survey: 7-12 per state minimum



In addition to the surveys, qualitative data was also collected by way of focus groups, interviews and a two-day FSS stakeholder convening with workshops in each state.

In February 2025, a joint delegation composed of representatives from the FSM National Department of Resources and Development and the Rutgers University Food Systems Science team conducted field visits across all four states. Together with in-state NGOs, two-day stakeholder workshops/convenings were organized in each FSM state during which the FSS project's survey results and findings were shared. Each in-state convening/workshop served as an important platform to engage local stakeholders and gather critical insights as to how local food production and processing can be implemented. Convening/workshop participants included representatives from state governments, traditional leaders, and elected officials such as members of legislatures and mayors, farmer associations, members of crop and marine producer associations, and individuals from the private sector. These stakeholders had the opportunity to review FSS survey findings, participate in facilitated breakout sessions, and provide detailed feedback on the challenges and opportunities facing local food production and distribution systems. The stakeholders' contributions highlighted the pressing need to strengthen local agricultural production, enhance market access for producers, and build more robust trade networks within and between states.

The Food Systems Solutions (FSS) convenings emphasized the importance of developing locally driven food system strategies that **respect traditional knowledge**, and support community resilience, while advancing sustainable economic development objectives and adhering to practices and growth that strengthen and protect the environment. The FSS project, therefore, **prioritizes sustainable, economic growth and capacity building** in areas such as community led trade facilitation, agricultural economics, marketing strategies, and value chain development. By linking agricultural innovation with marketing and trade expertise, the project seeks to expand market opportunities for FSM's farmers and fishers, improve food availability, and generate new income streams that contribute to broader economic growth.

Working with the same NGO and community partners who collaborated on the Green Climate Fund SAP020 baseline assessment, the Food Systems Solution stakeholder survey tools were co-created to capture data relevant to local food system development from more than 600 farming families found here: <https://rd.gov.fm/food-security>

The results of the Green Climate Fund SAP020 baseline assessment informed the **Pohnpei Food Security Policy and Master Plan 2025** also prepared with support from the Rutgers Food System Science team:

<https://pohnpeistate.gov.fm/wp-content/uploads/2025/02/2025-Pohnpei-Food-Security-Policy-and-Food-Production-Master-Plan-submitted.pdf>

In 2024, 947 new mixed methods surveys of farmers/food producers were conducted by local enumerators conducted in local languages for this Food Systems Solutions project.

The 2-day workshops held in each of the FSM states in February 2025 included presentation of results from stakeholder surveys regarding challenges and goals for local food production with the following prompts for workshop breakout sessions:

Prompt: List the 3-4 most important local food raw materials that producers can supply to a FIC and what support do the producers need?

Prompt: Describe 3 ways community leaders can implement policy to support food production, food processing, increased nutrition and job growth.

Prompt: What features would be most useful in a food system app for your state?

Prompt: When developing a Food Processing System for your state, where and how should food be collected, stored, processed, and distributed per product?

What type of facilities and equipment are needed and where should they be located?

Prompt: How and where should training take place in your state to support food production, business management, and food processing?

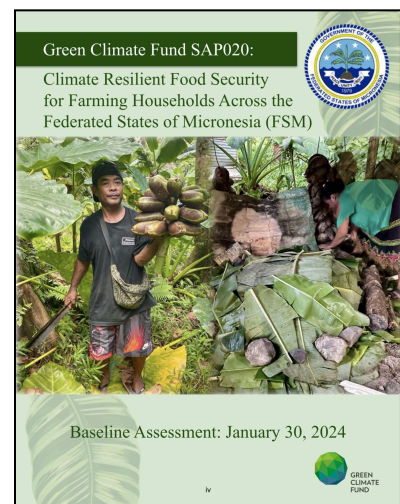
Convening workshop participants, including food producers, food sellers, community leaders, and policy makers, worked in groups to respond to the above prompts and then presented their answers at the convenings. All answers were recorded by video and have been transcribed to be included and summarized in the final Food Systems Solutions reports and proposed food production strategies that will be presented to each of the FSM states.

Comparing FSS data to GCF SAP020 data of climate change impact on more than 600 farming families

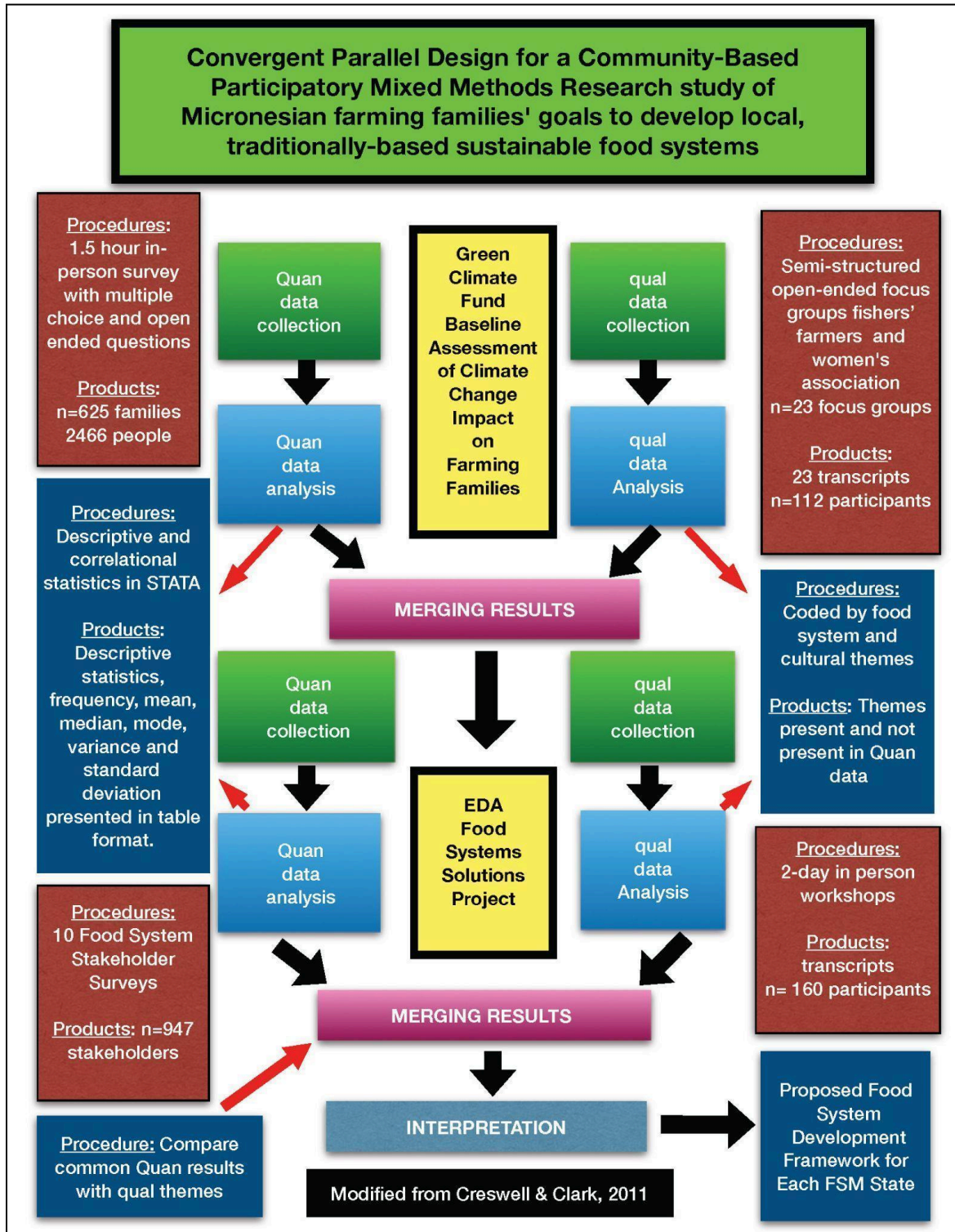
In 2022, the Rutgers Food System Science team was awarded a contract to conduct the baseline assessment for the FSM Green Climate Fund food security project GCF SAP020 that includes studying the impact of climate change on more than 600 indigenous farming families across the nation. Using a community engaged, participatory approach in partnership with local NGOs and community groups, data was collected for the GCF baseline during 2022/2023. Working with the local partners, this data was shared with the community and final baseline

reports were prepared with local Micronesian partners as co-authors. Using a convergent parallel design, the Rutgers Food System Science team now compares data from these two large FSM food system research projects that include more than 1000 surveys, focus groups, community convenings and interviews.

Convergent Parallel Design Triangulation and Validation: The convergent parallel design allows for the triangulation of data from two large FSM based projects (GCF Baseline and Food Systems Solutions), with results from the quantitative and qualitative analyses compared and



contrasted to validate findings and identify any inconsistencies or gaps in the research. The quantitative surveys provide patterns from large portions of the FSM populations, while qualitative interviews, focus groups and convenings, provided more nuanced cultural perspectives and were conducted within a more traditional Micronesian context of community knowledge sharing.



The Food Systems Solutions project has now prepared this research-driven, community-based food system development framework specifically designed for each FSM state and built from a wide variety of stakeholder and food producer input.

Food Systems Solutions Data Collection Methods and Results

The research protocol titled “Strengthening Food Security in the Federated States of Micronesia: An Innovative Approach to Enhancing Information Systems, Establishing an FSM Food Innovation Center and Supporting Local Capacity Building” received Institutional Review Board (IRB) approval from both the College of Micronesia-FSM and Rutgers University. At Rutgers, the protocol (IRB Number Pro2024000757) was reviewed under minimal risk and granted exempt status (Exempt 2i) on April 30, 2024, with approval issued by the Rutgers Human Research Protection Program. At the College of Micronesia-FSM, the protocol (WIRB® Protocol #0020724072024) was reviewed on July 2, 2024, and formally approved as exempt on July 29, 2024, by the COM-FSM IRB. Both approvals affirmed that the study may proceed in accordance with the approved protocols and applicable human subjects protection regulations. For the surveys, partnering NGO facilitated trained local enumerators to conduct the food system stakeholder interviews in local languages. All enumerators were required to complete and were awarded CITI certification and received training from the Rutgers Food System Science Team prior to conducting the surveys.

In Pohnpei State, the surveys were designed and conducted through a strong partnership framework that integrated collaboration with local institutions and stakeholders. The State of Pohnpei served as the core partner and provided essential guidance and logistical support, and the Conservation Society of Pohnpei acted as the principal contact and survey implementer. The survey effort was carried out by a dedicated team of seven enumerators, each CITI trained prior to initiating the study. There were 10 different survey tools and a total of 251 surveys were completed.

The surveys were strategically and geographically distributed across Pohnpei’s five main municipalities of Sokehs, Kitti, Madolenihmw, U, and Nett between August 1 and September 30, 2024. Outer islanders of Mwokilloa, Kapingamarangi, Sapwuaifik, and Nukuoro living on main island Pohnpei were also included to ensure their voices and aspirations were incorporated.

Links to the complete Food Systems Solutions survey data results can be found at

<https://rd.gov.fm/fss>

and by way of this QR code:





(L) Taro flour production on Pingalap atoll and (R) Taro flour preparation at Island Food Community, Pohnpei main island

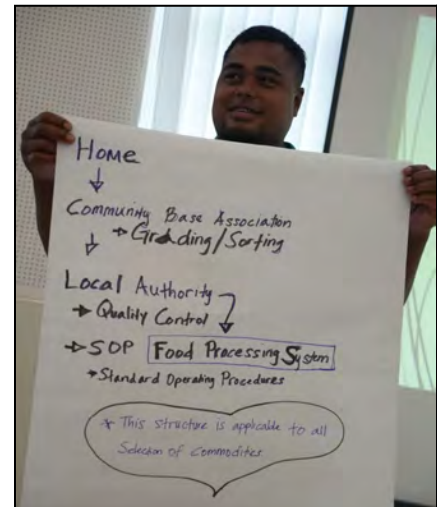
Part I:

Pohnpei State Evidence-Based

Multi-Stakeholder Goals for

Local Food Production and Processing

A Participatory Approach to Ensure Place-Based, Culturally Appropriate Local Food System Development Data from Pohnpei's Stakeholders:



To gather critical state-specific data to support local food processing, the Rutgers Food System Science team used a community-based, participatory mixed methods approach to develop 10 stakeholder surveys that were conducted in each state by local enumerators in local languages as part of the project's participatory data collection methodology. The team worked closely with the Conservation Society of Pohnpei (CSP), a local NGO that oversaw the Food Systems Solutions (FSS) survey collection in Pohnpei and ensured that all enumerators received CITI IRB certification through the Rutgers System.

FSS Multi-Stakeholder Surveys Conducted for Pohnpei State:

Producer Survey: 92 surveys conducted

Consumer Survey: 82 surveys conducted

Community Management Leader Survey: 12 surveys conducted

Food Distributors and Retailers: 31 surveys conducted

- **Local markets:** 19 surveys conducted
- **Restaurants:** 12 surveys conducted

Trainer Surveys: 13 surveys conducted

Information Content Providers Survey: 8 surveys conducted

Information Infrastructure Provider Survey: 3 surveys conducted

Technical IT Survey: 3 surveys conducted

Policymaker Survey: 14 surveys conducted



"Although we have a traditional food system that has sustained us for many, many years, we are now dependent on imported food and must consider how to make better use of our local foods that we have in abundance. In a breadfruit season, I estimate that we only consume 20% of the breadfruit and we leave 80% to go to waste. So we must ask ourselves how can we return to more efficiently using our local crops to improve our health and our economy. I ask all participants to keep an open mind to what is being presented today and critically consider what can be possible here in Pohnpei." - Honorable Governor Stevenson Joseph

Expanding FSS's qualitative data with 2-day stakeholder workshops/convening:

In February 2025, a joint delegation composed of representatives from the FSM Department of Resources and Development and the Rutgers University Food Systems Science team conducted field visits across all four states. Together with in-state NGOs, two-day stakeholder workshops/convenings were organized in each FSM state during which the FSS project's survey results and findings were shared. Each in-state convening/workshop served as an important platform to engage local stakeholders and gather critical insights as to how local food production and processing can be implemented. Convening/workshop participants included representatives from state governments, traditional leaders, and elected officials such as members of legislatures and mayors, farmer associations, members of crop and marine producer associations, and individuals from the private sector. These stakeholders had the opportunity to review FSS survey findings, participate in facilitated breakout sessions, and provide detailed feedback on the challenges and opportunities facing local food production and distribution systems. The stakeholders' contributions highlighted the pressing need to strengthen local agricultural production, enhance market access for producers, and build more robust trade networks within and between states.

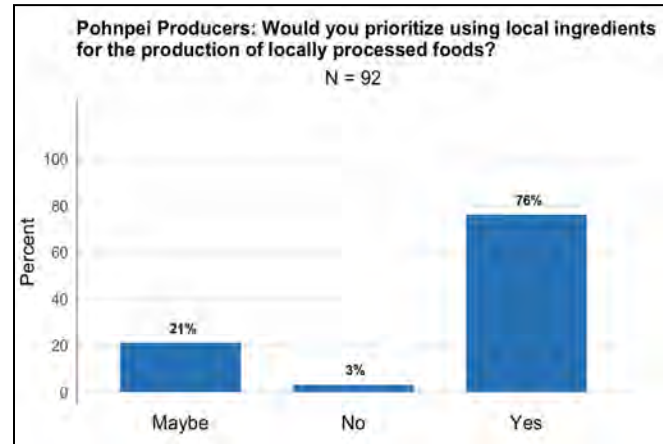
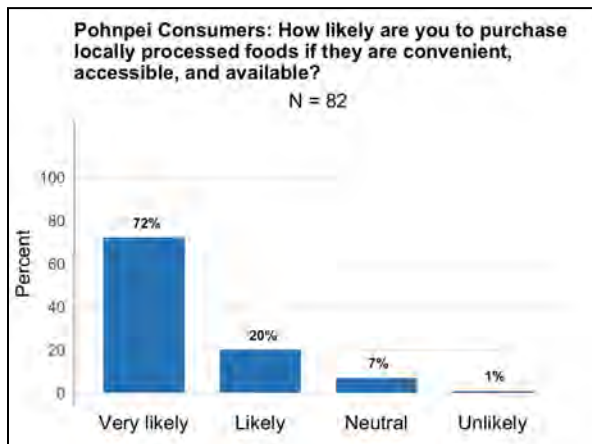
The February 2025 Food Systems Solutions (FSS) convenings emphasized the importance of developing locally driven food system strategies that **respect traditional knowledge**, support community resilience, and advance economic development objectives. The FSS project, therefore, **prioritizes economic growth** and capacity building in areas such as trade facilitation, agricultural economics, marketing strategies, and value chain development. By linking agricultural innovation with marketing and trade expertise, the project seeks to expand market opportunities for FSM's farmers and fishers, improve food availability, and generate new income streams that contribute to broader economic growth.

Notable attendees include: Honorable Governor Stevenson Joseph, Acting Secretary FSM R&D Brihmer Johnson, Assistant Secretary Bermance Aldis, Director of R&D Mark Kostka, Senator Tindy Lewy, Engly Ioanis, Eugene Joseph, Assistant Secretary FJ Yatilman, Rich Adams, Saimon Mix, Emihner Johnson from Island Food Community, Pohnpei's Chief of Commerce Michaela Saimon, Tenny Leopold, Lenard Leopold, Smithy Clark Mayor of Pingelap, Denson David, Peterson Anson, Pohnpei's Chief of Agriculture Kordy Carl, Pohnpei's Chief of Natural Resource Management Eugene Eperiam.



Summary of Pohnpei Stakeholder survey/convening responses to support local Food Production and Food Processing:

During the FSS convening/workshop held at the Pohnpei Governor's Conference room, members of Pohnpei's community showed an interest in creating a circular economy through local food production. Members of Pohnpei's leadership, specifically state senators and chiefs, discussed the importance of recirculating wealth within their own communities to support food producers, create local jobs, and strengthen the local economy. There is a strong stakeholder momentum to prepare and process local food crops to create import substitution to strengthen the economy, create jobs, increase local nutrition and reduce the number of food related non-communicable diseases.



Pohnpei State's traditional food system revolves around locally grown and harvested foods, particularly taro, breadfruit, banana, and coconut, alongside fish and seafood. This system is deeply intertwined with traditional cultural practices like shifting cultivation and agroforestry and food is more often bartered than sold. While local food is consumed and sometimes sold in Pohnpei, stakeholders shared that farming has not generally been recognized as a means to earning a cash income. At the same time, the Food Systems Solutions Pohnpei stakeholder survey results indicated a strong perception that **local food processing of local staple crops would strengthen and support traditional Pohnpeian culture.**

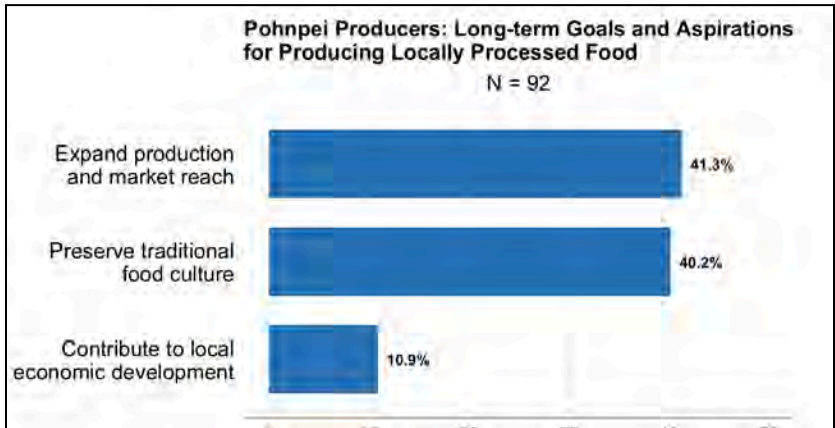


"While our ancestors thrived on our islands for thousands of years, today we are no longer able to produce our own food. Instead, we are dependent on food grown and produced thousands of miles away and shipped to us. The average Pohnpeian is spending more than 50% of their income on imported food so we come together today to work for our state and national economic growth through local food system development."

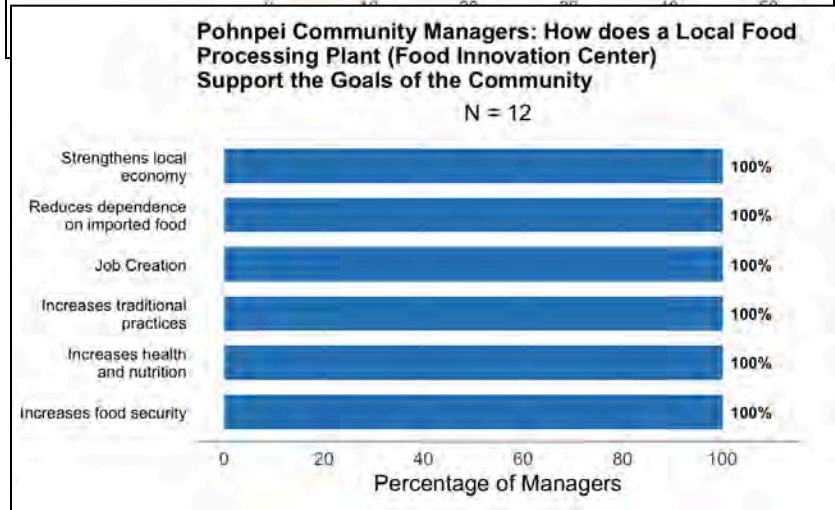
- Acting Secretary of FSM R&D Brihmer Johnson

Pohnpei’s producers highlight the preservation of traditional culture as one of the main long-term goals of producing locally processed foods.

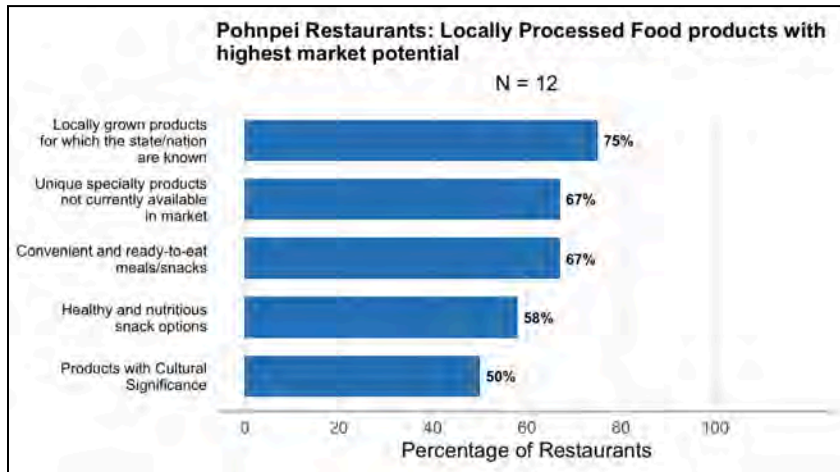
FSS survey results highlight the importance of cultural preservation that often supersedes economic development and is comparable to market expansion.



Pohnpei stakeholders surveyed showed overwhelming support for the development of food processing of local staple crops *within Pohnpei’s cultural framework* to provide regular and nutritious import substitution.

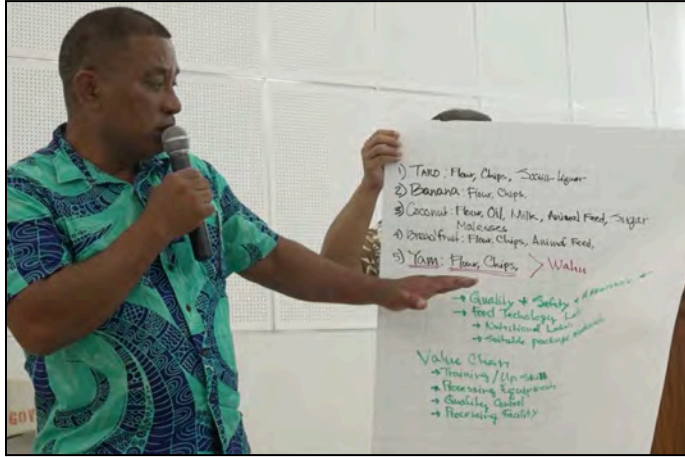


Pohnpei’s community managers are confident that a Food Innovation Center where storage will be located will actually increase traditional practices, again by prioritizing traditionally grown crops.



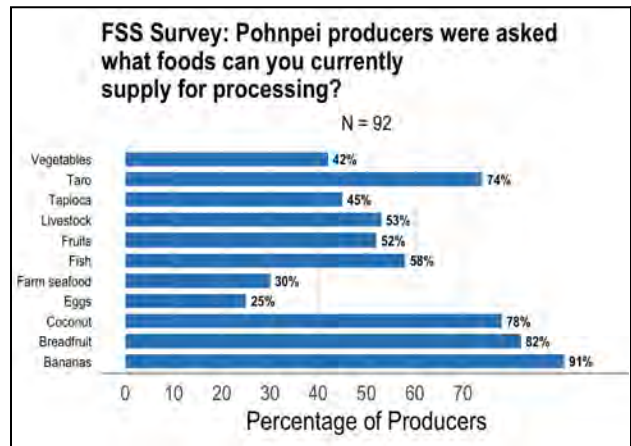
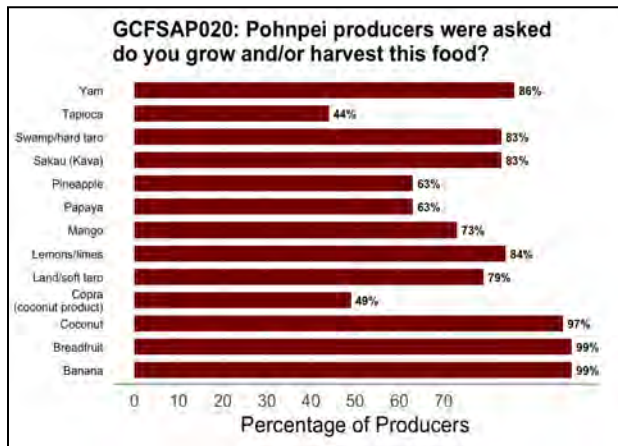
Pohnpei’s restaurants have identified products grown locally for which the state and nation are known as the products with the highest market potential.

Based on the GCFSAP020 and FSS survey data, Pohnpei food producers share the local staple food crops that they currently harvest and can supply to local food processing facilities.



"Taro is available all year round so we believe that's priority one. We should focus on the taro to add value to it for flour, chips and possibly Socha liquor like they make in Palau. Second is banana, also year round and also for flour and chips. From our abundant coconuts, we can get local flour, milk, cooking oil, sugar and important to the Pohnpeian men, coconuts and breadfruit can be used for animal feed."

- Assistant Secretary Bermance Aldis

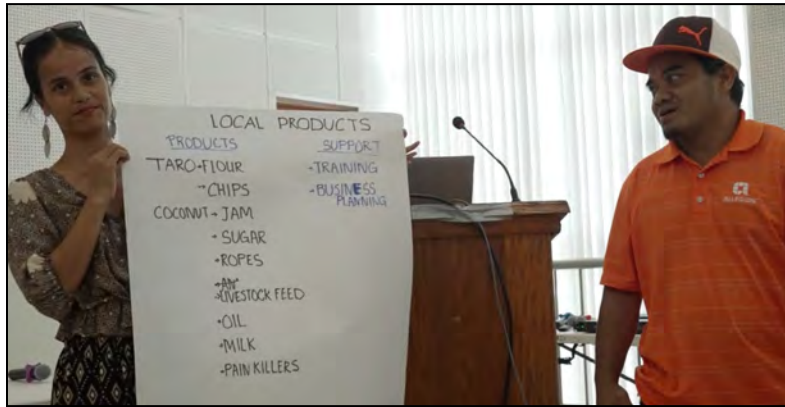


Stakeholders also recognize that introducing new, improved varieties of local staple crops is necessary for more consistent yield and easier production.

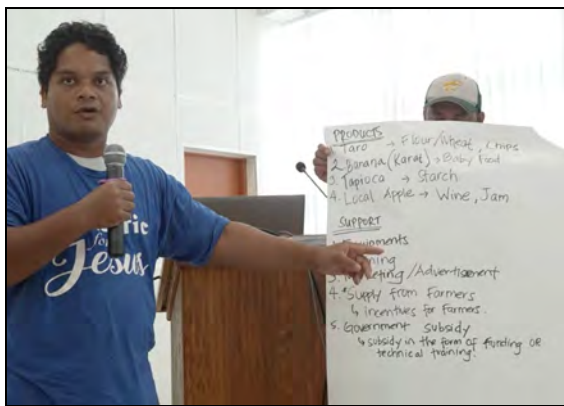
"Our coconuts can produce local food products to replace many imported foods. But first we need to enhance the production of our coconuts. We must introduce new varieties of coconuts that can bear fruits, not a long term, just maybe one year, two years. We need to replace our senile trees and maybe get the dwarf coconut so the fruit is easier to reach." - Michaela Saimon

Local food products that Pohnpei stakeholders most want from a local food processing system, according to producer and consumer surveys:

<i>Product</i>	<i>Consumers (82 surveys)</i>	<i>Producers (92 surveys)</i>
<i>Fish and Seafood – Salted</i>	76	47
<i>Banana chips</i>	70	68
<i>Breads and baked goods (donuts / muffins)</i>	70	43
<i>Feed for chicken / pigs</i>	65	40
<i>Rope, mats and other fiber products</i>	63	33
<i>Coconut cooking oil</i>	60	48
<i>Chicken meat and products</i>	60	42
<i>Coconut products (sugar, etc.)</i>	60	33
<i>Seafood – Bottled</i>	59	40
<i>Pork meat and products</i>	59	34
<i>Vinegar</i>	59	32
<i>Breadfruit chips</i>	57	58
<i>Fish and Seafood – Dried</i>	54	40
<i>Fruits – Juices</i>	50	28
<i>Coconut milk</i>	49	38
<i>Hot sauce</i>	49	22
<i>Vegetables – Pickled</i>	44	28
<i>Spices – Dried</i>	44	22
<i>Breadfruit flour</i>	40	48
<i>Fruits – Jellies and Jams</i>	39	17
<i>Taro chips</i>	38	29
<i>Coconut flour</i>	37	36
<i>Fish and Seafood – Smoked</i>	37	35
<i>Fruit – Syrups</i>	37	24
<i>Taro flour</i>	35	39
<i>Vegetables – Dried</i>	35	16
<i>Sea salt</i>	34	13
<i>Fish Jerky</i>	33	28
<i>Fruits – Dried</i>	33	23
<i>Vegetable sauce / salsa</i>	33	18
<i>Fish Sauce</i>	32	33
<i>Spice pastes</i>	23	17
<i>Spice blends</i>	23	14
<i>Flavored (infused) oils</i>	21	11
<i>Fish syrups</i>	20	13
<i>Other</i>	5	1



"We can make sugar, rope, feed, jam oil and even medicine from our coconuts." - Local farmer



"Our karat bananas can be used for baby food, we can get starch from our tapioca and we can make wine from our local Pohnpei apple."

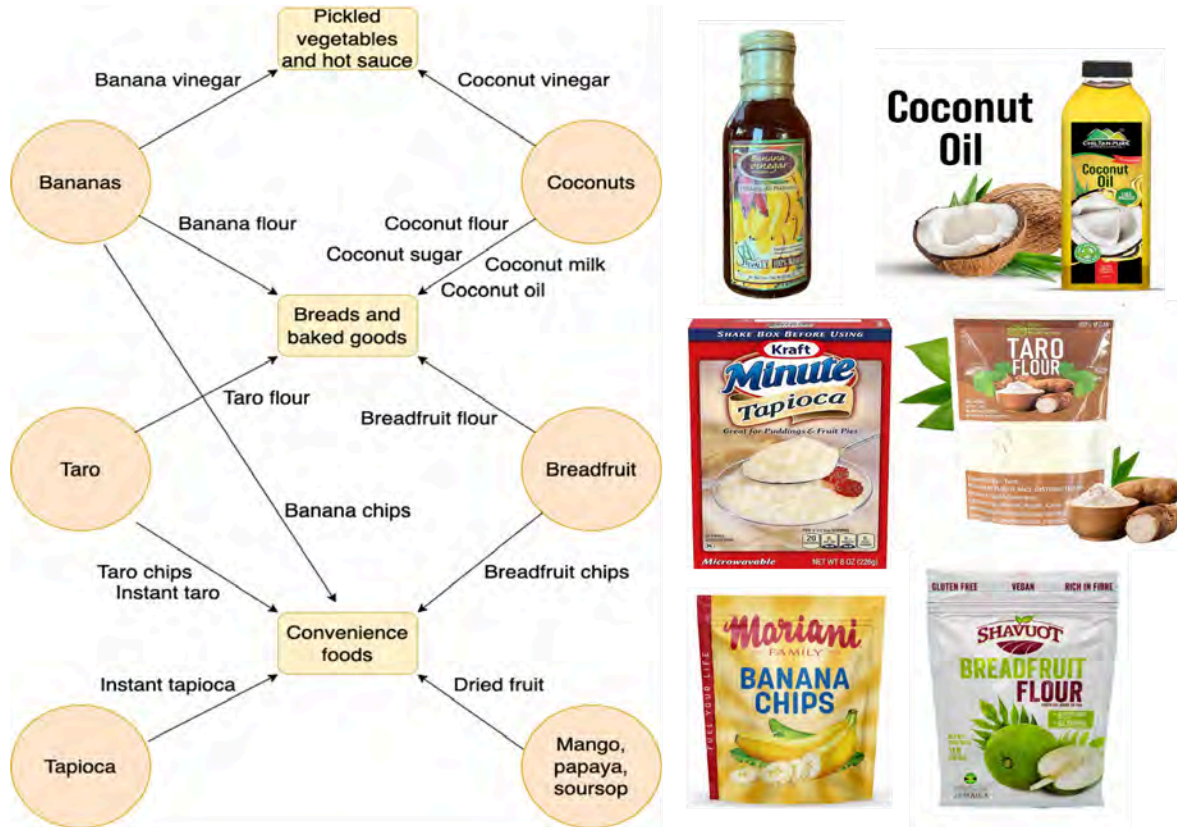
- Local farmer

Transforming staple crops into locally processed food commodities:

70% of surveyed consumers are requesting baked goods, but only 43% of producers are interested in processing these foods. The core ingredients – flour, oil, milk, sugar – of baked goods are understood to be imported products like wheat, butter and cow’s milk. Producers understand, however, that these raw ingredients can be made using staple crops like banana, breadfruit, and taro for flour, coconut sugar, oil, and milk. In fact, 48% of producers want to produce breadfruit flour. The raw ingredients to create locally sourced baked goods are present and with enough training and creative recipes, these products can replace imported baked goods.

<i>Product</i>	<i>Consumers (82 surveys)</i>	<i>Producers (92 surveys)</i>
<i>Breads and baked goods (donuts / muffins)</i>	70	43
<i>Coconut cooking oil</i>	60	48
<i>Coconut products (sugar, etc.)</i>	60	33
<i>Coconut milk</i>	49	38
<i>Breadfruit flour</i>	40	48
<i>Coconut flour</i>	37	36
<i>Taro flour</i>	35	39

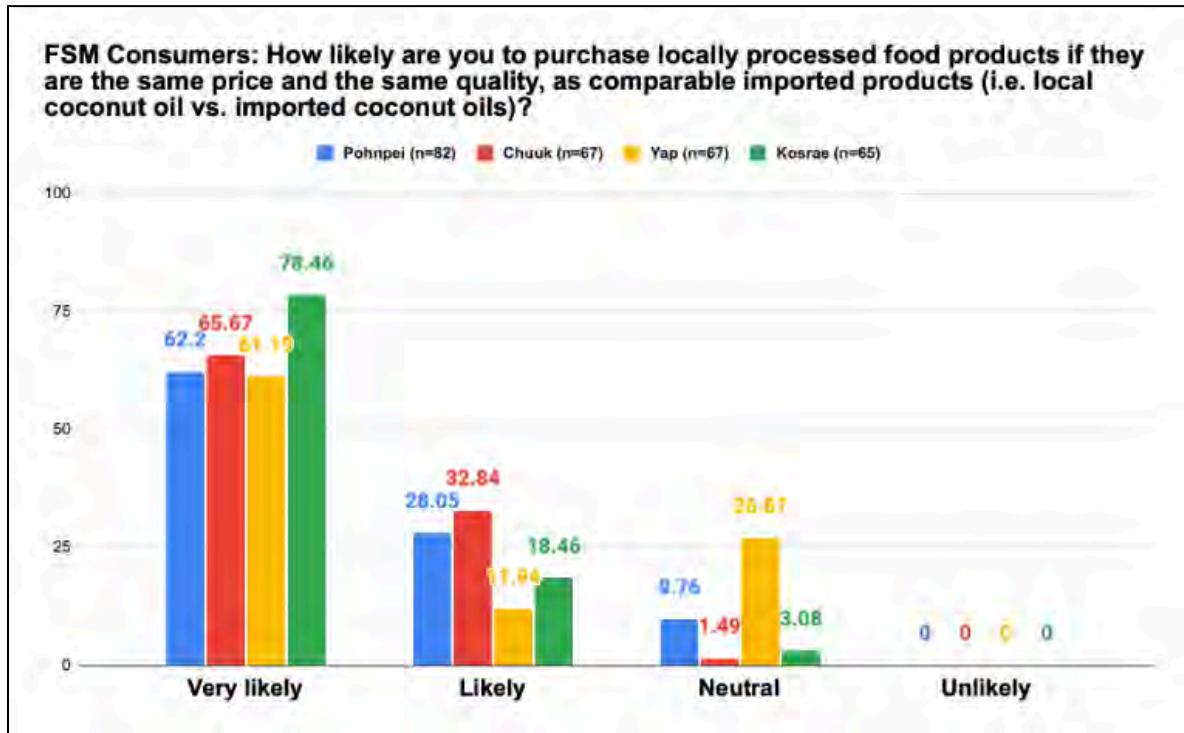
Staple crops to be used as raw ingredients for highly desired foods:



Import substitution with similar locally sourced products was highlighted throughout the GCF SAP020 surveys. Consumers recognize that many imported raw materials can be substituted from locally processed crops, and the majority are very likely to purchase local substitutions if they are comparable in price and quality.



"We should be using our coconuts to make coconut cooking oil to replace imported vegetable oil, to also make fresh coconut milk to replace imported cows milk, and then coconut flour can help us replace imported flour."
 - Director Mark Kostka, Pohnpei State Dept Resources & Development



GCFSAP020: Survey respondents were asked if they are interested in replacing imported milk products with coconut milk.

Questions	Resp.	YAP		Pohnpei		Kosrae		Chuuk		All	
		Freq	%	Freq	%	Freq	%	Freq	%	Freq	%
Would you be interested in consuming more locally produced coconut milk products daily if they were more available and affordable?	No	13	8	26	17	5	3	7	5	51	8
	Yes	148	92	131	83	144	97	140	95	563	92
... imported milk products with coconut milk products for cooking?	No	54	33	40	25	9	6	11	8	114	19
	Yes	108	67	118	75	140	94	135	92	501	81

Coconuts offer a wide range of substitute products like oil and milk to replace imported goods. The vast majority of respondents from all four states in FSM are interested in consuming coconut milk instead of imported milk both for daily consumption and for use in cooking.

Pohnpei Stakeholders identified the potential of the state’s abundant coconuts to provide locally produced ingredients needed for baked goods. Processing equipment and facilities for coconuts are already present in the country through the Vital Coconut for Life Program.



"A good example of raw material collection for our local food processing is the Vital coconut program so there is a mechanism that is already in place that we can build upon and scale up." - Eugene Joseph

Considering Pohnpei Traditional Agroforestry System and Seasonal Offerings

Main Island Pohnpei's local food production takes place within a unique agroforestry system that includes yearly offerings of staple crops to the traditional leaders. Pohnpei's farming system traditions must be considered when prioritizing how and when to process local food crops.

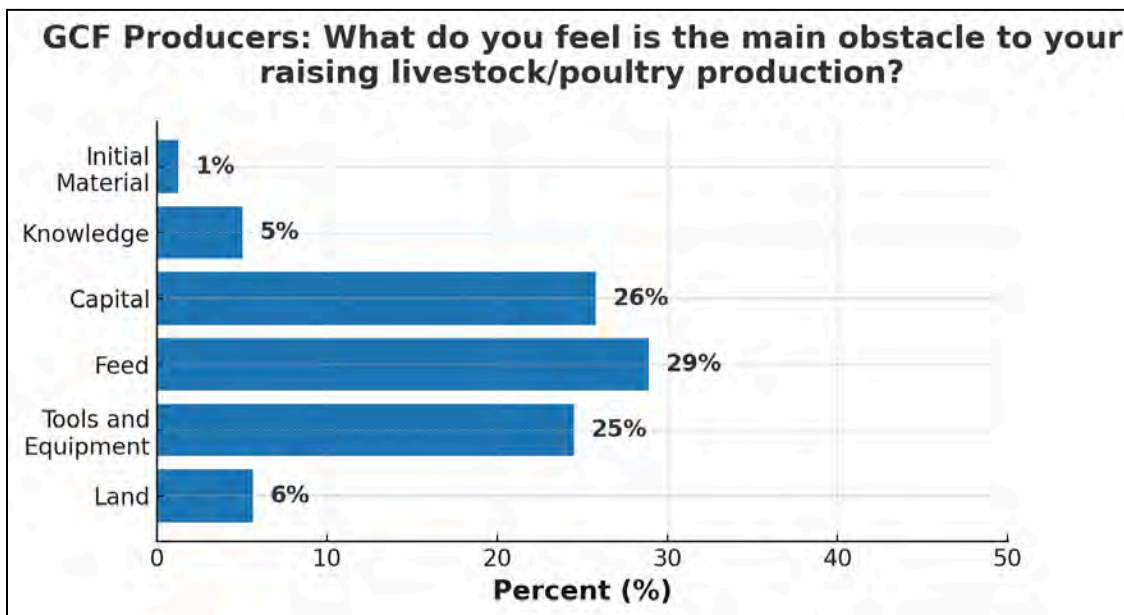


"Every year yam is an important product for the traditional leaders. At the end of the year we celebrate our yam harvest, so it is important to go to the traditional leaders and consider the cultural sensitivity of this crop. During breadfruit season, we have offering season. We offer some of our breadfruit harvest to traditional leaders. Local municipal governments will need to coordinate food harvesting and processing with traditional chiefs.

Some people may want to skip the offering because they will sell more of their products. We need to create a community effort within municipalities to allow for both traditional offerings and value-added products." - Assistant Secretary Bermance Aldis

Interest in livestock and poultry farming:

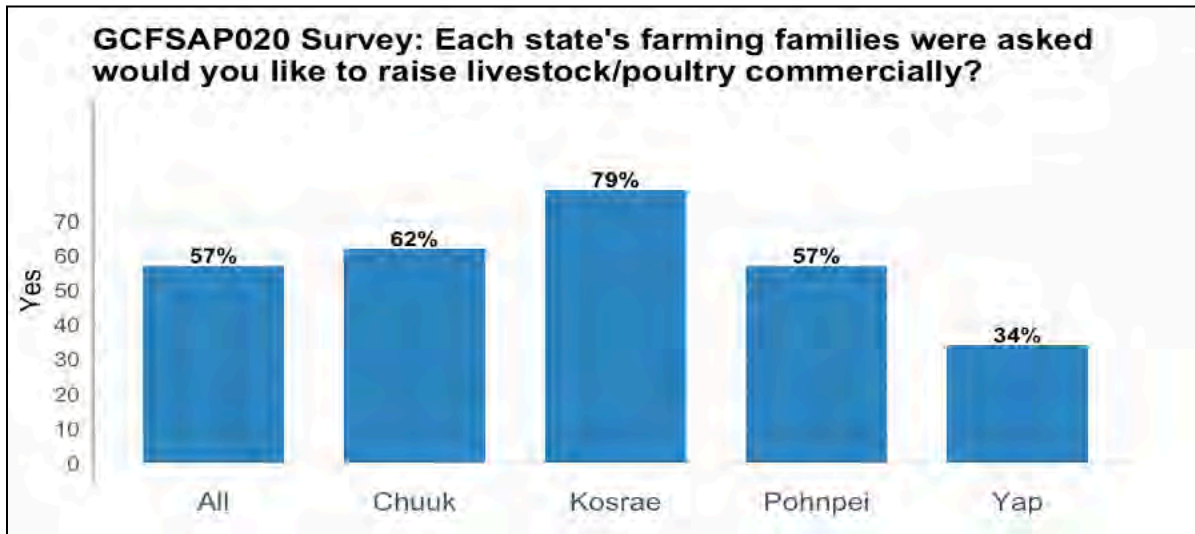
The GCF SAP020 Baseline Assessment (2024) identified feed as the largest obstacle to livestock and poultry farming. Feed production training would further reduce dependency on external inputs, enabling producers to create balanced, locally sourced diets for their livestock. According to the 2025 FSS survey, 61% of producers requested training in feed production, indicating a gap in nutrition-specific knowledge that could impact livestock health and productivity. Feed production training would further reduce dependency on external inputs, enabling producers to create balanced, locally sourced diets for their livestock.



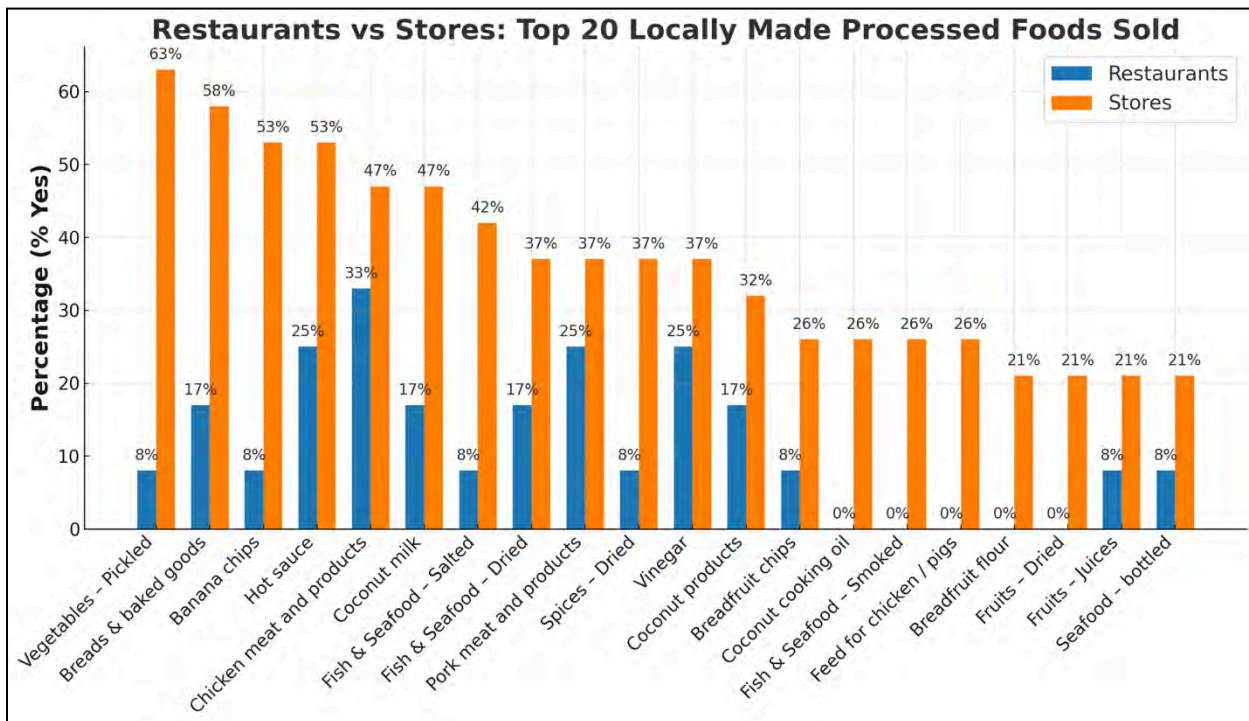
“Pigs are a major expense for families. Hopefully, this feed idea can cut down the costs and make it cheaper to have pigs and even buy them. The feed concept, it's really going to work here because Pohnpeians will always raise pigs. The demand will always be high.”

– Governor Stevenson Joseph

Other states in FSM are very interested in livestock production. This can encourage interstate trade between the FSM states.



Frequency of local processed foods currently available in Pohnpei's restaurants and stores:



100% of restaurant and store respondents think that making locally processed food products in the state is important.

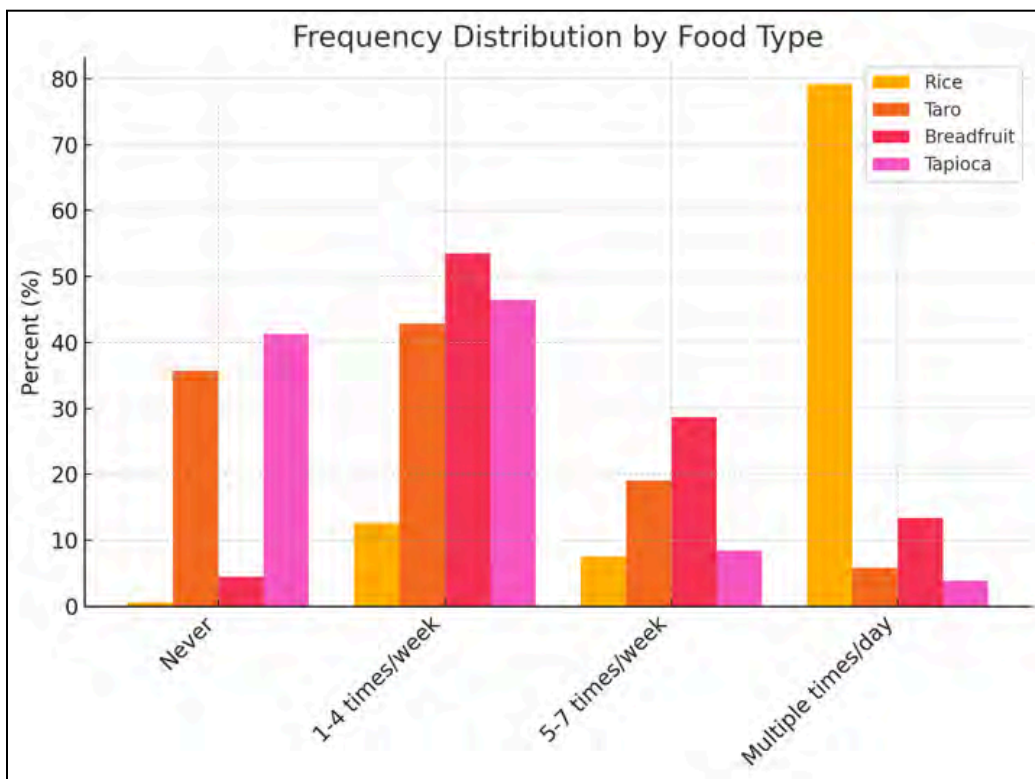
Rice is consumed for convenience but not for preference.

Comparing extensive Pohnpei consumer survey data (FSS and GCFSAP020 baseline), Pohnpeian stakeholders are communicating that they are consuming rice more frequently than staple crops, but it is not necessarily their preferred food.

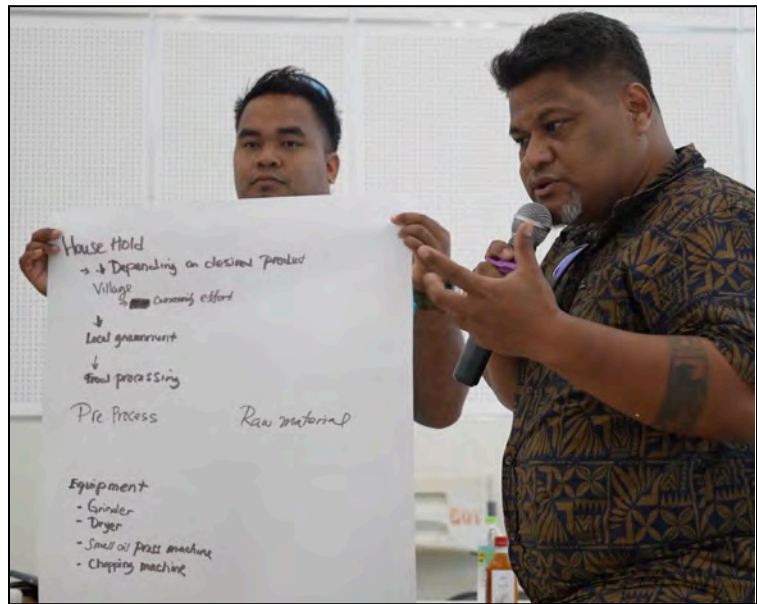
GCFSAP020 Survey of Farming Families Import Replacement Question:

Questions	Resp.	YAP		Pohnpei		Kosrae		Chuuk		All	
		Freq	%	Freq	%	Freq	%	Freq	%	Freq	%
Would you replace imported rice with local starch crops such as taro and breadfruit if they are more available and affordable?	No	42	26	44	28	24	16	18	12	128	21
	Yes	121	74	115	72	124	84	129	87	489	79

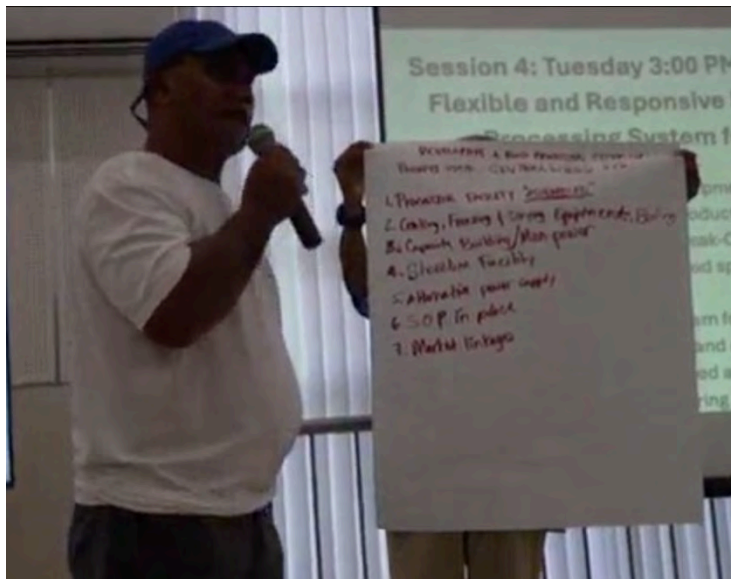
FSS Consumer Survey Pohnpei State:



"Our group determined that the first Tier I is home, the farming family, the people collecting the raw food materials. Tier II is governed by community-based organizations, or associations representing village, because they work with the local authority, which is the local government. The local government will just provide the quality control for the food coming from Tier I to Tier II." - Eugene Joseph



Maritime processing and pickup:



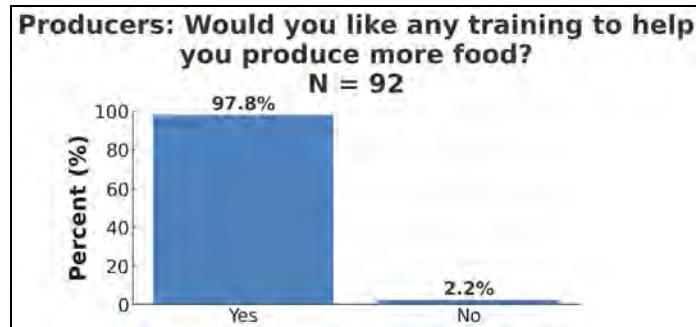
"We want the food processing system to be centralized in a place that all the municipalities in the outer islands will have access to. We prefer a shoreline facilities, unless we have a good waste management system in the facility. We picked a centralized facility in Kolonia because the power system will be convenient. We want to link all the markets and all the farmers into the facility."

- Local farmer

Participating stakeholders proposed that fishing and aquaculture will be a two-tiered system. Fishermen from Pohnpei main island and outer islands can bring their fish to a **fish processing** center in Kolonia, where they can deliver fish to be sold fresh, or rent out equipment to dry,

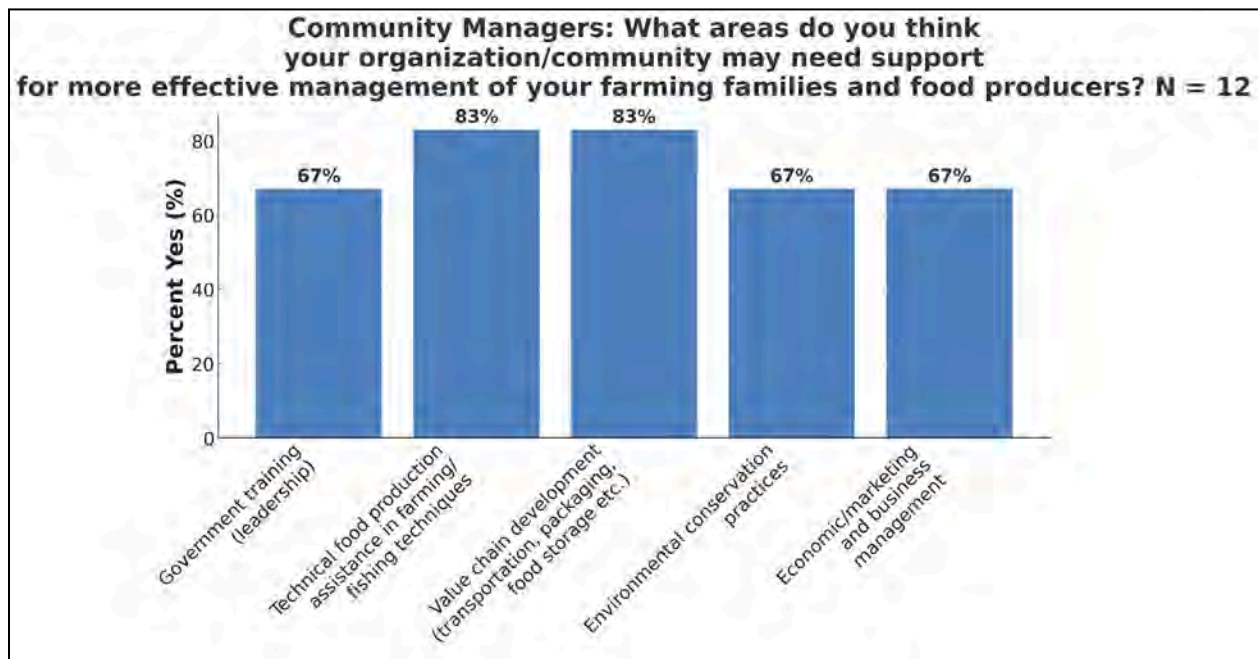
salt, and further prepare fish. This Tier III processing center could process bycatch brought by commercial fishing vessels and turn fish waste into animal feed.

The outer islands do not have access to refrigeration for storage and have limited pathways to the main island. It will be important for outer islands to focus on foods that require less processing for local consumption like dried fruits and vegetables, salted fish, coconut sugar and milk to be consumed immediately. Outer islands can sell non-perishable items to the main island like ropes, mats, and fibers made from banana and betelnut leaves.



A significant challenge to local food production is the shortage of technical expertise in product development, as reported by 83% of survey respondents. Without skilled personnel, it becomes difficult to create, refine, or expand product lines, which stifles growth and diversification within the local food

industry. Additionally, 53% of respondents mentioned a shortage of trained workers, reflecting a workforce gap that may further hinder productivity and the consistent quality of local products.



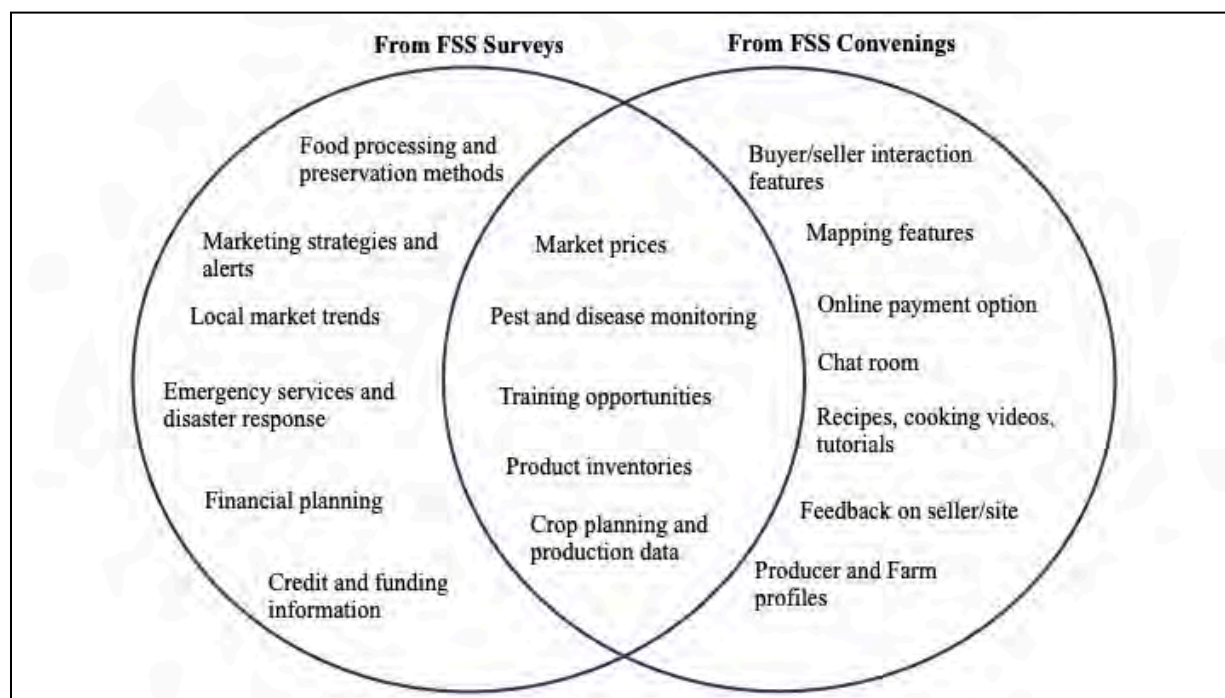
Training programs are crucial to the success of food system development. Past projects have only focused on new infrastructure, and as soon as the equipment broke down, there was nobody to fix it. **Providing producers with comprehensive training resources can empower them to**

navigate the complexities of food processing and marketing, fostering a more robust and competitive local food industry. It is necessary to ensure that trainers themselves have adequate training on topics of interest to producers.

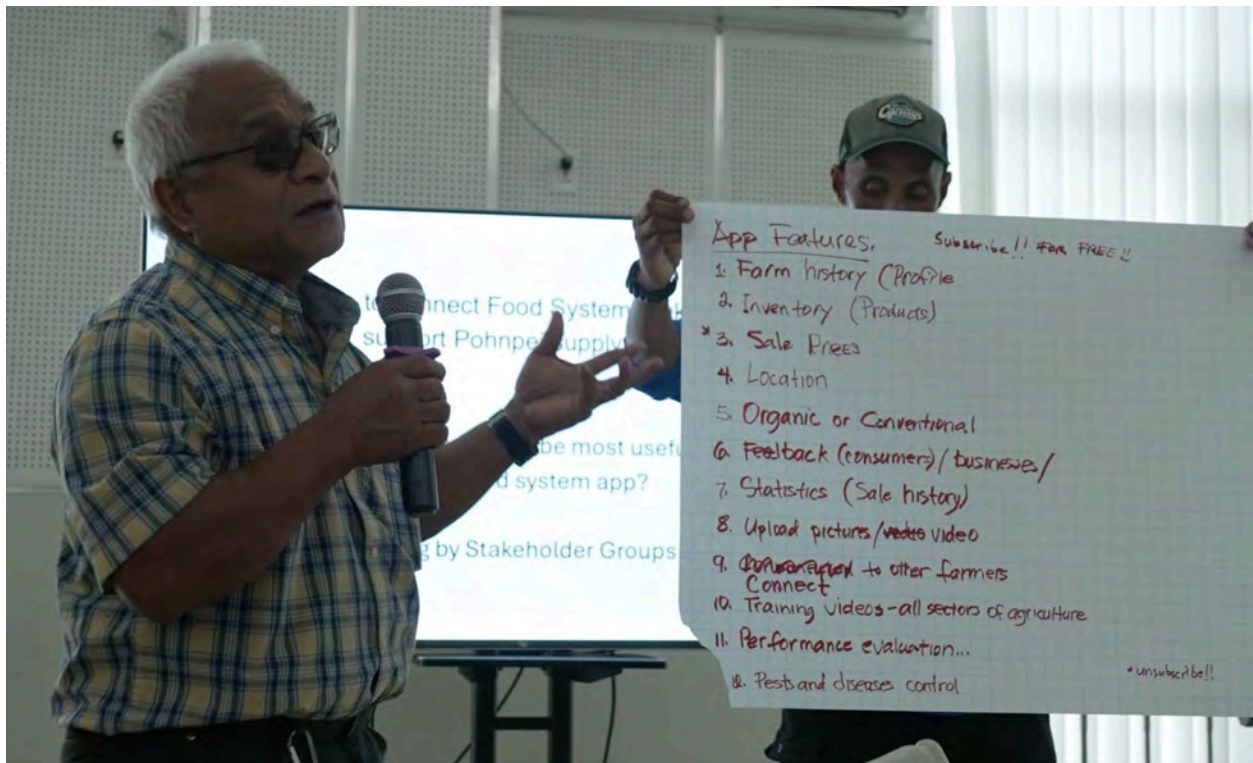
FSS Survey Results: Training requested by Pohnpei Food Producers

Topic	Training Requested (>50% Yes by Producers) (N= 92)	Training Needed (<50% knowledgeable Trainers) (N=13)
Agriculture	General crop production/planting timing; Improving your soil	<i>Training available on island</i>
Livestock	General livestock management; Making local feed	General livestock management; Feed formulation
Marine/Aqua culture	Fishing safety & search & rescue	Fishing safety & search & rescue
Relevant Technologies	Greenhouse growing	<i>Training available on island</i>
Climate Change	Sustainable farming & land management; Invasive species management	Invasive species management
Marketing	Food preservation/processing/packaging/marketing; Product marketing	Product marketing
Business Management	Business planning & management; Financial management	Business planning & management; Financial management

Requested Pohnpie State Food System App features:

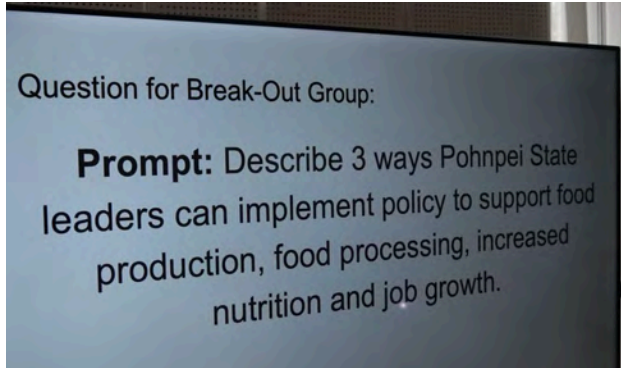


Pohnpei stakeholders identify the need for a food systems app to strengthen communication and information. There are current connectivity gaps within Pohnpei’s outer islands, however, there are new solutions in Starlink, satellite links, and improving infrastructure to mitigate these issues. Facilitating an easier way for groups to connect is essential in keeping the food system organized and productive. Having features like offline availability also ensures that the outer islands can participate without infrastructural issues with connection. Sustaining a centralized hub for information ensures effective communication and allows for stakeholder groups alike to work together. **This new age technology is meant to build upon the foundation of traditional culture, not replace it.**



“We want to be able to pull up each farm’s profile, history and inventory, check prices and location, and know if it’s organic or conventional. There should be customer feedback and a dropdown to connect with other farmers—so you don’t all end up selling cucumbers at once. It will be helpful to have sections to help farmers resolve problems and a section on best disease-control practices.” - Mr. Engly Ioanis

The role of policymakers and community leaders to support local food production:



“I would require every government function to be at least 50% local food (starting with a low number and increasing to 80%, or even 100%). For all these government functions, we should strive to fill the table with all local food. The local market will expand supporting our farmers and fishers because now the government is behind it. We could do this at hospitals, schools, government functions, wherever public funds are used to purchase food.” – Governor Stevenson Joseph



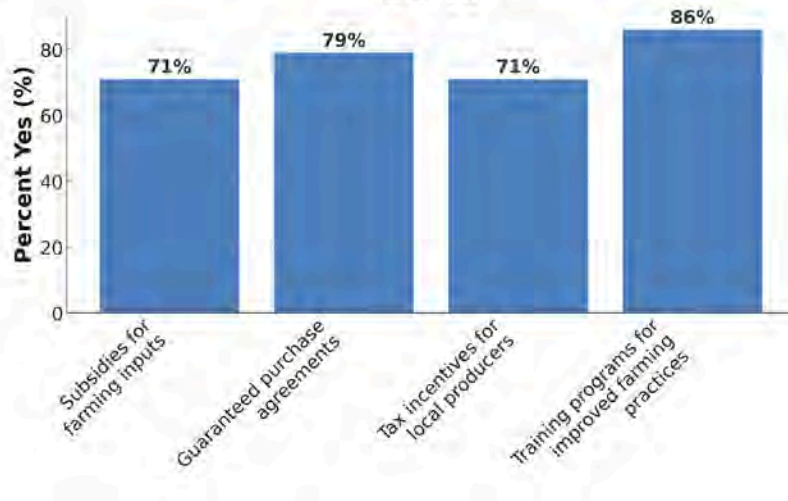
“As the government, we should increase taxes on unhealthy imported foods. We should tax imported chips to support the production of local banana and breadfruit and taro chips. Community leaders and school officials should align their policies by restricting junk food at school stalls and encouraging parents to send local snacks like bananas to schools instead of ramen.”

- Director Mark Kostka



“We must consider imposing tariffs on commodities that can be produced locally, but we need to first look at our production capacity for those products before we start imposing taxes or else we end up with nothing in the end.” - Assistant Secretary Bermance Aldis

Policymakers: What specific policies can support farmers in supplying raw materials to a Food Innovation Center?
N = 14



Policymakers report they can contribute to a stronger food system in multiple different ways.

There is a strong interest in increasing community involvement with local leaders and policy development. Focusing on what producers need via training, infrastructure, selling, and security is largely supported by policymakers as they strengthen ties to local involvement.

Local stakeholders emphasized that expanding local production should be paired with demand-side policy support. By requiring schools, hospitals, and government events to source a share of their food locally, reliable markets can be created for Pohnpei’s farmers.

Convening Participants Identified the First Two Years of Pohnpei State 5 Year Plan as:

- Commerce and Industry in collaboration with SBDC to oversee for the first 2 years and provide support
- Build upon Island Food for Local Food Production Education Awareness campaign for health, nutrition and economy growth
- Engaging traditional leaders to advance educational awareness (breadfruit and yam)
- Assessment and identification of locations for processing facilities per municipality to help develop each municipality.
- Assessment of commodities and volume currently produced and projected.
- Identification of at least 3 initial products to scale up and systems of production
- Designing the Food Innovation Center and regional facilities
- Centralized facility for research and development that includes quality control and food safety lab testing, packaging, labeling, distribution. Management responsible for collecting processed goods from municipalities.
- Begin construction/renovation and purchasing of equipment`including establishing cold and food safe storage facilities in each municipality

- Policy - tax waiver or reduction for equipment and supplies (seeds, fertilizer, all inputs) that contribute to food security including local food production, processing, and storage
- Policy - considering taxing imports that compete with local foods
- Public/Private Partnership (NGOs) - multi-stakeholder ownership encourage broad investment
- Assessment - ensure both environmental and social safeguards are in place
- Consider how food production and processing align with current policies and/or need adjustments.
- Formalize institution with Organizational and Management Structure (Cooperative of Pohnpei Farmers (and fishers). 2 representatives from each municipality create a board of directors and within this body, they elect the president, treasurer, and secretary. These representatives are identified by the mayors of each municipality.
- Hiring management and staffing
- Development of tools and IT apps including Information Hub
- Training for the main island and neighboring island. Engage and train our producers.
- Capitalize on NGOs and business and government agencies such as VITAL and Island Food with local knowledge to help with local food processing training
- Promote small grants program
- Support import from neighboring islands (raw materials and value-added products)
- Identify food processing needs/wants for outer islands communities
- Message from Director Kostka to Legislature requesting legislation to facilitate growth of local food production and demand. Government-funded functions included schools to include 100% local foods.
- Pohnpei State R&D to create a price floor to help standardize prices for local food products to ensure fair and consistent prices for farmers.

Indicators of local food system development to increase economic growth:

(money earned, number of beneficiaries, crop production yield, increase in local food consumption, number of micro-enterprises formed, number of jobs created, health benefits, reduction of imports)

Conclusion:

This FSS project provides evidence-based recommendations for the implementation of FSM state-specific food system development and food processing. These suggestions are based on stakeholder input and intended to support increased food production, improved market integration, enhanced community-led management, and stronger inter-state coordination. Ultimately, the project aspires to help FSM build a more resilient, self-reliant, and prosperous food system that meets the nutritional, economic, and cultural needs of its people. A detailed framework for a local food system processing implementation guide follows based on the Pohnpei community's recommendations.

Part II: Pohnpei Food Systems App



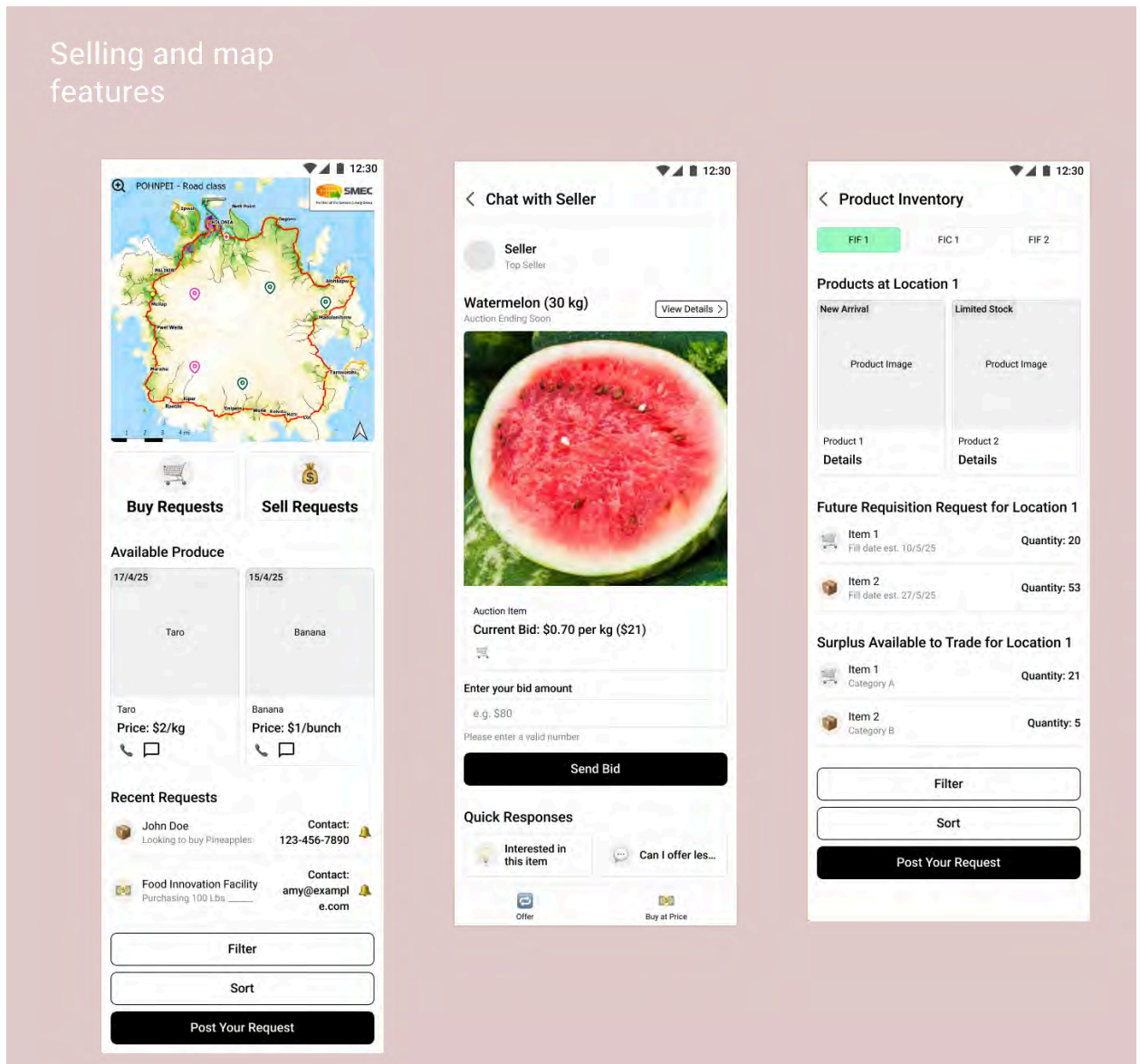
Source: SourceTrace Systems, 2017. Pacific Pets Pathogens Weeds Phone App, 2023.

As identified by policymakers and stakeholders through FSS surveys and convenings, interconnectedness through technology is key to creating an integrated food system that connects all levels of the value chain to one-another. Sharing of information remains limited across FSM's islands, so using technologies such as websites and phone applications is essential to connecting producers, processors, sellers, and consumers. Such platforms offer repositories of information for people to share including agricultural practices (traditional and with new technologies), pest and disease management, market prices, harvest schedules, product availability, event calendars, real-time weather updates, special calls that require foods and other products, and a platform for communicating and linking producers with sellers. By enhancing interconnectivity across the entire food system, a web-based application will maximize efficiency and ensure all participants remain informed about developments in FSM's tiered agricultural ecosystem.

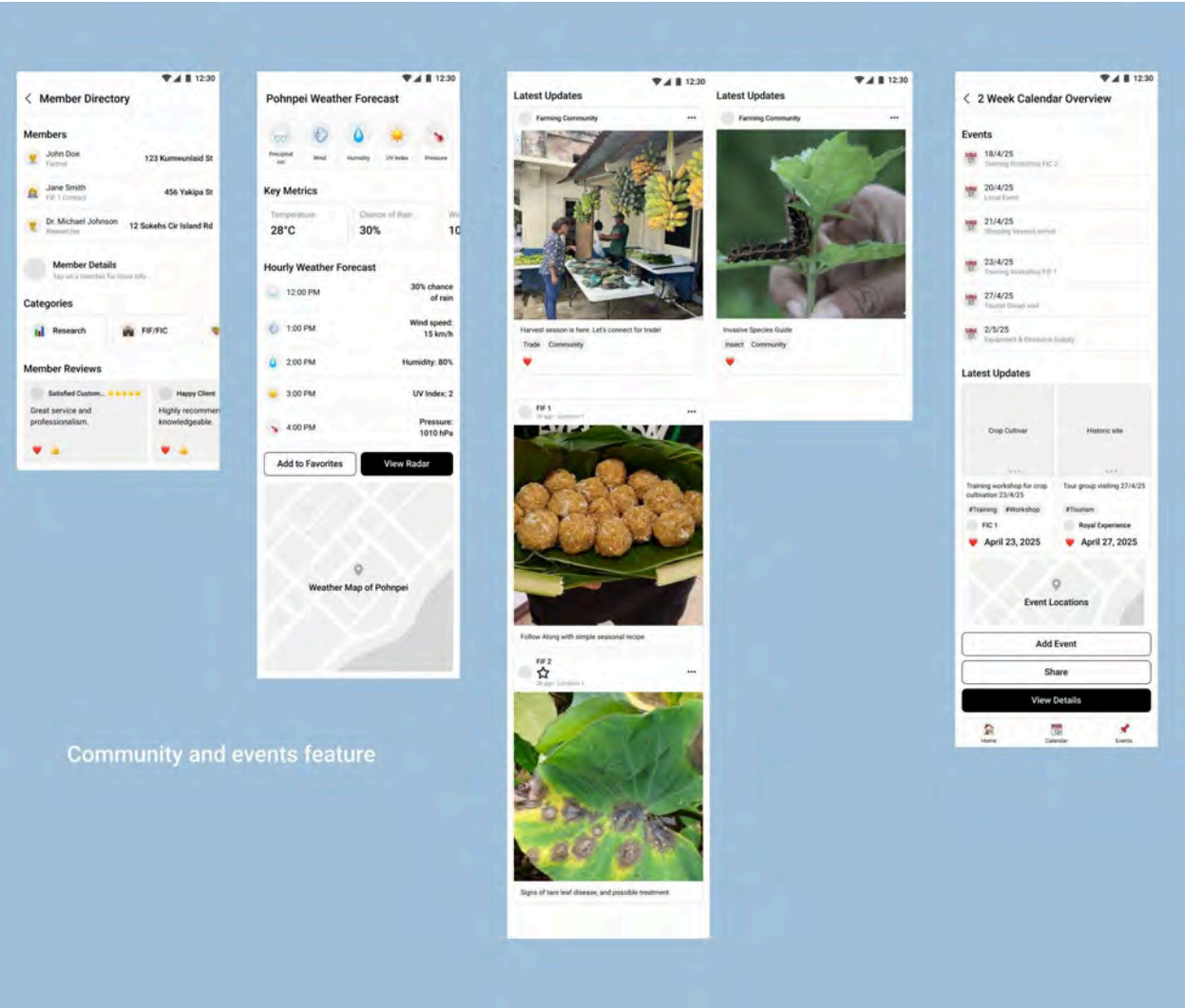
The centralized phone app is becoming popular within food processing hubs as a way to keep everyone connected. This proposed app is only one part of a larger information network, which includes websites that already exist.

Key features include:

1. A map of each island, identifying the locations of products or items available for purchase, and, if buyers want, pins where they want food to be delivered.
2. Buyer-seller chat features to bid on wholesale produce as soon as it is harvested and to inform potential buyers of an upcoming collection or harvest. This chat feature is designed to be private between the two parties and enables the buyer to be in communication with the seller (collector/producer) to be kept aware of the product's availability, quantity, and processing status. This feature also is open to allow both parties to agree upon expectations as to state and quality of product from type of container to package and more. This site would be designed to accommodate and allow transfer of photos and agreements.

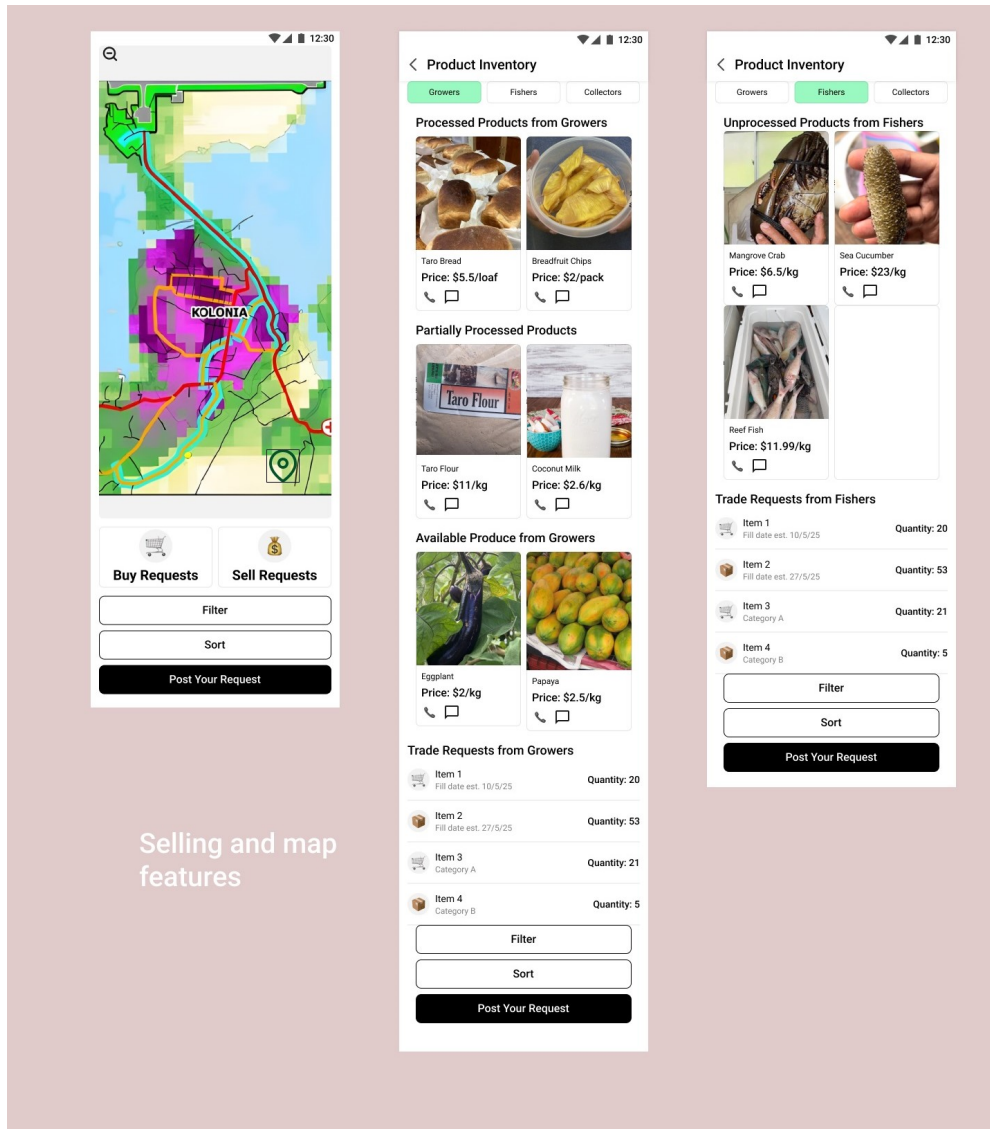


3. A comprehensive product inventory which highlights surplus produce available for trade and pre-order through future requisition requests.
4. A member directory of growers and processors, with business locations, contact information, and community member reviews.



Community and events feature

- Real-time weather forecasts and emergency preparedness information. This could also be achieved by linking to existing platforms Pohnpei State now uses with FSM Telecom and as practiced by DECEM. In this phone app, users would have the ability to report adverse weather and other emergencies in real time as they observe, thus serving as an early warning reporting that can complement the state and national services.



- A community social media feature to highlight local recipes, pests and diseases that emerge, success stories, and event outreach.
- An overview of upcoming events happening in the state, including training workshops and farm/facility tours to help grow the capabilities in all levels of the tiered food processing system.

This phone app needs to be commercialized by a local private vendor and made available to Pohnpei State, compatible with Android and Apple phones and in concert with FSM Telecom and the State. The phone app is to include the following features and functions:

(i) Offline functionality to access information without continuous connectivity to users. That is, there needs to be sufficient memory for photos and data collection remotely when offline for later automatic downloading into the app's system when online.

(ii) Ensure sufficient storage capacity and backup solutions built-in to safeguard data and ensure uninterrupted access.

(iii) Easy-to-follow guides to enhance functionality for use.

(iv) Information dissemination policy and guidelines. FSM Telecom already has policies and guidelines in place to allow for the rapid or timely dissemination of information via SMS text to subscribers. This system is available but has not been used for food security, food production and agriculture/forestry/marine uses per se. Expanding the usage by Pohnpei State as is now done by DECEM's current system to share vital emergency information for the public good through use of SMS texts would greatly strengthen Pohnpei's food system. Messages and notifications prepared by the State (in concert with other organizations such as COM and CRE and others) and submitted to FSM Telecom for review and distribution are recommended. FSM Telecom has a review system in place and is willing and able to expand its use to distribute such information public good (and not commercial) for free to all their subscribers. In short, SMS-based systems are recommended to deliver agricultural information, market updates, and weather forecasts to growers and residents.

(v) FSM Telecom also has policy and guidelines to allow for the rapid or timely dissemination of information via SMS text to subscribers for a fee when such messages are for commercial gain (buying and selling for example). This can be used by commercial growers/fishers and food collectors/distributors if/as needed.

(vi) Discussion with regional STARLINK distributors to determine if such similar arrangements could be agreed upon for their subscribers to get free access to content and SMS as part of their subscription agreement.

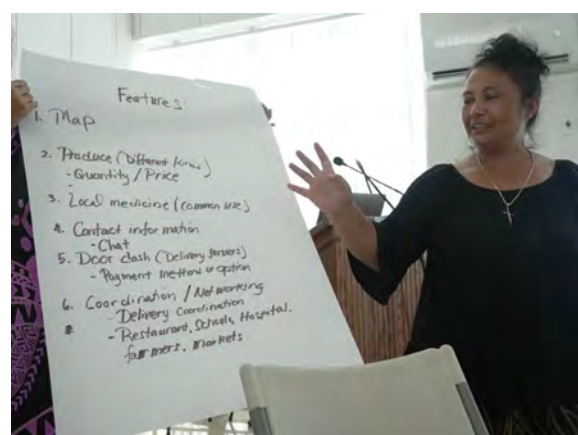
(vii) Building the requisite content for the information hub app which can be expanded upon and included in an online website. We recommend that for Pohnpei State, we make space available on the State's government website which can be linked to the National website. Information relevant for the needs of Pohnpei State would be coordinated by Pohnpei State (e.g. Resources & Development) in concert with FSM National Resources & Development's Office of Agriculture and Office of Trade. Given the current role of COM, CRE, and state and national R&D as well as the limitations relative to staffing and expertise, we also propose to form a

‘Food System Innovation Hub Committee’ to include members from these sectors, as well as those who have been assisting us with our food system and environment, to join in order to have a state and national team that can assist us in building an information library hub for Pohnpei and the FSM. As such, we recommend extending invitations to our current partners, including the Food Security Research Team at Rutgers, the University of Guam, and the University of Hawaii. This Committee can then develop the background information and review the already online sources of information to recommend best practices and sound, reliable information for our crops, their nutritional content, production and processing systems, technologies of interest, identification of pests and diseases, and control recommendations. These information sources are to include scientific reports, state and national reports, and studies which have been conducted but were not previously made accessible, extension materials, learning modules, and easy-to-follow practical guides and information to our farmers and communities.

Information Sharing Use Web-Based Platforms

To be efficient, phone apps will need reliable scientific data and content to be prepared and made available. To strengthen our Pohnpei State Food System foundation, we recommend that staff within the State R&D office be given the responsibility to coordinate with the state government and the COM and CRE to form a committee as detailed above in section (vii).

A Pohnpei State website that allows all users free access to information on agriculture, including marine and fisheries, food production and processing, weather and environmental practices to mitigate against climate change and food security will be developed. Pohnpei State is committed to including a coordinator to contribute toward building and ensuring access to such an information repository.



Pohnpei State Food Systems Solutions Convening Participants share the features they most want in a Pohnpei State Food System App and a shared information system.

Part III

Pohnpei's Food Processing Implementation Framework

Here are the proposed steps to developing a food processing system for the State of Pohnpei based upon community input shared as part of the Food Systems Solutions project surveys, focus groups and convenings.

These sustainability strategies will inform both the economic opportunities available to local communities and the broader village and national approaches to improving food security and sustainable development systems. These adaptations to food prioritization, and valuation systems are flexible and responsive to real-time events, ensuring feedback from state government and community members to inform and guide the development of a sustainable and culturally relevant local food processing system.

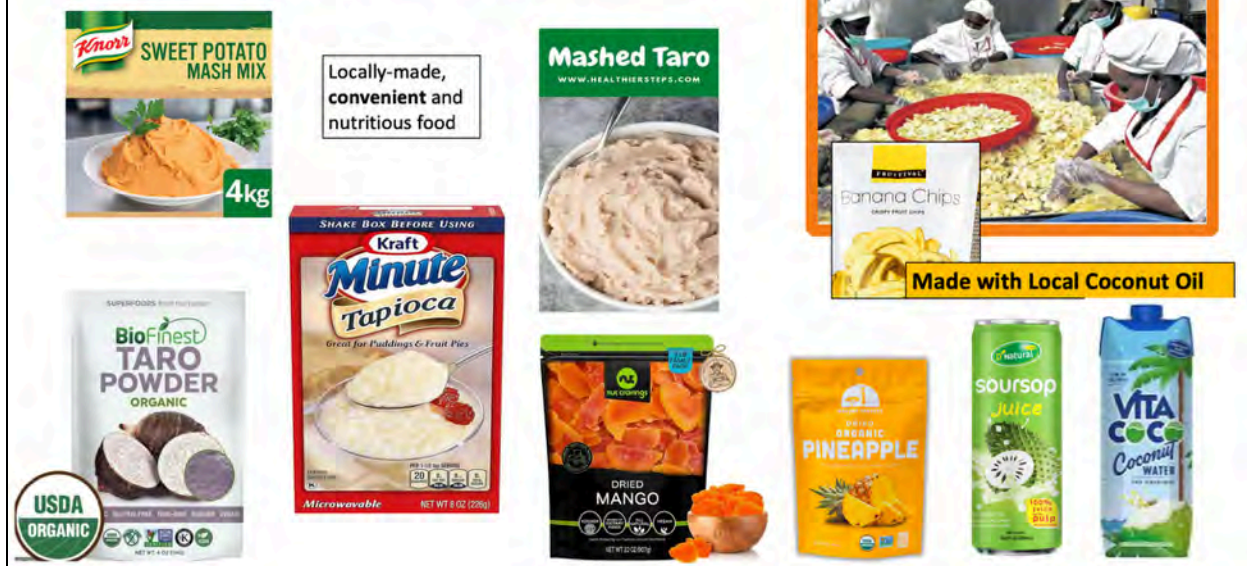
The Value of a Food Innovation Center (FIC) in Food Processing System:

A Food Innovation Center (FIC) within a local food processing system offers **versatile equipment** for food safety, commercial-grade processing and professional packaging that can be used for a variety of staple crop preparation. Food Innovation Centers are intended to increase affordability and availability of local, healthy, and convenient food products while providing jobs, strengthening the economy, and reducing dependence on imported processed foods.



Centralizing Processing of Local Crops for Convenient Processed Foods

Taro - high levels of vitamin C, vitamin B6, and vitamin E



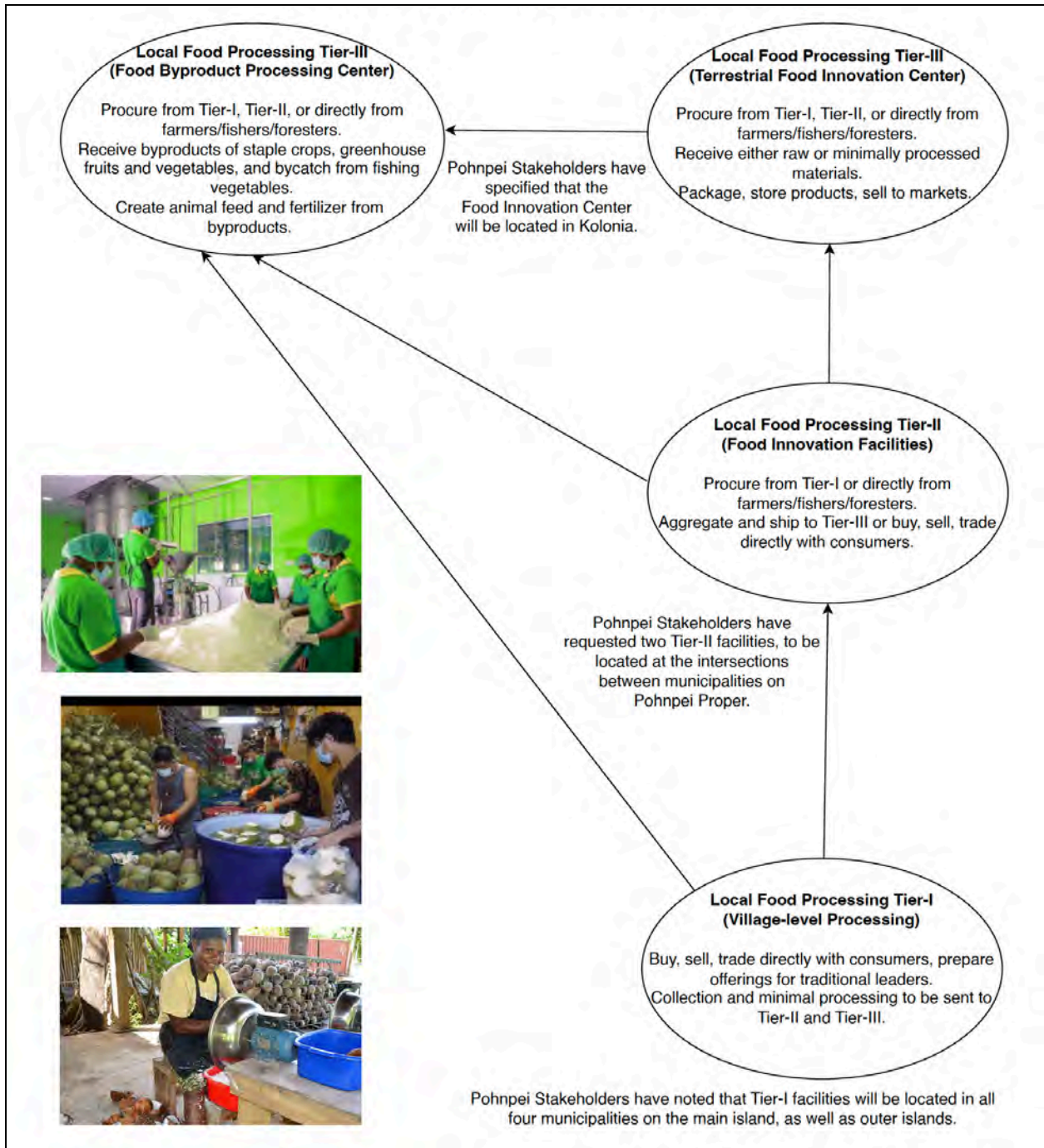
Capacity Building and Job Creation examples



Decentralized, Tiered Food Processing System for Pohnpei State:

In Pohnpei State, stakeholder feedback indicates that an FIC would be part of a decentralized food processing system with linkages from households and villages to communities and regions and ultimately feeding into a the larger-scale shared FIC processing facility..

An Illustrated Example of the Connections between the Food Processing Facilities at each Tier with the Food Innovation Center at Tier III.



The proposed Pohnpei State decentralized food processing system begins at the household and village level, referred to as **Tier-I**. This tier provides basic, cost-effective, and context-appropriate processing equipment, which can be operated without electrical power. Tier-II consists of community-level Food Innovation Facilities (FIFs), with approximately two such facilities in Pohnpei State. These facilities include teaching and training kitchens for commercial food preparation, mid-scale processing equipment for priority products identified by Pohnpei State representatives, and storage infrastructure. Each Tier-II facility will be specialized for certain agricultural inputs, i.e. one is specific to coconut processing and one specific to breadfruit and taro processing. Yet, with the needed equipment for each of those commodities, additional plant-based commodities could also be processed. Tier-III represents a more advanced, state-level FIF, with one centralized facility per state equipped with modern, large-scale processing technologies for terrestrial products. Another smaller scale Tier-III facility will be focused on processing of marine bycatch and terrestrial byproducts, using it for animal feed and fertilizer. Tier III facilities are designed to be FDA compliant for food safety allowing local, regional and eventual international marketing of these food-based products. These three tiers are designed to function both independently and in coordination with one another. This modular structure reduces operational risk, promotes rapid adoption, and creates opportunities for income generation and employment. Each FIF and the broader FIC system are intended to stimulate local food production and processing while enhancing food security. Key stakeholder surveys and multi-day convenings with grower, seller, consumer, and community leader representation were employed to identify the location of these facilities and priority food products to be processed. An in-depth analysis of survey and convening responses can be found in the evidence-based stakeholder goals document. These decisions were informed by tradition, culture, familiarity of traditional food systems, and market demand, and aligned with existing agricultural and foraging/collection practices. This design is rooted in a decentralized approach that emphasizes food safety, accessibility, and broad-based participation, and mitigates risk. The establishment and utilization of FIF and FIC as economic drivers of change will promote and increase local food production, processing, and consumption while reducing imports and creating a more circular economy that keeps more money in the state for families and communities. Ultimately, this proposed implementation serves to tap into and sustain an already existing, under explored local market.

Tier I Food Innovation Facility (FIF)

– Located in the village:

Tier-I facilities represent the foundational level of the food innovation processing system, consisting of 100-200 square foot spaces that can include communal kitchens. Pohnpei stakeholders have suggested twenty-four Tier-I facilities, four in each main island municipality and one on each of four outer islands (Mwoakilloa, Sapwuahfik, Nukuoro,

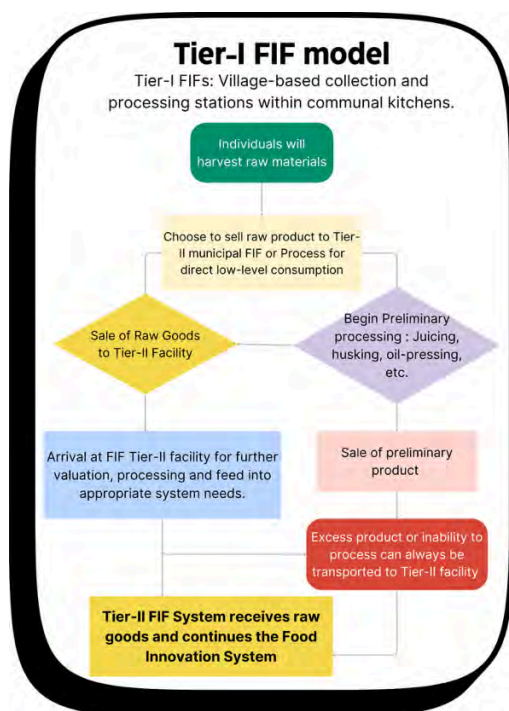


and Kapingamarangi). Pingalap already has separate funding to build a Tier-II facility. These spaces are equipped with fully functioning workbenches and essential materials necessary for preliminary food staging and processing activities.

The operational workflow begins when individual community members harvest raw materials from their local sources and deliver them to the village-level communal kitchen facility. They can choose to prepare raw materials for direct sale as inputs, making them available for weekly pickup by Tier-II facilities, or they can opt for low-level processing that involves preliminary, low-energy equipment to create value-added products either for direct consumption or to be brought to Tier-II .

The processing activities at Tier-I facilities encompass a diverse range of products and techniques. For immediate sale items, the facilities focus on products like coconut water or fruit juice, which will perish quickly and therefore only be accessible for same-day consumption. Simultaneously, staple crops such as taro, bananas, and breadfruit are collected, minimally processed, and stored in designated areas, awaiting transport to higher-tier facilities where they will undergo more sophisticated processing. An important aspect of the Tier-I operation involves the strategic utilization of byproducts, where food processing waste is sent to the specialized Tier-III facility to be converted into valuable components for poultry and animal feed, ensuring minimal waste throughout the system. Each Tier-I facility will use food waste to prepare compost piles, which will then be used to tend to soil in the surrounding area. Food waste, green kitchen waste, and locally available materials will be collected and placed on top of the ground in 1m x 2m x 1m piles or into specially constructed open boxes made of local materials. If space is available, the compost pile can be placed within a wooden frame. Composts will be placed away from toilets and streams, and will be watered during dry periods, but otherwise simply turned with a shovel or hoe every few weeks. The more poultry or animal manure that is added, the better the quality of the compost will be, because it will accelerate the decomposition process and make the compost more uniform

Documentation and coordination represent critical components of the Tier-I operation, with community partners maintaining comprehensive records through both physical and digital logging systems. These logs capture detailed information about food harvesting activities, preparation and processing procedures,



and all exchange transactions that occur within the facility. This meticulous documentation serves a dual purpose, providing immediate operational insights while feeding into the broader national food sustainability and security planning system through a dedicated food systems mobile application.

The market coordination and communication functions of Tier-I facilities rely heavily on the digital app system to maintain efficiency and prevent market oversaturation. Through this platform, facilities log processed items and raw material inventory, coordinate with community leaders to organize local sales events, and communicate product availability directly to local consumers. The system also enables sharing of information with other Tier-I processing centers, creating a network that helps prevent oversaturation of single products at higher-tier facilities and ensures balanced market distribution across the region.

Each Tier-I facility operates within a comprehensive output notification system that digitally reports critical operational metrics. These reports include the quantity of raw materials received during each operational period, the amount of processed goods available for local market sales, the volume of materials designated as inputs for Tier-II value-added processing systems, and the quantity of food scraps that will be delivered to the Tier-III Bycatch and Animal Feed Processing Center facility in Kolonia. This systematic reporting ensures transparency and enables effective coordination across all levels of the food innovation network.

Tier-II Food Innovation Facility Layout (5,000–6,000 sq ft – Located between Madolenihmw, Sokehs, Kitti, Uh, and Nett.

Tier-II Facilities will receive raw and low-level processed materials from each of the twenty-four Tier-I facilities. During the FSS convening, Pohnpei policymakers highlighted the need for each facility to be accessible to all municipalities of Main Island Pohnpei. Tier-II processing locations will each be equipped with manual and powered equipment, storage spaces for fruits/vegetables and staple crops, and outdoor community kitchens for workshops and training.

The Tier-II system has additional facilities in their ability to process staple crops, including bananas, coconuts, taro, and breadfruit and has community kitchen facilities. Tier-II facilities are designed with added precautionary measures to ensure that they are all uniform, clear of contamination opportunities, and ensure the most sanitary practices throughout the system workflow.

Our core layout proposal includes designated square footage and functionality for each critical process area:

- Receiving/Loading Dock – 1,000 sq ft
- Specialized Staple Crop Processing - 600 sq ft
- Community Kitchen/Workshop Training – 500 sq ft [Outdoor]
- External Storage Container
- Factory Room 1,000 sq ft

Tier-II Food Innovation Facility 1:

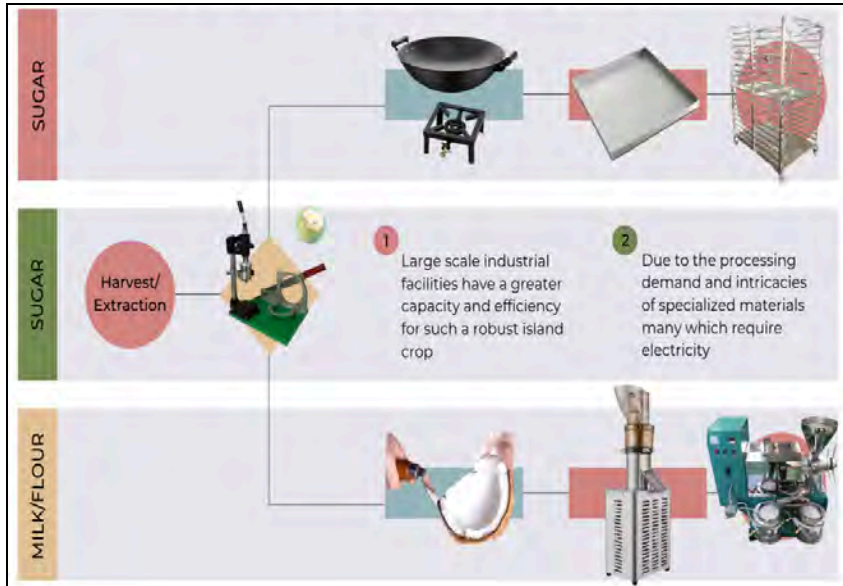
The first Tier-II FIF will be focused on processing coconuts for sugar, milk, and vinegar. Uh municipality currently produces 70% of all coconuts on Main Island Pohnpei, so this proposed facility will be located around Uh. Collected sap from coconut flowers will be brought for sugar extraction, while whole, dehusked coconuts will be brought for milk extraction. Processed sugar and milk will be sent in bulk to the Kolonia terrestrial Tier-III Food Innovation Center for food safety testing, packaging and storing, while byproducts like coconut water and coconut cakes will be sent to the Tier-III byproduct processing Center to be used as animal feed and fertilizer.

Tier-II Food Innovation Facility 2:

The second Tier-II FIF will be focused on processing breadfruit, bananas, and taro for flour and chips. Cleaned breadfruits, taro, and bananas will be collected at Tier-I facilities across Pohnpei main island and outer islands. Tier-I facilities will have the option to dry and grind their products for value-addition, or

this can be done in Tier-II. Flour and chips will be created in bulk at this Tier-II facility and sent to the Tier-III Food Innovation Center for testing and packaging. Byproducts will be sent to the Tier-III Byproduct Processing Center for animal feed and fertilizer.

Example Coconut processing for Milk/Flour/Sugar at Specialized Tier-II Facility:



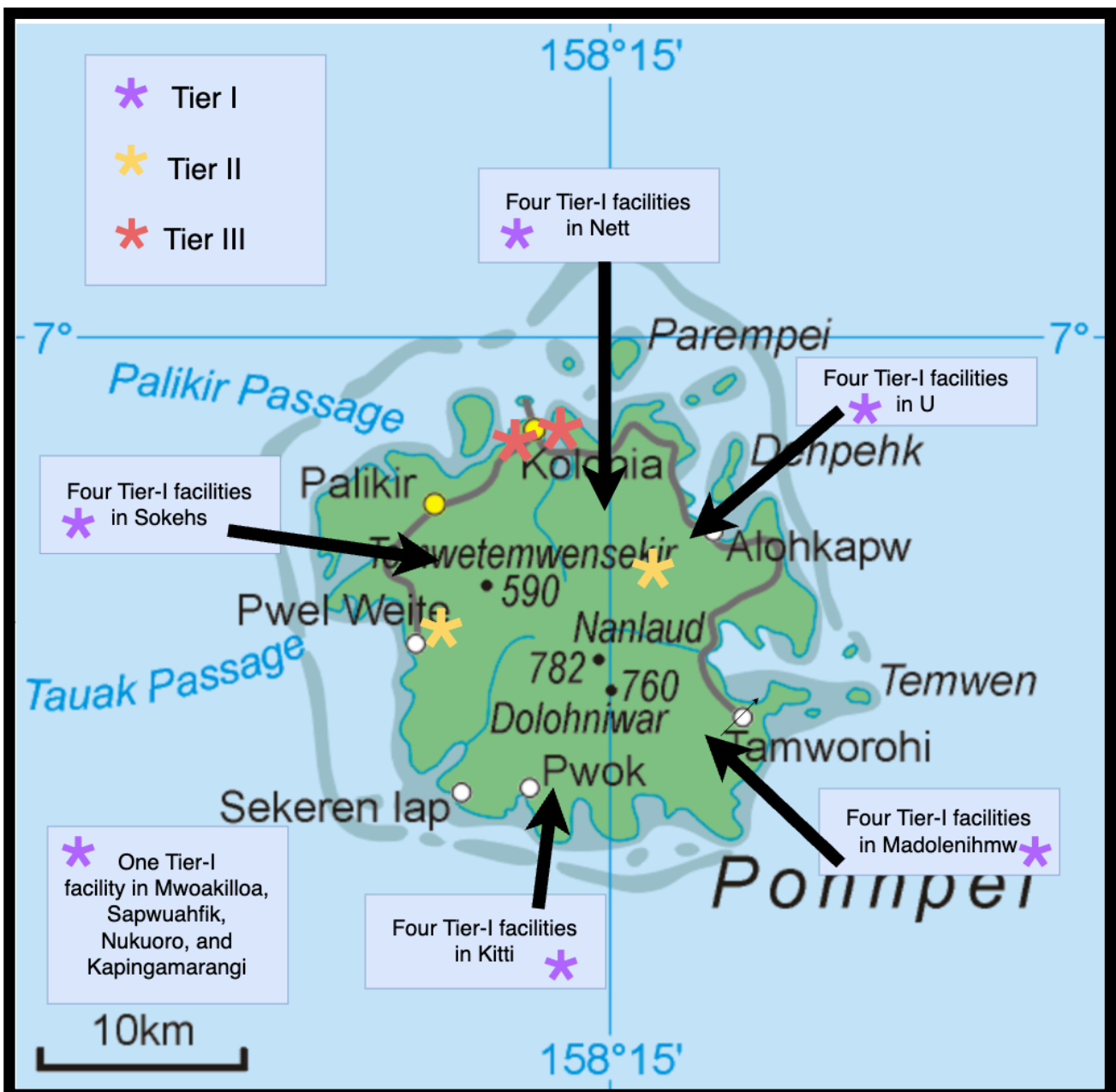
Coconut processing is more integrated than most other fruits and vegetables and requires the use of more sophisticated technologies to ensure that all parts are used with the most efficiency. Certain aspects of the coconut processing system can be done at the Tier-I FIF level but the waste generated or its inability to retrieve all the flesh or all of the water will render it less efficient.



Taro flour processing on Pingalap atoll, Pohnpei State.

Map of Locations for Food Processing Facilities in Pohnpei State:

24 Tier I Facilities
 2 Tier II Facilities
 2 Tier III Facilities



Tier III Terrestrial Food Innovation Center Layout (5,000–6,000 sq ft) - Located in Kolonia

The proposed Tier-III layout includes designated square footage and functionality for each critical process area:

- High-Level Processing and Packaging Area – 1,000 sq ft
- Community Kitchen – 1,000 sq ft
- Storage Areas – 800 sq ft
- Administrative Office – 300 sq ft
- Food Testing Lab – 300 sq ft



Food quality check, packaging and distribution at Tier III facility.

Technical Scope of Each Room Designation Area

Room Designation	Function, types of crops and types of technology
Room 1 Staple Crop Processing	<p>Functions: Washing, chopping, drying (solar-assisted), grinding, and packaging.</p> <p>Crops: Breadfruit, taro, cassava, coconut.</p> <p>Technologies: Solar dryers, low-energy grinders, local packaging systems</p>
Room 2 Vegetable & Fruit	<p>Functions: Cleaning, peeling, slicing, dehydration, vacuum sealing.</p> <p>Produce: Banana, papaya, mango, greens.</p>

Processing	Technologies: Blade processors, solar drying systems, hand wash stations.
Room 3 Community Kitchen	Functions: Cooking demos, nutrition education, recipe development. Tools: Solar-powered stoves, fermentation crocks, culturally rooted recipe books.
Room 4 Storage Areas	Features: Dry and cold storage, inventory tracking, adaptive cooling systems including eggs
Room 5 Administrative Office	Functions: Recordkeeping, training coordination, business management.
Room 6 Food Testing Lab	Functions: Nutritional testing, product development, food safety monitoring.
Room 7 Workforce Training Room	Functions: Video display, hands-on workshops, youth and women engagement.

Tier III Bycatch and Animal Feed Processing Center Layout (5,000–6,000 sq ft) - Located in Kolonia

The proposed Tier-III layout includes designated square footage and functionality for each critical process area:

- Terrestrial Byproduct Collection Area – 500 sq ft
- Marine Bycatch Collection Area – 500 sq ft
- Storage Areas – 800 sq ft
- Animal Feed Processing Area – 1,000 sq ft
- Fertilizer Processing Area – 1,000 sq ft





Technical Scope of Each Room Designation Area

Room Designation	Function, types of crops and types of technology
Room 1 Terrestrial Byproduct Collection Area	Functions: Collecting, Sorting. . Crops: Breadfruit, taro, cassava, coconut, banana, green vegetables, mango, papaya. Technologies: Low-energy grinders, freezers, vacuum sealers
Room 2 Marine Bycatch Collection Area	Functions: Collecting, Sorting. Produce: Wild-caught fish, farmed fish, shellfish, sea cucumbers. Technologies: Freezer, grinders, renderer, centrifuge, dryer, pulverizer.
Room 4 Storage Areas	Features: Dry and cold storage, inventory tracking, adaptive cooling systems
Room 5 Animal Feed Processing Area	Functions: Processing, Preserving, Packaging. Technologies: Freezers, dryers, grinders, centrifuges, pellet mills, pellet coolers, crumblers, packaging equipment
Room 6 Fertilizer Processing Area	Functions: Processing, Preserving, Packaging. Technologies: Shredders, grinders, compost turners, pH monitors, packaging equipment

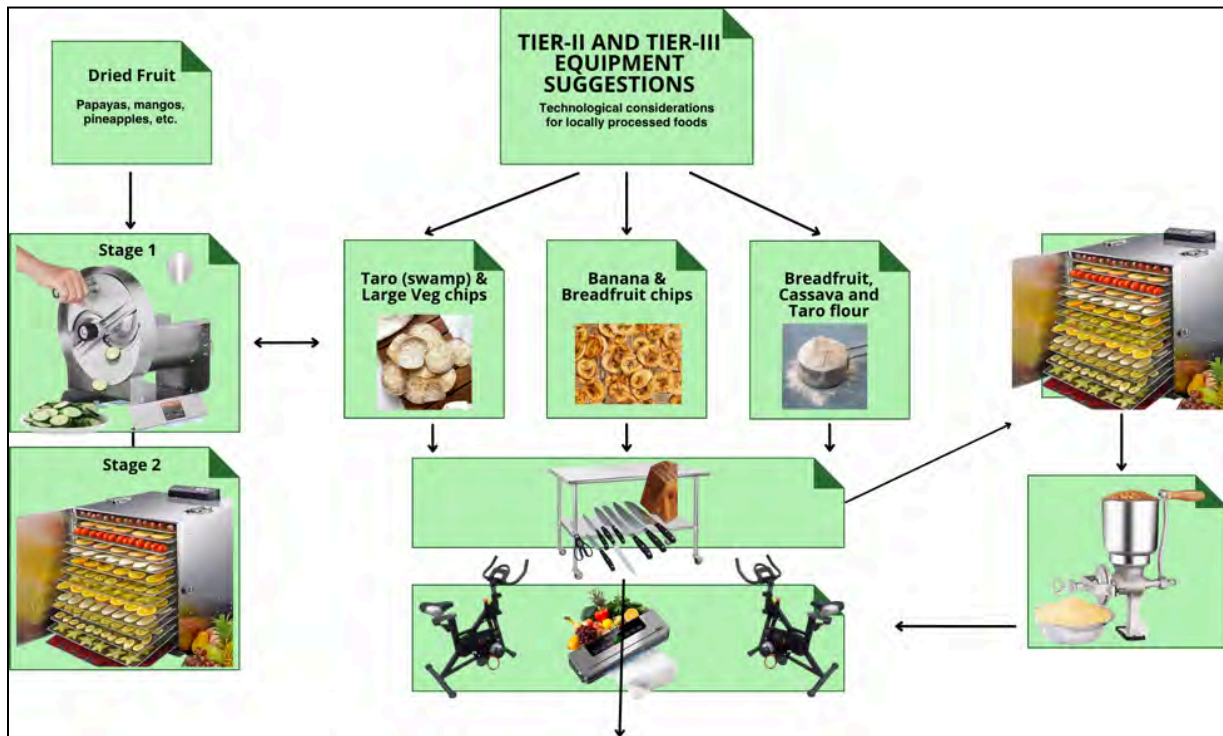
Illustrated Example of the Maritime Processing at the Tier-III Bycatch and Animal Feed Processing Center.



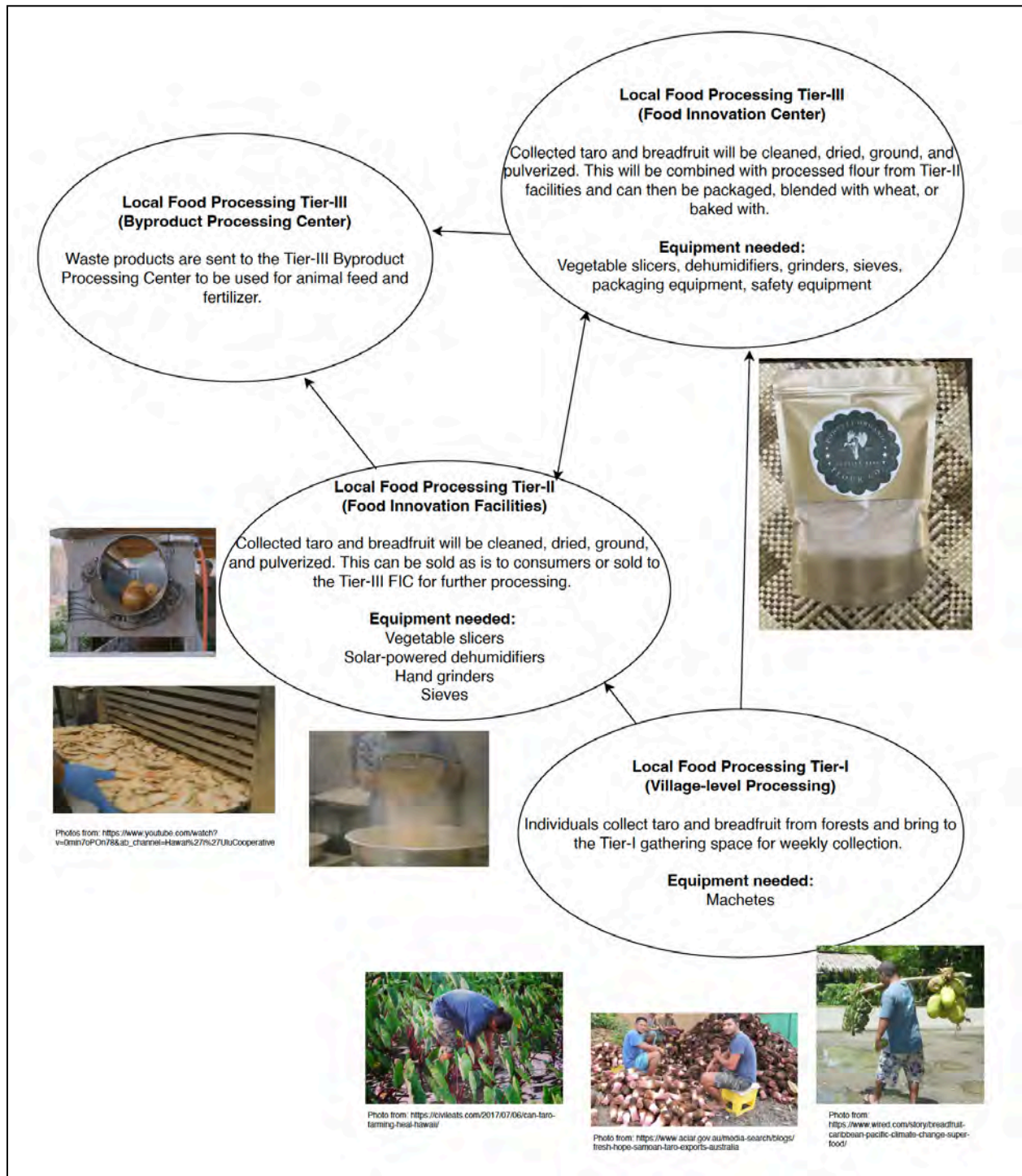
These full-scale regional Food Innovation Centers will be supporting research, policy integration, high-volume processing, storage, waste management, logistics, and training. The facilities will be located in Kolonia and will be fully supported by electricity and back up generator power, which is crucial for the high-powered equipment for processing, testing, and long-term storage. The Terrestrial FIC will produce the highest level of value-added products with the longest shelf life and highest safety standards. This implication is crucial because of the level of sophistication, long term storage and industry agreed upon during convening requests and suitable to meet the lionshare of the requests. Such a facility will achieve the highest level of preservation, processing, and innovation.

Food processing will be completed at this level and a long term storage unit will be attached for inter island support (when needed). This will also be the site of the data center, providing both data analysis and tracking seasonal trends, purchase/sale schematics and informing representative food system input collaborators with up to date, live-time updates. This facility will host large conferences and facilitate large scale convenings, meetings and trainings.

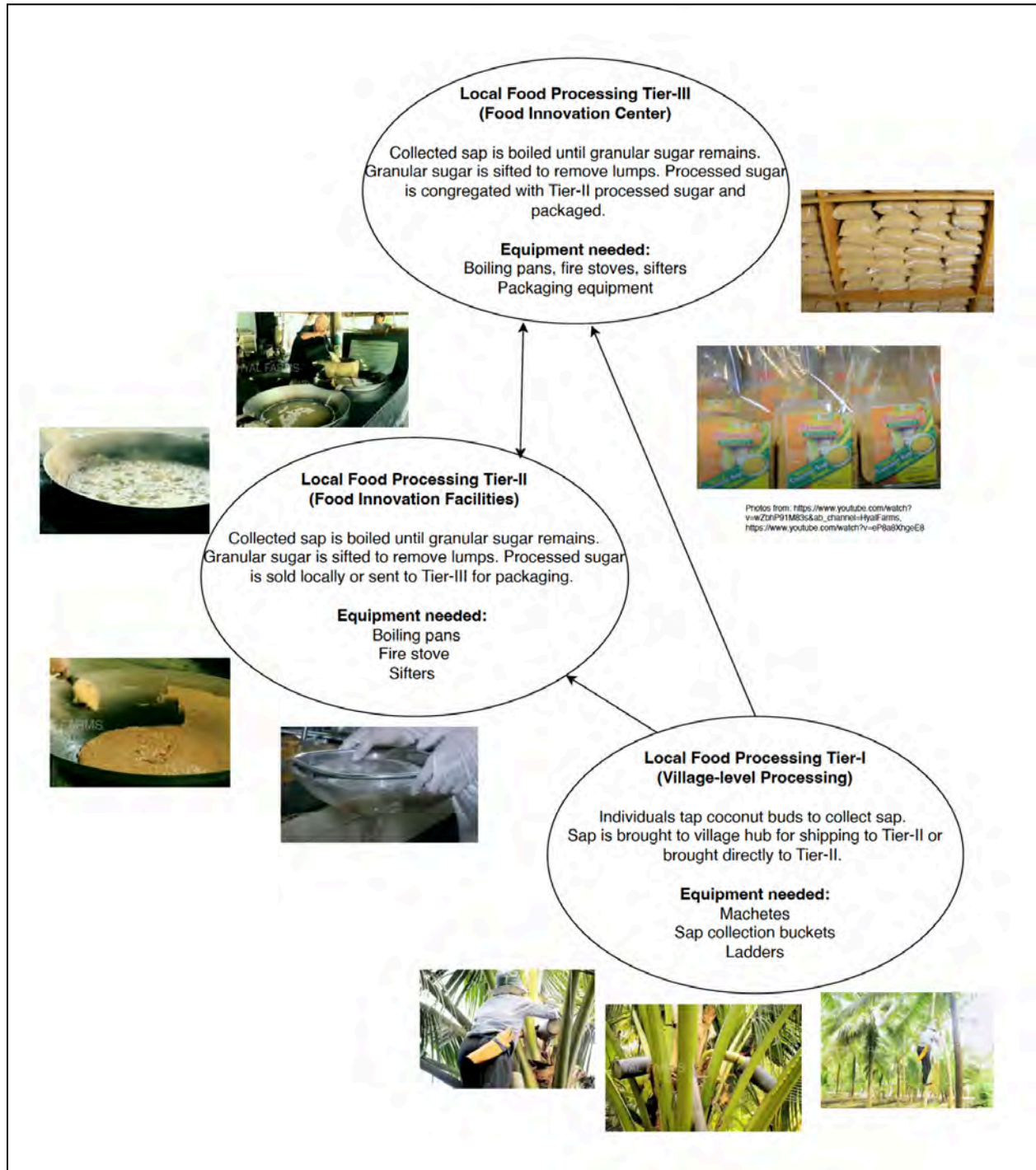
Example of Tier-II and Tier-III Processing System:



Example of Tiered System for Processing of Taro and Breadfruit Flour:



Example of Tiered System for Processing of Coconut Sugar:

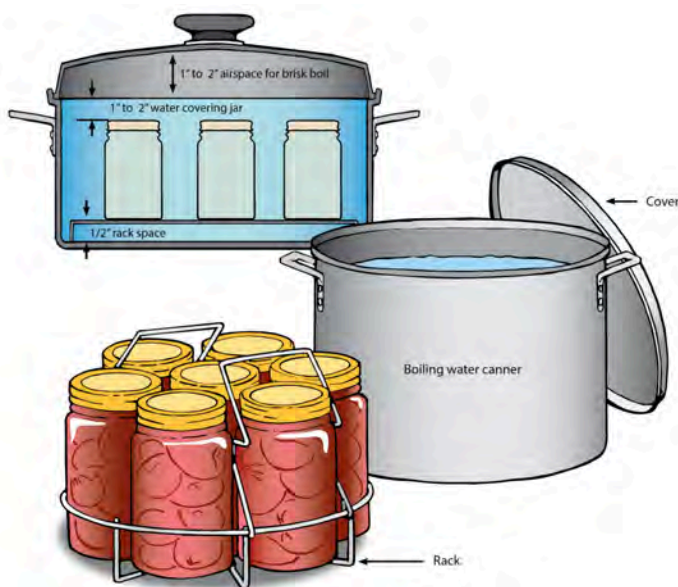


Tropical Food Preservation through Canning and Pickling

Stakeholder surveys indicated the desire for longer term storage through shelf-stable, ready-made products. Consumer survey respondents ranked pickled vegetables as a top requested food item, and the seasonal availability of preferred fruits documented in the GCFSAP020 Baseline Surveys demonstrates a clear need for canning as an off-season preservation method. This overview brings together best practices in food storage through canning and pickling, adapted for environments of high heat and humidity, which accelerate food spoilage. Below is a review of canning and pickling practices that highlight food safety and longevity of shelf life.

Fundamental Principles of Canning and Pickling

Canning works by heating food to very high temperatures (116-121°C) under pressure and sealing it in airtight containers. This heat kills harmful bacteria, enzymes, and other microorganisms that cause food to spoil. The airtight seal prevents new bacteria from getting in and keeps gases or liquids from escaping. This process makes food safe to store at room temperature without refrigeration.



Royer, 2022

Pickling preserves food by making it acidic. When food becomes acidic enough (with a pH below 4.6), harmful bacteria like *Clostridium botulinum* cannot grow. There are two ways to make food acidic for pickling: adding vinegar directly, or using natural fermentation where beneficial bacteria produce acid that lowers the pH naturally.

Both methods allow food to be stored safely for long periods without spoiling.

Summary table of canning and pickling processes, from *Peter & Lief (2003)*:

Category	Canning	Pickling
Microbial Stability	Very High (Sterile)	High (if pH maintained < 4.6)
Shelf Life (in controlled environment)	1-5 years	6-24 months
Energy Input	High (Thermal technology, 1-2kWh/batch)	Low (Minimal heating)
Nutrient Retention	Moderate - Low (Thermal loss of Vit C & B-Complex)	Moderate to High (Some vitamin loss in brining)
Sensory Qualities	Texture/structure changes (Softening)	If Brine controlled can maintain crispness
Failure Points	If seal is compromised	pH drift, unstable fermentation, yeast/mold growth

Workflow steps for Canning (Pressure Canning Emphasis)

Steps	Consideration
Step 1 (Selection)	Harvest selection of produce should occur at peak ripeness. <i>Bruised, moldy or overripe food items should be rejected</i>
Step 2 (Cleaning and Prep)	Food stuffs should be washed in potable water with 50ppm chlorine solution <i>Provisions for food items should be discerned whether to peel, core, slice as needed based on food item</i>
Step 3 (Pre-treatment)	Blanch (high-acid foods) like tomatoes and fruits Boiling (low-acid foods) like green beans, poultry
Step 4 (Packing Jars)	Hot pack methods are often preferred in humid regions to reduce internal jar airspace Maintain headspace of about .5-1 inch
Step 5 (Sterilization/Pressure Canning)	Use Pressure Canner at 10-15 psi <i>(dependent on current altitude at time of processing)</i> Process 20-100 minutes <i>(depends on food density)</i>
Step 6 (Cooling and Sealing)	Allow jars to cool undisturbed for 12-24 hours <i>(Test seals, Label food item with date and other pertinent information)</i>
Step 7 (Storage)	Store in temperature controlled environment or low-humidity room

	<i>(Additionally can cover jars with cloth to reduce condensation-induced rusting due to environment)</i>
--	---

Workflow steps for Natural Fermentation and Vinegar Pickling

Steps	Consideration
Step 1 (Selection)	Harvest selection of produce should occur prior to peak ripeness. <i>Selecting for young vegetables without the presence of bruising. Moldy or overripe food items should be rejected.</i>
Step 2 (Cleaning and Prep)	Looking for signs of pathogen presence on food stuffs and removal of those indicating (Salmonella, listeria and other risks in hot climates). Food stuffs should be washed in potable water with 50ppm chlorine solution <i>Provisions for food items should be discerned whether to peel, core, slice as needed based on food item</i>
Step 3 (Pre-treatment) Brine Preparation	Fermentation brine 2.5-5% salt by weight Or Vinegar Pickling via 5% acetic acid vinegar (Commercial Standard)
Step 4 (Submergence)	Submerge food stuff under brine and ferment at 22-26 degrees Celcius for 5-14 days in a controlled environment Pickling causes immediate acidification (via use of vinegar) and therefore no fermentation processing is required
Step 5 (Monitoring)	Being mindful at this step for signs of yeast film, molds and other tropical susceptibilities. Skim off films if needed
Step 6 (Finishing Step)	Transfer fermented food stuffs into clean jars and top with fresh brine
Step 7 (Storage)	Store in/under refrigeration or vacuum seal in the case of ambient storage

Summarizing Technical Strategies/Considerations

Therefore, to Summarize Technical Strategies and evaluate which technique is not only preferential (according to current seasonal needs) but also which is best fit for the type of food you are processing, please see below:

Canning	Can you meet this parameter (Y/N)	Pickling	Can you meet this parameter (Y/N)
Strict adherence to pressure/time parameters <i>(Please see USDA Canning Guidelines)</i>		Salinity adjustment <i>Aiming for 3.5-5% salt brine in hot/humid climates</i>	
Use of pressure rated glass jars and lids		pH testing <i>Using simple pH meters or test strips with a final pH target of <4.0</i>	
Monthly inspection <i>Stored goods for rust, leaks, or bulging lids</i>		Shortened fermentation times <i>Completing fermentation between 5-7 days in controlled environments/climates to avoid microbial ingress</i>	

Circular Village Egg Production:

Key stakeholder surveys and convenings have highlighted the increasing demand for locally sourced eggs. Pohnpei state has many wild chickens, but they do not consistently lay eggs due to an improper diet. The proposed egg farming model exists within the tiered Food Innovation System, with Tier-I being home-coops, Tier-II being microenterprises around chicken feed and hatcheries, and Tier-III being an egg congregating and processing center to be sold directly to restaurants/stores or to be used for baked goods and sold. The tiered structure enables a circular, zero-waste method that uses waste from the processing of staple crops for chicken feed and waste from poultry as manure for the crops.

The initiative prioritizes community engagement and value-added production through **Step 1: Community Organization & Training**, establishing training modules for community leaders and individuals that are interested in poultry farming for eggs. **Step 2: Coop Infrastructure & Design** utilizes local materials such as bamboo and coconut wood to construct elevated, climate-resilient structures with integrated rainwater collection and composting systems.

Step 3: Chicken Acquisition & Care identifies hardy, heat-tolerant egg-laying breeds and introduces best practices for maintaining a flock. **Step 4: Local Feed Production** meets the dietary needs of egg-laying chickens and transforms food scraps from other Food Innovation Facility operations into nutrient-rich fermented feed. **Step 5: Daily Maintenance & Biosecurity** establishes protocols that support bird health, prevent disease and predation, and ensure long-term productivity.

The system addresses waste management through **Step 6: Waste Transformation**, converting manure, bedding, and spoiled feed into compost. **Step 7: Egg Collection, Grading & Storage** implements gentle handling procedures, clay pot cooling methods, and community recordkeeping systems. **Step 8: Sales, Barter & Community Distribution** creates micro-economic opportunities that reinvest local labor into community prosperity.

Step 9: Feedback & System Monitoring establishes monthly review processes, performance scorecards, and responsive improvement mechanisms to maintain system transparency and effectiveness. Finally, **Step 10: Circular Economy Integration & Innovation** ensures complete resource utilization by transforming every byproduct into a valuable input while building knowledge transfer systems that enhance regional resilience.

This framework extends beyond infrastructure development to embody the Food Innovation Center's commitment to collective restoration, where sustainable production methods, systematic feedback, and community-driven innovation create lasting food system transformation.

Community Organization & Training

The goal and focus of this critical step should be creating a shared vision, a sense of cooperative trust and rotational sustainable responsibilities through strategic activities. Sufficient training was highlighted as one of the largest deficiencies in poultry farming. Pohnpei state currently has wild chickens foraging in the woods and irregularly laying eggs, leaving community members to forage for a couple of eggs at a time. In creating an egg farming training program, community members will learn best practices for creating a coop, feeding chickens an appropriate diet, tracking trends in egg laying to understand seasonality or environmental barriers, and waste management for full utilization of the community's resources. Individuals will use the knowledge gained from these workshops to build their own backyard coops, purchase chicks from a hatchery, and begin their own Tier-I chicken production facility.

Recent research models complement some of the questions and ideas brought forth from community members and key stakeholder groups in the GCFSAP020 Baseline Assessment (2024), the FSS Pohnpei stakeholder surveys and convening sessions (2025). This data was utilized to tailor the focus of this step to consider the following, from Besbes et al. (2012):

1. What are small-scale and village poultry production systems?
2. What practices will increase the supply of eggs throughout the year?
3. How will individual egg production lead to income generation?
4. What to do during extreme weather events?

5. How to monitor trends in individual and community egg production through the Pohnpei Food Systems app?

These investigation tools will help create a community feedback mechanism for a living coop model and therefore ensure the long-term success of this aspect of the FIC system, establish a shared governance/training and clarify roles for village residents.

In developing community organizational structures and public participation, we have:

Initiated contact through collective invitations to workshops, to be recorded and available on Pohnpei State's food system app and radio notices to community leaders previously identified in our FSS 2025 surveys and convenings (farmers, youth leaders, women's groups, school staff and traditional leaders). Outer island representatives will be encouraged to attend workshops to bring the knowledge back to their communities, so coops and hatcheries can be set up on outer islands as well. Infographics will be used to succinctly show best practices for coop design, chicken feed, and waste management. Discussed below, the project vision and invitation to the construction of orientation gatherings.

Gathering via Village assembly: with the use of visual aids, (maps, mockups, storyboards) and intergroup dialogue, we created a safe space for ideas, stories, wisdom exchange and resource identification.

We have formed working groups: which have identified prospective facilitators, leadership rotations and begins the establishment of teams to advance in the following areas:

1. Egg team
2. Feed team
3. Coop team
4. Compost team
5. Recordkeeping

We will continue to build on these previous steps of Community Organizational development around the Chicken & Poultry model in the FIC system in the following steps:

Foundational Trainings: Covering chicken care, sanitation, egg handling, cooperative models and systems of transport/articulation with other FIC Tiered Structures. Additionally, community leaders have highlighted the importance of incorporating traditional cultivation techniques and successes and failures of past projects to ensure community members avoid the mistakes that were made in the past.

Communication mechanisms through the Pohnpei food systems app, bulletin boards near coops, color-coded flag systems (Green = help needed, yellow = supply request and red = critical alert) will enable need-based monitoring system designs that improve our poultry system (Sari, Aritonang, & Sumarlin, 2021).

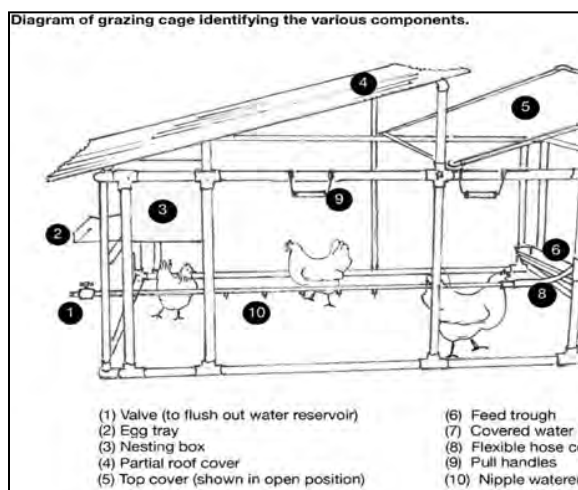
Coop Infrastructure & Design

Ecological considerations and local resource availability are necessary in developing a protocol for coop design. Simple cages can be constructed from bamboo stems, wire mesh, and a tarp roof to house at most

ten chickens. This has been successfully done in Pohnpei through a USDA-SARE project by the College of Micronesia (Young-Uhk, 2011), shown in the image below. Environmental considerations for coop design and maintenance include heat, high wind, heavy rain, saltwater inundation, and disease and pest pressure.



Young-Uhk (2011)



Fukumoto (2009)

Village-level design workshops will be administered by community leaders, who themselves have already completed this training. The workshop will engage villagers in a basic participatory sketch session. Utilizing ropes to map out the coop's geographic footprint on the land, and especially considering the logistics associated with Food Innovation Facilities (FIF's). Participants will actively survey materials for harvest (including bamboo and coconut wood), collection of palm leaf, recycled tin sheets and old barrels.

Construction of foundation and coop floor will be scheduled immediately following the design workshop to begin the implementation of skill development procedures, like that of digging post holes and installation of elevated supports utilizing coconut trunks and bamboo flooring slats for nutrient cycling (Brass et al., 2015).

Walls and roofing material can either be layered palm leaf (thatch) or tin roofing based on available viable materials. The structure of the pitch design for the roofing will be location specific as well as the availability of bamboo panels or slats as building material. Nesting box installation and perches go hand in hand with the structural considerations of a locally sourced sustainable chicken coop enclosure and are essential compliments to elevated structures that undoubtedly serve the positive health supports for the chicken populations (Malchow et al., 2019). Other available building resources include coconut husks, old crates and salvaged wood to begin the design for access hatches for egg collection.

The incorporation of rain catchment systems is especially important in anticipation of water scarcity (due to limited availability of liquid tanker trucks and heat conditions) and the high amount of agricultural and egg production needs in the future. Rainwater harvesting systems must incorporate precipitation measurements/trends (specific for each island community), roofing designs, demand-specific considerations (in reflection to the number of chickens to feed ratio) and production cycles (based on health, behavior and demand) (Arenas-Navarro et al., 2020). The rain catchment system will consist of bamboo or recycled PVC pipes. Additionally, incorporating recycled barrels or food-grade containers as forms of water storage.



Chickens: Acquisition & Care

Adaptation to Pohnpei's climate is a crucial consideration in poultry selection. Pohnpei currently has feral chickens across all of its populated islands, which offer an irregular supply of eggs. These chickens are likely a hybrid of domesticated chickens brought over by early settlers and redfowl, which is a wild chicken breed (Martin Cerezo et al., 2023). They are extremely resilient to the extreme heat and rainfall experienced throughout FSM and it is crucial to find similar chicken breeds that can withstand extreme climate conditions.

Chicken breeds suitable for Yap's climate include:



Leghorns – Tolerant to high heat, good foragers, produce many crisp white eggs, the most common commercially available eggs. Enjoy a free range environment. Can be flighty, difficult for beginners. Start laying eggs between four-six months. Finish between 6-7 years.

Manorcas – Tolerant to high heat, tolerate foraging and free-range environment, also tolerate confinement. Good layers, large white eggs. Flighty but can be socialized. Start laying eggs around 4 months. Finish between 5-7 years.



Rhode Island Reds – Can be raised for eggs and meat. Excellent layers, producing up to 300 eggs a year. Extra-large, brown eggs, two to three years of peak laying, can lay eggs all year. Relatively friendly, but can become territorial in confined spaces. Start laying eggs around 4-5 months. Finish around 5-7 years.



Australorps – Can be raised for eggs and meat. Excellent layers, producing up to 300 eggs a year. Active and enjoy foraging. Can adapt to warm climates with sufficient shade and water. Sit on their eggs, light brown eggs. Start laying eggs around 5-6 months. Finish around 4-5 years.



Raising egg-laying chickens in Yap’s tropical climate requires careful attention to heat management and humidity control. Provide adequate shade and ventilation in coops, as temperatures can remain consistently high year-round, and ensure proper drainage to prevent moisture buildup during the frequent rain showers. Feed your hens a balanced layer feed supplemented with calcium sources like crushed oyster shells, and provide constant access to fresh, clean water as chickens consume significantly more water in hot climates. Protect your flock from tropical storms by constructing sturdy, well-anchored coops, and maintain a regular health monitoring routine as the warm, moist environment can promote parasites and bacterial infections. Consider the timing of egg collection, as eggs can spoil quickly in high temperatures, and plan for adequate predator protection since island ecosystems may have unique threats like crabs or introduced mammals.

Local Feed Production

The GCF SAP020 Baseline Assessment and follow-up surveys and convenings identified sufficient access to feed as the number one barrier in egg production across FSM. This presents a unique opportunity for chicken feed production to serve as a microenterprise (Tier-II facility) on Yap’s main island, to supply feed to individuals on the main island and across outer islands.

Egg-laying chickens require a specific diet, which includes around 15-20% protein, 3-4% calcium, and 0.4-0.5% phosphorus. The rest of the diet should be carbohydrates/starches, traditionally grains but with available substitutions of FSM’s staple crops (Pacheco, Gulizia, & Downs, 2022). Some raw materials used/incorporated in feed productions include fish meal, copra meal, palm kernel meal, coconut oil and added supplement costs (Glatz et al., 2013).

Proposed diet from available staple crops:

40-45% taro, tapioca for starch

30-35% fish byproducts, for protein

10-15% coconut meat for healthy fats

10% mangos, papayas, seaweed, leafy vegetables for added vitamins and nutrients

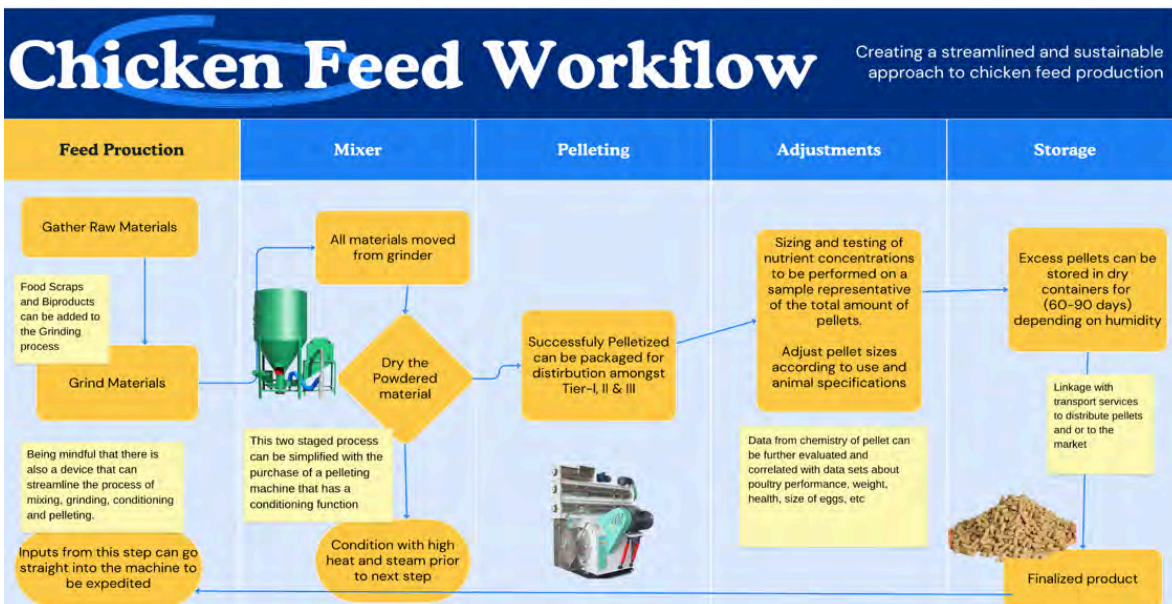
Supplement with giant clam shells for calcium

Fermented ingredients will help with nutrient uptake and digestion

Imported or farmed soybean or corn will also be beneficial to include in chicken feed for a complete diet.

This Tier-II microenterprise will be a place for Tier-I facilities to bring less-than desirable or excess harvested staple produce.

The Poultry Feed Processing/Pellet System (P.F.P.S.) is aimed to retrieve all the waste products (peels, skins, byproducts and excess raw materials) as inputs towards the production of village pellets for animal feed.





Chicken Hatchery Microenterprise

In order to maintain chicken egg production and processing, Pohnpei State will require a chicken hatchery microenterprise, which will provide day-old chicks to individuals to expand their flocks. Facilities will include: Climate-controlled incubation room; Brooding area to 2-week old chicks; Parent stock will need to be vaccinated and an ongoing schedule of procuring fertilized eggs is planned.

Daily Maintenance & Biosecurity

On average, poultry farming usually only requires 15 minutes a day (Diambra-Odi & Hollyer, 2017). Daily hygiene management includes disinfection, feeding, supplying fresh drinking water, replenishing bedding, checking ventilation and temperature, and manure cleaning.

Feed and water: Key considerations for water systems include quality, height, pressure, mineral content, and accessibility. A rainwater collection and storage system will be the simplest way to ensure that there is a water reserve during extreme heat or times with little to no rain. On average, a mature hen should consume around 100-150 grams of feed ($\frac{1}{4}$ pound) daily. It is important that this feed has the appropriate ratio of carbohydrates, protein, phosphorus, and calcium to ensure efficient and quality egg-laying. Fresh feed should be provided daily, as old or spoiled feed can lead to illness (APA Admin, 2022).

Environmental Monitoring: Temperature, humidity, and air quality should be monitored to ensure the chickens are comfortable. Chicken breeds that are resilient to FSM's climate should be prioritized, as they will require the least amount of attention during extreme weather events. Appropriately selected chicken breeds should be able to withstand temperatures up to 40° C (105° F) and 75% humidity (Wilson et al., 1975).

Biosecurity Considerations: It is important for chickens to have a secured coop for protection from predators. Common predators of eggs and chicks include cats, dogs, birds of prey, monitor lizards, and large crabs (Yap, FM, 2018). The primary diseases that can affect chickens are Avian Encephalomyelitis, Avian Influenza, Avian Tuberculosis, and Newcastle Disease to name a few (Disease - Poultry Hub Australia, 2020). These diseases can be spread from wild migratory birds so it is important to catch them early and separate birds that may have been exposed/infected. New birds should be quarantined before they are introduced to the flock to ensure that they are not carrying any diseases.

Waste Transformation

When fed an appropriate diet, chicken manure is extremely nutrient-dense and can be used as a natural fertilizer for vegetable farming. Chicken manure contains significantly more nitrogen and phosphorus and about the same amount of potassium as other farm manures. It is also an excellent soil amendment, as it can increase the soil's moisture-holding and nutrient-holding properties (McCall, 1980). Chicken manure can either be applied directly to the soil or it can be dried, pulverised, and packed to be sold as fertilizer. The dried manure can then be added to an irrigation supply or simply sprinkled on the soil and tilled in before rainfall. Tilling the manure into the soil is not necessary, but will remove the odor. Only about 15-40 pounds of dried manure should be applied to 100 square feet of farmland (1 heaping shovel per large plant) to prevent nutrient burning of the plants. Manure should not directly touch the plants.

Egg Collection, Grading, and Storage

Egg production typically varies throughout the year, depending on day length and temperature. In general, chickens need 14-16 hours of light to maximize egg production, and warmer temperatures typically lead to higher production (Diambra-Odi & Hollyer, 2017). In general, the summer months see the most eggs produced. During peak season, eggs should be collected twice a day. As long as the eggs are not rinsed with water, they do not have to be refrigerated. Once eggs are washed, however, they lose a protective membrane and require refrigeration. Egg color depends on the species of chicken. For example, Rhode Island Reds and Australorps produce brown eggs, while Leghorns produce white eggs. Shell color does not have any effect on the quality of the egg. Unfertilized eggs are for consumption, while fertilized eggs are for chicken production, so it is important to keep roosters separate from egg-laying hens unless you want to increase your breeding stock.

Sales, Barter, and Community Distribution

Chicken eggs will be sold to the Food Innovation Center (Tier-III) in Colonia to be used for baked goods processing. Eggs will also be sold to restaurants and stores to be sold to consumers. Because individuals

will all have the opportunity to produce eggs on their land, we expect that they will directly use some of the eggs in their own kitchens.

Stakeholders noted, however, that the largest barrier in poultry production is availability of feed. This creates an opportunity for a microenterprise separate from the FIC that makes chicken feed mixes to sell to farmers.

Feedback & System Monitoring

All sales to the Food Innovation Center should be logged on Yap's food systems app. Individuals should also log any disease pressure that they experience within their coop to prevent an epidemic on an island.

The development of Appendices & Technical Tools

Each facility includes testing kits and safety systems to ensure compliance with national and international food safety guidelines. These include:

- **Food Quality Testing Tools:**
 - pH meter (with calibration kit)
 - Thermometers (digital + infrared)
 - Water Activity Meter
 - Moisture Meter
 - Colorimeter
 - Brix Meter
 - Allergen Test Kits
- **Microbial Testing:**
 - Salmonella
 - E. coli
 - Staphylococcus aureus
 - Yeast & Mold
 - Listeria monocytogenes
- **Food Safety Systems:**
 - Consumer Complaint Program
 - Crisis Response Templates
 - Pest Control SOP
 - Internal Audit Program
 - Hold & Release Procedures

Based on community needs and collective FSM organizational conversations, we are also developing new Communications Innovations: A FSMTC-Integrated Mobile App

In partnership with FSM Telecommunications Corporation (FSMTC), we are developing a digital mobile app designed to streamline communication, logistics, and food system coordination. Features include:

- Cloud-based document & photo repository
- Transportation data sharing for tech, goods, and equipment
- Real-time map of:
 - Nearby FIFs, FICs, surplus storage, schools, clinics, and shops
 - Goods flow and transport status
- Inventory tracking and needs forecasting
- Encrypted messaging between staff, communities, and institutions
- Educational suite: Videos, manuals, food safety guidance
- Emergency alert and weather forecasting integration
- Marketplace features for local sales and payment facilitation
- Recipe and nutrition library with local inputs
- Open forum for questions, innovations, and feedback

All digital strategies are low-bandwidth optimized and offline-adaptable for remote environments.

Part IV: Management and Organization Structure for the Food Innovation Facilities and Food Innovation Center in Pohnpei State

There are several key factors critical to the success of a business enterprise in Pohnpei. These include a clear vision and mission grounded in traditional values and community cohesion, supported by strong management and an organizational structure with clearly defined roles that are consistent with Pohnpeian customary leadership, village governance, state regulations, and applicable national policies.

To strengthen food security and economic resilience, Pohnpei State aims to develop a decentralized food innovation system rooted in local realities such as low population density, outer island connectivity challenges, reliance on imported foods, and smallholder-based production systems. The strategy focuses on the processing and value addition of locally sourced staple foods such as taro, breadfruit, yam, banana, as well as higher value fruits and vegetables and poultry, fish, and marine products through a tiered system consisting of village-based Tier I facilities, regional Tier II Food Innovation Facilities (FIF), and a central Tier III Food Innovation Center (FIC). Each facility will serve as a node for local food aggregation, small-batch processing, packaging, storage, and where feasible, more advanced value-added operations.

Given Pohnpei's tight knit communities and communal labor systems, this model will thrive when built around cooperative and inclusive ownership structures. It is proposed that each facility be established through a public-private partnership in which Pohnpei State and municipal governments contribute public infrastructure, regulatory support, and seed funding, while the facilities are operated by independent cooperatives or community enterprises that emphasize local ownership, training, employment and are economically driven as an agribusiness. This model encourages entrepreneurial development without compromising environmental integrity or traditional knowledge systems.

The proposed organizational structure recognizes Pohnpei's geographic spread and diverse community settings from Kolonia to remote Outer Islands. Therefore, while the three tiered system is designed for coordination and vertical integration, each facility must also be capable of functioning autonomously. This mitigates risk, fosters local sales and trade, enhances resilience to transportation disruptions, ensures local control over production and revenue generation, and supports niche product development suited to the cultural and ecological assets of each region.

Operational success depends on recruiting and mentoring local talent, especially youth and women, integrating environmental safeguards to protect Pohnpei's fragile ecosystems, such as low input processing and renewable energy integration, and ensuring transparency in cooperative governance. Community engagement must occur at every stage, from site selection and design to

management, so that the initiative reflects the values, food traditions, and development priorities of Pohnpeian people. Internships and collaborations with local schools and integration of the facilities at the start with communities for training and awareness will further support the new value-added facilities as it also serves as a community center.

Accordingly, Pohnpei State endorses the formation of public-private partnerships based on cooperative frameworks that allow communities to participate meaningfully in both governance and benefit sharing. This approach is vital to ensuring the economic, cultural, and environmental sustainability of the Food Innovation Center and associated facilities throughout Pohnpei State.

The Partnership Framework can be built using a partnership model.

The partnership framework in Pohnpei can be structured using a culturally responsive and locally anchored partnership model. This model reflects the essential collaboration between the Pohnpei State government, municipal councils, traditional leadership, and an independently operated cooperative that is deeply embedded in the community. It aligns public development priorities with the practical efficiencies and entrepreneurial energy of the private sector, while fully honoring Pohnpeian traditions, environmental stewardship, and village-level engagement.

Partnership Model: A collaborative arrangement among state and local government authorities, councils of traditional chiefs, and a community based cooperative that is independently managed. This model is designed to support Pohnpei’s goal of building food security and local economic resilience through food processing, value addition, and the revitalization of local agriculture, fisheries, and livestock sectors. It is built on respect for customary decision-making, recognition of land tenure systems, and equitable inclusion of Outer Islands and remote communities.

Core Principle: The cooperative maintains full operational independence, both economically and technically, while working in partnership with public sector institutions to advance shared goals. These goals include creating decentralized facilities that can store, repack, distribute, and process fresh and locally harvested crops, livestock, poultry, and marine resources. The model is also committed to training and employing local community members, including youth and women, to build skills and provide livelihoods. Wherever feasible, facilities will be made available through rental or shared-use agreements to individuals, families, and community groups who wish to develop and market their own food products.

All activities must be carried out in ways that reflect Pohnpei’s commitment to environmental protection, respect for traditional land and resource management systems, and the promotion of local self-reliance. This includes prioritizing low waste systems, the use of renewable energy, and aligning food production with climate resilience. The partnership model must also promote inclusive governance, fair benefit sharing, and decision making that reflects both modern and customary authorities.

This Pohnpei-specific partnership model ensures that innovation and enterprise development proceed in ways that reinforce cultural values, sustain natural ecosystems, and maximize community ownership and participation across all islands and municipalities.

Formation Structure

Public Sector Partners

- **Pohnpei State Government and Local Municipalities**

Key agencies such as the **Department of Resources and Development, Pohnpei State Department of Agriculture and Forestry, and Pohnpei State Environmental Protection Agency** will provide regulatory oversight, policy support, and public infrastructure investment. Municipal governments will play a critical role in site identification, community mobilization, and integration with local planning priorities.

- **Traditional Leaders**

The traditional chiefs, Nahnmwarki, must be formally engaged at every stage to ensure cultural alignment, land use approval, and the incorporation of customary governance systems. Their involvement will help strengthen legitimacy and community ownership.

- **Community-Based Organizations and Producer Groups**

Established associations such as the **Pohnpei State Cooperative Farmers' Association, Island Food Community of Pohnpei, Pohnpei Women's Council, and Outer Islands community groups** will be essential partners for organizing producer networks, coordinating training, and promoting equitable access to processing and marketing facilities. These groups represent key agricultural, fishing, and value-adding constituencies in both main island and outer island communities.

- **Public Financing and Development Institutions**

Institutions such as the **FSM Development Bank** and the **Mesenieng Credit Union** may offer financial support through concessional loans, microcredit schemes, or matching grants to support enterprise development and equipment procurement for cooperatives and facility users.

- **Research and Training Institutions**

Local branches and programs under the **College of Micronesia-FSM (COM-FSM)** including the **Pohnpei Campus** and the **Cooperative Research and Extension (CRE) Program** will provide technical expertise, training modules, and participatory research to enhance the capacity of cooperatives and local entrepreneurs. Regional partners such as the **Pacific Community (SPC)** and the **University of Guam** could support research and value chain development efforts.

Private Sector Cooperative

- **Independently Incorporated Cooperative Owned by Private Members**

The cooperative will be legally established as a Pohnpei-based food processing and marketing enterprise, owned by individual member-producers, small businesses, and community groups who contribute equity and use the facilities.

- **Autonomous Governance Structure with Elected Board**

The cooperative will be governed by a locally elected board, ensuring representation from both main and Outer Islands, different producer sectors (e.g., livestock/poultry, marine, root crops), and key demographic groups including women and youth.

- **Self-Directed Management and Operations**

Day-to-day operations will be led by a professional management team drawn from local talent wherever possible, and supported through capacity building partnerships with COM-FSM and regional organizations.

- **Private Capital Investment from Member-Owners**

Initial capital will be mobilized through share purchases and in-kind contributions from member-owners, supplemented by reinvested profits and potential grants from development programs such as the **FSM Climate Change and Food Security Fund**.

This Pohnpei-specific formation structure ensures that both traditional and modern systems are integrated to foster a cooperative model that reflects local realities, protects cultural values, and creates inclusive economic opportunities throughout the state.

Partnership Formation Process

Phase 1: Partnership Development

This phase focuses on building a shared vision and identifying aligned objectives among Pohnpei’s key stakeholders, integrating customary authority, public institutions, and community-based organizations.

- Identification of mutual objectives and complementary capabilities among Pohnpei State Government, municipal councils, Nahmwarki (traditional leaders) and organizations such as the **Pohnpei Farmers Associations, Pohnpei Women’s Council, the Conservation Society of Pohnpei, the National Fisheries Corporation (NFC), and the COM-FSM Cooperative Research and Extension Program**
- Feasibility studies and market analysis tailored to Pohnpei’s food production systems, local consumer preferences, environmental constraints, and inter-island transportation realities
- Stakeholder consultation and community engagement through participatory village meetings, traditional leadership consultations, and workshops held with producer groups from both the main island and Outer Islands
- Risk assessment and mitigation planning focused on Pohnpei’s geographic isolation, climate vulnerabilities (typhoons, sea level rise), energy and water reliability, and inter-island logistical challenges
- Initial establishment of the cooperative model for food processing, drawing on lessons learned from the Food Systems Solutions Project and small-scale value-added activities piloted with various formal and informal farmers associations

Phase I has been largely completed through the groundwork laid by the Pohnpei Food Systems Solutions Project, which involved extensive fieldwork, community input, and technical assessments. That project built upon extensive surveys and studies on vulnerable households and

farming households in Pohnpei supported by the Green Climate Fund in concert with the State of Pohnpei and national R&D of the FSM.

Phase 2: Legal Framework

This stage formalizes the institutional and legal basis for operation while ensuring both cooperative autonomy and alignment with state and customary systems.

- Development of a formal partnership agreement outlining the roles and responsibilities of Pohnpei State Government, local municipalities, traditional councils, and cooperative members
- Governance protocols that respect cooperative independence while incorporating traditional oversight where appropriate
- Agreements on intellectual property, data sharing, and the use of Indigenous knowledge in product development and marketing
- Establishment of performance metrics related to food production increases, job creation, environmental sustainability, and cooperative profitability

Pohnpei State recommends moving forward based on existing public-private arrangements that have proven effective in areas such as microenterprise development and fisheries management, and to build upon institutional structures already supported by the FSM National Government and international partners, such as SPC and the FAO.

Phase 3: Implementation

This phase initiates operations across tiers, guided by clear structure, community representation, and infrastructure readiness.

- Formal incorporation of the cooperative and recruitment of active member-owners from each municipality and outer island region
- Institutionalization of cross-tier representation, ensuring that members involved at the Tier I village level also have seats or advisory roles in Tier II regional FIFs and the Tier III FIC, to build vertical integration and maintain feedback loops
- Allocation of public resources for equipment, site preparation, water and sanitation infrastructure, and cold storage systems by agencies such as **Pohnpei State Department of Public Works** and the **FSM Division of Agriculture**
- Joint development or upgrading of facilities with local contractors, use of government buildings when feasible, and integration of climate resilient design principles
- Launch of operations with defined service levels including training, facility use access, processing schedules, and packaging support
- Involvement of the **Pohnpei Utility Corporation (PUC)** to plan for reliable electricity access, renewable energy integration, and long-term utility expansion aligned with facility growth

This phased formation process ensures that the Food Innovation Center and related facilities are rooted in Pohnpei's social structure, supported by technical expertise, and responsive to the realities of a remote island economy. It also helps cultivate ownership and accountability across all levels of the system.

Operational Structure

Cooperative Independence

In Pohnpei, the cooperative model is rooted in community trust, shared responsibilities, and cultural governance traditions. The cooperative will function as a self-sustaining, member-driven enterprise that reflects Pohnpeian values of mutual support and transparency.

- Ownership is held by private members including farmers, fishers, women’s groups, youth entrepreneurs, and small agribusinesses, and could be organized through entities such as the **Island Food Community of Pohnpei**, **Outer Islands agricultural cooperatives**, and **Pohnpei Women’s Council**. Each member has equal voting rights regardless of financial contribution, aligning with Pohnpeian values of communal equity.
- An independent board of directors will be elected by cooperative members, with initial nominations guided by Pohnpei State in consultation with the **Nahnmwarki**, municipal governments, and key producer organizations to ensure geographic and demographic representation. Importantly, an Advisory Board from public and private sectors would be formed to advise, guide and provide oversight to ensure the operations are done properly, and with a focus on economic development and viability and enhancing food security and local food production and processing.
- Management and staff hiring will be autonomous, with preference for local candidates trained through institutions such as the **College of Micronesia–FSM Pohnpei Campus**, and with support from regional partners such as the **Pacific Community (SPC)** and the **USDA Natural Resources Conservation Service (NRCS)** technical assistance programs.
- Business strategy and daily operations will be designed and implemented by the cooperative, with flexibility to respond to market trends, seasonal production changes, and community needs, while maintaining full compliance with state regulations and traditional protocols.
- Financial operations including budgeting, reinvestment, and profit distribution will be conducted transparently, with dividends distributed based on usage volume, and a portion retained for reinvestment into equipment, training, and infrastructure maintenance.

Public Sector Role

The public sector will play a vital enabling and regulatory role without interfering in the daily management of the cooperative, supporting the broader goals of sustainable development, economic resilience, and food security in Pohnpei.

- The Pohnpei State Government will establish and maintain the enabling policy and regulatory framework in consultation with traditional leaders and national stakeholders to ensure environmental protection, land use respect, and food safety compliance. Policies could be as simple as preferential purchase of local foods, if/when available for all state functions and other recommendations as set forth in the recently approved Pohnpei State Food Production and Master Plan Strategy (State of Pohnpei, 2025).
- Financial assistance will be provided through grants or guarantees from sources such as the **FSM Development Bank**, **Pohnpei State Small Business Guarantee Finance**, the **Asian**

Development Bank, the World Bank and/or with Corporation climate adaptation funds, such as support from partners like the **Food and Agriculture Organization (FAO)** or **German Society for International Cooperation (GIZ)**.

- Technical support and capacity building will be offered through the **COM-FSM Cooperative Research and Extension Program**, **NRCS**, and other regional and international partners and regional programs focusing on value chain development, business literacy, and climate-smart agriculture.
- The government will assist in facilitating market access by promoting Pohnpei-branded products in regional tourism markets, government food procurement programs (e.g., schools, hospitals), institutional sales to an incoming United Nations workforce, and through connections to regional trade fairs and niche markets for traditional foods.
- Infrastructure investments will focus on improving access to transportation for inter-island shipment, expanding cold chain and storage capacity, enhancing telecommunications for business operations, and securing reliable utilities in partnership with the **Pohnpei Utility Corporation (PUC)**

Governance and Accountability

Dual Accountability System

The governance structure in Pohnpei reflects the importance of traditional leadership, community consensus, and modern cooperative principles. It is designed to promote transparency, equity, and responsiveness while aligning with Pohnpeian cultural values and public policy goals.

- The cooperative is accountable to its member owners including farmers, fishers, women's groups, and local producers through democratic processes. One member, one vote elections will ensure equal participation and accountability. Organizations such as the **Island Food Community of Pohnpei**, **Pohnpei Women's Council**, and Outer Islands community councils will support broad member engagement across Pohnpei's diverse communities.
- The public-private partnership is accountable to traditional authorities, municipal leaders, and Pohnpei State agencies through performance indicators that reflect Pohnpei's unique priorities. These include increased use of local raw materials, job creation for youth and women, affordability and access for remote communities, and adherence to cultural and environmental values.
- Regular reporting on cooperative and partnership outcomes will be conducted through quarterly community meetings, municipal consultations, and an annual public review. These reports will be accessible through the **Pohnpei State Economic Planning Office** and will be shared at community outreach sessions supported by the **COM FSM Cooperative Research and Extension Program**.
- Independent monitoring and evaluation mechanisms will be developed in collaboration with external partners such as **SPC** and **FAO**, and coordinated locally by institutions like **COM FSM Pohnpei Campus** and the **Pohnpei State Department of Agriculture and Forestry** to ensure transparency and local relevance.

Decision-Making Authority

The decision-making process will balance cooperative independence with meaningful collaboration and oversight.

- The cooperative retains full authority over internal operations including hiring, pricing, sourcing, product development, and business planning. Decisions will be guided by the elected board and local management, grounded in the needs and realities of Pohnpei’s producers and communities.
- Joint decisions between the cooperative and public sector partners will be required only in areas where state investment or shared oversight is involved, such as public land use, facility development, and alignment with state food security policies.
- Public sector involvement will remain advisory. Agencies such as the Pohnpei State Department of Resources and Development, Environmental Protection Agency, and Department of Health Services will provide technical guidance, regulatory clarity, and program coordination without direct control of operations.
- Dispute resolution will use both formal legal pathways and culturally grounded mediation methods involving respected elders and traditional leaders. This ensures both procedural fairness and harmony within Pohnpei’s close knit communities.

Financial Arrangements

Public Sector Contributions

The Pohnpei State Government and its development partners will play a foundational role in supporting the financial sustainability of the Food Innovation Center and its associated facilities. Contributions will reflect Pohnpei’s need for small-scale infrastructure, climate resilient design, and capacity building for dispersed island communities. Partial financial ownership by the state will foster a stronger public: private partnership.

- Infrastructure support may include grants for construction, renovation, and equipment installation through the **Pohnpei Small Business Guarantee Finance Corporation** and targeted allocations from the FSM National Government’s Compact funding and Climate Change and Food Security programs.
- Technical assistance and training will be delivered through local institutions such as the **COM FSM Pohnpei Campus** and its **Cooperative Research and Extension Program**, as well as by external partners like the **Pacific Community (SPC)** and the **USDA Natural Resources Conservation Service** and international institutions of higher learning and international NGOs that have been engaged in supporting the FSM and State of Pohnpei.
- Risk mitigation will be facilitated through tools such as loan guarantees or micro-insurance programs offered by the **FSM Development Bank** and **Mesenieng Credit Union** to encourage smallholder and cooperative investments in processing and value addition.
- Market development support will include product branding initiatives by the **Pohnpei Department of Resources and Development**, and promotional opportunities through the **Micronesia Trade Fair**, tourism platforms, and potential exports to regional niche markets.

Private Sector Investment

To ensure ownership and long-term viability, private capital will be mobilized from individuals, families, and community enterprises actively engaged in Pohnpei’s agriculture, fisheries, and food service sectors.

- Member equity contributions and share purchases will come from farmers, fishers, women entrepreneurs, and small businesses organized through groups like the **Island Food Community of Pohnpei**, **Pohnpei Women’s Council**, and municipal producer cooperatives.
- Retained earnings from facility operations will be reinvested into maintenance, equipment upgrades, and training programs to strengthen long-term sustainability.
- Private debt financing, where feasible, will be supported by the **Mesenieng Credit Union** or revolving loan funds linked to enterprise development programs led by NGOs and church based economic initiatives.
- Performance-based returns will be distributed to member owners based on their level of usage and contribution to the cooperative’s services, promoting equitable growth and reinvestment.

Shared Benefits

The financial structure is designed to generate broad-based benefits across Pohnpei’s diverse communities, particularly those in rural and outer island settings.

- Job creation will be localized and tied to food production, processing, logistics, and cooperative management, providing income opportunities for youth, women, and returning migrants.
- Agricultural and marine value chains will be strengthened by providing stable markets, reducing post-harvest losses, and supporting the development of locally branded products such as smoked fish, dried banana, or coconut oil.
- Food security will be improved by reducing reliance on imported products, increasing the availability of processed local foods, and reinforcing self-reliance at household and community levels.
- Knowledge transfer will be promoted through applied training in processing techniques, food safety, small business operations, and environmentally sound practices, delivered by COM FSM and partner organizations.

Risk Management

Risk management in Pohnpei must address the unique challenges of a remote island environment, including the small and dispersed population, limited infrastructure, and strong reliance on traditional leadership and community cohesion. The following framework aligns with Pohnpeian governance norms, environmental constraints, and cooperative principles.

Public Sector Risks

- Ensuring consistent performance monitoring by Pohnpei State Government agencies without interfering in the internal operations of the cooperative. Oversight responsibilities will be coordinated through agencies such as the **Pohnpei State Department of Resources and Development** and the **Pohnpei State Economic Planning Office**.
- Maintaining political continuity and long term support for cooperative initiatives across different administrations. Engagement with the Nahnmarki traditional leadership bodies will provide cultural stability and reinforce nonpartisan alignment.
- Promoting transparent and appropriate use of public resources including Compact funds, climate adaptation grants, and development bank financing. Accountability will be ensured

through publicly accessible reports and regular reviews involving municipal governments and community based organizations.

Private Sector Risks

- Exposure to market volatility due to Pohnpei’s small market size, seasonal fluctuations in agricultural output, and vulnerability to shipping delays. This risk is especially significant for Outer Islands with limited access to inter-island transport.
- Ensuring cooperative autonomy from political influence, especially during public investment phases or when engaging in government procurement. Operational independence will be safeguarded through strong bylaws and member-led governance.
- Sustaining active participation and long term commitment from cooperative members, including smallholder farmers, women entrepreneurs, and youth. Fluctuations in income, migration, and competing livelihood priorities may affect continuity.

Mitigation Strategies

- Developing clear contractual agreements between Pohnpei State, municipalities, and the cooperative that define responsibilities, resource use, and exit procedures. These agreements will be supported by local legal advisers and aligned with Pohnpeian norms.
- Implementing regular performance reviews and learning-based evaluations that involve cooperative members, public sector stakeholders, and external technical partners is needed annually to ensure transparency and to review past work and plan for upcoming work.
- Diversifying funding sources through a blend of member contributions, earned income from processing and packaging services, technical assistance grants from donors, and financing from local institutions like the FSM Development Bank and Mesenieng Credit Union
- Reinforcing strong governance structures through training and support for cooperative boards, ensuring representation from each municipality and sector. Guidance from local, regional and international institutions such as the COM FSM Pohnpei Campus and partner NGOs will help build transparency and resilience.

Success Factors

Critical Elements

- Respect for cooperative autonomy is essential to build trust and accountability among Pohnpei’s producers, fishers, and community members. The cooperative must operate independently while remaining aligned with public development goals and cultural values. Groups such as the **Island Food Community of Pohnpei**, **Pohnpei Women’s Council**, and Outer Islands agricultural groups exemplify grassroots ownership and governance models that can inform cooperative design.
- Clearly defined roles, responsibilities, and boundaries between the cooperative, Pohnpei State Government, municipal authorities, and Nahnmarki traditional leadership councils are necessary to avoid overlap, confusion, or undue influence.
- Alignment of objectives between public sector agencies and private cooperative members must be based on shared goals such as food security, local employment, import substitution, and

environmental protection, while preserving day-to-day operational independence for the cooperative.

- Operating the facilities as a private business is fundamental to ensure long-term sustainability and generating business and new opportunities.
- Strong leadership is required in both public and private components. This includes committed officials from agencies such as the **Pohnpei Chamber of Commerce, Department of Resources and Development**, and experienced community leaders from producer groups and local cooperatives who understand Pohnpei's market and logistical challenges.
- Adequate financing and timely resource allocation must come from a mix of public investment, member equity, donor support, and small-scale financing tools through institutions such as the **FSM Development Bank and Mesenieng Credit Union**.
- Community support and active stakeholder engagement are central to long-term success. The project must regularly engage communities through participatory planning, feedback sessions, and traditional consultative forums led by village chiefs and local associations.

Performance Indicators

- Financial sustainability of the cooperative, including consistent revenue from processing services, product sales, and member use. Member satisfaction will be measured through annual surveys and participation rates in governance activities.
- Achievement of public policy objectives such as reduced food imports, improved nutrition, support for youth entrepreneurship, and economic diversification across Pohnpei's municipalities and Outer Islands.
- Community economic impact demonstrated through increased household income from agriculture and fisheries, local job creation especially for women and youth, and new business formation linked to value added products.
- Innovation and technology adoption including the use of solar-powered cold storage, low input processing methods, CoolBot refrigeration systems, and appropriate packaging technologies developed through partnerships with **COM FSM**, the **Pacific Community** and others.
- Environmental and social responsibility measured through waste reduction, sustainable sourcing, protection of marine and land resources, gender equity, and inclusive participation from remote communities.

Long-term Sustainability

Partnership Evolution

- An annual review process will be institutionalized to assess cooperative performance, community outcomes, and alignment with state and municipal development priorities. These reviews will be facilitated by the **Pohnpei State Economic Planning Office** in collaboration with the **Department of Resources and Development**, the cooperative board, and traditional leaders.
- Over time, the cooperative will move toward full operational and financial independence, reducing reliance on state or donor subsidies. This transition will be supported by leadership training through **COM FSM Cooperative Research and Extension Program** and by developing internal systems for budgeting, marketing, and procurement.
- Successful models and practices from the central Food Innovation Center and regional Food

Innovation Facilities will be documented and adapted for other islands or sectors, such as root crop drying or marine product packaging in selected Outer Islands. Replication will be guided by lessons from community based farmers' associations.

- A culture of continuous learning and innovation will be cultivated. The cooperative will regularly test technologies including solar powered equipment, low waste packaging, Indigenous preservation methods and other technologies developed elsewhere but which could be practical to introduce and use in Pohnpei. Support from regional partners such as the **Pacific Community** and **University of Guam** will be essential for applied research and training.

Exit Strategy

- A clear set of performance benchmarks and governance milestones will define when the public sector can transition from a direct partner to an oversight and support role. These criteria will be set during the initial agreement and reviewed annually.

- If public infrastructure or funding is used, there will be transparent arrangements for asset ownership transfer to the cooperative or to local governments, depending on the nature of the investment and agreements in place. Legal guidance from the **Pohnpei State Office of the Attorney General** will ensure clarity and fairness.

- The cooperative is expected to continue operations beyond the end of formal partnership agreements. This will be supported by a strong member base, diversified revenue, and connections to local institutions like the **Mesenieng Credit Union** and **FSM Development Bank** for future financial needs.

- The legacy of the partnership will be sustained through ongoing community relationships, regional knowledge sharing, and the visibility of Pohnpeian products in local and regional markets. Schools, health programs, and tourism operators may continue sourcing products from the cooperative, reinforcing its role in the broader economy.

II. Food Innovation Facilities and Food Innovation Center will operate as a Food Processing Cooperative

Cooperative Principles

The Pohnpei-based cooperative will follow internationally recognized cooperative values while fully integrating local customs, traditional decision-making practices, and community-based economic models. It will operate under the principles of democratic member control, shared ownership, and active economic participation, adapted to Pohnpei's village-based production systems and communal norms. Equal voting rights will be extended to all members regardless of the size of their financial investment or land holdings, consistent with Pohnpeian traditions of consensus and equity.

Membership Structure

Member Owners

The cooperative will be owned and governed by active producers and small enterprises engaged

in agriculture, fisheries, marine harvesting, and food processing. Members may include individuals, families, village groups, and producer cooperatives from both the main island and Outer Islands. Priority groups include:

- Members of Pohnpei Farmers' Organizations
- Women entrepreneurs affiliated with the Pohnpei Women's Council
- Fisher cooperatives including the Caroline Fisheries Corporation and National Fisheries Corporation
- Youth-led enterprises and church-based community farming initiatives

Membership Requirements

- Active engagement in agricultural, fishing, or related value-added production
- Purchase of a minimum number of shares, with options for in-kind contributions such as raw materials or labor in the startup phase
- Commitment to using the cooperative's facilities or services such as drying, packaging, storage, or labeling
- Agreement to uphold the cooperative's bylaws, which will be reviewed and endorsed by traditional leaders, municipal councils, and the membership

Governance Structure

Board of Directors

- The board will consist of 7 to 9 members elected through a democratic process involving all active member owners, with at least one seat reserved for representation from Outer Islands and one for a women's group.
- Board terms will be staggered to ensure continuity, with initial appointments possibly guided by Pohnpei State and traditional councils to build balance and trust.
- The board will provide strategic oversight, set policy direction, and appoint and evaluate management. It will also ensure alignment with local development plans and uphold community values.
- Meetings will be held quarterly and rotated between locations when possible to facilitate inclusion from remote areas.

Executive Leadership

- **General Manager:** Responsible for day-to-day operations, community relations, and ensuring services meet member needs. Preferably a Pohnpeian professional with experience in cooperative management or agribusiness.
- **Operations Manager:** Oversees all processing activities, including food safety, quality control, scheduling, and equipment maintenance. Will coordinate closely with village-level collection points and seasonal production cycles.
- **Financial Manager:** Manages bookkeeping, budgeting, and transparent reporting, with support from the Mesenieng Credit Union or outside auditing firms for accountability.
- **Marketing Manager:** Develops local and regional sales strategies, supports branding of

Pohnpei-made products, and maintains relationships with buyers such as schools, tourism outlets, and shipping distributors.

Operational Management

Processing Operations

The day-to-day operations of the Food Innovation Center and regional Food Innovation Facilities in Pohnpei will reflect local production rhythms, community labor structures, and environmental constraints such as water availability and energy reliability.

- Production supervisors from within Pohnpei will oversee daily processing of local crops such as taro, breadfruit, banana, coconut, and marine products like tuna and rabbitfish. These supervisors will be trained through the **COM FSM Cooperative Research and Extension Program** and mentored by external experts in food safety and small-scale processing.
- A dedicated quality assurance team will ensure that food products meet safety and hygiene standards. They will be guided by protocols developed with the **Pohnpei State Environmental Protection Agency** and the **Department of Health Services**.
- Maintenance staff will be responsible for regular cleaning, equipment repair, and facility upkeep. Whenever possible, youth from vocational training programs at **Pohnpei Island Central School (PICS)** and **COM FSM Pohnpei Campus** will be recruited and trained to handle these roles, fostering local employment.

Member Services

Member services will be community-centered and reflect Pohnpei's strong tradition of cooperation, respect for elders, and inter-village coordination.

- A member liaison will act as the primary contact for cooperative members, including farmers, fishers, and women-led microenterprises. This individual will speak local languages, regularly visit remote sites, and report feedback to the cooperative board.
- The liaison and their team will coordinate raw material receiving, grading, weighing, and payment. Payment systems will be designed to accommodate cash-based and barter-based interactions where appropriate, especially for producers in Outer Islands.
- Technical assistance and market information will be provided through partnerships with **Pohnpei Farmers' Organizations**, the **Pohnpei Women's Council**, and support from regional programs led by the **Pacific Community** and the **University of Guam**. Services will include training on product grading, packaging, business skills, and value chain linkages.

Decision Making Process

Cooperative decision making will blend formal governance procedures with traditional consultative methods to ensure transparency and cultural legitimacy.

- Major decisions such as bylaw revisions, large capital investments, or membership rule changes will require a vote at annual or special member meetings. These meetings will be rotated across municipalities and scheduled in consultation with traditional councils to ensure inclusive participation.
- The elected board of directors will be responsible for developing strategic plans, approving

budgets, and monitoring cooperative performance in line with community values and economic sustainability.

- Management will handle operational decisions such as staff schedules, pricing strategies, and procurement within board-approved guidelines. This structure supports efficient responses to market needs while preserving member oversight.
- Financial transparency will be ensured through quarterly reports presented at member meetings and public forums. Visual tools and local language summaries will be used to promote accessibility and understanding.

Profit Distribution

The cooperative will reinvest in its future while sharing financial benefits fairly among members.

- Net margins will be distributed to members based on their patronage, meaning the volume of raw materials supplied or services used. This ensures that rewards are tied to active participation.
- A portion of annual profits will be retained for capital improvements, maintenance, training, and emergency reserves to ensure the long-term stability of the facility.
- Patronage dividends will be distributed once financial and operational benchmarks are met, in line with cooperative bylaws approved by the membership.

Accountability Measures

- Annual member meetings will present audited financial statements, cooperative achievements, and development plans. These meetings will also provide a platform for feedback from village representatives and traditional leaders.
- Board meetings will be held at least once per quarter and documented with written minutes in both English and local language where feasible.
- Independent financial audits will be conducted annually by a third-party accounting firm or in collaboration with the **Pohnpei State Auditor's Office**.
- A clear grievance and conflict resolution process will be established, combining formal procedures and community-based mediation. This will include anonymous feedback options, member dispute panels, and where needed, involvement of respected elders for culturally appropriate resolution.

This structure ensures democratic control while maintaining efficient operations, balancing member interests with business sustainability and growth.

Part V: Food Innovation Centers and Facilities

Pohnpei State Proposed Budget

Total estimated cost for building and equipping two US FDA Compliant Tier III Food Innovation Center (FIC) plus two regional Food Innovation Facilities (FIF) and 24 village level Tier I FIFs is: \$12.26 million (USD)

Total Budget: \$12.26 million USD

Below is a **comprehensive budget narrative** that aligns with the facilities layout and equipment zones described in the design document. We present these plans recognizing that each needs to be flexible and adaptable while allowing for the core products to be processed efficiently and safely, packaged and commercially sold. The following description separates the most advanced FDA compliant two Tier III Food Innovation Center's (FIC) with its own respective estimated breakdown and costs; then provide a proposed budget for the lesser sophisticated regional Tier II Food Innovation Facilities (FIF) also presented with their respective breakdown costs; and finally, the village level Tier I FIFs that includes the smallest investment of equipment and processing that can be done easiest locally and smaller-scale. This decentralized approach allows for each Tier to operate, manufacture and sell locally and operate independently as well as in coordination and connection with the larger FIFs and FIC to procure adequate product supplies for increased production capacity and with increasing sophistication and quality from Tier I, Tier II and Tier III.

A. FIC- First Tier III. Total cost = \$5,571,940.82

A Tier III FIC is envisioned to be developed at a single site in or near Kolonia, with the specific location to be determined by Pohnpei State. At this stage, we present the FIC as a unified entity with the objective of establishing FDA compliant food safe infrastructure for processing and value addition of Pohnpei's terrestrial food products (plant based such as breadfruit, bananas, taro, yam, coconut) and chicken and pork processing.

FIC- Second Tier III. Total cost = \$3,568,029

The second Tier III Food Innovation Center (FIC) proposed in Pohnpei is dedicated to FISH and BYCATCH and sustainable animal feed production using locally available byproducts such as marine bycatch fish waste, coconut cake, and legume and other plant biomass waste including waste from the food innovation center. This standalone facility, proposed to be located also in or near Kolonia is designed to meet USDA/APHIS, Codex, and HACCP feed safety standards and will span 3,000 square feet. Built with climate-resilient materials and equipped with energy-efficient feed processing technology, the center is expected to produce approximately 260 metric tons of high-protein animal feed annually. The initiative complements Pohnpei's broader food security strategy by transforming underutilized waste into value-added feed, reducing import dependency, and supporting smallholder livestock and poultry productivity. This facility is designed to meet the FISH PROCESSING and ANIMAL/POULTRY FEED needs of Pohnpei and over time for shipment to Yap, Chuuk and Kosrae and for the substitution and replacement of imported animal feed into the FSM.

B. FIF- Tier II (2 total). Total cost= **\$2,669,131**

- Two regional Tier II Food Innovation Facilities are proposed to be located on main island Pohnpei, with one FIF designed for coconut products (sugar, oil, milk) and one for local crop flour/chips/vinegar. Each of these FIFs are designed at 2,500 square feet each, with construction costs estimated at \$450 per square foot, totaling \$1,125,000 per Tier II facility. With two such FIF's total is \$2,250,000. When equipment, administrative setup, training infrastructure, and contingency allowances are included, the full cost for both facilities amount to \$2,669,131.22. These centers will support value-added processing of coconut-based and plant/crop-based products, advancing enterprise development and market integration across the state.

C. Village Level Tier I (24 total) = **\$148,149**

The total estimated investment for 24 Tier I Food Innovation Facilities (FIFs) in Pohnpei is \$148,149.07, with each unit costing \$6,172.88. These micro-scale FIF centers will be distributed across all five municipalities—Sokehs, Nett, Kitti, U, and Madolenihmw—with four per municipality, and one each on the four inhabited outer islands (Mwoakilloa, Sapwuahfik, Nukuoro, and Kapingamarangi). Designed to support pre-processing, aggregation (the receiving, holding and distribution of food products to Tier II or III facilities, and training, these community-level facilities are key to promoting inclusive participation, localized trade and sales and localized value addition within Pohnpei's food system.

D. Contingency Funds= **\$300,000**.

Grand Total= \$12.26 million

A. The Pohnpei Tier III Food Innovation Center (FIC)

A. FIC- Tier III. Total cost = \$5,571,940.82 (4,500,000 + 721,940.82 + 90,000 + 185,000 + 75,000)

Budget Narrative:

1. Construction and Infrastructure for Terrestrial Tier III : \$4,500,000

This estimate reflects the cost of constructing a single 6,000 square foot Tier III FIC in Pohnpei State, based on a benchmark rate of \$750 (US) per square foot and aligned to be FDA compliant food-grade facility standards.

The estimate accounts for imported materials, skilled labor as needed, refrigeration, sanitary systems, climate-resilient construction, and project management. We present the design this way to offer flexibility for Pohnpei State and its designated lead agency to determine whether to construct on a new site or integrate elements of existing food processing and agricultural

infrastructure in Kolonia. Pohnpei's frequent rainfall, high humidity, and vulnerability to coastal flooding require that the facility be situated in a safe physical space and engineered for durability and safe operations under tropical conditions and adverse weather. Site location needs to consider access and connection to excellent road and marine access and infrastructure.

A. Foundation and Structural Works – \$1,845,000

This component covers civil works and vertical construction activities required to develop a fully enclosed, climate-resilient, food-safe and storm resistant structure. It reflects the realities of building in Pohnpei State, where persistent rainfall, coastal exposure, and limited road access pose logistical and engineering challenges. Nearly all critical inputs such as gravel, sand, cement, steel, and specialized labor must be imported and coordinated through port facilities in Dekehtik or Kolonia.

1. Site Preparation and Slab Work – \$575,000

- **Land clearing, grading, and compacting:** Using imported equipment or locally leased heavy machinery adapted for Pohnpei's volcanic soil and sloped terrain.
- **Sub-base and reinforcement:** Placement of imported gravel, sand, and geotextiles to stabilize the ground and reduce saturation risks common in high-rainfall zones.
- **Reinforced concrete slab:** Six-inch industrial-grade poured slab with rebar mesh, engineered to withstand heavy processing equipment and reduce erosion and settlement under humid conditions.
- **Drainage design:** Sub-slab slope integrated with floor drains and connections to greywater or septic systems, designed for rapid runoff management.
- **Shipping surcharges:** Includes handling costs for over 600 tons of construction-grade materials through Pohnpei's main port, including demurrage, offloading, and inter-island transport as needed.

2. Structural Framing and Envelope – \$750,000

- **Main steel frame and columns:** Galvanized I-beams and trusses prefabricated abroad and shipped to Pohnpei for on-site assembly with corrosion-resistant coatings.
- **Roof framing and support:** Trussed rafters engineered to withstand tropical storm winds and seismic shifts typical in FSM's geophysical setting.
- **Exterior and internal framing:** Combination of steel studs and treated tropical hardwoods for non-load-bearing partitions in food-safe zones.
- **Anchoring and wind resistance:** Hurricane ties and bolted foundations to comply with Pohnpei's building codes and ensure structural stability during cyclonic events.

3. Roofing System – \$250,000

- **Galvanized corrugated steel panels:** Rust-resistant panels with Class A fire rating, suitable for humid, salt-laden air.
- **Radiant insulation barrier and vapor shield:** Reduces indoor heat gain and condensation, critical for equipment longevity and food safety.
- **Rainwater management and water collection system:** Guttering and downspouts integrated with large cisterns for harvesting and non-potable usage during water shortages.
- **Roof overhangs and soffits:** Designed to deflect driving rain and provide shade, reducing interior heat buildup and external wall degradation.

4. Loading Bay and Exterior Finishes – \$170,000

- **Receiving and dispatch area:** Concrete apron with covered roof for safe loading/unloading of food products in a high-rain environment.

- **Driveway grading and compaction:** Engineered to ensure access by heavy-duty trucks year-round, including slope stabilization for hillside terrain.
- **Exterior wall finishes:** Insulated sandwich panel siding or rendered block, treated with mold-resistant, food-safe coatings.
- **Security features:** Includes motion-activated lighting, mesh window screens, and tamper-resistant steel doors at all access points.

5. Construction Logistics and Material Handling – \$100,000

- **Crane rental and offloading services:** Required for unloading containers and positioning prefabricated structural modules.
- **Storage containers and on-site warehousing:** Secure facilities to hold equipment and building supplies for a multi-phase construction timeline.
- **Inter-island transport and labor mobilization:** Barge or aircraft charter for tools, materials, and personnel moving between Kolonia, outer municipalities, and regional vendors.
- **Customs brokerage and insurance:** Necessary for importing high-value materials and ensuring coverage through Pohnpei’s port and customs facilities.

B. Plumbing and Electrical Systems – \$715,000

This component ensures that the facility is hygienically operable, energy-resilient, and food-safety compliant. In a tropical, infrastructure-limited environment like Pohnpei, plumbing and electrical systems must be both robust and adaptable to manage utility fluctuations, persistent rainfall, and sanitation-intensive operations. The budget reflects full importation of components, skilled installation labor, and built-in allowances for logistics and contingency adjustments.

1. Potable Water and Sanitation Systems – \$310,000

- **Facility-wide potable water lines:** Food-grade PEX or CPVC piping installed throughout processing zones, dry and cold storage, sanitation rooms, and administrative areas.
- **Dedicated hand-wash stations:** At least two per processing room, fitted with foot- or elbow-operated valves, splash guards, and hygienic hand-drying dispensers.
- **Triple-compartment sinks:** Installed in the community kitchen, R&D laboratory, and wash-down areas to meet safe food handling protocols.
- **Grease traps and floor drainage:** Stainless steel interceptors and epoxy-sealed drains with engineered slope, linked to the centralized graywater handling system.
- **Rainwater catchment and storage system:** Roof-integrated gutter systems feeding cisterns with first-flush filters, UV or chlorination units for non-potable use in cleaning and landscaping.
- **Septic system:** Onsite wastewater treatment designed for high-volume discharge from food-grade operations, aligned with Pohnpei EPA regulations and flood-resilient engineering.

2. Electrical Distribution and Food-Safety Power Design – \$260,000

- **Dedicated circuits for critical equipment:** Independent power lines for cold rooms, heat sealers, and high-load processing machinery, stabilized for voltage variation.
- **Processing zone separation:** Individual electrical sub-panels per room to isolate failures and enable safe equipment maintenance.

- **Food-safe electrical finishes:** All conduits and outlets sealed against moisture intrusion, with splash protection in wet areas and compliance with international food-grade standards.
- **LED lighting:** Shatterproof, high-efficiency LED fixtures with increased lumen output in food prep areas to improve visibility and inspection quality.
- **Emergency lighting and signage:** Battery-backed lighting and illuminated exit signs strategically installed to meet Codex and IFS food facility requirements.

3. Generator Interface and Solar Power Integration – \$105,000

- **Backup generator system:** Diesel-powered 50–80 kW generator housed in a noise-dampened, cyclone-resistant enclosure.
- **Automatic transfer switch (ATS):** Enables seamless transition during power outages to preserve cold chain and data systems.
- **Solar-ready conduits and interface controls:** Designed for future photovoltaic integration, with rooftop and inverter panel compatibility.
- **Battery/inverter compatibility:** Wired to support lithium-ion or lead-acid battery backup installation in later phases, with surge protection and grounding.

4. Fire Suppression and Safety Systems – \$40,000

- **Commercial hood-integrated fire suppression:** Wet-chemical systems installed over stoves, ovens, and fryers in high-risk kitchen and meat/poultry processing areas.
- **Wall-mounted extinguishers and alarms:** Dry chemical and CO2 units installed at regulated intervals, along with training modules for staff response.
- **Electrical grounding and lightning arrestors:** Protection systems installed to minimize equipment damage and reduce outage frequency during heavy storms.
- **Safety signage and PPE storage:** Clearly designated areas for emergency response, including spill kits, eye wash stations, gloves, and evacuation maps.

This section ensures that water, energy, and sanitation systems in the Pohnpei FIC are resilient to local climatic stressors and built to sustain uninterrupted operations under demanding processing conditions. All system specifications are aligned with HACCP principles and Codex Alimentarius standards for internationally compliant food safety.

C. Interior Finishing – \$625,000

This component ensures the internal spaces of the Food Innovation Center (FIC) meet rigorous international food safety standards for hygiene, durability, cleanability, and pest exclusion. All construction materials are selected to endure heavy usage in Pohnpei’s humid, salt-rich climate while complying with HACCP, USDA, and Codex food processing protocols. The budget includes full importation, skilled labor, and design modifications to accommodate moisture control and local environmental conditions.

1. Hygienic Wall Systems – \$225,000

- **FRP (Fiberglass Reinforced Plastic) panels:** Installed across wet processing zones such as fish, poultry, kitchen, and sanitation areas. These are chemical-resistant, mold-repellent, and easily cleaned for continuous sanitary operations.
- **Food-safe epoxy wall coatings:** Used in dry zones including storage, admin, and training areas. Coatings include antimicrobial additives and high-gloss finishes for visual inspection and contamination control.
- **Corner guards and coving:** Seamless transitions between walls and floors help prevent buildup of residues and allow for more effective washdowns.

2. Epoxy-Coated Flooring with Integrated Drainage – \$175,000

- **High-performance epoxy coatings:** Non-slip, abrasion- and chemical-resistant flooring installed throughout the facility. Designed to withstand rolling equipment, wet cleaning, and foot traffic under constant humidity.
- **Anti-microbial aggregates:** Embedded in epoxy for added pathogen resistance and grip, especially in slaughter and preparation areas.
- **Drainage design:** Integrated slope directing effluent to stainless steel trench drains located in processing zones.
- **Expansion joints and water barriers:** Incorporated to prevent structural cracking caused by tropical humidity and temperature cycling.

3. Pest-Sealed Ceiling Systems – \$100,000

- **Waterproof, seamless ceiling panels:** Used in prep and storage areas, with minimized joints to discourage insect and mold infiltration.
- **Reinforced ceiling insulation:** Includes moisture barriers to prevent condensation that could affect stored food or processing equipment.
- **Rodent- and insect-proof seals:** Food-safe silicone and mesh gaskets applied to all ceiling penetrations, including HVAC and lighting fixtures.
- **Access hatches for maintenance:** Fully gasketed and secure to maintain pest exclusion integrity and enable service access.

4. Internal Partitions, Doors, and Zoning – \$75,000

- **Clean-to-dirty workflow zoning:** Physical partitions established to separate raw input zones from finished product areas, supporting safe food handling practices.
- **Airtight doors with gaskets:** Heavy-duty stainless steel or food-grade PVC doors ensure hygienic isolation and temperature containment.
- **Observation windows and light panels:** Allow for transparent training and supervision without compromising sanitary zones.
- **Magnetic hold-open systems:** Enable hands-free access in high-traffic areas, reducing cross-contamination risks.

5. Fixtures, Restroom Finishes, and Food-Safe Cabinetry – \$50,000

- **Restroom fixtures:** Low-flow toilets, urinals, foot-operated sinks, and hygienic hand dryers installed in gender-separated sanitation facilities.
- **Stainless steel cabinetry:** Built for the kitchen, lab, and sanitation areas to store PPE, reagents, utensils, and sealed food components.
- **Lockable storage units:** Used for hazardous materials, sensitive documentation, and regulatory compliance archives.
- **Public area finishes:** Durable, non-toxic paints and hardware throughout offices and meeting rooms, along with insect-resistant screening and directional signage.

The interior finishing ensures that the Pohnpei FIC can meet export-ready hygiene requirements while enduring tropical wear conditions. Every surface is selected for resilience, pest exclusion, and ease of sanitation—ensuring operational integrity and longevity of the facility under local environmental stressors.

D. Refrigeration and Ventilation – \$940,000

This budget line ensures the Tier III Food Innovation Center (FIC) in Pohnpei maintains robust cold-chain integrity and consistent air quality across all processing and storage areas. Given Pohnpei’s humid tropical climate, frequent rainfall, and the perishability of local crops, fish, and poultry, this investment supports the installation of energy-efficient systems that enhance food safety, climate control, and operational reliability.

1. Cold Storage Systems – \$480,000

- **Walk-in Coolers and Freezers:**

Two industrial walk-in units—one freezer and one cooler—constructed with polyurethane-insulated wall panels, heavy-duty sealing gaskets, and digital temperature regulation. Units include stainless steel shelving, hygienic floor surfaces, and internal drainage for safe and efficient product handling.

- **Hybrid CoolBot Cold Rooms:**

Two temperature-controlled rooms using CoolBot technology paired with high-BTU window air conditioning units, ideal for supplemental or emergency cold storage of fruits, vegetables, or finished goods awaiting shipment.

- **IQF (Individual Quick Freezing) System:**

A compact quick-freeze tunnel to support rapid chilling of taro, breadfruit, and other produce, helping preserve quality and extend shelf life for both domestic use and export markets.

- **Battery-Logged Temperature Monitoring:**

All cold storage areas are equipped with sensor-based temperature loggers that record data to cloud dashboards, ensuring HACCP compliance and supporting traceability audits.

2. Ventilation and Odor Control Systems – \$250,000

- **Commercial Exhaust Hoods:**

Installed over cooking and cleaning stations in poultry, livestock, and kitchen areas. Units feature high-efficiency stainless steel grease filters and integrated fire suppression where needed.

- **Cross-Ventilation Design:**

Ceiling-mounted and wall-mounted fans installed in dry storage and staple crop rooms to ensure airflow, reduce stagnant humidity, and prevent spoilage and condensation buildup.

- **Dehumidifiers and Air Scrubbers:**

Specialized dehumidification systems placed in livestock and poultry zones to control microbial growth and maintain safety. Air scrubbers with activated carbon and UV filters eliminate strong odors and improve air quality.

- **Zonal Pressure Management:**

Negative air pressure maintained in high-risk zones (e.g., poultry and livestock processing) to isolate contaminants, while packaging, administrative, and R&D areas retain positive pressure to ensure clean air integrity.

3. Thermal Efficiency and Backup Systems – \$210,000

- **Solar Integration Readiness:**

All major refrigeration and ventilation units are pre-wired for rooftop solar photovoltaic (PV) connections and/or hybrid solar-diesel integration for future sustainability upgrades.

- **Insulation Upgrades:**

Walls and ceilings in cold storage rooms and processing areas are fitted with high-R insulation and reflective foil barriers. Thermal seals are installed around all entry points to minimize cooling loss and reduce power consumption.

- **Backup Generators and Switchgear:**

Includes one fixed 25–30 kVA diesel generator with an automatic transfer switch for the full cold storage load, along with a portable generator for limited backup of critical equipment during extended outages.

- **Thermal Curtains and Air Locks:**

Installed at all entryways to walk-in freezers and coolers to limit exposure to warm ambient air during frequent door openings, preserving temperature stability and reducing operational strain on cooling systems.

Together, these refrigeration and ventilation systems allow the Pohnpei FIC to meet international food safety requirements, maintain cold chain standards, and operate efficiently under high ambient moisture and temperature conditions. The design emphasizes modularity, redundancy, and adaptability to support uninterrupted service delivery year-round.

E. On-Site Project Management and Technical Oversight – \$375,000

This component ensures that the Food Innovation Center (FIC) in Pohnpei is constructed and commissioned according to internationally recognized food facility standards, particularly those aligned with U.S. FDA requirements. It also addresses the specific implementation challenges in Pohnpei, including unpredictable shipping timelines, extended wet seasons, and limited local access to specialized trades. Strong oversight will ensure the facility is completed on time, on budget, and to specification.

1. Full-Time Construction Manager and staff assistant– \$200,000

A dedicated, Pohnpei-based construction manager and staff assistant will lead all phases of the build, from site mobilization through commissioning and handover.

Key responsibilities include:

- Day-to-day oversight of general contractors, subcontractors, and local labor teams
- Verifying compliance with engineering drawings, food facility safety codes, and schedule milestones
- Coordinating the arrival, offloading, and on-site storage of imported materials and equipment
- Addressing unforeseen delays related to site conditions, weather impacts, or logistics bottlenecks
- Managing sequencing of plumbing, electrical, HVAC, and finishing teams to avoid conflicts
- Delivering weekly progress reports and risk alerts to the project coordination unit

Cost includes:

- Monthly professional fees over a 12-month period
- Travel costs from a regional base or U.S. origin
- Temporary furnished housing and utilities in Pohnpei
- Local per diem and ground transport for daily site access

2. FDA-Aligned Food Facility Technical Advisor – \$125,000

A specialized technical advisor will ensure the FIC meets hygienic design criteria including food-safe zoning, equipment layout, drainage planning, and materials compliance. The advisor will be engaged during design finalization, construction supervision, and facility commissioning.

Key deliverables include:

- Reviews of architectural and utility drawings for HACCP and Codex compliance
- Expert guidance on facility layout, critical control points, and workflow optimization
- In-person supervision of equipment installation and sanitary finish applications
- Technical support for regulatory certifications (e.g., USFDA registration, HACCP protocols)
- Development and documentation of SOPs, sanitation plans, and staff training guidance

- Lead workshops in HACCP and food safety and engineering for all Tier III staff, as well as bringing in for trainings staff from all other FIC and FIF in Pohnpei.

Cost includes:

- Monthly advisory retainer over 9–12 months
- Three field visits including airfare, lodging, and meals in Pohnpei
- Virtual coordination for plan review, document feedback, and remote training modules

3. Quality Assurance and Construction Audits – \$50,000

To uphold construction quality and reduce long-term rework costs, independent QA/QC audits will be conducted throughout the project lifecycle by a licensed civil engineer or architect, ideally sourced from the region.

This includes:

- Bi-weekly site inspections with written evaluations and issue tracking
- Material verification against technical specifications and bills of quantity
- Photographic and physical validation of critical systems such as drainage, electrical layout, and flooring
- Certification checklists for milestone-based contractor payments and performance incentives

Together, this oversight package guarantees that the Pohnpei FIC is constructed to specification, with high standards of safety, quality, and compliance. The combination of local management and technical expertise provides funders and stakeholders with assurance that the investment will yield a durable, fully functional, and regulation-ready food-grade facility.

Total Construction and Infrastructure: \$4,500,000

Component	Amount (USD)
A. Foundation & Structure	\$1,845,000
B. Plumbing & Electrical	\$715,000
C. Interior Finishing	\$625,000
D. Refrigeration & Ventilation	\$940,000
E. Project Management & Oversight	\$375,000
Total	\$4,500,000

2. Equipment and Supplies for Terrestrial FIC: \$721,940.82

This equipment budget covers the procurement, shipping, and installation of specialized machinery tailored to the operational needs of a Tier III Food Innovation Center (FIC) in Pohnpei. The facility will be outfitted to support a wide range of food processing functions including staple crops, poultry, livestock, and community kitchen activities, as well as packaging, cold storage, and internal logistics.

The equipment is organized by functional zones to ensure smooth, hygienic workflows and support safe, efficient value-added processing of local foods such as breadfruit, taro, banana, coconut, cassava, and reef fish. Each processing room will be equipped with machinery that enables both traditional and modern food production methods in compliance with global food safety protocols.

All equipment purchases will include installation guidance, critical spare parts, and operational support features such as HACCP traceability systems. Selected tools are modular and scalable to allow future expansion or upgrades. The investment ensures that the FIC will be fully operational with sufficient capacity to support training, local entrepreneurship, product development, and potential export-readiness.

A. Staple Crop & Vegetable/Fruit Processing

This zone supports the transformation of Pohnpei’s local staples—including breadfruit, taro, banana, coconut, and cassava—into shelf-stable, value-added products such as flour, chips, leathers, and dried fruit. Equipment in this area enables pre-treatment, slicing, dehydration, frying, and vacuum sealing under food-safe conditions.

Key Equipment:

- Produce washer and precision vegetable cutters (Nilma or Sammic models)
- Solar or hybrid electric dryers designed for fruits and starchy roots
- Flour grinder for taro and cassava meal production
- Commercial deep fryer and chamber vacuum sealer for snack lines
- HACCP traceability software and spare parts kits for continuous uptime

B. Poultry Processing

This dedicated space enables hygienic, small-scale poultry processing aligned with humane slaughter protocols and a linear “dirty-to-clean” workflow. The layout is optimized for chilled flow-through operations and compliance with HACCP poultry handling guidelines.

Key Equipment:

- Slaughter cone station, hot water scalding tank, and defeathering machine
- Chill tanks, evisceration benches, cutting tables, and poultry saws
- Vacuum sealing unit and barcode labeling system
- Overhead rail system for processing line flow and stainless sanitation toolkits
- Cold storage for whole birds, cuts, and fresh eggs

Key Equipment:

- Stainless steel filleting and gutting tables with integrated spray-down jets
- Entry-level Baader deboning machine and IQF (Individual Quick Freezing) tunnel
- Salt curing tanks and hygiene kits for microbial safety control

D. Community Kitchen

This shared-use kitchen provides infrastructure for culinary innovation, food safety training, and small-batch entrepreneurship. It is designed to support recipe testing, cooking demonstrations, and pilot-scale production runs for new product development and use as rental for food production for catering and sale.

Key Equipment:

- Commercial-grade oven, countertop deep fryer, and gas cooktop with exhaust hood
- Planetary mixer, blast chiller, and either a steam kettle or tilt skillet
- Heavy-duty dishwashing station and electric warming cabinet

E. Storage and Logistics

This zone underpins the entire facility’s cold chain and inventory system, supporting raw material intake, intermediate storage, and finished product staging. Designed for modular efficiency, it allows flexible handling of both perishable and dry goods.

Key Equipment:

- Walk-in cold room, upright commercial freezers, and dry storage shelving
- Food-grade ingredient bins, pallet jacks, and insulated delivery coolers
- Temperature and humidity monitoring systems with digital alerts
- Modular racking systems for vertical storage optimization and FIFO management

Total Equipment Investment (with Logistics Buffer):

This total includes:

- Equipment purchase based on validated vendor pricing and technical specifications
- Estimated international shipping, port clearance, and customs handling
- Installation, setup, and calibration support as required by specific equipment
- Contingency buffer to accommodate unexpected freight surcharges or delays

This comprehensive equipment suite enables the Pohnpei FIC to operate efficiently across a range of product categories—including poultry, fish, root crops, and tropical fruits—while meeting international hygiene and traceability standards. Each investment is selected to support local food processing capacity, entrepreneurial activity, and workforce training, strengthening food system resilience and economic development in Pohnpei.

Equipment & Supplies for a Tier III FDA-compliant Food Innovation Center in Pohnpei:

Equipment	Price per Unit	Number of Units	Total without Cost Conversion	Total with 1.5x Cost Conversion
Staple Crop Processing Items				
Staple Crop Slicer	1,825.25	1	1,825.25	2,737.88
Flour Mill	1,250.00	3	3,750.00	5,625.00
Coconut Processing Items				
Coconut Water Extractor	2,200.00	1	2,200.00	3,300.00
Coconut Milk Extractor	10,300.00	1	10,300.00	15,450.00
Coconut Sugar Processor	3,500.00	1	3,500.00	5,250.00
General Tier-III				
Tabletop Impulse Sealer - 20"	200.00	2	400.00	600.00
Vertical Band Sealer	890.00	2	1,780.00	2,670.00

Double Chamber Vacuum Packaging Machine	4,000.00	1	4,000.00	6,000.00
Dehydrator Dryer	22,600.00	1	22,600.00	33,900.00
Solar powered Cold Room	10,000.00	2	20,000.00	30,000.00
Ventilated Stack and Nest Container	24.00	50	1,200.00	1,800.00
Flour and Sugar Sieve	305.43	3	916.29	1,374.44
Stainless Steel Worktables	575.00	5	2,875.00	4,312.50
Poultry Processing Items				
Mainstreet Stainless Steel Floor Fryer	749.00	1	749.00	1,123.50
Stainless Steel Triple Basins	306.15	1	306.15	459.23
Avantco A-49R-HC 54" Reach in Refrigerator	1,949.00	1	1,949.00	2,923.50
Mannlake Scalding with Temp Control	525.00	1	525.00	787.50
Food Safety Testing Checklist				
Food Safety Testing				300,000.00
Culture Plates				0.00
Thermopen Thermometer	299.00	1	299.00	448.50
Water Activity meter (Aquamer)				0.00
Hygiene monitor and Management system	1,000.00	1		0.00
High sensitivity Allergen Tester	284.65	1	284.65	426.98
Handheld temp adjusted Refractometer	260.00	4	1,040.00	1,560.00
Thermometer Calibrator (4 point hot/cold)	1,592.12	1	1,592.12	2,388.18
Bench-top refractometer	3,000.00	1	3,000.00	4,500.00
pH meter (with calibration kit)	2,500.00	1	2,500.00	3,750.00
Thermometers (digital + infrared)	300.00	2	600.00	900.00
Water Activity Meter and Moisture Meter	3,000.00	2	6,000.00	9,000.00
Check-Set IV Cold/Hot Calibrator	1,592.12	1	1,592.12	2,388.18
AP550 Flat-Surface Label Applicator	2,395.00	1	2,395.00	3,592.50
AP380 Label Applicator	1,595.00	1	1,595.00	2,392.50

PL400 Pouch Labeler	1,595.00	1	1,595.00	2,392.50
Barcode Thermal Ribbons	56.00	1	56.00	84.00
Barcode Scanner L13687	1,025.00	1	1,025.00	1,537.50
Barcode software	790.00	1	790.00	1,185.00
Zebra ZQ511 Mobile Receipt Printer	840.00	1	840.00	1,260.00
Zebra ZT620 industrial Barcode Printer	6,200.00	1	6,200.00	9,300.00
Safety Equipment				
Porta Stream II Eyewash station	460.00	3	1,380.00	2,070.00
Saline Concentrate Refill	100.00	10	1,000.00	1,500.00
Dust Cover	52.00	3	156.00	234.00
S Carton Uline Industrial Latex Gloves	26.00	10	260.00	390.00
M Carton Uline Industrial Latex Gloves	14.00	10	140.00	210.00
L Carton Uline Industrial Latex Gloves	19.00	10	190.00	285.00
Class A First Aid Kits	67.00	5	335.00	502.50
Class B First Aid Kits	155.00	5	775.00	1,162.50
Class B+ First Aid Kits	395.00	5	1,975.00	2,962.50
Uline Ice Wraparound Fog Armor Dispenser box	94.00	2	188.00	282.00
3M Construction Harness	185.00	2	370.00	555.00
Carton Polyethylene Apron	22.00	6	132.00	198.00
Multi compartment Stainless Steel Dispensers	250.00	3	750.00	1,125.00
Canning and Pickling Equipment				
Canner Aluminum Bath water Canner	269.99	2	539.98	809.97
30 Gallon Large Round Canner	1,451.25	1	1,451.25	2,176.88
Case Wide Mouth Ball Glass Mason Jars 32 oz	16.44	100	1,644.00	2,466.00
10 Gallon Fermentation Crock	199.99	2	399.98	599.97
Fermentation Weights	43.97	20	879.40	1,319.10
Fermentation lid cloth covers	13.93	25	348.25	522.38

Potable Aqua Water Purification Tabs with PA plus	12.99	50	649.50	974.25
Stainless Steel Funnel	10.49	10	104.90	157.35
11.5 Qt Canning Rack	8.49	10	84.90	127.35
Additional Equipment				
Nilma Veg Wash	4,000.00	1	4,000.00	6,000.00
Floor Frier Rig	1,600.00	1	1,600.00	2,400.00
Semi Automatic Bucket Conveyor Pouch filling and sealing machine	9,599.00	1	9,599.00	14,398.50
Chicken Processing Rig (Feathering, scalding, cooling and cone)	6,000.00	1	6,000.00	9,000.00
Slaughtering Table	425.00	2	850.00	1,275.00
Vertical Electric Liquid and Paste Water bottle filling machine	1,750.00	1	1,750.00	2,625.00
Butchers Table	1,000.00	3	3,000.00	4,500.00
Poultry cutting saw	2,631.00	1	2,631.00	3,946.50
Oven and range 72"	15,293.00	1	15,293.00	22,939.50
176lb Floor Electric Mixer	7,123.00	1	7,123.00	10,684.50
Heavy Duty Steel shelving 96 x 24 x 72"	1,445.00	5	7,225.00	10,837.50
Solar Dryer or Dehumidifier Dried Fruit	210.00	10	2,100.00	3,150.00
Information Hub				
Mobile Platform app				0.00
Samsung 4TB SSD Hard drives	439.99	3	1,319.97	1,979.96
Website				0.00
Dell Inspiron 27' All in one cpu	1,189.98	1	1,189.98	1,784.97
4 Person L Desk Workstation	3,210.00	1	3,210.00	4,815.00
LG smart TV	299.00	1	299.00	448.50
Norton Anti virus software	19.99	1	19.99	29.99
Mesh Task Chairs	165.00	6	990.00	1,485.00
Downtown conference tables (Powered) 192 x 48"	1,560.00	1	1,560.00	2,340.00
Portable Projector Screen 107"	525.00	1	525.00	787.50

Wall monitor Mount	95.00	1	95.00	142.50
Kitchen Supplies				
Mobile ingredient bins	343.00	3	1,029.00	1,543.50
Self ingredient Bin 200 cups	243.00	3	729.00	1,093.50
Baking Pan	216.00	3	648.00	972.00
Wire Grate	168.00	3	504.00	756.00
Cambro Dish Racks	42.00	3	126.00	189.00
Cambro Glass Racks	80.00	3	240.00	360.00
Pan Dolly	305.00	3	915.00	1,372.50
Uline Trash Cans	74.00	3	222.00	333.00
Uline Trash can lids	29.00	3	87.00	130.50
Biohazard Step On Waste Can	131.00	3	393.00	589.50
Uline Thin trash can 23G	45.00	3	135.00	202.50
Rubbermaid Slim Jim Lid Can/bottle	52.00	3	156.00	234.00
Rubbermaid Slim Jim Lid paper	52.00	3	156.00	234.00
Rubbermaid Slim Jim Swing top	51.00	3	153.00	229.50
Stainless Dollie	135.00	3	405.00	607.50
Handsfree Trash Can 55G	255.00	3	765.00	1,147.50
Outdoor Landmark Series Trash Can Dome top 50G	970.00	3	2,910.00	4,365.00
Fork liftable Transport tilt truck	2,505.00	3	7,515.00	11,272.50
Hydraulic Platform Stacker	2,695.00	3	8,085.00	12,127.50
130km low speed new energy double cab mini pick up truck	9,999.00	3	29,997.00	44,995.50
Commercial Cutting Board	152.00	5	760.00	1,140.00
Commercial Mixing 3qt	62.00	3	186.00	279.00
Commercial Mixing 5qt	89.00	3	267.00	400.50
Commercial Mixing 8qt	125.00	3	375.00	562.50
Commercial Mixing 13qt	94.00	3	282.00	423.00
Commercial Mixing 20qt	150.00	3	450.00	675.00
Stainless Steel Steam Table Pans 3qt	150.00	3	450.00	675.00

Stainless Steel Steam Table Pans 6qt	250.00	3	750.00	1,125.00
Stainless Steel Steam Table Pans 10qt	150.00	3	450.00	675.00
Stainless Steel Steam Table Pans 14qt	175.00	3	525.00	787.50
Stainless Steam Table Pan Lids 1/6	55.00	3	165.00	247.50
Stainless Steam Table Pan Lids 1/3	85.00	3	255.00	382.50
Stainless Steam Table Pan Lids 1/2	110.00	3	330.00	495.00
Stainless Steam Table Pan Lids Full	205.00	3	615.00	922.50
Stainless Steel Scoops 8oz	69.00	3	207.00	310.50
Stainless Steel Scoops 16oz	75.00	3	225.00	337.50
Stainless Steel Scoops 32oz	80.00	3	240.00	360.00
Stainless Steel Scoops 64oz	86.00	3	258.00	387.00
Stainless Steel Scoops 96oz	114.00	3	342.00	513.00
Stainless Steel Scoops 128oz	122.00	3	366.00	549.00
Stainless Steel Scoops 160oz	134.00	3	402.00	603.00
Stainless Steel Mixing Paddles 48"	35.00	3	105.00	157.50
Mixing Polypropylene Paddles 40"	65.00	3	195.00	292.50
Mixing Polypropylene Paddles 52"	72.00	3	216.00	324.00
Hand Scraper 3 x 8"	7.00	5	35.00	52.50
Hand Scraper 4 x 9"	8.00	5	40.00	60.00
Stainless steel paper cutter 36"	163.00	2	326.00	489.00
Unbleached Paper rolls 36"	81.00	3	243.00	364.50
Handheld Induction Sealer and Caps	340.00	5	1,700.00	2,550.00
Clear Straight-sided Glass jars with metal cap 8oz	40.80	5	204.00	306.00
Clear Straight-sided Glass jars with metal cap 16oz	54.60	5	273.00	409.50
Clear Straight-sided Glass jars with metal cap 32oz	64.80	5	324.00	486.00
Amber Straight-Sided Glass Jars with Metal Cap 8oz	40.80	5	204.00	306.00
Case Standard Glass Canning Jars 8oz	14.40	5	72.00	108.00

Case Standard Glass Canning Jars 16oz	18.00	5	90.00	135.00
Case Standard Glass Canning Jars 24oz	20.40	5	102.00	153.00
Case Standard Glass Canning Jars 32oz	22.80	5	114.00	171.00
Case Replacement Standard Canning Jar Lids	81.00	5	405.00	607.50
Case Glass Spice Jars 2oz	48.00	5	240.00	360.00
Case Glass Spice Jars 4oz	27.60	5	138.00	207.00
Case Glass Spice Jars 8oz	15.60	5	78.00	117.00
Case Glass Spice Jars 16oz	18.60	5	93.00	139.50
Case Cubitainers	60.00	5	300.00	450.00
Case of Square Utility Jugs	34.20	3	102.60	153.90
Jug Pump	10.50	3	31.50	47.25
Chemical Resistant Spray Bottles	25.50	3	76.50	114.75
Case Replacement nozzles	17.25	3	51.75	77.63
Bundle Egg Cartons	90.00	10	900.00	1,350.00
Egg Filler Flat Case	42.00	10	420.00	630.00
Williams Sonoma Prep Tools 15 Piece Gadget and Utensils Set	279.95	3	839.85	1,259.78
Berry Basket	75.00	5	375.00	562.50
Lab Ware				
Case Graduated Glass Dropper Bottles 1/2 oz	48.00	5	240.00	360.00
Case Graduated Glass Dropper Bottles 1oz	50.40	5	252.00	378.00
Case Graduated Glass Dropper Bottles 2 oz	28.80	5	144.00	216.00
Case Graduated Glass Dropper Bottles 4oz	33.60	5	168.00	252.00
Case Glass Beakers 100ml	31.00	5	155.00	232.50
Case Glass Beakers 250ml	40.00	5	200.00	300.00
Case Glass Beakers 400ml	27.00	5	135.00	202.50
Case Glass Beakers 1,000 ml	58.00	5	290.00	435.00

Case Test Tubes 8ml	40.00	5	200.00	300.00
Case Test Tubes 16ml	62.00	5	310.00	465.00
Case Test Tubes 25ml	67.00	5	335.00	502.50
Case Test Tubes 50ml	94.00	5	470.00	705.00
Test tube racks 13mm	22.00	5	110.00	165.00
Test tube racks 16mm	22.00	5	110.00	165.00
Test tube racks 20mm	22.00	5	110.00	165.00
Test tube racks 25mm	22.00	5	110.00	165.00
Glass Graduated Cylinders 10ml	24.00	10	240.00	360.00
Glass Graduated Cylinders 25ml	30.00	10	300.00	450.00
Glass Graduated Cylinders 50ml	23.00	10	230.00	345.00
Glass Graduated Cylinders 100ml	38.00	10	380.00	570.00
2" x 250' Parafilm M Lab Film	44.00	5	220.00	330.00
4" x 125' Parafilm M Lab Film	44.00	5	220.00	330.00
Case Whirl-Pak bags 2oz	98.00	10	980.00	1,470.00
Case Whirl-Pak bags 4oz	100.00	10	1,000.00	1,500.00
Case Whirl-Pak bags 18oz	139.00	10	1,390.00	2,085.00
Case Whirl-Pak bags 24oz	184.00	10	1,840.00	2,760.00
Case Whirl-Pak bags 69oz	318.00	10	3,180.00	4,770.00
Pack Weighing Dishes (Aluminum) 20ml	15.00	10	150.00	225.00
Pack Weighing Dishes (Aluminum) 40ml	17.00	10	170.00	255.00
Pack Weighing Dishes (Aluminum) 80ml	21.00	10	210.00	315.00
Safety wash bottles 500ml	54.00	6	324.00	486.00
Safety Wash bottles 1,000ml	64.00	6	384.00	576.00
Case Transfer Pipettes 3ml	32.00	10	320.00	480.00
Case Transfer Pipettes 5ml	32.00	10	320.00	480.00
Case Transfer Pipettes 7ml	32.00	10	320.00	480.00
Total Cost				721,940.82

3. Administration, Training, and R&D: \$90,000

This component ensures that the Food Innovation Center (FIC) in Pohnpei serves not only as a production facility, but also as a fully functional administrative, scientific, and educational hub. It supports reliable operations, digital traceability, quality control, and human capacity development. The budget includes costs for importing IT infrastructure, lab instruments, and training resources, which are critical but expensive to source, ship, and maintain in a remote island setting.

A. Administrative Office – \$22,000

A 300 square foot space will serve as the operations and coordination center for the FIC.

Key Components:

- Office furniture crafted locally where feasible (e.g., coconut timber desks and shelves), paired with imported ergonomic seating and storage cabinets
- One laptop and one desktop computer with extended warranties, surge protection, and wireless multifunction printer/scanner
- Dry-erase boards, secure inventory and filing cabinets, and wall-mounted visual planning aids
- Split-unit air conditioning and ceiling fans for humidity control, delivered and professionally installed

Additional cost reflects air freight of electronics, durability enhancements for the tropical climate, and backup systems to minimize disruptions.

B. Research and Development Laboratory – \$30,000

This 150–200 square foot lab will focus on food quality assurance, safety testing, and new product development.

Key Equipment:

- Stainless steel wash benches, corrosion-resistant sinks, and drainboards
- Microscopes, incubators, scales, moisture analyzers, and handheld pH testing tools
- Seal integrity testers and microbiological media for product stability analysis
- Lockable refrigeration for reagent and sample storage
- PPE sets, fire extinguisher, and eyewash station

All laboratory tools will be imported from certified suppliers and include calibration kits and startup training for local technical staff.

C. Training Room – \$13,000

This 12-seat training space will support food safety instruction, small business workshops, and hands-on entrepreneurship sessions.

Includes:

- Digital projector with retractable screen and multiple media inputs (HDMI, USB)
- Mixed modular seating (imported and local), with provisions for cultural layouts such as pandanus mats
- HACCP training posters, whiteboards, and mobile flip charts
- Lockable cabinet for training materials and instructor supplies
- Ceiling fans and screened windows, with an optional outdoor annex for community-based sessions

Shipping costs for audiovisual and educational materials, as well as packaging for kits, are included. The adjacent outdoor area with cement flooring and a traditional roof structure will

function as an extension space for training and product drop-off; its costs are accounted for under the main facility construction budget.

D. Office Supplies & IT Infrastructure – \$25,000

This component supports digital administration, traceability, remote collaboration, and reporting.

Inclusions:

- Two computers (desktop and rugged laptop), color printer, and dual high-speed routers
- Satellite uplink or high-capacity mobile hotspot to ensure connectivity in remote parts of the island
- Cloud subscriptions for inventory control and HACCP compliance platforms (e.g., Google Workspace, FoodReady)
- UPS backups, power stabilizers, office supplies, document binders, laminator, and IT setup support

Cost reflects the need for enhanced networking, security features, and redundancy to operate reliably in areas where technical support is limited or unavailable.

Total for Section 3: \$90,000

Component	Cost
A. Administrative Office	\$22,000
B. R&D Laboratory	\$30,000
C. Training Room	\$13,000
D. Office Supplies & IT Systems	\$25,000
Total	\$90,000

4. Operational Readiness and Sustainability: \$185,000

This budget line ensures that the Tier III Food Innovation Center (FIC) in Pohnpei is fully functional at launch—not only constructed and equipped, but also staffed, supplied, and prepared to deliver services from day one. Costs reflect the logistical and financial realities of initiating operations in an island context, including freight-intensive procurement of materials, limited availability of local suppliers, early-stage staffing needs, and temporary utility burdens before revenue begins to stabilize.

A. Initial Inventory (Raw Materials) – \$50,000

Start-up inventory will support test runs, staff training, community outreach, and product demonstrations. These inputs provide the foundation for practical learning and enable the FIC to begin limited processing operations immediately after commissioning.

Includes:

- Bulk purchase of locally sourced fruits and staples such as breadfruit, taro, banana, yam, coconut, and cassava
- Poultry inputs for training in slaughter, evisceration, packaging, and chilling
- Reef fish and nearshore pelagic species (e.g., skipjack, tuna) for processing trials
- Food-grade packaging materials: vacuum pouches, PET containers, glass jars, labels, cartons (primarily imported)

- Oil, spices, vinegar, and salt for food preparation during pilot runs and public events
- Inventory buffer to support outreach to Pohnpei’s outlying municipalities or schools

Costs reflect the need to import shelf-stable materials and packaging supplies not available on-island, as well as delivery logistics for reaching remote communities.

B. Training and Staffing – \$95,000

This component addresses the initial staffing and knowledge transfer necessary to build local capacity in food-safe operations. Given the limited pool of trained food processors in Pohnpei, funds are included to recruit and retain key personnel and to engage experienced trainers for the launch phase.

Includes:

- Salaries for a core team over the first 6 to 8 months: facility manager, food safety officer, sanitation worker, maintenance technician, and administrative/training support
- HACCP onboarding and certification training led by regional or remote instructors
- Technical training from equipment vendors or partner institutions on safe operation of machinery
- Bilingual (English and Pohnpeian) training resources in both digital and print formats
- “Train-the-trainer” programs to build long-term local instruction capacity

Budget includes travel stipends or honoraria for expert trainers from Hawaii, Guam, the Philippines, or other regional partners, along with virtual training modules supplemented by in-person demonstrations.

C. Utilities and Operating Costs (Year 1) – \$40,000

The FIC will face elevated utility costs during its first year, due to the need for continuous cleaning, refrigeration, and basic digital infrastructure. While passive ventilation and future solar capacity may reduce some expenses, others remain high due to import dependency and service limitations.

Includes:

- Power generation (diesel fuel and backup generator maintenance), grid connection where feasible, and solar interface upkeep
- Potable water supply and wastewater management for sanitation and processing
- Weekly facility cleaning, daily replenishment of PPE, detergents, and sanitizers
- Pest management services, basic building maintenance, and consumable replacement parts
- Internet service, telephone access, and hosting for a basic outreach website

This budget ensures smooth operations and client-readiness during the critical first year of service delivery, while allowing time for the development of sustainable revenue streams through product sales, training services, or rental of shared facilities.

Total for Section 4: \$185,000

Component	Cost
A. Initial Inventory (Raw Materials)	\$50,000
B. Training and Staffing	\$95,000

Component	Cost
C. Utilities and Operations (Year 1)	\$40,000
Total	\$185,000

5. Contingency Fund: \$75,000

To support the successful completion and uninterrupted launch of the Tier III Food Innovation Center (FIC) in Pohnpei, a contingency reserve of \$75,000—approximately 6 to 7 percent of the overall project budget—has been set aside. This fund provides critical financial flexibility to manage unanticipated costs, delays, or technical challenges common to infrastructure development in remote island environments.

Rationale and Use:

Contingency funding is essential in Pacific Island contexts where import reliance, shipping delays, labor shortages, and extreme weather are routine variables. This reserve ensures that unforeseen circumstances do not compromise project delivery or necessitate cuts in core functionality.

Examples of Use Cases:

- **Construction material volatility:** Price surges in rebar, cement, or insulation due to international shipping fluctuations or port rerouting via Guam, Hawaii, or Asia
- **Logistical setbacks:** Additional charges for delayed offloading, barge rebooking, or long-term storage fees at Pohnpei port caused by schedule disruptions or equipment backlogs
- **Installation mismatches or broken parts:** Modifications needed to integrate imported machinery with local layouts or power systems, requiring specialized labor or custom parts
- **Weather-induced delays:** Storms or flooding that interrupt building schedules or damage pre-positioned equipment and supplies
- **Operational bridging costs:** Short-term staffing extensions, fuel procurement, emergency repairs, or delays in cost-share contributions from partners or donors

Governance and Oversight:

Use of contingency funds will be carefully monitored by the financial oversight team and require documented justification by the facility manager, followed by review and approval from the designated project steering committee or oversight body. Should any funds remain unused after the construction and initial operating phase, they may be redirected to capacity building, food safety certifications, system upgrades, or strategic investments that strengthen long-term facility performance. Key is for fiscal transparency to ensure proper allocation and use of all funds.

B. Tier III Bycatch and Animal Feed Processing Center in Pohnpei, FSM

Overall Budget: \$3,568,029

Overview

This proposal envisions a 3,000 square foot Tier III Food Innovation Center (FIC) in Pohnpei focused on manufacturing protein-rich animal feed using bycatch fish waste, coconut cake, and legume biomass. The facility supports circular economic practices and enhances food and feed security across the Federated States of Micronesia (FSM), reducing reliance on imported feed and creating value from underutilized local resources. The facility will also serve as a training hub for agro-entrepreneurs and support local pig, poultry, and aquaculture sectors.

Design Assumptions

- Construction cost: \$500 per sq ft, based on food-grade, cyclone-resilient, ventilated design with hygienic zoning.
- Operating year-round with up to two daily shifts (six-day workweek).
- Estimated 80 percent operational uptime to account for maintenance, holidays, and training.
- All raw materials (bycatch, coconut cake, legume crops) are seasonally available in sufficient quantities through partnerships with local fishers, oil processors, and farmers.

Production Capacity

- Target: ~1 metric ton (1,000 kg) of feed per day.
- **Annual production (under optimal input availability): ≈260 metric tons.**
- Feed types: floating and sinking pellets for aquaculture; mash or pelleted feeds for poultry and pigs.

Core Ingredients

- **Bycatch Fish Waste:** Collected at Pohnpei's port and processed onsite through grinding, drying, and deodorizers.
- **Coconut Cake:** Obtained from Tier II coconut processing FICs, used as a high-fiber, protein-rich base.
- **Legume Biomass:** Derived from local pigeon pea, velvet bean, and other nitrogen-fixing crops cultivated in agroforestry systems.
- **Plant Biomass** from area and from all **waste following processing.**
- Supplemented with dried root vegetables, seaweed powder, and mineral premixes where needed.

Facility Design

- Includes raw material receiving bays, preprocessing zone (grinders, dryers), feed mixing and pelleting room, drying tunnels, quality control lab, packaging area, training room, cold storage, and administrative office.
- Integrated solar-ready electrical system and water catchment.
- Waste management through composting and wastewater filtration systems.

Strategic Objectives

- Support local poultry and livestock feed production through value-added processing.

- Enable import substitution for feed inputs currently imported.
- Promote agro-enterprise models for fishers, processors, and youth groups.
- Ensure compliance with Codex and HACCP standards for feed production.
- Strengthen food system resilience by creating internal feed supply chains.

Facility Specifications

- **Location:** Pohnpei State, Federated States of Micronesia
- **Facility Type:** Tier III Food Innovation Center (Animal Feed Manufacturing)
- **Size:** 3,000 square feet
- **Construction Cost:** \$500 per square foot × 3,000 sq ft = **\$1,500,000**
- **Design Standards:** The facility will be constructed in accordance with internationally recognized food and feed safety standards, including Codex Alimentarius, HACCP principles, and USDA/APHIS guidelines for hygienic design, sanitation, and biosecurity. This ensures compliance for both domestic use and export-readiness where applicable.
- **Target Production Output:** Under ideal operating conditions (two shifts/day, six days/week, with seasonal input availability), the facility aims to produce approximately 1 metric ton of feed per day, resulting in an estimated **260 metric tons per year**.
- **Core Processing Zones:**
 - Raw material receiving and preprocessing (fish waste handling, drying, and deodorization)
 - Feed milling, blending, pelleting, and drying
 - Cold and dry storage for raw materials and finished product
 - Quality assurance lab for feed composition and safety testing
 - Administrative and training spaces for operators and agri-entrepreneurs
- **Power and Utility Design:** Hybrid energy setup with diesel backup and solar-ready wiring; rainwater harvesting and greywater reuse systems will support sustainability.
- **Staffing and Operation:** The facility will employ a team including a plant manager, feed technician, machine operator, sanitation worker, and admin assistant, with specialized training supported by technical partners and regional experts.

Estimated Budget Summary

1. **Construction and Infrastructure**
 - Size: 3,000 sq ft
 - Rate: \$500/sq ft (based on tropicalized, food-grade facility design)
 - **Total: \$1,500,000**
2. **Equipment and Installation**
 - Feed dryers, grinders, hammer mills, pelletizers, mixers, cooling conveyors, and packaging tools
 - Cold storage and odor control for fish waste intake
 - Generators and ventilation systems
 - **Estimated Total: \$1,100,000**
3. **Administration, R&D, and Training Facilities**
 - Includes an administrative office, training room, and micro-lab
 - Computers, IT equipment, and audiovisual tools
 - **Estimated Total: \$95,000**
4. **Operational Readiness and Start-Up Inventory**

- Raw material buffer (legumes, coconut cake, fish waste)
 - Packaging, labeling, PPE, safety materials, feed supplement inputs
 - Training personnel and initial salaries
 - **Estimated Total: \$185,000**
5. **Utilities and Safety Systems**
- Water and electrical systems
 - Generator and solar integration readiness
 - Fire suppression, pest control, sanitation systems
 - **Estimated Total: \$110,000**
6. **Project Management and Technical Oversight**
- On-site construction management and technical audits
 - Compliance with FDA feed safety standards and Codex regulations
 - **Estimated Total: \$105,000**
7. **Contingency Fund (7%)**
- To address freight delays, price escalations, labor shortages
 - **Estimated Total: \$230,000**

Equipment & Supplies for a Tier III FDA-compliant Fish Bycatch and Animal Feed Processing Center in Pohnpei:

Equipment	Price per Unit	Number of Units	Total without Cost Conversion	Total with 1.5x Cost Conversion
Fish Processing Items				
Mannlake Scalding with Temp Control	525.00	1	525.00	787.50
Fish Fillet Cutter	2,000.00	2	4,000.00	6,000.00
Fish Cleaning, Scaling, Gutting	1,600.00	2	3,200.00	4,800.00
Mainstreet Stainless Steel Floor Fryer	749.00	1	749.00	1,123.50
Stainless Steel Triple Basins	306.15	1	306.15	459.23
Avantco A-49R-HC 54" Reach in Refrigerator	1,949.00	1	1,949.00	2,923.50
Stainless Steel Worktables	575.00	3	1,725.00	2,587.50
Animal Feed and Fertilizer Processing Items				
Fish and Produce Processing Grinder	5,000.00	2	10,000.00	15,000.00
Chicken Feed (Streamline)	2,500.00	1	2,500.00	3,750.00
Chicken Feed Production Line	5,500.00	1	5,500.00	8,250.00
Feed Pellet Packager	2,000.00	1	2,000.00	3,000.00

Robot Coupe R702VV 2 Continuous Feed Food Processor	6,011.00	1	6,011.00	9,016.50
Bags	0.07	50,000	3,500.00	5,250.00
Fertilizer mixer	3,500.00	2	7,000.00	10,500.00
Bulk Storage Containers	688.00	15	10,320.00	15,480.00
Shovels	51.00	15	765.00	1,147.50
Pitchforks	59.55	15	893.25	1,339.88
Food Safety Testing Checklist				
Check-Set IV Cold/Hot Calibrator	1,592.12	1	1,592.12	2,388.18
AP550 Flat-Surface Label Applicator	2,395.00	1	2,395.00	3,592.50
AP380 Label Applicator	1,595.00	1	1,595.00	2,392.50
PL400 Pouch Labeler	1,595.00	1	1,595.00	2,392.50
Barcode Thermal Ribbons	56.00	1	56.00	84.00
Barcode Scanner L13687	1,025.00	1	1,025.00	1,537.50
Barcode software	790.00	1	790.00	1,185.00
Zebra ZQ511 Mobile Receipt Printer	840.00	1	840.00	1,260.00
Thermapen Thermometer	299.00	1	299.00	448.50
Safety Equipment				
Porta Stream II Eyewash station	460.00	3	1,380.00	2,070.00
Saline Concentrate Refill	100.00	10	1,000.00	1,500.00
Dust Cover	52.00	3	156.00	234.00
S Carton Uline Industrial Latex Gloves	26.00	10	260.00	390.00
M Carton Uline Industrial Latex Gloves	14.00	10	140.00	210.00
L Carton Uline Industrial Latex Gloves	19.00	10	190.00	285.00
Class A First Aid Kits	67.00	5	335.00	502.50
Class B First Aid Kits	155.00	5	775.00	1,162.50
Class B+ First Aid Kits	395.00	5	1,975.00	2,962.50
Uline Ice Wraparound Fog Armor Dispenser box	94.00	2	188.00	282.00
3M Construction Harness	185.00	2	370.00	555.00
Carton Polyethylene Apron	22.00	6	132.00	198.00

Multi compartment Stainless Steel Dispensers	250.00	3	750.00	1,125.00
Additional Equipment				
Slaughtering Table	425.00	2	850.00	1,275.00
Butchers Table	1,000.00	3	3,000.00	4,500.00
Cookshack SM360 Smoker Oven	13,490.00	1	13,490.00	20,235.00
Heavy Duty Steel shelving 96 x 24 x 72"	1,445.00	5	7,225.00	10,837.50
Solar Dryer or Dehumidifier Dried Fruit	210.00	10	2,100.00	3,150.00
Information Hub				
Samsung 4TB SSD Hard drives	439.99	2	879.98	1,319.97
Dell Inspiron 27' All in one cpu	1,189.98	1	1,189.98	1,784.97
4 Person L Desk Workstation	3,210.00	1	3,210.00	4,815.00
LG smart TV	299.00	1	299.00	448.50
Norton Anti virus software	19.99	1	19.99	29.99
Mesh Task Chairs	165.00	6	990.00	1,485.00
Downtown conference tables (Powered) 192 x 48"	1,560.00	1	1,560.00	2,340.00
Portable Projector Screen 107"	525.00	1	525.00	787.50
Wall monitor Mount	95.00	1	95.00	142.50
Kitchen Supplies				
Mobile ingredient bins	343.00	2	686.00	1,029.00
Self ingredient Bin 200 cups	243.00	2	486.00	729.00
Baking Pan	216.00	2	432.00	648.00
Wire Grate	168.00	2	336.00	504.00
Cambro Dish Racks	42.00	2	84.00	126.00
Cambro Glass Racks	80.00	2	160.00	240.00
Pan Dolly	305.00	2	610.00	915.00
Uline Trash Cans	74.00	2	148.00	222.00
Uline Trash can lids	29.00	2	58.00	87.00
Biohazard Step On Waste Can	131.00	3	393.00	589.50

Uline Thin trash can 23G	45.00	3	135.00	202.50
Rubbermaid Slim Jim Lid Can/bottle	52.00	2	104.00	156.00
Rubbermaid Slim Jim Lid paper	52.00	2	104.00	156.00
Rubbermaid Slim Jim Swing top	51.00	2	102.00	153.00
Stainless Dollie	135.00	2	270.00	405.00
Handsfree Trash Can 55G	255.00	3	765.00	1,147.50
Outdoor Landmark Series Trash Can Dome top 50G	970.00	3	2,910.00	4,365.00
Fork liftable Transport tilt truck	2,505.00	2	5,010.00	7,515.00
Hydraulic Platform Stacker	2,695.00	2	5,390.00	8,085.00
130km low speed new energy double cab mini pick up truck	9,999.00	2	19,998.00	29,997.00
Commercial Cutting Board	152.00	5	760.00	1,140.00
Commercial Mixing 3qt	62.00	3	186.00	279.00
Commercial Mixing 5qt	89.00	3	267.00	400.50
Commercial Mixing 8qt	125.00	3	375.00	562.50
Commercial Mixing 13qt	94.00	3	282.00	423.00
Commercial Mixing 20qt	150.00	3	450.00	675.00
Stainless Steel Steam Table Pans 3qt	150.00	3	450.00	675.00
Stainless Steel Steam Table Pans 6qt	250.00	3	750.00	1,125.00
Stainless Steel Steam Table Pans 10qt	150.00	3	450.00	675.00
Stainless Steel Steam Table Pans 14qt	175.00	3	525.00	787.50
Stainless Steam Table Pan Lids 1/6	55.00	3	165.00	247.50
Stainless Steam Table Pan Lids 1/3	85.00	3	255.00	382.50
Stainless Steam Table Pan Lids 1/2	110.00	3	330.00	495.00
Stainless Steam Table Pan Lids Full	205.00	3	615.00	922.50

Stainless Steel Scoops 8oz	69.00	3	207.00	310.50
Stainless Steel Scoops 16oz	75.00	3	225.00	337.50
Stainless Steel Scoops 32oz	80.00	3	240.00	360.00
Stainless Steel Scoops 64oz	86.00	3	258.00	387.00
Stainless Steel Scoops 96oz	114.00	3	342.00	513.00
Stainless Steel Scoops 128oz	122.00	3	366.00	549.00
Stainless Steel Scoops 160oz	134.00	3	402.00	603.00
Stainless Steel Mixing Paddles 48"	35.00	2	70.00	105.00
Mixing Polypropylene Paddles 40"	65.00	2	130.00	195.00
Mixing Polypropylene Paddles 52"	72.00	2	144.00	216.00
Hand Scraper 3 x 8"	7.00	5	35.00	52.50
Hand Scraper 4 x 9"	8.00	5	40.00	60.00
Stainless steel paper cutter 36"	163.00	2	326.00	489.00
Unbleached Paper rolls 36"	81.00	3	243.00	364.50
Case of Square Utility Jugs	34.20	2	68.40	102.60
Jug Pump	10.50	2	21.00	31.50
Chemical Resistant Spray Bottles	25.50	2	51.00	76.50
Case Replacement nozzles	17.25	2	34.50	51.75
Williams Sonoma Prep Tools 15 Piece Gadget and Utensils Set	279.95	2	559.90	839.85
Total Cost				243,028.91

Grand Total (All-Inclusive)

Category	Amount (USD)
Construction and Infrastructure	\$1,500,000
Equipment and Installation	\$1,100,000
Admin, Training, and R&D	\$95,000
Operational Readiness & Start-Up Inputs	\$185,000
Utilities and Safety Systems	\$110,000
Project Management and Oversight	\$105,000
Contingency Fund	\$230,000

Equipment and Supplies	243,028.91
Total Estimated Budget	\$3,568,029

Key Outputs and Outcomes

- Daily feed production capacity of approx. 1 metric ton
- Utilization of underused marine and agricultural waste
- Training hub for youth and agro-entrepreneurs
- Reduction of animal feed imports to FSM
- Resilient food and livestock systems through circular resource flows

C. Pohnpei State Tier II Food Innovation Facilities (FIF)

FIFs Two Tier II Total Cost: \$2,669,131 (2,250,000 + 296,631.22 + 30,000 + 92,500)

Pohnpei State proposes the establishment of two regional Tier II Food Innovation Facilities (FIFs), each designed at approximately 2,500 square feet, based on an estimated cost of \$450 per square foot. The total cost for each facility is projected at \$1,125,000, yielding a combined construction cost of \$2,250,000 for both FIFs.

The two proposed Tier II FIFs (with proposed locations on the eastern and western side of Pohnpei State, located between municipalities will serve distinct agricultural value chains critical to Pohnpei’s economy and food security strategy. One facility will be dedicated to coconut-based processing—supporting the production of coconut oil, virgin coconut milk, desiccated coconut, coconut sugar, and related derivatives. The second facility will focus on diversified crop processing, including local staples such as banana, taro, breadfruit, sweet potato, and vegetables, with the intent to develop dried, pureed, fermented, or packaged forms for local consumption and small-scale trade.

Each FIF will serve as a semi-centralized hub supporting aggregation, processing, training, and storage in alignment with HACCP standards and Codex Alimentarius food safety protocols. The facilities are envisioned as modular and replicable, designed to provide geographic and thematic coverage across Pohnpei’s major agro-ecological zones while enhancing community-level value addition and market access.

Budget Narrative:

1. Construction and Infrastructure: \$1,125,000 per Tier II FIF

This estimate reflects the cost of constructing a 2,500 square foot Tier II Food Innovation Facility (FIF) in Pohnpei, based on a benchmark rate of \$450 per square foot. The design is aligned with FDA-compliant food-grade facility standards and adapted for island-specific environmental and logistical realities. The estimate includes imported building materials, skilled labor, refrigeration and sanitation systems, climate-resilient features, and project management oversight.

A. Foundation and Structural Works – \$461,250

This component encompasses all civil works and vertical construction required to deliver a fully enclosed, durable, food-safe structure. As with many Pacific island environments, nearly all construction inputs in Pohnpei—such as cement, rebar, roofing, and steel—must be imported, and transportation logistics remain complex and high-cost.

1. Site Preparation and Slab Work – \$143,750

- Land clearing, grading, and compacting: Executed with leased local machinery or imported equipment as available
- Sub-base and reinforcement: Stabilized with imported gravel, sand, and geotextiles to prevent erosion and water intrusion
- Reinforced concrete slab: Six-inch thick, industrial-grade poured slab with embedded rebar mesh, designed to endure heavy machinery and high humidity
- Drainage integration: Slope-engineered flooring linked to subsurface graywater or septic handling
- Shipping surcharges: Includes freight charges for bulk aggregate and cement delivery to Pohnpei port, plus demurrage and local stevedoring

2. Structural Framing and Envelope – \$187,500

- Galvanized steel beams and structural columns: Fabricated off-island and assembled on site
- Roof and rafter framing: Designed to meet Pacific cyclone codes, with trussed systems for weather resilience
- Partition framing: Interior non-load bearing walls built using treated local timber or steel studs where available
- Anchoring system: Engineered foundations with hurricane straps and wind-load compliance

3. Roofing System – \$62,500

- Galvanized corrugated panels: Rust-resistant and Class A fire-rated for tropical climates
- Thermal barrier and vapor seal: Prevents heat ingress and condensation around processing equipment
- Rainwater harvesting: Includes gutters, downspouts, and cistern-compatible outflows
- Overhangs and soffits: Designed for passive cooling and protection from driving rain

4. Loading Bay and Exterior Finishes – \$42,500

- Covered receiving and dispatch platform: Concrete apron to accommodate supply vehicles and packaged product flow
- Graded access paths: Driveways with slope-stabilized surfaces for delivery truck use
- Exterior wall treatments: Mold-resistant finishes with food-safe paint or sandwich panel facades
- Security enhancements: Includes motion-sensitive exterior lighting, reinforced entry doors, and screened windows

5. Construction Logistics and Material Handling – \$25,000

- Crane and hoisting support: Required for steel frame placement, refrigeration units, and HVAC equipment
- Storage and warehousing: On-site containers for safeguarding imported materials over an extended build period
- Mobilization: Includes inter-island transport, barge shipments, and contractor deployment
- Customs clearance and risk management: Covers insurance, broker fees, and handling of sensitive or high-value imports

This construction package provides the structural foundation needed to implement high-functioning, food-grade processing facilities tailored to Pohnpei's conditions. Each FIF will adhere to international food safety design standards while maintaining the resilience and adaptability needed in the FSM context.

B. Plumbing and Electrical Systems – \$178,750

This component ensures that the facility is hygienically operable, energy-resilient, and food-safety compliant. In Pohnpei’s tropical, infrastructure-limited setting, plumbing and electrical systems must be durable, adaptable, and optimized for water-intensive processing and intermittent power access. The budget reflects the need for full importation of components, skilled installation labor, and contingency allowances for climate and supply chain variability.

1. Potable Water and Sanitation Systems – \$77,500

- Facility-wide potable water lines: Food-grade PEX or CPVC piping throughout processing, sanitation, and admin areas
- Hand-wash stations: Two per processing zone, with foot- or elbow-activated faucets and hands-free towel dispensers
- Triple-compartment sinks: Installed in community kitchen, sanitation stations, and oil/coconut processing zones
- Grease traps and drainage: Integrated system using stainless steel interceptors and epoxy-coated floor drains
- Rainwater catchment and storage: Cisterns fed by roof guttering, with sediment filtration and UV/chlorine treatment for non-potable reuse
- Septic system: On-site wastewater disposal capacity tailored to peak food processing volumes

2. Electrical Distribution and Food-Safety Power Design – \$65,000

- Dedicated circuits for essential processing equipment: Separate feeds for coolers, fryers, dryers, and vacuum units, with surge protection
- Room-based sub-panels: Each production zone on independent load circuits to manage maintenance and safety
- Food-grade electrical finish: Moisture-sealed conduits and outlets, splash zones protected by guards and elevated cable runs
- Shatterproof LED lighting: High-lumen, food-safe LED fixtures throughout, with enhanced visibility in production and inspection rooms
- Emergency lighting and signage: Battery backup lights and compliant exit signs to meet international food facility protocols

3. Generator Interface and Solar Integration – \$26,250

- Backup generator: One 50–80 kW diesel unit housed in a ventilated, weatherproof enclosure
- Automatic Transfer Switch (ATS): Enables continuous power supply for refrigeration, IT, and sanitation systems during outages
- Solar-ready wiring: Pre-installed conduits and switchgear for Phase II PV integration or donor-funded solar expansion
- Battery/inverter readiness: Compatible electrical layout for lithium-ion or lead-acid battery storage systems in the future

4. Fire Suppression and Safety Systems – \$10,000

- Kitchen hood fire suppression: Commercial-grade automatic discharge systems in processing and cooking areas
- Extinguishers and alarm placement: CO2 and dry chemical units positioned every 75 feet, with fire alert systems
- Grounding and lightning protection: Island-appropriate surge suppression and grounding rods to reduce outage risk

- PPE storage and signage: Clearly marked storage for safety gear, chemical spill kits, and emergency response tools

This package ensures that all water, sanitation, and energy systems meet global food safety norms and can function reliably despite utility instability, frequent rainfall, or operational peaks. It aligns with Codex Alimentarius and HACCP guidelines and anticipates future upgrades to improve sustainability and resiliency in the Pohnpei context.

C. Interior Finishing – \$156,250

This component ensures that the interior spaces of the Tier II Food Innovation Facilities (FIFs) in Pohnpei meet rigorous global food safety standards for hygiene, durability, cleanability, and pest exclusion. All surfaces and materials are designed to withstand high humidity, salt exposure, and intensive use in food processing environments. The budget includes imported finish materials, tropical-grade sealing, and specialized labor consistent with HACCP, USDA, and Codex guidelines.

1. Hygienic Wall Systems – \$56,250

- FRP (Fiberglass Reinforced Plastic) panels: Installed in wet processing zones such as coconut, root crop, and sanitation rooms. Panels are mold- and corrosion-resistant, smooth-surfaced, and easily sanitized.
- Epoxy wall coatings: Applied in dry zones, offices, and storage rooms. Coatings include antimicrobial additives and are high-gloss for better visibility of contaminants.
- Wall-floor coving and corner guards: Rounded, seamless joints to eliminate harborage points for bacteria or pests and simplify cleaning in corners and transitions.

2. Epoxy-Coated Flooring with Integrated Drainage – \$43,750

- Epoxy flooring system: Slip-resistant, food-grade coatings across all rooms, reinforced for heavy equipment and daily wet cleaning.
- Antimicrobial finishes: Granular additives for microbial resistance and staff safety in high-traffic zones.
- Integrated trench drainage: Strategically sloped floors with stainless steel trench drains in processing and sanitation zones to minimize pooling.
- Moisture protection: Waterstop expansion joints and thermal sealing barriers to prevent subfloor degradation.

3. Pest-Sealed Ceiling Systems – \$25,000

- Seamless, washable ceiling panels: Water-resistant and joint-minimized surfaces in all food prep and storage rooms.
- Moisture-barrier insulation: Installed above ceilings to prevent condensation from forming and dripping onto work surfaces.
- Pest-proofing: Insect- and rodent-sealed light fixtures, vent penetrations, and cabling channels using silicone and mesh.
- Secure maintenance hatches: Locked and gasketed access panels prevent ceiling void contamination.

4. Internal Partitions, Doors, and Zoning – \$18,750

- Hygienic zoning: Internal partitions designed to maintain clean-to-dirty product flow and staff movement.
- Airtight food-grade doors: Insulated, gasketed doors for processing rooms, fitted with antimicrobial handles.
- Visual monitoring windows: Tempered glass observation panels installed in training and demonstration areas.

- Hands-free door systems: Magnetic door holders and kick plates installed at high-traffic transitions for hygienic access.

5. Fixtures, Restroom Finishes, and Food-Safe Cabinetry – \$12,500

- Restroom infrastructure: Eco-flush toilets, foot-operated sinks, hand dryers, and changing space for sanitation workers.
- Stainless steel storage: Corrosion-proof cabinets for tools, PPE, and ingredients in R&D and kitchen zones.
- Chemical and compliance storage: Lockable units for detergents, SOP binders, and safety documentation.
- Finishes for shared areas: Mold-resistant paints, window insect screens, and durable signage in administrative spaces.

This interior finishing investment ensures that both Tier II FIFs in Pohnpei are food-safe, resilient, and compliant with export-quality standards. Each surface and fixture is selected for maximum longevity and sanitation performance in Micronesia’s humid, high-wear environment.

D. Refrigeration and Ventilation – \$235,000

This budget line ensures that the Tier II Food Innovation Facilities (FIFs) in Pohnpei maintain consistent cold-chain reliability and effective air circulation throughout the facilities. Given the island’s tropical climate and the perishability of products like coconut derivatives, taro, banana, and leafy greens, this investment supports climate-resilient, energy-efficient systems designed to uphold food safety, reduce spoilage, and ensure continuous operations.

1. Cold Storage Systems – \$120,000

- **Walk-in Coolers and Freezers:** Two commercial-grade insulated cold rooms (one cooler and one freezer), constructed with polyurethane paneling, sealed gaskets, and food-grade flooring. Systems are equipped with temperature controls and humidity-resistant shelving for safe storage of processed coconut, root crops, and fresh produce.
- **CoolBot Hybrid Cold Rooms:** Two rooms integrated with CoolBot controllers and high-capacity air conditioners for flexible, energy-conscious cooling, ideal for overflow inventory, community co-packing, or R&D trials.
- **Entry-Level IQF System:** Compact Individual Quick Freezing unit for rapid chilling of products like coconut cubes, banana slices, or taro, extending product shelf life for both local and export markets.
- **Remote Temperature Monitoring:** Battery-logged, cloud-connected temperature tracking systems for all refrigerated zones, ensuring full HACCP-aligned traceability.

2. Ventilation and Odor Control Systems – \$62,500

- **Exhaust Hoods and Filters:** Heavy-duty stainless steel hoods installed over frying and boiling stations in coconut and root processing rooms, equipped with grease filters and integrated fire suppression.
- **Airflow Systems:** Wall-mounted and overhead fans ensure continuous ventilation across processing and storage zones, minimizing moisture buildup and reducing microbial risks.
- **Humidity and Odor Management:** Dehumidifiers, UV air purifiers, and activated carbon scrubbers control environmental conditions in food prep and storage zones, especially important in high-moisture coconut and fermented food applications.
- **Zonal Pressure Control:** Negative pressure zones in high-risk areas (e.g., grating and fermentation rooms), with positive pressure maintained in packaging and admin areas to prevent air contamination.

3. Thermal Efficiency and Backup Systems – \$52,500

- **Solar Compatibility:** All cold chain and ventilation infrastructure pre-configured for solar system installation. Roof structures are engineered to support future photovoltaic modules.
- **Enhanced Insulation:** All storage and processing areas include reflective thermal barriers, high-R value insulation, and vapor-resistant sealing to reduce heat gain and cut operating costs.
- **Backup Generator and Transfer Switches:** Dedicated 25–30 kVA diesel generator with automatic transfer switch to protect refrigeration operations during grid outages. A portable generator provides redundancy for critical zones.
- **Thermal Barriers and Air Locks:** PVC curtains and door airlocks installed at cold room entry points to minimize temperature fluctuation during product transfer.

Together, these refrigeration and ventilation investments ensure that the Pohnpei Tier II FIFs maintain the cold-chain integrity required for safe food storage, preparation, and packaging. Designed with redundancy and energy awareness, these systems allow uninterrupted operation and compliance with export and domestic food safety standards, even in Pohnpei’s challenging tropical setting.

E. On-Site Project Management and Technical Oversight – \$93,750

This component ensures that the Tier II Food Innovation Facilities (FIFs) in Pohnpei are constructed and commissioned to meet internationally recognized food facility standards—particularly those aligned with U.S. FDA, HACCP, and Codex Alimentarius requirements—while addressing logistical and infrastructural challenges specific to the Federated States of Micronesia (FSM).

1. Full-Time Construction Manager – \$50,000

A dedicated on-site construction manager will oversee the full implementation of each facility, from groundbreaking through final commissioning.

Responsibilities include:

- Daily supervision of construction teams and subcontractors
- Ensuring adherence to architectural plans, engineering designs, and safety regulations
- Overseeing scheduling, procurement, and on-site logistics for imported building materials and systems
- Troubleshooting delays due to weather, shipping, or infrastructure constraints
- Coordinating plumbing, electrical, finishing, and refrigeration subcontractors to streamline workflows
- Delivering weekly updates and compliance documentation to project leads and funders

Cost includes:

- Monthly fee for 9 to 12 months of site engagement
- Travel and relocation from a regional hub (e.g., Guam, Hawaii, or mainland U.S.)
- Housing stipend, per diem, and in-country transport support

2. FDA-Aligned Food Facility Technical Advisor – \$31,250

A specialized food facility consultant will provide ongoing guidance to ensure hygienic layout, food-safe material use, drainage logic, and processing zone standards meet international benchmarks.

Key deliverables include:

- Pre-construction review of design and utility schematics for compliance with HACCP, GMP, and zoning best practices
- Real-time feedback during construction and pre-commissioning walkthroughs

- Guidance on equipment placement, sanitation zones, and raw-to-finished product segregation
- Drafting SOP templates and cleaning protocols for operations readiness
- Support for food safety training, audit preparation, and possible certification pursuits

Cost includes:

- Consulting retainer over 9–12 months
- Three site visits (including airfare, housing, and meals)
- Remote working sessions, document reviews, and training sessions

3. Quality Assurance and Construction Audits – \$12,500

To reduce costly rework and maintain accountability during construction, the project will engage an independent civil engineer or architect to conduct ongoing inspections and reporting.

Scope includes:

- Bi-weekly site visits and progress verification reports
- Cross-checking of actual materials and quantities against procurement records
- In-field testing of electrical, plumbing, and finish work (e.g., epoxy floors, drainage)
- Structured milestone validation to authorize staged contractor payments

This oversight and technical support package will ensure that both Pohnpei Tier II FIFs are delivered with high construction integrity, in compliance with global food processing standards, and with clear documentation for funders and local stakeholders. It builds in institutional knowledge, minimizes construction risk, and positions the facilities for long-term success.

Total Construction and Infrastructure or Remodeling for Tier II:

Component	Amount (USD) for each Tier II FIF	Amount (USD) for both Tier II FIFs
A. Foundation & Structure	\$461,250	\$922,500
B. Plumbing & Electrical	\$178,750	\$357,500
C. Interior Finishing	\$156,250	\$312,500
D. Refrigeration & Ventilation	\$235,000	\$470,000
E. Project Management & Oversight	\$93,750	\$187,500
Total	\$1,125,000	\$2,250,000

2. Equipment & Supplies for the Tier II FIFs: \$296,631.22

Equipment	Price per Unit	Number of Units	Total without Cost Conversion	Total with 1.5x Cost Conversion
Staple Crop Processing Items				
Machine Coconut Opener	300.00	10	3,000.00	4,500.00
Oven/range	1,000.00	5	5,000.00	7,500.00
Wok	17.00	10	170.00	255.00
Burner	4.30	10	43.00	64.50
Steel Tray	10.00	100	1,000.00	1,500.00
Tray Rack	90.00	10	900.00	1,350.00
Flesh tool	3.00	10	30.00	45.00
Industrial Juicer	600.00	2	1,200.00	1,800.00
Oil Extractor	800.00	2	1,600.00	2,400.00
Machete	28.00	20	560.00	840.00
Coconut Flour Machine	800.00	2	1,600.00	2,400.00
Liberty Stainless Steel Taps	84.00	20	1,680.00	2,520.00
Sugaring Bucket	51.94	40	2,077.60	3,116.40
28' Fiberglass Extension Ladder	460.00	4	1,840.00	2,760.00
Winco 12 in Sieve Baking Sheet	24.01	20	480.20	720.30
Lakshmi Coconut Milk Extractor	210.80	2	421.60	632.40
Coconut Packager	1,650.00	2	3,300.00	4,950.00
Coconut Oil press	168.75	2	337.50	506.25
Manual Coconut Milk press	90.00	2	180.00	270.00
Dehydrator	239.00	1	239.00	358.50
Solar Dryer or Dehumidifier Dried Fruit	210.00	10	2,100.00	3,150.00
Stainless Steel Worktables	575.00	10	5,750.00	8,625.00
Fish & Poultry Processing Items				
Mainstreet Stainless Steel Floor Fryer	749.00	2	1,498.00	2,247.00
Stainless Steel Triple Basins	306.15	1	306.15	459.23
Avantco A-49R-HC 54" Reach in Refrigerator	1,949.00	2	3,898.00	5,847.00

Food Safety Testing Checklist				
Benchtop Ph Meter	1,035.00	1	1,035.00	1,552.50
Thermopen Thermometer	299.00	1	299.00	448.50
Hand held temp adjusted Refractometer	260.00	4	1,040.00	1,560.00
Thermometer Calibrator (4 point hot/cold)	1,592.12	2	3,184.24	4,776.36
Thermometers (digital + infrared)	300.00	10	3,000.00	4,500.00
Safety Equipment				
Half Face respirator	43.00	4	172.00	258.00
Porta Stream II Eyewash station	460.00	2	920.00	1,380.00
Goggles	22.00	20	440.00	660.00
S Carton Uline Industrial Latex Gloves	26.00	20	520.00	780.00
M Carton Uline Industrial Latex Gloves	14.00	20	280.00	420.00
L Carton Uline Industrial Latex Gloves	19.00	20	380.00	570.00
Class A First Aid Kits	67.00	4	268.00	402.00
Class B First Aid Kits	155.00	4	620.00	930.00
Class B+ First Aid Kits	395.00	4	1,580.00	2,370.00
Uline Ice Wraparound Fog Armor Dispenser box	94.00	4	376.00	564.00
Carton Polyethylene Apron	22.00	10	220.00	330.00
Canning and Pickling Equipment				
Canner Aluminum Bath water Canner	269.99	4	1,079.96	1,619.94
https://www.allamericancanner.com/41-Quart-Pressure-Canning-Kit.htm	677.99	2	1,355.98	2,033.97
Wide Mouth Ball Glass Mason Jars 32 oz	1.37	400	548.00	822.00
Fermentation Crock	85.49	2	170.98	256.47
Fermentation Weights	43.97	50	2,198.50	3,297.75
Fermentation lid cloth covers	13.93	50	696.50	1,044.75
Potable Aqua Water Purification Tabs with PA plus	12.99	200	2,598.00	3,897.00
Stainless Steel Funnel	10.49	25	262.25	393.38
11.5 Qt Canning Rack	8.49	100	849.00	1,273.50

Canning Labels	6.49	10	64.90	97.35
1000 sheets of 4 rectangular labels	109.99	1	109.99	164.99
Hatchery Equipment				
2560 Egg Incubator Kit	6,119.99	2	12,239.98	18,359.97
Chick Brooder 3 Layer H: 15"	799.99	4	3,199.96	4,799.94
Grow out Pen 5 Layer H: 9.5"	699.99	4	2,799.96	4,199.94
Walk in 15ft Chicken run	1,999.99	2	3,999.98	5,999.97
Over Ez Tarp for walk in 8 foot chicken run	199.99	6	1,199.94	1,799.91
Over Ez Chicken Coop Jumbo	3,999.00	2	7,998.00	11,997.00
Nesting Pads	39.99	10	399.90	599.85
Eaton Natural Hemp Bedding 8lb	24.99	10	249.90	374.85
Silo Feeder (40LB) 3 pack	699.99	10	6,999.90	10,499.85
High Country Plastics 270lbs feed bin with stand	312.99	4	1,251.96	1,877.94
3 section breeding pen	239.99	4	959.96	1,439.94
Heater & Thermostat for Box Brooder 110V	114.99	4	459.96	689.94
Chick Brooder heating Plate Temperature Controller	19.99	4	79.96	119.94
Thermo-Chicken 12.5 in. x 18.5 in 40-Watt Heated Pad	71.98	4	287.92	431.88
Solar Powered Automatic Chicken Coop Door with remote	89.99	4	359.96	539.94
Wise mountable feeder 22lbs poultry & Game feeder	59.99	6	359.94	539.91
Wise mountable drinker 3 Gallon poultry and game waterer	69.99	6	419.94	629.91
Pencron Expandable portable power station 1920WH	679.00	2	1,358.00	2,037.00
24000 Watt Dual Fuel Air cooled Standby Generator	6,398.10	2	12,796.20	19,194.30
Global Industrial Stainless Steel Veterinary Scale	515.00	2	1,030.00	1,545.00
Global industrial replacement AC adapter	19.75	4	79.00	118.50

Global Industrial Stainless steel cleaner & Polish	68.95	12	827.40	1,241.10
Rayovac AAA 24 Battery Contractor Pack	12.24	25	306.00	459.00
Electronic Weighing Poultry Scale, Chicken weighing Bag with sling	23.99	4	95.96	143.94
Poultry First Aid Kit	104.99	10	1,049.90	1,574.85
Chicken Ointments Best of show by Manna Pro	43.99	10	439.90	659.85
Coop Cleaning Supply Kit	59.99	20	1,199.80	1,799.70
OverEZ Chicken Waterer 12 Gallon	79.99	4	319.96	479.94
Case of 250 cartons for eggs	169.99	12	2,039.88	3,059.82
Tier-II Information Hub				
Samsung 4TB SSD Hard drives	439.99	2	879.98	1,319.97
Dell Inspiron 27' All in one cpu	1,189.98	2	2,379.96	3,569.94
LG smart TV	299.00	2	598.00	897.00
Norton Anti virus software	19.99	2	39.98	59.97
Mesh Task Chairs	165.00	4	660.00	990.00
Downtown conference tables (Powered) 192 x 48"	1,560.00	2	3,120.00	4,680.00
Wall monitor Mount	95.00	2	190.00	285.00
Kitchen Supplies				
Mainstreet Stainless Steel Floor Fryer	749.00	2.00	1,498.00	2,247.00
Stainless Steel Triple Basins	306.15	1.00	306.15	459.23
Avantco A-49R-HC 54" Reach in Refrigerator	1,949.00	2.00	3,898.00	5,847.00
Self ingredient Bin 200 cups	243.00	4	972.00	1,458.00
Baking Pan	216.00	4	864.00	1,296.00
Wire Grate	168.00	4	672.00	1,008.00
Cambro Dish Racks	42.00	4	168.00	252.00
Cambro Glass Racks	80.00	4	320.00	480.00
Pan Dolly	305.00	2	610.00	915.00

Uline Trash Cans	74.00	4	296.00	444.00
Uline Trash can lids	29.00	4	116.00	174.00
Biohazard Step On Waste Can	131.00	4	524.00	786.00
Uline Thin trash can 23G	45.00	4	180.00	270.00
Rubbermaid Slim Jim Lid Can/bottle	52.00	4	208.00	312.00
Rubbermaid Slim Jim Lid paper	52.00	4	208.00	312.00
Rubbermaid Slim Jim Swing top	51.00	4	204.00	306.00
Stainless Dollie	135.00	4	540.00	810.00
Handsfree Trash Can 55G	255.00	4	1,020.00	1,530.00
Outdoor Landmark Series Trash Can Dome top 50G	970.00	4	3,880.00	5,820.00
Fork liftable Transport tilt truck	2,505.00	2	5,010.00	7,515.00
Hydraulic Platform Stacker	2,695.00	2	5,390.00	8,085.00
130km low speed new energy double cab mini pick up truck	9,999.00	2	19,998.00	29,997.00
Commercial Cutting Board	152.00	4	608.00	912.00
Commercial Mixing 3qt	62.00	4	248.00	372.00
Commercial Mixing 5qt	89.00	4	356.00	534.00
Commercial Mixing 8qt	125.00	4	500.00	750.00
Commercial Mixing 13qt	94.00	4	376.00	564.00
Commercial Mixing 20qt	150.00	4	600.00	900.00
Stainless Steel Steam Table Pans 3qt	150.00	4	600.00	900.00
Stainless Steel Steam Table Pans 6qt	250.00	4	1,000.00	1,500.00
Stainless Steel Steam Table Pans 10qt	150.00	4	600.00	900.00
Stainless Steel Steam Table Pans 14qt	175.00	4	700.00	1,050.00
Stainless Steam Table Pan Lids 1/6	55.00	4	220.00	330.00
Stainless Steam Table Pan Lids 1/3	85.00	4	340.00	510.00

<u>Stainless Steam Table Pan Lids 1/2</u>	110.00	4	440.00	660.00
<u>Stainless Steam Table Pan Lids Full</u>	205.00	4	820.00	1,230.00
<u>Stainless Steel Scoops 8oz</u>	69.00	4	276.00	414.00
<u>Stainless Steel Scoops 16oz</u>	75.00	4	300.00	450.00
<u>Stainless Steel Scoops 32oz</u>	80.00	4	320.00	480.00
<u>Stainless Steel Scoops 64oz</u>	86.00	4	344.00	516.00
<u>Stainless Steel Scoops 96oz</u>	114.00	4	456.00	684.00
<u>Stainless Steel Scoops 128oz</u>	122.00	4	488.00	732.00
<u>Stainless Steel Scoops 160oz</u>	134.00	4	536.00	804.00
<u>Stainless Steel Mixing Paddles 48"</u>	35.00	2	70.00	105.00
<u>Mixing Polypropylene Paddles 40"</u>	65.00	2	130.00	195.00
<u>Mixing Polypropylene Paddles 52"</u>	72.00	2	144.00	216.00
<u>Hand Scraper 3 x 8"</u>	7.00	2	14.00	21.00
<u>Hand Scraper 4 x 9"</u>	8.00	2	16.00	24.00
<u>Stainless steel paper cutter 36"</u>	163.00	2	326.00	489.00
<u>Unbleached Paper rolls 36"</u>	81.00	4	324.00	486.00
<u>Handheld Induction Sealer and Caps</u>	340.00	4	1,360.00	2,040.00
<u>Clear Straight-sided Glass jars with metal cap 8oz</u>	40.80	2	81.60	122.40
<u>Clear Straight-sided Glass jars with metal cap 16oz</u>	54.60	2	109.20	163.80
<u>Clear Straight-sided Glass jars with metal cap 32oz</u>	64.80	2	129.60	194.40
<u>Amber Straight-Sided Glass Jars with Metal Cap 8oz</u>	40.80	2	81.60	122.40
<u>Case Standard Glass Canning Jars 8oz</u>	14.40	2	28.80	43.20
<u>Case Standard Glass Canning Jars 16oz</u>	18.00	2	36.00	54.00
<u>Case Standard Glass Canning Jars 24oz</u>	20.40	2	40.80	61.20

<u>Case Standard Glass Canning Jars</u> <u>32oz</u>	22.80	2	45.60	68.40
<u>Case Replacement Standard</u> <u>Canning Jar Lids</u>	81.00	2	162.00	243.00
<u>Case Glass Spice Jars 2oz</u>	48.00	2	96.00	144.00
<u>Case Glass Spice Jars 4oz</u>	27.60	2	55.20	82.80
<u>Case Glass Spice Jars 8oz</u>	15.60	2	31.20	46.80
<u>Case Glass Spice Jars 16oz</u>	18.60	2	37.20	55.80
<u>Case Cubitainers</u>	60.00	2	120.00	180.00
<u>Case of Square Utility Jugs</u>	34.20	2	68.40	102.60
<u>Jug Pump</u>	10.50	2	21.00	31.50
<u>Chemical Resistant Spray Bottles</u>	25.50	2	51.00	76.50
<u>Case Replacement nozzles</u>	17.25	2	34.50	51.75
<u>Bundle Egg Cartons</u>	90.00	2	180.00	270.00
<u>Egg Filler Flat Case</u>	42.00	2	84.00	126.00
<u>Williams Sonoma Prep Tools 15</u> <u>Piece Gadget and Utensils Set</u>	279.95	2	559.90	839.85
<u>Berry Basket</u>	75.00	2	150.00	225.00
Total Cost				296,631.22

3. Administration, Training, and R&D: \$15,000 per Tier II FIF

This budget category ensures that each Tier II Food Innovation Facility (FIF) in Pohnpei operates not only as a processing unit but also as an administrative and training hub. It supports critical back-office functions, technical coordination, food safety compliance, and staff development. The budget accounts for equipment shipping and installation in a remote island context where ICT and scientific tools are costly to import and maintain.

A. Administrative Office – \$5,500

Each facility includes a 300 square foot office to support day-to-day management, documentation, and coordination activities.

Key Features:

- Desks, chairs, and cabinets sourced locally when possible (e.g., coconut timber), supplemented with imported ergonomic seating and secure filing systems
- One laptop and one desktop computer with surge protectors and extended warranties
- Wireless printer/scanner and router for document handling and communication
- Dry-erase boards, planning boards, storage shelves, and secured records cabinets
- One split-unit air conditioner and fans for cooling and humidity control

Cost drivers include the need for furniture and electronics that can withstand tropical humidity, backup components to reduce downtime, and air-freight of sensitive devices.

B. Research and Development Laboratory – \$7,500

A 150–200 square foot R&D lab is included in each facility to support quality assurance and small-batch product development.

Key Equipment:

- Stainless steel benches and sealed sinks with corrosion-resistant fittings
- Basic lab equipment including microscope, pH meters, incubators, moisture analyzers
- Seal testers, microbial media, and refrigerated storage for samples and reagents
- Personal protective equipment (PPE), fire extinguishers, and eyewash station

These items are expected to be imported with necessary calibration and user training provided.

Lab support is vital for innovation and hygiene compliance.

C. Training Room – \$3,250

Each FIF includes a 12-person training space for workshops on food safety, entrepreneurship, and equipment use.

Features:

- Digital projector with screen and multimedia inputs
- Flexible seating arrangements: mix of modular chairs and traditional pandanus mats
- HACCP posters, flip charts, instructor workstation, and display boards
- Ceiling fans, screened windows, and provisions for an adjacent open-air annex for overflow training or staging

Shipping costs reflect specialized AV and educational tools. The outdoor annex area with cement flooring and thatched roof will be incorporated into the core building design.

D. Office Supplies & IT Infrastructure – \$6,250

Supports communication, documentation, and cloud-based management of food safety protocols.

Inclusions:

- Rugged laptop, desktop computer, color printer, wireless routers
- Connectivity infrastructure such as mobile hotspot or satellite uplink
- Subscriptions to secure cloud platforms for inventory, traceability, and reporting (e.g., Google Workspace, FoodReady)
- Office supplies including binders, laminators, UPS backup, and IT support

The budget includes redundancy measures to address connectivity gaps and reduce operational disruptions in Pohnpei’s more isolated areas.

Total for Section 3: \$90,000

Component	Amount (USD) for each Tier II FIF	Amount (USD) for both Tier II FIFs
A. Administrative Office	\$5,500	\$11,000
B. Training Room	\$3,250	\$6,500
C. Office Supplies and IT Infrastructure	\$6,250	\$12,500

Total	\$15,000	\$30,000
--------------	----------	----------

4. Operational Readiness and Sustainability: \$46,250 per Tier II FIF

This budget line ensures that each Pohnpei Tier II Food Innovation Facility (FIF) is not only constructed and outfitted with equipment, but also fully functional, staffed, and ready to begin operations from day one. It addresses the costs of procuring initial inventory, training personnel, covering startup utilities, and maintaining basic operations in the early phase, especially while the facility transitions to self-sustaining revenue generation.

A. Initial Inventory (Raw Materials) – \$12,500

Each FIF requires sufficient start-up inventory to conduct processing trials, staff training, product demonstrations, and early-stage market testing.

Included Inputs:

- Bulk local crops such as taro, banana, breadfruit, coconut, and sweet potato for processing into flour, chips, milk, oil, and other products
- Purchased poultry and eggs for the facility focused on coconut and animal-based processing
- Imported or locally sourced packaging materials including vacuum bags, PET bottles, laminated pouches, labels, and shipping cartons
- Supplemental ingredients like oil, salt, spices, and sugar for recipe trials and training modules

The budget reflects freight costs for packaging and food-grade supplies not available locally and allows flexibility to source perishables from nearby islands if needed.

B. Training and Staffing – \$23,750

Initial operating success depends on building a team trained in hygienic processing, traceability, and equipment operation. These funds support hiring and upskilling staff and engaging qualified trainers.

Covered Costs:

- Staff salaries for 6 to 8 months for roles such as operations lead, sanitation and quality staff, maintenance support, and training assistant
- HACCP and SOP training delivered via remote instruction or short-term regional visits
- Technical training from equipment vendors on proper operation of cold storage units, sealers, fryers, or coconut processing tools
- Custom training materials in English and adapted to Pohnpei’s languages and cultural context
- Travel support for regional or national trainers, and remote Zoom-based modules with hybrid in-person days

This budget ensures that once operational, each facility can maintain food safety standards, operate machinery correctly, and build local institutional capacity for future scaling.

C. Utilities and Operating Costs (Year 1) – \$10,000

While some energy savings are achieved via solar design and CoolBot refrigeration, significant utility and operating costs persist during the first year of launch.

Inclusions:

- Generator fuel, solar integration maintenance, and electrical usage
- Water for sanitation and cleaning, plus wastewater management and treatment
- Cleaning agents, PPE, sanitizers, gloves, and weekly deep cleaning
- Pest control, minor repairs, and routine upkeep for facility hygiene

- Connectivity costs including mobile hotspot plans, domain hosting, and phone service for outreach or coordination

These funds ensure the FIF can maintain safe, consistent operations while it builds clientele, contracts, or government-supported processing programs.

Component	Amount (USD) for each Tier II FIF	Amount (USD) for both Tier II FIFs
A. Initial Inventory (Raw Materials)	\$12,500	\$25,000
B. Training and Staffing	\$23,750	\$47,500
C. Utilities and Operating Costs	\$10,000	\$20,000
Total	\$46,250	\$92,500

D. Pohnpei State Tier I Food Innovation Facilities (FIFs)

FIFs Tier I Total Cost: \$72,578.78 (24 centers @ \$3,024.12 each = \$72,578.78)

Pohnpei State proposes the establishment of **24 Tier I Food Innovation Facilities (FIFs)**, distributed across all five municipalities—Sokehs, Nett, Kitty, U, and Madolenihmw—with four centers per municipality to ensure local accessibility and engagement at the community level. In addition, one Tier I facility will be located on each of the four inhabited outer islands:

Mwoakilloa, Sapwuahfik, Nukuoro, and Kapingamarangi. These micro-scale facilities are intended to serve as decentralized nodes for pre-processing, aggregation, farmer training, and basic value addition of local crops and marine resources.

Each Tier I center will serve multiple purposes including:

- Providing space for sorting, washing, and drying produce
- Supporting basic equipment for coconut grating, taro slicing, and fruit dehydration using solar dryers
- Hosting community trainings on food hygiene, nutrition, and agro-processing
- Serving as staging areas for municipal-level aggregation and cold chain integration with higher-tier facilities

The total estimated cost per Tier I facility is \$6,172.88, which includes construction-ready kits, local materials, starter tools, water access solutions, and transport costs to each island or interior site. In more remote locations such as Nukuoro and Kapingamarangi, additional logistics costs have been averaged into the per-unit figure to reflect barge chartering, weather contingencies, and offloading needs. The facilities will be co-designed with municipal stakeholders to ensure cultural appropriateness, community ownership, and alignment with local land availability.

1. Construction and Infrastructure: \$24,000

This cost covers the basic construction or renovation of spaces to establish Tier I collection and pre-processing facilities across Pohnpei. A total of 24 facilities will be developed: four in each of

the five municipalities (Sokehs, Nett, Kittu, U, and Madolenihmw), and one each on the outer islands of Mwoakilloa, Sapwuahfik, Nukuoro, and Kapingamarangi.

Each Tier I facility will feature a simple, functional structure consisting of a raised cement floor, open-air walls for ventilation, and a durable, weather-resistant roof. Locally available materials such as hardwood posts, bamboo framing, woven palm panels, and corrugated tin or thatch roofing will be prioritized to reduce costs and foster community participation. The spaces are intended to support basic agricultural activities such as sorting, peeling, grating, sun-drying, and temporary storage.

At an average cost of \$1,000 per facility, the budget reflects minimal yet essential investments in infrastructure, including:

- Site preparation and slab foundation
- Roof construction using locally sourced or donated labor
- Basic water drainage and sanitation considerations
- Adaptations for island-specific site conditions (e.g., elevation in flood-prone areas)

This decentralized infrastructure model is critical for supporting early-stage food processing, household engagement, and farm-to-market linkages across both the main island and outer island communities of Pohnpei.

2. Equipment & Supplies for Tier I Village Food Innovation Facilities in Pohnpei: \$48,578.78.

Equipment	Price per Unit	Number of Units	Total without Cost Conversion	Total with 1.5x Cost Conversion
General Processing Item				
Manual Veg Slicer	90.00	5	450.00	675.00
Stainless Steel Commercial Work Table	674.18	10	6,741.80	10,112.70
Manual Taro	50.00	10	500.00	750.00
Hand Grinder	20.00	10	200.00	300.00
Knives	30.00	15	450.00	675.00
Pedal Generator Stationary	255.00	10	2,550.00	3,825.00
Coconut Mesh Bag	35.00	10	350.00	525.00
Portable Solar generator	200.00	10	2,000.00	3,000.00
Compostable Gallon Resealable Bag	16.00	10	160.00	240.00
Coconut Processing Items				

Flesh tool	3.00	15	45.00	67.50
Machete 20 pieces	559.80	20	11,196.00	16,794.00
Coconut Flour Machine	800.00	1	800.00	1,200.00
Liberty Stainless Steel Taps	84.00	10	840.00	1,260.00
Sugaring Bucket	51.94	10	519.40	779.10
28' Fiberglass Extension Ladder	460.00	3	1,380.00	2,070.00
Winco 12 in Sieve Baking Sheet	24.01	10	240.10	360.15
Manual Coconut Milk press	90.00	10	900.00	1,350.00
Fishing Equipment				
Powerpro Braided Fishing Line	16.99	20	339.80	509.70
Promar Hook Resist Fishing nets	21.99	20	439.80	659.70
Gamakatsu Baitholder Fishing Hook	11.49	100	1,149.00	1,723.50
3 Gallon Tamco Fabricated HDPE Rectangular Tank with cover	226.99	5	1,134.95	1,702.43
Total Cost				48,578.78

Grand Total: \$12,257,250 USD

The total estimated investment for the first Tier III Food Innovation Center (FIC) plus all the equipment and supplies for Tier I and Tier II Food Innovation Facilities (FIF) in the Federated States of Micronesia shown above. This figure reflects a comprehensive, procurement-ready cost that includes design, construction, equipping, staffing, operational launch, and contingency allowances. It is based on a realistic per-square-foot estimate of \$750 for a 6,000 sq ft FDA-aligned food-grade facility, factoring in FSM's geographic, logistical, and infrastructural constraints. The total estimated cost of this facility is \$5,540,515.45.

The total estimated investment for the second Tier III Food Innovation Center (FIC) in Pohnpei, focused on manufacturing animal feed from locally sourced byproducts, is \$3,325,000. This cost reflects a fully developed, procurement-ready budget that incorporates design, construction,

equipment procurement, staffing, start-up operations, utilities, and contingency provisions. The construction component is based on a \$500 per square foot estimate for a 3,000 square foot feed-grade facility, aligned with Codex, HACCP, and USDA/APHIS animal feed safety standards. All estimates take into account the logistical, environmental, and infrastructural realities of the Federated States of Micronesia and are designed to ensure reliable, sustainable, and compliant production of locally formulated animal feed. This facility complements the broader food systems strategy by valorizing bycatch and agro-waste, reducing feed imports, and enhancing food and livestock security across the islands.

With two regional Tier II Food Innovation Facilities (FIFs) proposed for Pohnpei—each designed at 2,500 square feet and estimated at a construction cost of \$450 per square foot—the base construction cost per facility is \$1,125,000. Together, these two regional FIFs represent a total construction cost of \$2,250,000. However, the full investment extends beyond construction alone. Including equipment procurement, installation, facility administration, training infrastructure, utility systems, and a contingency allocation for freight, delays, and cost escalation, the **total estimated investment for both Tier II facilities is \$2,773,701.22**. These mid-scale processing hubs will support product lines such as coconut milk, oil, sugar, and dried produce, as well as taro, banana, breadfruit, and other indigenous crops—creating new pathways for value addition, enterprise incubation, and farmer-market linkages across Pohnpei.

The total estimated investment for the twenty-four Tier I Food Innovation Facilities (FIFs) across Pohnpei State is \$148,149.07. This figure reflects a decentralized strategy to establish low-cost, community-embedded processing units in all five municipalities—Sokehs, Nett, Kitty, U, and Madolenihmw—with four centers in each. Additionally, one Tier I FIF will be placed on each of the four inhabited outer islands: Mwoakilloa, Sapwuahfik, Nukuoro, and Kapingamarangi. These micro-scale facilities, budgeted at \$6,172.88 each, are designed to support pre-processing, aggregation, and basic value addition of local agricultural and marine products. They also serve as vital entry points for farmer training, food safety awareness, and rural economic empowerment, ensuring inclusive food system engagement from the village level up.

All equipment and supplies included above. Grand total for two tier III FICs, two regional FIF, and 24 tier 1 FIFs is **\$12,257,250**.

Contingency or discretionary funds at **\$300,000** are needed for alterations in supplies and equipment, additional needs identified.

Strategic Justification:

This investment creates a **fully compliant and climate-resilient processing facilities** designed for value addition, hygiene, and long-term resilience. It also builds **local capacity** by pairing modern technology with Pacific Island processing traditions. The FIC is:

- **Scalable** – It serves as a national model for replication in other states and Pacific nations.
- **Community-rooted** – It is integrated with local farming, fishing, and small enterprise development.
- **Regulatory-ready** – Designed to meet FDA, HACCP, and Codex food facility standards.
- **Climate-smart** – Incorporates solar readiness, passive ventilation, and efficient refrigeration to reduce carbon footprint and operating costs.

This **\$12.26 million (\$USD)** investment is not just a single facility—but a network of strategically designed food processing and innovation centers across Pohnpei. These include Tier I, Tier II, and Tier III facilities that serve as aggregation hubs, processing centers, training sites, and manufacturing platforms to strengthen Pohnpei State’s food system. The initiative is central to advancing FSM’s goals for food security, rural development, economic diversification, and import substitution through value addition and local enterprise development.

References and Works Cited

Adefila, A. O., Ajayi, O. O., Toromade, A. S., & Sam-Bulya, N. J. (2024). Integrating traditional knowledge with modern agricultural practices: A sociocultural framework for sustainable development. *Journal of Sustainable Agriculture and Development*.

Agarwal, V., Malhotra, S., Dagar, V., & M. R, P. (2023). Coping with public-private partnership issues: A path forward to sustainable agriculture. *Socio-Economic Planning Sciences*, 89, 101703. <https://doi.org/10.1016/j.seps.2023.101703>

American Poultry Association. (2022, October 5). 2025 APA Canadian National Meet. <https://amerpoultryassn.com/2022/10/feed-and-water-management/>

Arenas-Navarro, I., Montes, E. D., Serrano-Pinilla, S. M., & Rueda-Ordoñez, D. A. (2020). Development of a rainwater harvesting model for broiler farms. *Revista UIS Ingenierías*, 19(2), 127-134.

Besbes, B., Thieme, O., Rota, A., Guèye, E. F., & Alders, R. G. (2012). Technology and programmes for sustainable improvement of village poultry production. In *Alternative systems for poultry: Health, welfare and productivity* (pp. 110-127). CABI.

Brass, C., Scott, C., Bright, A., & Rayner, A. C. (2015). Chicken Run: A chicken-centred design research project. *The Virtuous Circle*, (00), 00-00.

Chen, J. (2024, September 12). *Corporate governance: Definition, principles, models, and examples*. Investopedia. <https://www.investopedia.com/terms/c/corporategovernance.asp>

Diambra-Odi, H., & Hollyer, J. (2017). *20-egg layers model* (Animal Agriculture Publication No. AA003). College of Natural & Applied Sciences, University of Guam. https://www.uog.edu/_resources/files/extension/publications/Chicken_Laying_Fact_Sheet_3_17.pdf

Federated States of Micronesia. (2024). *Third national communication and first biennial update report to the United Nations Framework Convention on Climate Change*. <https://unfccc.int/documents/628168>

Fukumoto, G. (2009). *Livestock Management Small-Scale Pastured Poultry Grazing System for Egg Production*. <https://www.ctahr.hawaii.edu/oc/freepubs/pdf/LM-20.pdf>

Glatz, P., Ayalew, W., Black, I., Pandi, J., Deklin, J., Mazi, M., ... & Solomon, E. (2013). *Improving the profitability of village broiler production in PNG*.

Jamaluddin, F., Saleh, N. M., Abdullah, A., Hassan, M. S., Hamzah, N., Jaffar, R., Abdul Ghani Aziz, S. A., & Embong, Z. (2023). Cooperative Governance and Cooperative Performance: A Systematic Literature Review. *SAGE Open*, 13(3). <https://doi.org/10.1177/21582440231192944> (Original work published 2023)

Malchow, J., Berk, J., Puppe, B., & Schrader, L. (2019). Perches or grids? What do rearing chickens differing in growth performance prefer for roosting? *Poultry Science*, 98(1), 29-38.

Maluf, R. S. (2021). Decentralized food systems and eating in localities: A multi-scale approach. *Revista de Economia e Sociologia Rural*, 59, e238782.

Martin Cerezo, M. L., López, S., van Dorp, L., Cui, R., Hamburger, J., Rieux, A., ... & Larson, G. (2023). Population structure and hybridisation in a population of Hawaiian feral chickens. *Heredity*, 130, 154-162. <https://doi.org/10.1038/s41437-022-00589-z>

Martinez, S. (2010). *Local food systems; concepts, impacts, and issues*. Diane Publishing.

McCall, W. (1980). *Hawaii Cooperative Extension Service Chicken Manure*. <https://www.ctahr.hawaii.edu/oc/freepubs/pdf/GHGS-02.pdf>

Novković, S., Miner, K., McMahon, C. (2023). Cooperative Governance in Context. In: Novković, S., Miner, K., McMahon, C. (eds) *Humanistic Governance in Democratic Organizations. Humanism in Business Series*. Palgrave Macmillan, Cham. https://doi.org/10.1007/978-3-031-17403-2_4

The Observatory of Economic Complexity. (n.d.). Micronesia (FSM) exports, imports, and trade partners. <https://oec.world/en/profile/country/fsm>

Pacheco, W., Gulizia, J., & Downs, K. (2022). *Backyard and Small Poultry Flock Management Series: Feeding the Laying Hen*. Alabama Cooperative Extension System.

Peter, Z., & Leif, B. S. (2003). *Food Preservation Techniques: Woodhead Publishing Series in Food Science, Technology and Nutrition* [Doctoral dissertation]. CRC Press.

Poland, G. (2019). Preventative healthcare. In *AVA Manual of Backyard Poultry Medicine and Surgery* (pp. 51-58). British Small Animal Veterinary Association.

Poulton, C., & Macartney, J. (2012). Can public-private partnerships leverage private investment in agricultural value chains in Africa? A preliminary review. *World Development*, 40(1), 96-109. <https://doi.org/10.1016/j.worlddev.2011.05.017>

Poultry Hub Australia. (2020, December 13). Disease. <https://www.poultryhub.org/all-about-poultry/health-management/disease>

Poultry Hub Australia. (2022, October 20). Chicken.

<https://www.poultryhub.org/all-about-poultry/species/chicken>

Ramaswamy, H. S., & Marcotte, M. (2005). *Food processing: Principles and applications*. CRC Press.

Rutgers, The State University of New Jersey. (2024). *Baseline assessment in support of climate-resilient food security for farming households across the Federated States of Micronesia*. <https://rd.gov.fm/gcf>

Rutgers, The State University of New Jersey. (2024). *Agriculture and food security vulnerability assessment: A companion to the baseline assessment in support of climate-resilient food security for farming households across the Federated States of Micronesia*. <https://rd.gov.fm/gcf>

ResearchGate, 2011-2023. Multiple case studies from Africa and developing nations demonstrate successful PPP models in agricultural development.

Micronesia. Technical Report to the Federated States of Micronesia, Micronesia Conservation Trust and the Green Climate Fund. <https://rd.gov.fm/food-security>

Sari, S. N., Arintonang, R., & Sumarlin, S. (2021). Smart chicken coop control and monitoring system design automatically with smartphone notifications. *Brilliance: Research of Artificial Intelligence*, 1(2), 38-46.

Schmidt, R. H., & Erikson, D. J. (2005). Sanitary design and construction of food processing and handling facilities: FSHN0408/FS120, 5/2005. *Edis*, 2005(5).

Scholl, M., & Sherwood, A. (2014, January). *Four Pillars of Cooperative Governance*. Columinate. <https://columinate.coop/four-pillars-of-cooperative-governance-cg/>

Spielman, D.J., von Grebmer, K. Public–Private Partnerships in International Agricultural Research: An Analysis of Constraints. *J Technol Transfer* 31, 291–300 (2006). <https://doi.org/10.1007/s10961-005-6112-1>

Wilson, H. R., Wilcox, C. J., Voitle, R. A., Baird, C. D., & Dorminey, R. W. (1975). Characteristics of White Leghorn chickens selected for heat tolerance. *Poultry Science*, 54(1), 126-130. <https://doi.org/10.3382/ps.0540126>

United Nations. (2025). *UN International Year of Cooperatives 2025*. IYC 2025. <https://2025.coop/>

Young-Uhk, S. (2011). *Utilization of the Tilapia Invasive Species as a Low-Cost Protein Feed to Improve Egg Production*. USDA Sustainable Agriculture Research and Education Projects, FW09-312.