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Strategy & Action Plan Formulation of Food Loss, Surplus Food, and Food Waste Management in Bali Province

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PAGE gratefully acknowledges the support of all its funding partners: European Union, Finland, Germany, Norway, Republic of Korea, Sweden, Switzerland and the United Arab Emirates.

About This Research

This research was initiated by the Ministry of National Development Planning/Bappenas of the Republic of Indonesia under Directorate of Food and Agriculture and Directorate of Environmental Affairs, in collaboration with the United Nations Partnership for Action on Green Economy (UN PAGE) and Waste4Change. This report is written as a continuation of effort for Food Loss and Waste management at regional level. The content of this report is based on consultation with various stakeholders, including both government and non-government organizations. Any views and opinions represented in this report belong

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Acknowledgement

This study is a result of support and collaboration of various parties. Our deepest appreciation to the Ministries/Agencies, Development Partners, Institutions/Agencies in Bali Province, the academic community in Bali Province, and stakeholders related to Food Loss and Waste management for their support in developing the Strategy & Action Plan for Food Loss and Waste Management in Bali Province. We also extend our gratitude to all parties who have contributed to the preparation of this study, which is expected to serve as an inspiration and guideline for managing Food Loss and Waste in Bali Province.

Ministry/Agency

- Ministry of Agriculture
- Ministry of Environment and Forestry
- National Food Agency

Institution/Agency

- Regional House of Representatives of Bali Province
- Regional Secretary of Bali Province
- Bureau of Public Procurement and Economic Affairs of Bali Province
- Center for Environmental Development Control of Bali and Nusa Tenggara Ecoregion
- Food and Drug Authority of Bali Province
- Regional Settlement Infrastructure Center of Bali Province
- Regional Inflation Control Team of Bali Province
- Traditional Village Council of Bali Province
- Agricultural Instrument Standardization Agency of Bali Province
- Regional Development Planning Agency of Bali Province
- Regional Research and Innovation Agency of Bali Province
- Advancement of Indigenous Peoples Agency of Bali Province
- Community Empowerment, Villages, Population and Civil Registry Agency of Bali Province
- Tourism Agency of Bali Province
- Public Works, Spatial Planning, Housing and Settlement Areas Agency of Bali Province
- Industry and Commerce Agency of Bali Province
- Cooperatives, Small and Medium Enterprises Agency of Bali Province
- Public Health Agency of Bali Province
- Social Service, Women's Empowerment and Child Protection Agency of Bali Province
- Education, Youth and Sports Agency of Bali Province
- Communication, Information and Statistics Agency of Bali Province
- Central Bureau of Statistics of Bali Province
- Family Empowerment and Welfare Movement Team of Bali Province
- Agriculture and Food Security Agency of City/Regency in Bali Province
- Marine and Fisheries Agency of City/Regency in Bali Province
- Environmental Agency of City/Regency in Bali Province

Association

- Reliable Fishermen Farmer Group (KTNA) Bali Province
- Indonesian Hotels and Restaurants Association (PHRI) Bali Province
- Parisada Hindu Dharma Indonesia (PHDI)

Insurance & Banking

- PT JASINDO

Academic Community

- Udayana University
- Warmadewa University
- Dhyana Pura University

Business Owners & Organization

Food Loss Sector

- Regionally Owned Enterprises (BUMD)
- Village Owned Enterprises (BUMDES)
- Regional Public Company Mangu Giri Sedana Badung Regency (Perumda)
- Regional Public Company Dharma Santika Tabanan Regency (Perumda)
- Regional Public Company Argha Nayottama Buleleng Regency (Perumda)
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- Garda Pangan

Food Waste Sector

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- Magi Farm Bali
- EcoBali Recycling
- Delterra
- Rikolto Indonesia
- Global Shaper Bali
- Bali Environmental Education Centre (PPLH)
- Mr. Ketut - Facilitator of TPS 3R Osaki Bali Province

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Executive Summary

❖ Food Loss, Surplus Food, & Food Waste Generation in Bali Province

The Food Loss and Waste (FLW) generation in Bali reaches 201.08 kg/capita/year, **exceeding the national FLW range** of 115-184 kg per capita per year (Bappenas, 2021). The highest proportion of losses occurs during the production and consumption stages, with the most significant FLW generation found in fruit commodities (oranges), followed by grains (unhusked rice), and vegetables (chayote).

Existing Proportion	Food Supply Chain	Generation of Food Loss, Surplus Food, & Food Waste in Bali Province	
		tons/year	kg/cap/year*
Food Loss 497,287 tons/year (56,69%)	Production Loss	300.650	68,92
	Post-Harvest & Storage Loss	180.225	41,31
	Processing & Packaging Loss	16.412	3,76
Surplus Food 185,179 tons/year (21,11%)	Distribution & Market Waste	153.766	35,25
	Consumption Waste	226.171	51,84
Food Waste 194,758 tons/year (22,20%)			
Total		877.224	201,08

Some impacts identified based on the Food Loss, Surplus Food, and Food Waste generated in Bali Province from 2016-2021:

- the total **greenhouse gas (GHG) emissions** generated annually ranged from **0.94 to 1.99 Mton CO2eq**, accounting for approximately 1.59% of the average national GHG emissions from SSP and food waste (85.14 Mton CO2eq).
- The **economic losses** incurred reached **IDR 6-10 trillion per year**, equivalent to 4.4-7.0% of Bali's GDP annually.
- For surplus food, it is also edible food that is being discarded. The failure to utilize this edible portion resulting in the **loss of potential nutritional value**.

In response, a study was conducted **to develop strategies and action plans for managing Food Loss, Surplus Food, and Food Waste in Bali Province**. The data from this study can serve as a basis for stakeholders to formulate policy and program implementation for managing Food Loss, Surplus Food, and Food Waste in Bali Province.

The study was conducted with **qualitative approach** through secondary data collection, literature review, in-depth interviews, and focus group discussions with relevant stakeholders. This was supported by **quantitative methods** to analyze impacts, project FLW trends, and set target indicators for the action plan based on historical data collected.

❖ Reduction Target of Food Loss, Surplus Food, & Food Waste in Bali Province

According to Indonesia's Food Loss and Surplus Food Roadmap, the central government has set **targets to reduce Food Loss and Surplus Food by 50% by 2030 and 75% by 2045**. To support more focused

efforts in reducing Food Loss, Surplus Food, and Food Waste in Bali Province, this recommendation document sets reduction targets that aligned with the nationally established targets.

Year	Food Loss		Surplus Food		Food Waste	
Target 2045	Reduction (%)	Food Loss Generation (thousand tons)	Reduction (%)	Surplus Food Generation (thousand tons)	Reduction (%)	Food Waste Generation (thousand tons)
	75.00%	203.50	75.00%	74.94	75.00%	78.82

❖ Recommendation of Strategy and Action Plan on Food Loss, Surplus Food, & Food Waste in Bali Province

Recommendations for **strategy and action plans for Food Loss, Surplus Food, and Food Waste Management in Bali Province** were developed based on focused discussions with various stakeholders, including the Bali Provincial Government, associations, NGOs, and food workers (farmers, livestock producers, and fishers).

The recommendation consist of **7 strategies and 18 action plans**, each with specific indicators, baseline data, phased milestones, and designated lead and supporting institutions. The milestones are divided into four phases: (1) Short-Term (2025–2029), (2) Medium-Term (2030–2034), (3) Long-Term (2035–2039), and (4) Golden Indonesia (2040–2045).





01

INTRODUCTION

CHAPTER 1. Introduction

Background

The amount of food loss, surplus food, and food waste generation in Indonesia from 2000 to 2019 reached 23–48 million tons/year, equivalent to 115–184 kg/capita/year. Without proper management, it is estimated that Indonesia's Food Loss, Surplus Food, and Food Waste generation could reach 344 kg/capita/year by 2045. However, by implementing appropriate strategies, Food Loss, Surplus Food, and Food Waste generation could be reduced to 166 kg/capita/year by 2045. One of the main directions for Food Loss, Surplus Food, and Food Waste Management Strategy in Indonesia is **the development of comprehensive study and data collection on Food Loss, Surplus Food, and Food Waste**¹.

In 2021, a regional study on Food Loss, Surplus Food, and Food Waste was conducted to obtain the latest data on **Food Loss, Surplus Food, and Food Waste generation, specifically in West Java, Central Java, and Bali Provinces**. The study's results showed that Food Loss, Surplus Food, and Food Waste generation in Bali reached 201.08 kg/capita/year, higher than the national range². This is likely due to the high food production in Bali, which is not matched by adequate efforts or technology to reduce food loss. The most significant proportion of food loss in Bali occurs at the production and consumption stages. The highest Food Loss, Surplus Food, and Food Waste generation in Bali were found in fruit commodities, followed by cereals and vegetables³.

Based on the previous results, a further study was conducted **to formulate the strategy and action plan for managing Food Loss, Surplus Food, and Food Waste in Bali Province**. These data will help stakeholders develop and implement relevant policies and programs. In line with the national Low Carbon Development Initiative (LCDI) policy and the circular economy agenda, which includes reducing Food Loss, Surplus Food, and Food Waste, the results of this study will serve as a strategic reference for the Bali Provincial Government. The provincial government can also use the findings of this study to integrate Food Loss, Surplus Food, and Food Waste management strategies into the Regional Medium-Term Development Plan (RPJMD) for the 2024-2029 period. Additionally, this study can serve as a reference for developing food loss, surplus food, and food waste management strategies in other provinces.

¹ Bappenas, WRI, Waste4Change and UK-FCDO (2021). *Study of Food Loss and Waste in Indonesia*. Jakarta.

² Bappenas, WRI, Waste4Change dan UK-FCDO (2021). *Laporan Studi Food Loss and Waste di Indonesia*. Jakarta.

³ Bappenas, Wrap, dan Waste4Change (2024). *Study Report Food Loss and Waste Regional – West Java, Central Java, and Bali (Unpublished Report)*. Jakarta.

Scope of the Study

Objectives

1. To identify and evaluate the strategies and mechanisms currently implemented for managing Food Loss, Surplus Food, and Food Waste, promote surplus food recovery, strengthen Food banks or Food Recovery Organizations, and provide incentives for food waste management.
2. To develop policy and action plan options that will be integrated into a comprehensive Food Loss, Surplus Food, and Food Waste management strategy, which will be further analyzed and incorporated into the PAGE (Partnership for Action on Green Economy) workflow related to the reduction of Food Loss, Surplus Food, and Food Waste in Indonesia.

Methodology

The methodology used in this study is a qualitative and quantitative. Qualitative approach conducted through secondary data collection and analysis, agricultural activity surveys, literature reviews, in-depth interviews, and focus group discussions with relevant stakeholders. An illustration of the methodology can be seen in Figure 1.1.

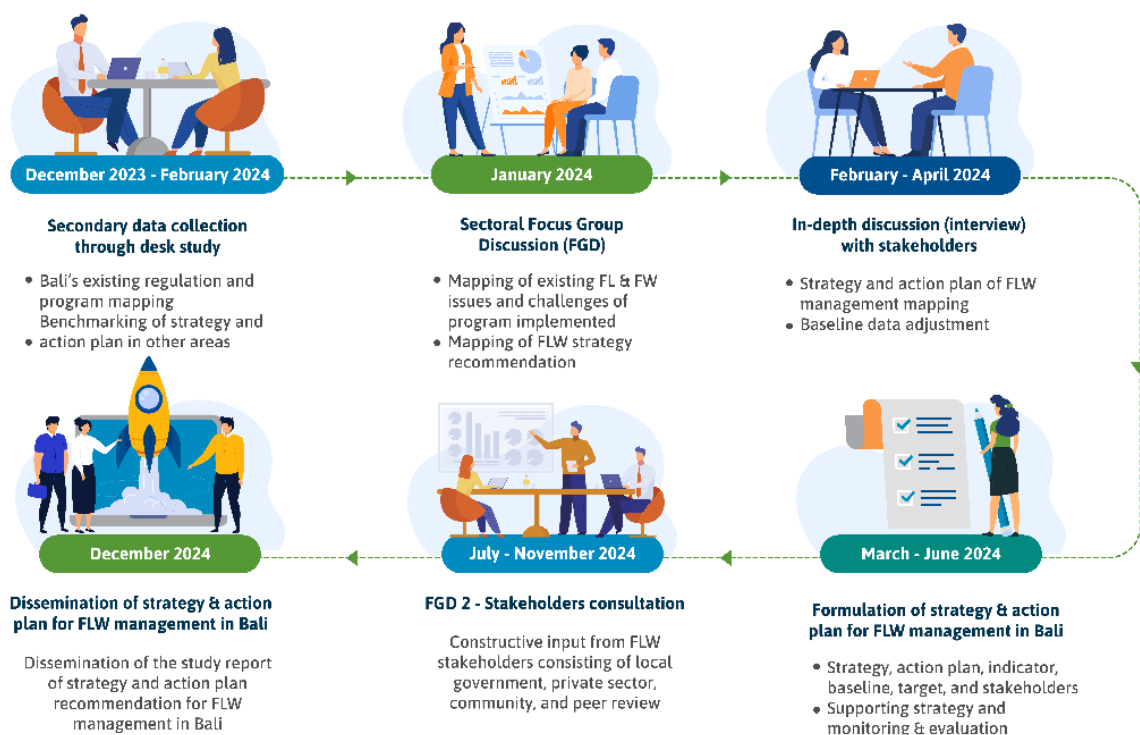


Figure 1.1 General Overview of Strategy and Action Plan Formulation Methodology

Furthermore, quantitative methods were used to analyze the impact and projection of Food Loss, Surplus Food, and Food Waste generation. The analyzed impact includes environmental, economic, and health (nutrition content). Aside from its impact, Food Loss, Surplus Food, and Food Waste generation were projected from 2022-2045 in 3 conditions including:

- (1) without intervention (*Business-as-Usual/BAU*),
- (2) optimistic strategy with reduction target reaching 75% by 2045, and
- (3) pessimistic strategy with reduction target reaching 50% by 2045.

Definition of Food Loss, Surplus Food, and Food Waste

The definitions of Food Loss, Surplus Food, and Food Waste used in this study refer to the definitions released by the Ministry of National Development Planning (Bappenas) in 2024 as part of the Roadmap for Food Loss, Surplus Food, and Food Waste Management in Supporting Food Security Achievement Towards a Golden Indonesia (*Indonesia Emas*) 2045. The definition in the roadmap also considered the definition of Food Loss and Food Waste from FAO⁴.

- **Food Loss:** A decrease in the quantity of food that occurs during producing, preparing, processing, making, preserving, packaging, repackaging, and/or transforming food⁵. Food Loss resulting from decisions and actions by food suppliers in the chain, excluding retailers, food service providers and consumers⁶. In the Food Supply Chain, Food Loss is generated in **Production, Post-harvest and Storage, and Processing and Packaging** stages.
- **Surplus Food:** Edible and safe food for human consumption that has the potential to be discarded and become food waste during the **Distribution** and **Consumption** stages⁷.
- **Food Waste:** Leftover food that is not utilized and is discarded, including spoiled or expired food, as well as inedible parts of food. Surplus food and Food waste resulting from decisions and actions by retailers, food service providers and consumers⁸.



⁴ FAO (2011). *Global food losses and food waste – Extent, causes, and prevention*. Rome.

⁵ Bappenas (2024). *Peta Jalan Pengelolaan Susut dan Sisa Pangan dalam Mendukung Pencapaian Ketahanan Pangan Menuju Indonesia Emas 2045*.

⁶ FAO (2011). *Global food losses and food waste – Extent, causes, and prevention*. Rome.

⁷ Bappenas (2024). *Peta Jalan Pengelolaan Susut dan Sisa Pangan dalam Mendukung Pencapaian Ketahanan Pangan Menuju Indonesia Emas 2045*.

⁸ FAO (2011). *Global food losses and food waste – Extent, causes, and prevention*. Rome.

Based on the definition above, scope of Food Loss, Surplus Food, and Food Waste in 5 stages of food supply chain is shown in the picture below, without including the loss of food quality and does not include pre-harvest stage.



Figure 1.2 Food Loss and Waste Scope in Food Supply Chain⁹

⁹ Bappenas, WRI, Waste4Change and UK-FCDO (2021). *Study of Food Loss and Waste in Indonesia*. Jakarta.



02

EXISTING CONDITION OF FOOD LOSS AND WASTE IN BALI PROVINCE

CHAPTER 2. Existing Condition of Food Loss, Surplus Food, & Food Waste in Bali Province

Food Loss and Waste Generation

Food Loss, Surplus Food, and Food Waste in Bali Province generates in every stages of food supply chain from Production to Consumption. Food Loss generated in Production, Post-harvest and Storage, and Processing and Packaging stages. Meanwhile, Surplus Food and Food Waste are generated in Distribution and Market, along with Consumption stages.

The amount of Food Loss, Surplus Food, and Food Waste generation in Bali Province reached **201.08 kg/capita/year** in 2021, which is higher than the range of Food Loss, Surplus Food, and Food Waste generation in Indonesia at **115-184 kg/capita/year**. The highest proportion of Food Loss, Surplus Food, and Food Waste in Bali Province is in the production and consumption stages. Meanwhile, the highest generation was found in Fruit commodities (oranges), followed by Cereals (cereal yield) and Vegetables (chayote)¹⁰. Below is the comparison of Food Loss, Surplus Food, and Food Waste generation in Bali Province 2021 and Indonesia level in 2019.

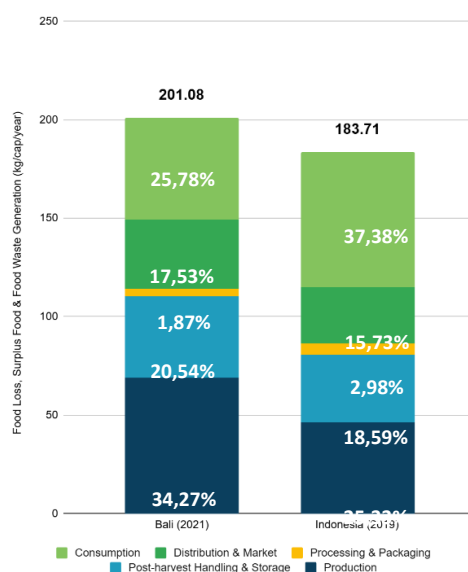


Figure 2.1 Food Loss, Surplus Food, and Food Waste Comparison¹¹

The following details (Table 2.1 and Figure 2.2) provide the generation and composition of Food Loss, Surplus Food, and Food Waste in Bali Province in 2021.

¹⁰ Bappenas, Wrap, dan Waste4Change (2024). *Study Report Food Loss and Waste Regional – West Java, Central Java, and Bali (Unpublished Report)*. Jakarta.

¹¹ Bappenas, Wrap, dan Waste4Change (2024). *Study Report Food Loss and Waste Regional – West Java, Central Java, and Bali (Unpublished Report)*. Jakarta.

Table 2.1 Food Loss, Surplus Food, and Food Waste Generation in Bali Province 2021¹²

Stage	Food Loss, Surplus Food, and Food Waste Generation in Bali 2021	
	tons/year	kg/capita/year
Production	300,650	68.92
Post-harvest Handling and Storage	180,225	41.31
Processing and Packaging	16,412	3.76
Distribution and Market	153,766	35.25
Consumption	226,171	51.84
Total	877,224	201.08

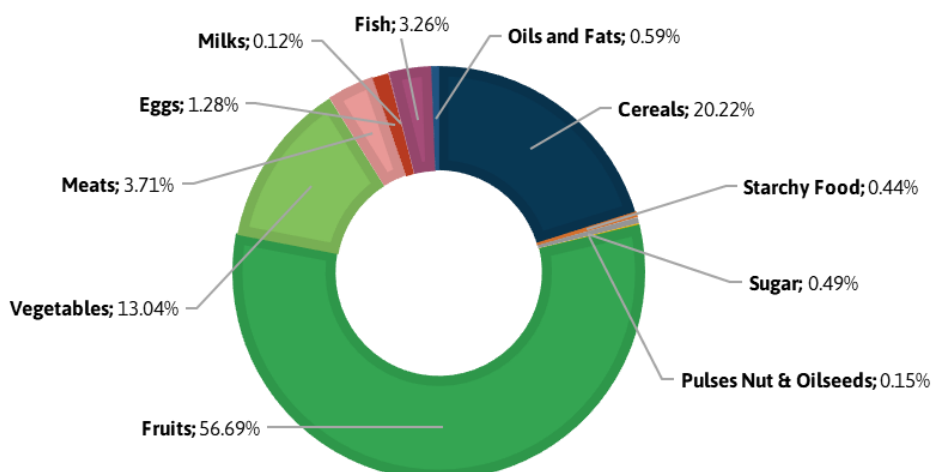
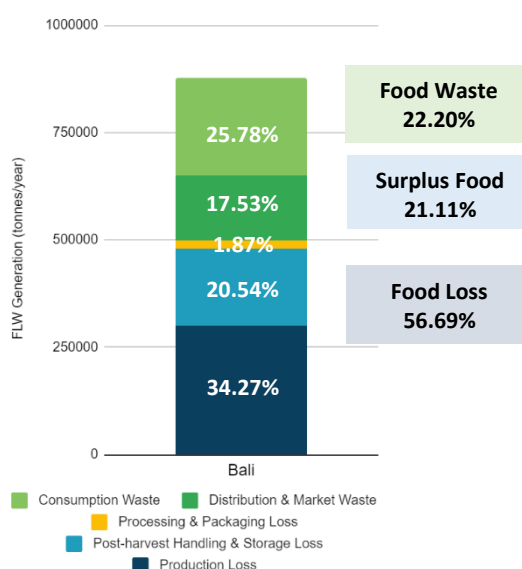


Figure 2.2 Food Loss, Surplus Food, and Food Waste Composition in Bali Province 2021¹³

Causes & Drivers of Food Loss, Surplus Food, and Food Waste

Various factors influence Food Loss, Surplus Food, and Food Waste generation and occur at various food supply chain stages. According to FAO, the factors causing Food Loss, Surplus Food, and Food Waste are divided into direct causes and indirect drivers. Direct causes are actions by actors in the food supply chain that directly cause Food Loss, Surplus Food, and Food Waste generation. At the same time, indirect drivers are systemic economic, cultural, and political conditions of the food system that affect how actors in the food supply chain operate, including Food Loss, Surplus Food, and Food Waste generation. The causes

¹² Bappenas, Wrap, dan Waste4Change (2024). *Study Report Food Loss and Waste Regional – West Java, Central Java, and Bali (Unpublished Report)*. Jakarta

¹³ Bappenas, Wrap, dan Waste4Change (2024). *Study Report Food Loss and Waste Regional – West Java, Central Java, and Bali (Unpublished Report)*. Jakarta.

and drivers of Food Loss, Surplus Food, and Food Waste in Bali Province are based on five stages of the food supply chain and five management aspects (technical, financial, institutional, policy, and social).

Direct Causes of Food Loss, Surplus Food, and Food Waste

The **direct causes** that affect Food Loss, Surplus Food, and Food Waste in Bali Province based on discussions with relevant stakeholders include:

1. Facilities and Infrastructure Limitations

Adequate facilities and infrastructure play an important role in maintaining the quality of food products. Many food workers lack sufficient support facilities. Some existing facilities are also damaged and poorly maintained, leading to ineffective food management and a high potential for food loss. For example, interviews with food workers revealed cases where rice was spilled due to unorganized sun drying or milling equipment was poorly maintained, resulting in significant losses during rice milling. In addition, the lack of storage space compared to the amount of food produced can lead to food products being poorly stored and easily damaged. Another case was found in the field where the procurement of cold storage for fish has been delayed due to a lack of land for cold storage.

2. Lack of Implementation of Good Agricultural Practice (GAP) and Good Handling Practice (GHP)

According to the FAO, good agricultural practice (GAP) is a production system that promotes sustainable and ecologically safe agriculture and non-toxic and high-quality products that contribute to food security¹⁴. Meanwhile, Good Handling Practices (GHP) include good post-harvest handling with the application of technology and the use of facilities and infrastructure¹⁵. GHP is related to food storage, distribution, and packaging procedures.

For example, when harvesting fruit, the method of harvesting should be carefully considered, such as the way the fruit is picked and placed, to avoid scratches or bruises that may make the fruit more susceptible to microbial attack and accelerate the action of ethylene gas, causing the fruit to overripe and rot faster. Moreover, many food workers, including collectors, do not understand the proper storage techniques for each food product according to the standards. This leads to issues with harvested shallots that should be dried to a specific moisture content to produce high-quality shallots. Although distributors usually have standard operating procedures (SOPs) for transportation in the distribution process, many ignore them, leading to mechanical damage to packaging or food products.

3. Poor Food Management Practices

In the community, it is still common to find habits of taking, ordering, or preparing more food than their consumption capacity. This is often due to "impulse buying or spendthrift," where consumers are

¹⁴ FAO (2007). *Guidelines "Good Agricultural Practices for Family Agriculture"*. <https://www.fao.org/4/a1193e/a1193e00.pdf>

¹⁵ Directorate of Horticulture Products Processing and Marketing (2004). *Cara Penanganan Pascapanen Yang Baik (Good Handling Practices) Komoditi Hortikultura*. <https://repository.pertanian.go.id/items/fd354e52-a29d-4d8a-9341-2bbf848e2fbc>.

not hungry but are attracted to the food they see and buy or the belief that "more is better than less." This understanding is particularly prevalent during gatherings, such as celebrations or religious ceremonies, where food is part of the offerings. These ceremonies are often linked to social status, in which the higher the social status, the larger the ceremony, resulting in more leftover food after the event. Leftover food is usually distributed to family or neighbours. Food that is not distributed or consumed is discarded as Food Waste. Additionally, preparing food ingredients, such as obtaining ingredients, cooking, and portioning, also affects the amount of food waste generated.

Indirect Drivers of Food Loss, Surplus Food, and Food Waste

The indirect drivers affecting Food Loss, Surplus Food, and Food Waste in Bali Province, based on discussions with relevant stakeholders, include:

1. Limited Access to Infrastructure

Infrastructure limitation is a driver that affects Food Loss, Surplus Food, and Food Waste, particularly upstream of the food supply chain. Poor infrastructure, such as damaged roads, can lead to food product damage and delay deliveries, causing food to spoil before reaching its destination. Other examples identified during discussions include cattle experiencing stress due to excessive shaking during transportation and vegetables wilting before arriving at their destination. This reduces the food's value or makes it unfit for sale, leading to waste. Additionally, it was found that existing storage facilities are not utilized to their full potential due to a lack of supporting infrastructure and maintenance. For example, there are storage spaces where the electricity supply is inadequate for the needs, resulting in them being abandoned.

2. Lack of Information/Education for Food Workers and Consumers

Limited understanding among food workers relates to harvesting techniques, capacity to operate machinery, ability to develop innovative food products, and skills to market their food products. Regarding Food Loss, many are unfamiliar with the term or the importance of reducing Food Loss. For consumers, inadequate upbringing or education on appreciating food affects habits of leaving leftovers and the tendency to order or serve excessive portions of food, which ends up uneaten. Moreover, there is still little understanding of the potential to recover surplus food by donating it to those in need.

3. Low Market Prices

Low market prices can lead to reduced quality of work and food products. For example, food prices often drop during peak harvest seasons. When the selling price does not match the cost of production or labour, some orange farmers in Bangli Regency and tomato farmers in Badung Regency choose not to harvest their crops, allowing them to go to waste as Food Loss.

4. Lack of Regulation and Law Enforcement

Regulations that apply in Bali, especially those related to food waste management, are considered sufficient by stakeholders, but their implementation is not yet optimal in reducing food loss, surplus food, and food waste in Bali Province. One regulation that could support the reduction of Food Loss, Surplus Food, and Food Waste is Bali Governor Regulation 99/2018 on the Marketing and Utilization of Local Agricultural, Fishery, and Industrial Products. This regulation encourages the absorption of local food products, thereby reducing Food Loss, Surplus Food, and Food Waste. However, there has been no monitoring and evaluation of its implementation in the field.

On the other hand, at the regional and national levels of Bali Province, there is no regulation governing the management of surplus food. This results in suboptimal implementation of Surplus Food utilization and Food Waste prevention. For potential donors such as the HORECA sector (Hotels, Restaurants, and Catering), there are concerns when they want to distribute surplus food to those in need, such as (1) Not knowing where to donate the food, (2) Fear that irresponsible parties might resell the food, and (3) Concerns about food quality deterioration that could cause poisoning, leading to potential lawsuits against the donating HORECA entity. Without a legal framework for Food Recovery Organizations or similar initiatives and regulations that govern how potential donors like retailers, HORECA, and the community can donate surplus food to those in need, most surplus food will be wasted.

Existing Policy Analysis

Various policies related to the management of Food Loss, Surplus Food, and Food Waste have been implemented in Bali Province. The following identifies several regional-level policies in Bali Province related to Food Loss, Surplus Food, and Food Waste management. Existing national-level rules are analyzed for policies that do not have derivative regulations at the regional level.

Table 2.2 Existing Policy related to Food Loss, Surplus Food, and Food Waste Management in Bali Province

Regulations	General Description	Relevance to Food Loss, Surplus Food, and Food Waste Management	Potential Gap
Roadmap for the Development of Agricultural Infrastructure and Facilities by Ministry of Agriculture 2023	Reference for formulating programs and activities for developing agricultural infrastructure and facilities to achieve sustainable, advanced, self-reliant, and modern agriculture.	Strengthening agricultural infrastructure and facilities can support better food management and reduce food loss.	The roadmap only mentions the development of infrastructure and facilities in the form of equipment for cultivation or on-farm processes. There is no specification regarding post-harvest machinery or processing equipment distributed to farmers.
Ministry of Agriculture Regulation No. 30/2023 on Agricultural Insurance Facilitation	Regulates the implementation of agricultural insurance, including crop insurance and farm/livestock insurance.	One of the agricultural insurance payment schemes includes a premium/ contribution subsidy scheme, which is prioritized for sustainable food agrarian land. Beneficiaries are required to carry out good agricultural or livestock	<ol style="list-style-type: none"> 1. Some losses or damages are not covered under the scope of the insurance 2. Some steps and/or requirements are complex for farmers to fulfil.

Regulations	General Description	Relevance to Food Loss, Surplus Food, and Food Waste Management	Potential Gap
		practices, which can support the reduction of Food Loss.	
Regional Regulation of Bali Province No. 8/2019 on the Organic Farming System	Regulates the organic farming system, one of the objectives of which is to maintain ecosystems for environmental conservation.	The organic farming system emphasizes implementing management practices prioritising the use of inputs from waste generated by cultivation activities on farmland, supporting increased utilization of Food Loss and Food Waste.	It does not provide further details on the technical use of inputs from waste generated by cultivation activities on farmland.
Regional Regulation of Bali Province No. 10/2022 on the Management of Provincial Government Food Reserves	Serves as a guideline for the provincial government in managing food reserves to achieve food sufficiency at affordable prices, improve food access, and provide food assistance to those in need.	The stages of managing food reserves, including procurement by prioritizing local farmers' production, maintaining food quality, and distributing according to the designated targets as stated in this regulation, can support better absorption and management of food, therefore reducing Food Loss and Food Waste.	The release of food reserves through the sale/exchange for food that has passed its storage time and/or is at risk of declining quality could potentially increase Food Loss and Food Waste.
Governor Regulation of Bali Province No. 15/2021 on the Organic Farming System	It implements regional regulation, providing guidelines for individuals, legal entities, and the provincial government in developing an organic farming system.	This regulation supports the reduction of Food Loss by encouraging individuals and/or legal entities developing the Organic Farming System to apply the principles of reduce, reuse, and recycle (3R) to prevent environmental pollution.	It does not explain waste management or the 3R principles in developing an Organic Farming System.
Governor Regulation of Bali Province No. 28 of 2022 on the Safety and Quality of Agricultural Food Products	Regulates the guidance, implementation, and supervision of the Safety and Quality of Agricultural Food Products to ensure safe and high-quality food products.	One of the food safety certificates is the Prima 1 certificate, awarded to agricultural business actors whose products are safe for consumption, high-quality, and environmentally friendly. Meeting food safety requirements can be achieved through the application of basic practices such as Good Agricultural Practices (GAP), Good Handling Practices (GHP), Good Manufacturing Practices (GMP), Good Distribution Practices (GDP), Good Retail Practices (GRP), and Good Veterinary Practices (GVP). Implementing these good practices can help reduce Food Loss and add value to products, making them more marketable and reducing Food Waste.	<ol style="list-style-type: none"> 1. It does not provide detailed explanations regarding monitoring and evaluating the implementation of basic requirement practices such as GAP, GHP, GMP, GDP, GRP, or GVP. 2. It does not elaborate further on the terminology of environmentally friendly products.
Governor Regulation of Bali Province No. 45 of 2023 on the Management of the Provincial Government Food	Covers planning, information systems, management, distribution, guidance, supervision, and reporting on food reserves.	The availability of integrated data and information for better-targeted management and distribution of food reserves can support the reduction of Food Loss.	<ol style="list-style-type: none"> 1. Does not explicitly mention certain staple foods other than rice. 2. Does not provide more detailed explanations regarding the technical aspects of monitoring,

Regulations	General Description	Relevance to Food Loss, Surplus Food, and Food Waste Management	Potential Gap
Reserve Information System			evaluation, or reporting related to the food reserve information system.

Based on the existing policies and their implementation, several issues have been identified regarding policies related to Food Loss, Surplus Food, and Food Waste in Bali Province, including:

1. Lack of specific regulations concerning Food Loss, Surplus Food, and Food Waste especially regarding food recovery organizations or similar organizations donating processed surplus food.
2. Insufficient law enforcement with structured, measurable, and regular monitoring and evaluation.
3. Policies and budget allocation focus primarily on increasing production and harvest capacity without considering the reduction of Food Loss.
4. Lack of clear terms and conditions for providing incentives and disincentives.
5. Low waste management fee/retribution rates.
6. Inadequate socialization and guidance regarding the existing policies.
7. Insufficient data collection related to Food Loss, Surplus Food, and Food Waste.

Impacts of Food Loss, Surplus Food, and Food Waste in Bali Province

Environmental Impact of Food Loss, Surplus Food, and Food Waste in Bali Province

The environmental impact of food loss, surplus food, and food waste analyzed in this study focuses on the global warming impact of greenhouse gas (GHG) emissions generated throughout the food supply chain, measured using the Life Cycle Assessment (LCA) method. GHG emissions from Food Loss, Surplus Food, and Food Waste in Bali Province were calculated **based on the average of national GHG emissions from Food Loss, Surplus Food, and Food Waste** between 2000 and 2019, which is 85.14 Mton CO₂-eq, with the consumption stage being the primary contributor. This is because the potential impact from the consumption stage includes the emissions generated at that stage and the impact from the preceding supply chain. The breakdown of contributions at each stage of the food supply chain is as follows.

Table 2.3 The average of Indonesia's GHG Emissions from Food Loss, Surplus Food, and Food Waste in 5 Supply Chain Stages per Year¹⁶

Stages	Average of GHG Emissions (Mton CO ₂ -eq)	Average of Food Loss, Surplus Food, and Food Waste Generation (million tons)	Average of GHG Emissions (Mton CO ₂ -eq) per million tons Food Loss, Surplus Food, and Food Waste
Production	9.45 (11.10%)	10.16	0.93
Post-harvest and Storage	7.42 (8.71%)	8.10	0.92
Processing and Packaging	1.75 (2.06%)	1.43	1.23
Distribution and Market	17.18 (20.18%)	5.19	3.31
Consumption	49.34 (57.95%)	10.97	4.50

¹⁶ Bappenas, WRI, Waste4Change, and UK- FCDO (2021). *Study of Food Loss and Waste in Indonesia*. Jakarta.

According to national data, **GHG emissions were calculated based on analysing food loss, surplus food, and food waste in Bali Province from 2016 to 2021**. The total GHG emissions produced annually range from **0.94-1.99 Mton CO₂-eq**, or 1.59%, compared to the average national GHG emissions from Food Loss, Surplus Food, and Food Waste (85.14 Mton CO₂-eq). The highest emissions were generated at the consumption stage, averaging 0.48 Mton CO₂-eq or 35.72% of the total GHG emissions due to Food Loss, Surplus Food, and Food Waste in Bali. This is because the potential impact of emissions generated includes the consumption stage and the potential impact from the preceding supply chain. Detailed GHG emissions based on the contribution of the 5 stages of the food supply chain for each year can be seen in the figure below.

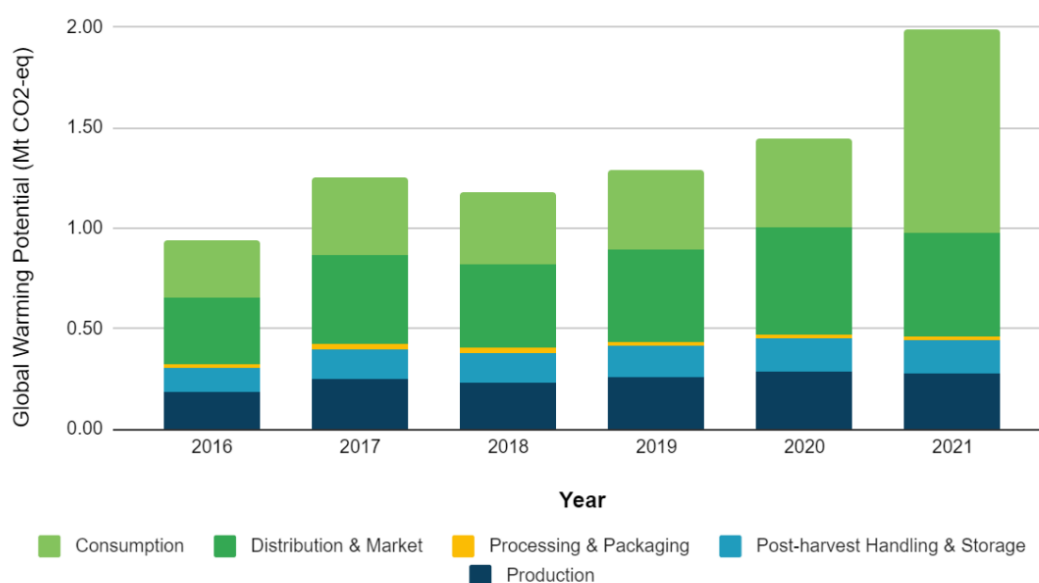


Figure 2.3 GHG Emissions due to Food Loss, Surplus Food, and Food Waste in Bali Province during 2016-2021 Based on 5 Supply Chains Stages

GHG emissions were also calculated based on the classification of 5 food sectors (Figure 2.4), with the percentage contribution of each sector referring to the national FLW study, showing the highest contribution percentages from (1) the horticulture sector, with an average GHG contribution of 45.05%. The significant contribution to the potential global warming impact produced by the Horticulture sector aligns with the condition that horticultural waste (specifically fruits) generates the highest Food Loss, Surplus Food & Food Waste composition in Bali¹⁷. This is followed by (2) the crops sector with 23.23%, (3) the farm (livestock) sector with 17.74%, (4) the fisheries sector with 12.44%, and (5) the plantation sector with 1.54%. Below are the GHG emission calculations based on the five food sectors in Bali province.

¹⁷ Bappenas, Wrap, dan Waste4Change (2024). *Study Report Food Loss and Waste Regional – West Java, Central Java, and Bali*. Jakarta.

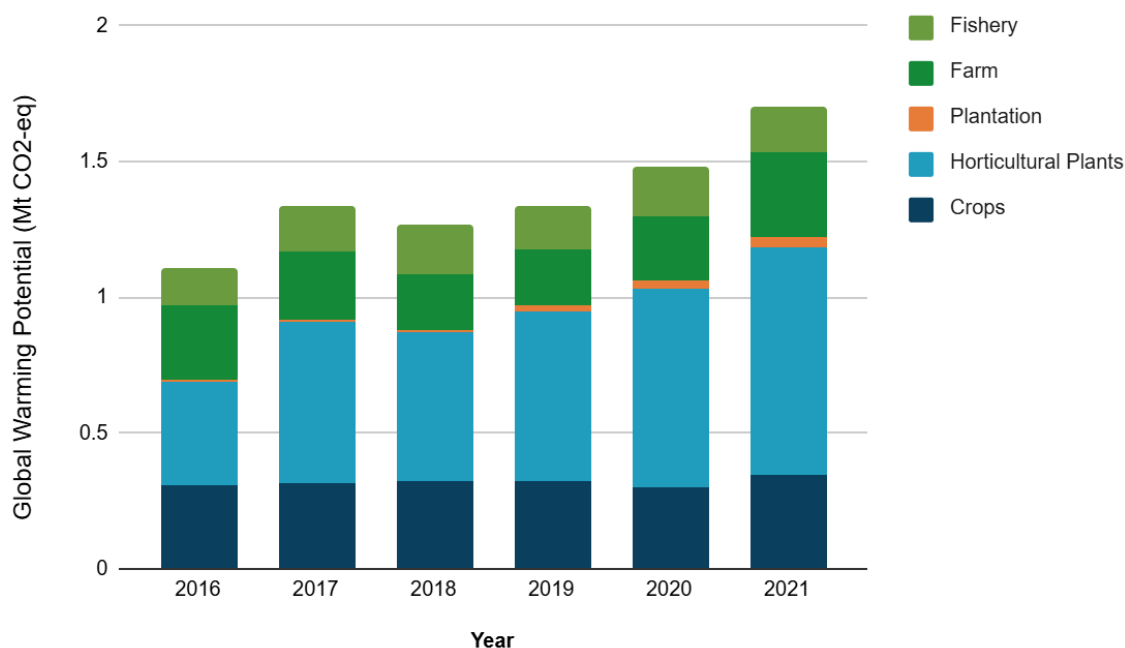


Figure 2.4 GHG Emissions due to Food Loss, Surplus Food, and Food Waste in Bali Province during 2016-2021 Based on 5 Food Sectors

Economic Impact of Food Loss, Surplus Food, and Food Waste in Bali Province

Food Loss, Surplus Food, and Food Waste generation can lead to economic losses in the food supply chain. In this study, the economic losses due to Food Loss, Surplus Food, and Food Waste in Bali are calculated based on the economic loss calculations from the national FLW study. In the national study, the economic loss calculations were based on producer price data available for 88 food commodities for Food Loss calculations and consumer price data for 64 food commodities for Surplus Food and Food Waste. Since this number is smaller than the total food commodities in the Food Balance Sheet (FBS), which amounts to 146 commodities, it is concluded that there is a potential for more significant economic losses than those already calculated¹⁸.

Based on Food Loss, Surplus Food, and Food Waste generation in Bali from 2016-2021, which reached 509-877 thousand tons/year, **the economic losses that occur as a result are 6-10 trillion rupiah/year or equivalent to 4-7.0% of Bali's GDP per year**¹⁹. The economic loss from Food Loss reached 3.2-4.9 trillion rupiah/year, Food Surplus reached 1.3-2.9 trillion rupiah/year, and Food Waste reached 1.4-3.1 trillion rupiah/year. The breakdown of economic losses due to Food Loss, Surplus Food, and Food Waste per year in Bali Province for the 2016-2021 can be seen in the figure below.

¹⁸ Bappenas, WRI, Waste4Change, and UK- FCDO (2021). *Study of Food Loss and Waste in Indonesia*. Jakarta.

¹⁹ BPS (2024). Annual GRDP (Gross Regional Domestic Product) of Bali Province Based on Constant Prices of 2010 by Business Field, 2016-2021. Online at <https://bali.bps.go.id/indicator/52/365/1/pdrb-tahunan-provinsi-bali-atas-dasar-harga-konstan-2010-menurut-lapangan-usaha.html>

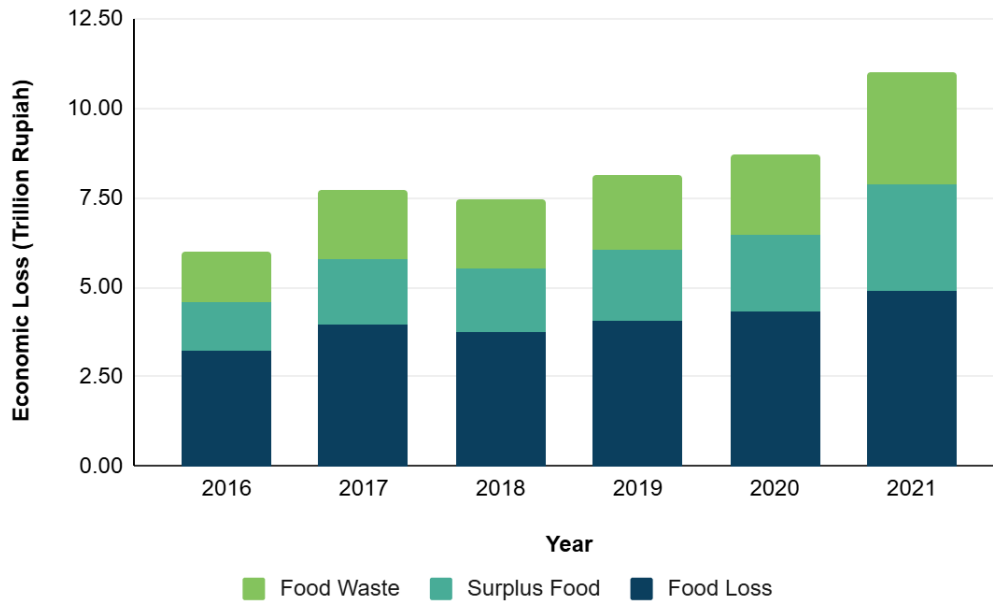


Figure 2.5 Economic Loss due to Food Loss, Surplus Food, and Food Waste in Bali Province during 2016-2021

Meanwhile, based on the five food sectors, the highest economic loss due to Food Loss, Surplus Food, and Food Waste was found in the Horticultural Plants category (2.8-6.2 trillion rupiah/year), followed by Farm (1.5-2.2 trillion rupiah/year) and Crops (1-1.1 trillion rupiah/year). Horticultural commodities (fruits & vegetables) tend to be vulnerable to damage due to susceptibility to pests, diseases, and mechanical damage such as scratches and bumps. Additionally, horticultural commodities are prone to moisture loss and have high respiration rates, making them quickly rot. Field surveys, particularly on fruits, indicate that only 60% of fruits can be sold fresh, while the remaining 40% experience physical damage due to distribution or caused by high respiration rates. The economic loss for each food sector can be seen in the figure below.

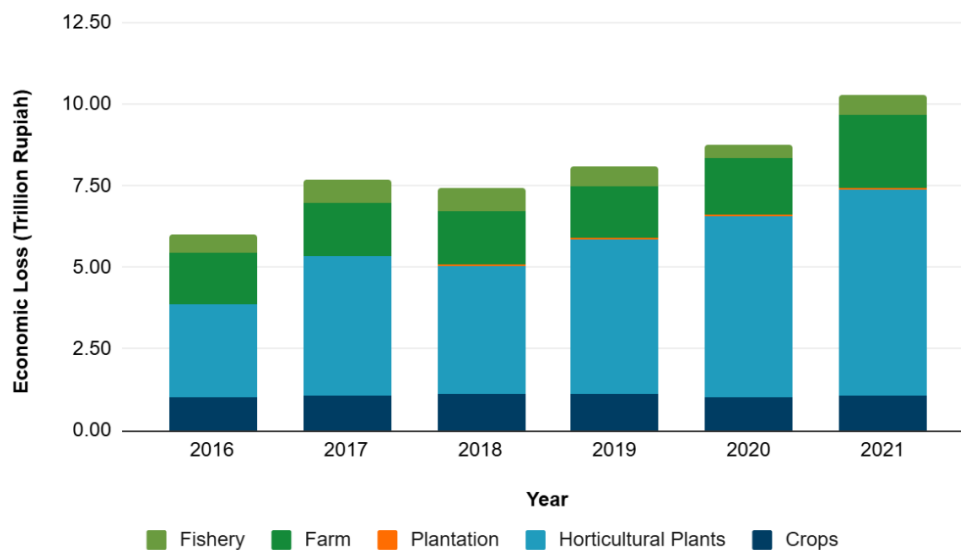


Figure 2.6 Economic Loss due to Food Loss, Surplus Food, and Food Waste in Bali Province during 2016-2021 in 5 Food Sectors

Health Impact of Food Loss, Surplus Food, and Food Waste in Bali Province

From the generation of food loss, surplus food, and food waste, edible portions of surplus food are still discarded. With the unutilized portion that could have been consumed, nutritional content could also be lost. Calculations were made for 4 parameters based on the national FLW study to measure the extent of the potential nutritional loss, which are energy, protein, vitamin A, and iron. Below is the amount of nutritional loss based on the Food Loss, Surplus Food, and Food Waste generation in Bali Province from 2016 to 2021.

Table 2.4 Nutrition Loss due to Food Loss, Surplus Food, and Food Waste in Bali Province during 2016-2021

Nutrient Content	Range of Nutrition Loss due to Food Loss, Surplus Food, and Food Waste per individual per day		Nutrition Intake per individual per day ²⁰	%Bali Population that can be fed Surplus Food	
	min	max		min	max
Energy (kkal)	469	724	2100	22%	34%
Protein (gr)	15	20	57	27%	35%
Vitamin A (Ug RE)	289	618	575	50%	107%
Iron (Fe) (mg)	4	6	10	37%	49%

1. Energy Content

Based on the Food Loss, Surplus Food, and Food Waste generation in Bali from 2016–2021, amounting to 509-877 thousand tons/year or equivalent to 121–201 kg/capita/year, it was found that there is a potential energy loss of 469-724 kcal/capita/day from surplus food that is not utilized. Considering this lost energy content and the average energy requirement of 2,100 kcal per person in Indonesia, it is estimated that in 1 year, around 0.9-1.5 million people or 22-34% of Bali's population could meet their energy needs.

2. Protein Content

Based on the Food Loss, Surplus Food, and Food Waste generation in Bali from 2016–2021, it was found that there is a potential protein loss of 15-20 grams/capita/day from surplus food that is discarded or not utilized. Considering this lost protein content and the average protein requirement of 57 grams per person in Indonesia, it is estimated that in 1 year, about 1.1-1.5 million people or 27-35% of Bali's population, could meet their protein needs.

3. Kandungan Vitamin A

Based on the Food Loss, Surplus Food, and Food Waste generation in Bali from 2016–2021, it was found that there is a potential vitamin A loss of 289-618 Ug RE/capita/day from surplus food that is discarded or not utilized. Considering this lost vitamin A content and the average vitamin A requirement of 575 Ug

²⁰ Ministry of Health Regulation No. 28/2019 on the Recommended Dietary Allowances for Indonesian Population.

RE per person in Indonesia, it is estimated that in 1 year, about 2.1-4.7 million people or 50-107% of Bali's population could have their vitamin A needs met.

4. Iron Content

Based on the Food Loss, Surplus Food, and Food Waste generation in Bali from 2016–2021, it was found that there is a potential iron loss of 4-6 mg/capita/day from surplus food that is discarded or not utilized. Considering this lost iron content and the average iron requirement of 10 mg per person in Indonesia, it is estimated that in 1 year, around 1.5-2.1 million people or 37-49% of Bali's population could meet their iron needs.

Social Impact of Food Loss, Surplus Food, and Food Waste in Bali Province

Based on the interviews and observations in the area, a mapping of social issues that can affect the increase and decrease of Food Loss, Surplus Food, and Food Waste generation was conducted. Social issues were mapped based on 17 material topics in the National Food Loss, Surplus Food, and Food Waste Study²¹.

From the 17 material topics, 8 are relevant to the conditions in Bali Province. Based on the results of interviews and field observations, social issues that can affect Food Loss, Food Waste And Food Waste generation were mapped. The 3 main topics that have the most influence are (1) Fair Trade, (2) Access to Services and Inputs, and (3) Poverty/Basic Needs. Detailed explanation of the mapping of social issues can be seen in the following table.

²¹ Bappenas, WRI, Waste4Change, and UK- FCDO (2021). *Study of Food Loss and Waste in Indonesia*. Jakarta.

Table 2.5 Potential Social Impacts of Food Loss, Surplus Food, and Food Waste in Bali Province

No	Social Topics	Implications	Potential Impact	
			Food Loss	Surplus Food and Food Waste
1	Fair Trade	Fairtrade, with value-added prices, encourages product quality improvement from farmers, ranchers, fishermen, or food business actors, Reducing Food Loss, Surplus Food, & Food Waste and vice versa.	<p>Stakeholders:</p> <ul style="list-style-type: none"> - Department of Agriculture and Food Security (Distanpangan Bali) - Agricultural Instrument Standardization Agency (BSIP Bali) - Maritime Affairs and Fisheries Service (Diskelkan Bali) - Department of Industry and Trade (Disperindag Bali) <p>Survey Results</p> <ul style="list-style-type: none"> - Farmers often complain about declining prices for horticultural commodities. For example, mustard greens drop from Rp 4,000/kg in the morning to Rp 1,000/kg in the afternoon, while tomatoes range from Rp 1,000–Rp 2,000/kg due to low market demand despite high availability²². - This often leads farmers to leave their harvest uncollected or unsold, resulting in food loss. 	<p>Stakeholders:</p> <ul style="list-style-type: none"> - Department of Industry and Trade (Disperindag Bali) - Departmen of Cooperatives, Small and Medium Enterprises (Diskopukm Bali) - Department of Forestry and Environment (DKLH Bali) - Department of Agriculture and Food Security (Distanpangan Bali) <p>Survey Results</p> <ul style="list-style-type: none"> - The government has taken measures to help market the produce by organizing affordable markets (<i>pasar murah</i>) to boost food products absorption.
2	Access to Service and Input	Workers' access to needed services and inputs such as raw materials, knowledge, financial facilities, or equipment can improve productivity and product quality and optimize waste management, reducing SSP & Food Waste. Ease of consumer access to food and distribution of excess food can also reduce Food Waste. Access to Food Support has the potential to increase the SSP & Food Waste rate if not fully implemented.	<p>Stakeholders:</p> <ul style="list-style-type: none"> - Distanpangan Bali - BSIP Bali - Culture Office (Disbud) - Diskelkan Bali - Collectors <p>Survey Results</p> <ul style="list-style-type: none"> - Surveys indicate that only 60% of fruits shipped are marketable, while 40% suffer mechanical damage or spoilage during transit. - Farmers find the provided insurance too complex, unhelpful, and ineffective²³. - Equipment grants and credit access are typically available only to farmers in farming groups. 	<p>Stakeholders:</p> <ul style="list-style-type: none"> - Social Service, Women's Empowerment and Child Protection (Dinsos P3A Bali) - Department of Education, Youth and Sports (Disdikpora Bali) - Department of Public Health (Dinkes Bali) - Distanpangan Bali <p>Survey Results</p> <ul style="list-style-type: none"> - Interviews reveal that surplus food distribution faces challenges due to the absence of regulations protecting donor institutions, leading to trust issues among potential donors and recipients. Additionally, some foods, like bread, have limited uptake due to low local consumption interest. - Inadequate enforcement of waste sorting at the source and lack of training for waste management workers result in poor food waste handling. - The Japanese Osaki Program, a collaboration between the provincial government and Japan, has trained TPS3R managers in organic waste management²⁴.

²² Bali Bisnis (2020). <https://bali.bisnis.com/read/20200910/538/1289853/harga-hortikultura-di-bali-anjlok-petani-di-beralih-ke-komoditas-pangan>

²³ Journall Beta (2020). <https://ojs.unud.ac.id/index.php/beta/article/download/54392/32810>

²⁴ Environmental Agency of Badung Regency (2023). <https://dislkh.badungkab.go.id/berita/53807-tim-osaki-jepang-kunjungi-tps3r-tanjung-benoa-terkait-monitoring-dan-pendampingan-secara-berkelanjutan-pada-penerapan-kelola-sampah-model-osaki>

No	Social Topics	Implications	Potential Impact	
			Food Loss	Surplus Food and Food Waste
3	Remuneration	<p>Low wages and benefits for workers in the food sector-including farmers, ranchers, fishermen, HORECA workers, retailers, markets, and waste management workers-have the potential to reduce the quality of work and products produced. As a result, Food Loss, Surplus Food, & Food Waste increase and the utilization of Surplus Food & Food Waste is not optimal. At the household level, higher incomes often lead to spending more on food than needed, contributing to food waste.</p>	<p>Stakeholders:</p> <ul style="list-style-type: none"> - DinsosP3A Bali - Farmers - Farmer Laborer - Fisherman - Livestock Farmer - Office of Manpower and Energy Mineral Resources (Disnaker Bali) - Distanpangan Bali - BSIP Bali <p>Survey Results</p> <ul style="list-style-type: none"> - Wages for food sector workers, including daily laborers, remain low and insufficient to meet household needs. On average, farm laborers earn Rp 100,000/day and do not work every day²⁵ - Low wages in the food sector lead to poverty, with examples including uninhabitable homes and difficulty accessing clean water. Farmers' minimal income leaves them struggling to meet rising living costs²⁶. 	<p>Stakeholders:</p> <ul style="list-style-type: none"> - DinsosP3A Bali - Distanpangan Bali - Disnaker Bali - DKLH Bali - Department for the Promotion of Indigenous Peoples (DPMA Bali) - Bali Province Office of Community Empowerment, Villages, Population and Civil Registry (DPMDDukcapil Bali) - Village Owned Enterprises (Bumdes) <p>Survey Results</p> <ul style="list-style-type: none"> - Some waste collection workers struggle to support their families, thus collecting recyclable items as additional income. - The average income of waste collection workers, at Rp 2,500,000, falls below Bali's provincial minimum wage of Rp 2,813,000²⁷. - Many waste processing workers are not provided with health insurance. - Higher economy communities tend to buy food more than needed, whether for personal consumption or events/ celebrations.
4	Worker Safety and Security	<p>Worker health and safety are critical as work accidents can reduce productivity and product quality, thereby increasing Food Loss and Surplus Food & Food Waste and hindering the utilization of Surplus Food & Food Waste.</p>	<p>Stakeholders:</p> <ul style="list-style-type: none"> - Disnaker Bali - Distanpangan Bali - Diskelkan Bali - Farmers - Farmer Laborer - Fisherman - Livestock Farmer <p>Survey Results</p> <ul style="list-style-type: none"> - Some farmers in Bali use personal protective equipment (PPE), such as gloves and boots, to prevent physical and chemical hazards. Interviews with 4 farmers and 2 fishermen confirmed they already use PPE at work. 	<p>Stakeholders:</p> <ul style="list-style-type: none"> - Disnaker Bali - Distanpangan Bali - DKLH Bali - Diskelkan Bali <p>Survey Results</p> <ul style="list-style-type: none"> - PPE usage standards and health protocols have been implemented²⁹. However, some workers are reluctant to use PPE due to discomfort. For example, waste collection or sorting workers rarely wear gloves as they find them disruptive during work.

²⁵ BPS (2022). <https://www.bps.go.id/id/pressrelease/2022/09/01/1943/perkembangan-upah-pekerja-buruh-agustus-2022.html>

²⁶ Bali Pos (2023) <https://www.balipost.com/news/2023/06/27/346914/Petani-Belum-Bisa-Hidup,Ritual...htmln>

²⁷ WageIndicator (2024). <https://gajimu.com/tips-karir/indonesia-pekerjaan-dan-gaji/indonesia-pengumpul-dan-pendaaur-ulang-sampah>

²⁹ Government of Bali Province (2020). file:///C:/Users/USER/Downloads/10_SEKTOR_PENGLOLAAN_DAN_PEMELIHARAAN_LINGKUNGAN_HIDUP.pdf

No	Social Topics	Implications	Potential Impact	
			Food Loss	Surplus Food and Food Waste
			<ul style="list-style-type: none"> - Fishermen check wind and weather conditions using personal judgment and BMKG information before sailing. If the weather is unfavorable, they avoid sailing for safety reasons. - Many workers already use PPE to avoid physical accidents at work²⁸ 	
5	Freedom of Association and Group Negotiation	Freedom of association allows workers to share knowledge on product quality improvement and waste management and supports operational enhancements. This can potentially reduce Food Loss, Surplus Food, & Food Waste.	<p>Stakeholders:</p> <ul style="list-style-type: none"> - Distanpangan Bali - BSIP Bali - Disbud - Diskelkan Bali - Farmers <p>Survey Results</p> <ul style="list-style-type: none"> - Various organizations, such as Subak, Gapoktan, KTNA (Kelompok Tani Nelayan Andalan), and Perpadi, help voice aspirations and serve as platforms for discussion among food-related groups³⁰. 	<p>Stakeholders:</p> <ul style="list-style-type: none"> - Disnaker Bali - Distanpangan Bali - DKLH Bali <p>Survey Results</p> <ul style="list-style-type: none"> - Waste management workers are not yet part of any formal association or group. - Some customary or traditional villages that manage waste responsibly, supported by tightly-knit communities, tend to succeed in their waste management programs.
6	Consumer Health and Safety	The existence of health and product safety rules/standards applied to production or other operational activities can provide more value with product results that meet the quality standards desired by consumers. This potential impact can reduce the occurrence of Food Loss, Surplus Food, & Food Waste.	<p>Stakeholders:</p> <ul style="list-style-type: none"> - Distanpangan Bali <p>Survey Results</p> <ul style="list-style-type: none"> - The implementation of agricultural and food management standards such as GAP and GHP by food workers produces high-quality products that meet consumer standards, increasing market absorption. 	<p>Stakeholders:</p> <ul style="list-style-type: none"> - Diskopukm Bali - Disnaker Bali - Disperindag Bali <p>Survey Results</p> <ul style="list-style-type: none"> - In Bali, activities such as promoting proper food processing practices to obtain SSP-IRT certification have helped MSMEs grow and maintain product quality in line with consumer expectations³¹. - Ensuring the safety and health of surplus processed food products facilitates donors in contributing food and recipients in accepting it through food recovery organizations.
7	Consumer Affordability	Products with an affordable value increase the absorption of food products, reducing the number of unsold food products. This potential impact can reduce the occurrence of Food Loss, Surplus Food, & Food Waste.	<p>Stakeholders:</p> <ul style="list-style-type: none"> - Distanpangan Bali - BSIP Bali - Diskelkan Bali - Farmers 	<p>Stakeholders:</p> <ul style="list-style-type: none"> - Disperindag Bali - Dispar Bali - Dinsos P3A Bali - Diskopukm Bali

²⁸Giri Made Kurnia Widiastut, Training on Occupational Health and Safety (OHS) in Agriculture in Antapan Village, Baturiti District, Tabanan Regency (2016). <file:///C:/Users/USER/Downloads/jwlmanager,+9107-Kurnia.pdf>

³⁰ Government of Bali Province (2024). <https://www.baliprov.go.id/web/buka-peda-xxvii-ktna-mahendra-jaya-minta-tingkatkan-nilai-tukar-petani-dan-nelayan-di-bali-2/>

³¹ Jnewonline (2022). <https://jnewonline.com/agar-naik-kelas-umkm-diberikan-sosialisasi-izin-spp-irt/>

No	Social Topics	Implications	Potential Impact	
			Food Loss	Surplus Food and Food Waste
			<p>Survey Results</p> <ul style="list-style-type: none"> - In agriculture, lower-grade products often have lower prices and attract less interest from buyers. Innovations include reprocessing these products into marketable goods, such as turning chili peppers into chili powder when prices drop. The Buleleng Regency government has implemented this in collaboration with Songan farmers. - In the livestock sector, unused parts like animal skins are typically processed into food products such as crackers³². 	<p>Survey Results</p> <ul style="list-style-type: none"> - Organic processed products have a higher price than those without organic labelling, and are typically preferred by consumers in the middle to upper economic classes. - Programs such as discounts on food products close to store closing times help increase the absorption of food products in the market.
8	Accessibility	<p>Ease of access or an optimized food supply chain system can reduce the potential decline in product quality standards in the supply chain. This potential impact can reduce the occurrence of Food Loss, Surplus Food & Food Waste</p>	<p>Stakeholders:</p> <ul style="list-style-type: none"> - Distanpangan Bali - BSIP Bali - Diskelkan Bali - Disperindag Bali <p>Survey Results</p> <ul style="list-style-type: none"> - An optimal accessibility or supply chain system that occurs in agriculture is the existence of a “foster father” or cooperation between a farmer and a company (e.g. hotel, supermarket, etc.). This can help with quality monitoring and control, efficient transportation, and efficient supply chains. - In fisheries, fishermen can cooperate with fish processing companies or restaurants near the beach in Bali (one example is the kedonganan beach and restaurants in the kedonganan area). 	<p>Stakeholders:</p> <ul style="list-style-type: none"> - Disperindag Bali - Diskopukm Bali <p>Survey Results</p> <ul style="list-style-type: none"> - Easy access can help reduce the decline in product quality during distribution. - Easy access for the community to proper waste management facilities or services can improve the responsible handling of food waste.

³² Government of Buleleng Regency, (2024). <https://ppid.bulelengkab.go.id/berita/detail/panen-perdana-cabai-bukti-nyata-pemkab-buleleng-dalam-pengendalian-inflasi>

Food Loss, Surplus Food, and Food Waste Management in Bali Province

Existing Management of Food Loss, Surplus Food, and Food Waste in Bali Province

In Bali Province, several efforts have been made to optimize food production, indirectly reducing the potential for Food Loss. These efforts include the procurement of agricultural tools and machinery (ALSINTAN) for both production and post-harvest; the construction of storage and processing facilities such as cold storage and slaughterhouses; the distribution of superior seeds, organic, and chemical fertilizers; and trainings for Good Agricultural Practice (GAP) and Good Handling Practice (GHP) implementation. In addition, a permaculture program consisting of permanent agricultural techniques that hold sustainable principles is being implemented by several communities, such as Jiwa Garden and Kul Kul Farm³³. Meanwhile, some other methods of handling Food Loss in Bali Province are:

1. Processed as other food products or personal consumption

Food Loss in the form of “ugly food” or overproduction, such as during the harvest season, is usually consumed personally, distributed to families or communities around the land, or processed further into other food products. In addition to reducing Food Loss, this effort can also increase the selling value of food. Existing programs that have been implemented, for example: (1) farmer groups in Buleleng Regency process grapes into juice, and grape seeds are reprocessed into crackers and tea; (2) fruit processing into sweets or preserves and jams. One of Bali's fruit preserves MSME is Manisan Salak Bali KWT Putri Santhi Lestari³⁴; (3) Bali Maritime and Fisheries Service suggests that the remaining unfavored parts of fish catches (scales, fish skin, fish bones) can be processed into handicrafts or other processed food products, such as fish chips and fish flour³⁵.

2. Used as materials for fertilizer and eco-enzyme

Organic fertilizers are fertilizers derived from crop residues, dead plants, livestock manure, and other organic wastes that go through a decomposition process³⁶. Meanwhile, eco-enzyme results from the fermentation of organic waste such as fruit and vegetable pulp, added by sugar (palm sugar, brown sugar, or cane sugar) and water³⁷. Processing organic fertilizer by utilizing crops unsuitable for sale or consumption provides benefits such as savings in fertilizer purchase costs and reduced waste accumulated in fields³⁸. Some examples in Bali are: (1) coffee bean scraps used as organic fertilizer in Buleleng Regency; (2) oranges that are not suitable for sale are used as fertilizer with a mixture of cow

³³ Permaculture Jiwa Garden (2024). <https://www.jiwagarden.com/>

³⁴ Manisan Salak Bali KWT Putri Santhi Lestari (2024). <https://pekenan.karangasembkab.go.id/?page=Merchants-Detail&language=id&domain=&id=010102022>

³⁵ Marine and Fisheries Agency Bali Province (2023). <https://www.kompas.id/baca/nusantara/2023/03/14/kkp-upayakan-tekan-impur-tepung-ikan>

³⁶ Ministry of Agriculture (2023): <https://pustaka.setjen.pertanian.go.id/info-literasi/info-teknologi-mengenal-sistem-pertanian-organik-2>

³⁷ Ministry of Health (2022): [https://yanke.kemkes.go.id/view_artikel/109/serba-guna-eco-enzym#:~:text=Menurut%20Imron%20\(2020\)%20eco%20enzyme,fermentasi%20asam%20manis%20yang%20kuat.](https://yanke.kemkes.go.id/view_artikel/109/serba-guna-eco-enzym#:~:text=Menurut%20Imron%20(2020)%20eco%20enzyme,fermentasi%20asam%20manis%20yang%20kuat.)

³⁸ Bappenas, WRI, Waste4Change, and UK- FCDO (2021). *Study of Food Loss and Waste in Indonesia*. Jakarta.

manure and the use of horticultural residues from damaged vegetables and fruits during harvest for eco-enzyme in Bangli Regency.

3. Utilized as animal feed

Crops or harvests that are unsuitable for consumption or unsold can be repurposed as animal feed by mixing them with other ingredients according to the nutritional needs of livestock³⁹. Examples commonly found in Bali are the use of rice bran, a byproduct from rice milling, as an addition to feed rations for cattle and pigs, as well as the utilization of agricultural harvest residues for pig feed ingredients. Additionally, vegetable and fruit farmers in Bali, particularly in the Badung area (based on a survey conducted in Plaga, Auman Village), process vegetable and fruit food losses into animal feed.

4. Left, discarded, or landfilled

In some cases, no further handling is carried out for Food Loss. Food Loss is discarded or piled up on the edges of fields or in vacant areas near production sites. Additionally, it is often left unattended on fields, such as unsellable oranges or surplus supply during peak harvest, which are left to rot under the trees.



Figure 2.7 Implementation Food Loss Management : (a) Manisan Salak Bali KWT Putri Santhi Lestari, (b) Auman Village Horticulture Farmers, (c) Soul Garden Permaculture Program, (d) Balinese Fish Skin Crackers

On the other hand, the following are some efforts to manage Surplus Food and Food Waste implemented in Bali Province.

1. Donation to those in need

In addition “ugly food”, there is also surplus food that are still fit for consumption at events or business activities such HORECA. This surplus food can be distributed to those in need through Food Bank or Food Recovery Organization (FRO). The organization receives surplus food from donors such as HORECA and bakeries, then the food is further processed before being donated to beneficiaries such as orphanages and nursing homes. The food bank's further processing aims to ensure and maintain the quality of the food that reaches the beneficiaries. An organization in Bali that is actively

³⁹ Bappenas, WRI, Waste4Change, and UK- FCDO (2021). *Study of Food Loss and Waste in Indonesia*. Jakarta.

implementing this initiative is Scholars of Sustenance (SOS). SOS also provides food safety training to donors⁴⁰.

2. Sold at Discounted Prices

Another effort to reduce food waste is the application of discounts near closing hours, as practiced by retailers like Papaya⁴¹. These discounts attract consumers to purchase food products, thus minimizing leftover waste. Discounted food products can also be found through the Surplus app⁴², which has around 60 partners consisting of hotels, restaurants, and bakeries in Denpasar and Badung listed on the app.

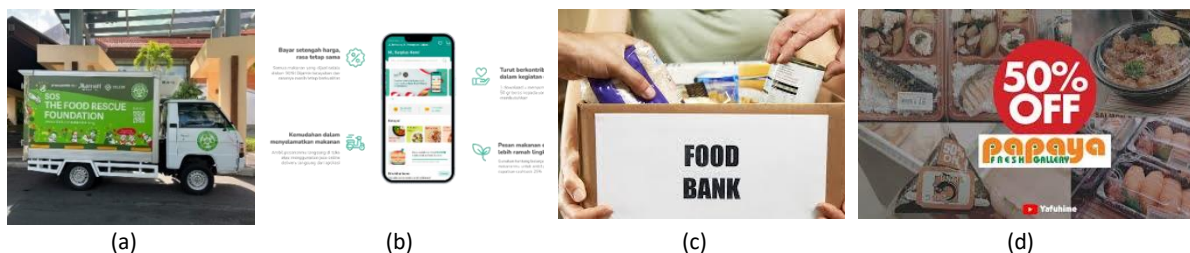


Figure 2.8 Impementation of Surplus Food Management (a) Scholars of Sustenance, (b) Surplus, (c) Food Bank Bali, (d) Papaya

3. Used as animal feed or given to pets

In households with pets, especially dogs, leftover food is often given to the pets. In non-household facilities, some hotels and restaurants also collaborate with collectors who distribute food waste to pig farmers. This practice is found in hotels and restaurants that are customers of TPS 3R Seminyak Clean. According to the manager of TPS 3R, the waste management facility does not take food waste (or very little) from hotels and restaurants because these facilities have already collaborated with pig farmers.

4. Composted/biopores, as eco-enzyme, or feed for Black Soldier Fly (BSF) cultivation.

Some households and non-household facilities manage their food waste by composting it, putting it into biopore holes, or processing it into eco-enzymes. Many non-household facilities also collaborate with third parties such as Urban Compost⁴³ or Magi Farm⁴⁴, which collect their food waste for further processing into compost or BSF feed. The food surplus management organization, SOS, also collaborates with Magi Farm to manage food waste that is no longer fit for consumption after sorting. Additionally, households and non-household facilities also become customers of TPS 3R and/or TPST that further manage waste, including food waste, before the residue is taken to the Final Processing Site (TPA). Organic waste, including food waste at these facilities, is generally composted using the

⁴⁰ Scholars Of Sustenance (2024). <https://www.scholarsofsustenance.org/sosbali-indonesia>

⁴¹ Papaya Bali (2024). <https://papayabali.co.id/>

⁴² Surplus Bali (2024). <https://surplus.id/>

⁴³ Urban compost (2024). https://www.urbanbiologistbali.com/urban_compost.html.

⁴⁴ Magi Farm (2024). <https://bio.site/haimagifarm>.

open windrow technique. In Bali, the provincial government through Environment and Forestry Agency (DKLH) cooperates with Osaki City (Osaki Kagoshima, Japan) for organic waste management at TPS 3R in Ketewel, Bona, Sukawati, Tanjung Benoa, Jembrana, and Blega Village using the Osaki Japanese method, which is useful for plants and planting media.⁴⁵



Figure 2.9 Implementation of Food Waste Management (a) Urban Compost, (b) Magi Farm, (c) Osaki Kagoshima Japan, (d) Potato Head

Food Waste Handling

Similar to other waste compositions, food waste handling in general is still in the form of collect-transport-dispose. Furthermore, waste sorting at source is still minimally practiced. (households and non-household facilities), waste is collected by waste transport workers, commonly called *Swakelola*. *Swakelola* is an organization that provides household waste transportation service. *Swakelola* can be carried out by villages, sub-districts, traditional villages, traditional *banjar*, business entities, individuals, and community groups⁴⁶.

Waste collected by *Swakelola* will be taken to TPS, or other FPPS such as TPS 3R and TPST, or directly to the landfill. There are also waste containers scattered in several locations far from TPS or FPPS. For household and non household facilities that are TPS 3R customers, the facility usually also provides waste collection services. Waste collection is carried out using various fleets such as carts, motor carts, pick-ups, and dump trucks. Generally, the cost of waste collection varies depending on the *Swakelola* or TPS 3R, with households paying between Rp 15,000 and Rp 50,000 per month, while non-households pay a higher fee of > Rp 100,000 per facility per month. Those who choose not to subscribe to *Swakelola* or TPS 3R services usually bring their own waste to containers, TPS, or TPS 3R. In some cases, people still burn their waste, dump it in the backyard, or dispose it carelessly in vacant land or rivers.

Waste collected at TPS 3R and TPST will be sorted according to its composition. Organic waste including food waste will be processed into compost. In Bali, there are several waste management model areas using the Osaki composting technique, namely 5 villages in Gianyar, 2 villages in Jembrana, and 1 village in Badung. An example of waste management practice in Tanjung Benoa Village, Badung, shows that food

⁴⁵ Osaki Kagoshima Japan (2023). <https://www.detik.com/bali/berita/d-6858251/pupuk-osaki-klungkung-diklaim-tekan-biaya-tingkatkan-hasil-pertanian>

⁴⁶ Denpasar Mayor Regulation No. 76/2019 on the Implementation of Self-Managed Waste Management (*Swakelola*).

waste is sorted at the household level in separate bins and then collected at TPS3R Panca Lestari for further processing. There are currently 278 TPS 3Rs spread across cities and regencies in Bali⁴⁷.

Waste management costs at TPS 3R are obtained from customer fees and the resale of inorganic waste with economic value. In addition, there is a Village Budget (APBDesa) for source-based waste management activities (PSBS) including for TPS 3R. The total APBDesa for PSBS in 2023 Bali Province reached Rp 91,834,143,182 with allocations for each city/ district varying from Rp 1,223,229,168 (Jembrana Regency) to Rp 29,446,691,050 (Badung Regency). Sources of APBDesa include village funds, Village Fund Allocation (ADD), Village Own-Source Revenue (PADesa), provincial financial assistance, regency financial assistance, and other legitimate income⁴⁸. Meanwhile, compost produced from organic waste management at TPS3R is usually distributed for free to people in need or used by the local government for public facilities such as city parks. The compost is rarely sold due to limited budget to test its content for distribution license registration. The financial constraints also affect the operation of TPS 3R, which do not function optimally, leaving a significant amount of residual waste from the management process.

Waste from TPS or residual waste from TPS3R is transported by local municipal/regency Environmental Agency (DLH) waste transport officers to TPST or TPA. In some regencies, DLH officers also provide waste collection services from sources located on the sides of main roads, usually in regency capital areas. The costs for waste transport and TPA are included in the local municipal/regency waste management budget, one of the sources of which is retribution. Below is the range of waste management or sanitation service retribution fees per month for household and non-household waste sources in each city/regency of Bali Province.

Table 2.6 Retribution Rate for Waste Management in City/Regencies of Bali Province

City/Regency	Waste Source		Regulations
	Household	Non Household	
Denpasar	Rp 23,000 – 90,000 (Rp 0 for low-income household)	Rp 50,000 – 2,400,000	Perda Denpasar 5/2023
Badung	Rp 4,000 – 12,000	Rp 4,000 - 600,000	Perda Badung 21/2011
Gianyar	Rp 5,000	Rp 5,000 - 200,000	Perda Gianyar 4/2021
Tabanan	Rp 10,000	Rp 8,000 - 250,000	Perda Tabanan 13/2023
Klungkung	Rp 3,000	Rp 8,000 - 115,000	Perda Klungkung 15/2012
Karangasem	Rp 10,000	Rp 10,000 - 8,000,000	Perda Karangasem 8/2023
Bangli	Rp 15,000	Rp 10,000 - 100,000	Perda Bangli 5/2023
Buleleng	Rp 7,500	Rp 7,500 - 3,000,000	Perda Buleleng 9/2023
Jembrana	Rp 1,500 - 33,000	Rp 33,000 - 2,466,000	Perda Jembrana 11/2023

Regarding TPST, there are currently 7 TPST in Bali, consisting of 3 TPST in Denpasar, 2 TPST in Badung, 1 TPST in Jembrana, and 1 TPST (TOSS) in Klungkung. The TPST in Denpasar and Badung, where waste management primarily involves converting waste into Refuse Derived Fuel (RDF), are managed by third parties with revenue sources from a tipping fee of around Rp 100,000/ton, the sale of RDF products, and

⁴⁷ Forest and Environment Agency of Bali Province (2024)

⁴⁸ Agency for Community Empowerment, Villages, Population, and Civil Registration of Bali Province. (2023)

the sale of recyclable inorganic waste. Meanwhile, the TPSTs in Jembrana and Klungkung are currently managed by the local government. Residual waste from TPST is transported by TPST management to the TPA. TPA in Bali still use the open dumping method. Other challenges include TPA that are nearly full or overloaded and recurrent fires during the dry season.



03

Recommendation for Strategy & Action Plan on Food Loss, Surplus Food, and Food Waste Management in Bali Province

CHAPTER 3. Recommendation Strategy & Action Plan for Food Loss, Surplus Food, and Food Waste Management in Bali Province

Strategy & Action Plan for Food Loss, Surplus Food, and Food Waste Management in Bali Province

The Recommended Strategies & Action Plans for Food Loss, Surplus Food, and Food Waste Management in Bali Province consist of 7 Strategies and 18 Action Plans, each with indicators, baseline data, milestone stages, and key and supporting agencies.

Each action plan was developed based on the results of sharpening and focused discussions with stakeholders, including the Bali Provincial government (through relevant agencies), associations, non-governmental organizations (NGOs), and food workers such as farmers, ranchers, and fishermen. Meanwhile, the milestone staging is divided into 4 stages, namely (1) Short Term 2025-2029, (2) Medium Term 2030-2034, (3) Long Term 2035-2039, and (4) Golden Indonesia 2040-2045.



Figure 3.1 Food Loss, Surplus Food, and Food Waste Management Strategy in Bali Province

The seven strategies have been formulated with consideration of their urgency and will be implemented in parallel annually. Foremost, there is a need to strengthen regulations to ensure policies or legal frameworks that serve as the foundation for enforcing the reduction and management of Food Loss, Surplus Food, and Food Waste (**Strategy I**). These regulations will be derived from national-level regulations currently under development and will be adapted to Bali’s specific conditions.

The next priority is optimizing funding, both for food management and food waste management (**Strategy II**). Funding can be sourced from various legitimate avenues or sources in compliance with applicable regulations and policies. It is expected that the funding will be planned and allocated appropriately to support capacity building for stakeholders across the food chain, from producers to consumers (**Strategy**

III), as well as improving facilities, whether by constructing new ones or upgrading existing infrastructure for food and food waste management (**Strategy IV**).

Capacity building aims to enable producers and consumers to reduce food loss, surplus, and waste, manage the food waste generated, and minimize waste transported to landfills. These efforts are expected to align with the Food Recovery Hierarchy, which prioritizes Prevention, Redistribution/Reuse, and Recycling in managing food and food waste effectively.

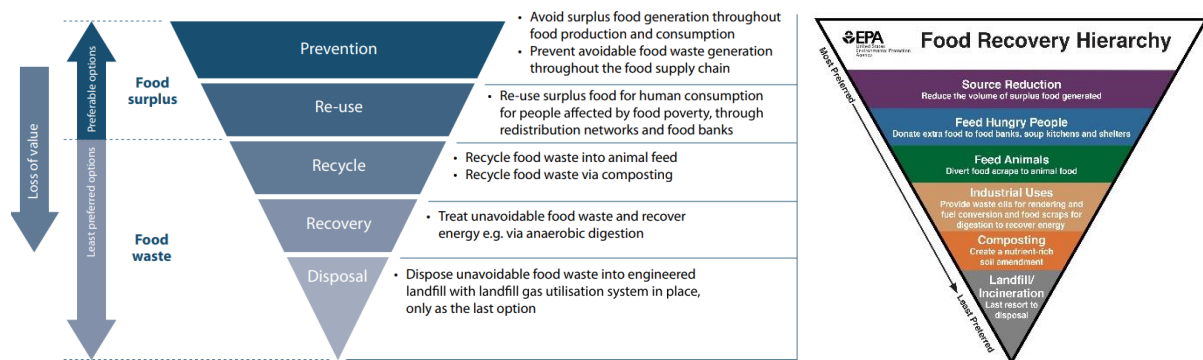


Figure 3.2 Food Recovery Hierarchy⁴⁹⁵⁰

Subsequent steps involve monitoring these efforts through an integrated data system (**Strategy V**). Continuous research and development (**Strategy VI**) will be conducted to enhance the outcomes of implemented initiatives. Finally, the implementation of incentives and disincentives (**Strategy VII**) will complement these efforts, encouraging the reduction and management of Food Loss, Surplus Food, and Food Waste.

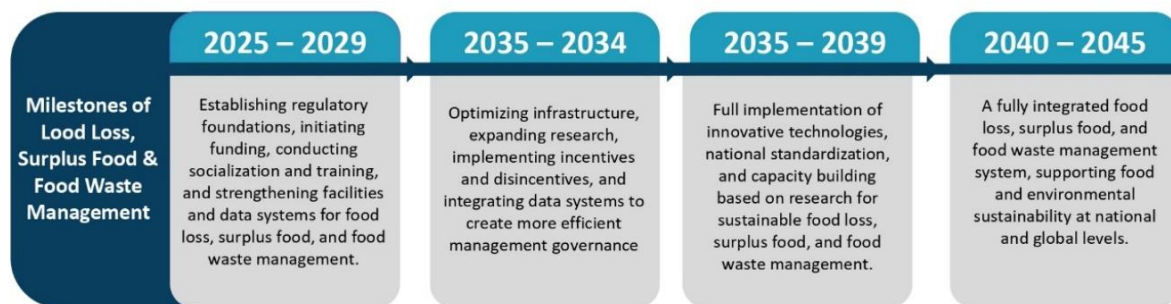


Figure 3.3 Milestone of Food Loss, Surplus Food and Food Waste in Bali Province

The detailed strategies and action plans for Food Loss, Surplus Food, and Food Waste Management in Bali Province can be seen in the table below.

⁴⁹ UNEP DTU Partnership (2021). Reducing Consumer Food Waste Using Green and Digital Technologies.

⁵⁰ United States Environmental Protection Agency - Food Recovery Hierarchy.

Table 3.1 Strategy I. Strengthening Regulations for Food Loss, Surplus Food, & Food Waste Management; and Legal Protection for Donors and Food Recovery Organizations (FRO)

STRATEGY I. Strengthening Regulations for Food Loss, Surplus Food, & Food Waste Management; and Legal Protection for Donors and Food Recovery Organizations (FRO)

Strengthening regulations for managing Food Loss, Surplus Food, and Food Waste, as well as legal protections for donors and Food Recovery Organizations (FRO), aims to enhance the management of these issues in Bali Province. This strategy includes developing specific regulations for Food Loss, Surplus Food, and Food Waste, which currently lack dedicated rules. Additionally, there is a need for regulations that provide legal protection for FRO activities and potential donors, such as HORECA and retailers, to improve surplus food management. Strengthening waste sorting at source through village regulations is crucial for effective food waste management. The implementation of these regulations must be accompanied by robust enforcement. This approach is supported by establishing specialized bodies, such as working groups, to oversee the management of Food Loss, Surplus Food, and Food Waste and enhance coordination among stakeholders. Stakeholders should collaboratively monitor and evaluate the performance of Food Loss, Surplus Food, and Food Waste management using measurable indicators periodically following applicable regulations. Based on the results, stakeholders can develop and implement collaborative strategies to improve the management of these issues in Bali Province.

Strategy I. Strengthening Regulations for Food Loss, Surplus Food, & Food Waste Management; and Legal Protection for Donors and Food Recovery Organizations (FRO)														
No	Action Plan Recommendations	Proposed Program	Objectives	Indicator	Existing Condition	Existing Condition 2024	Milestone				Primary Agencies	Supporting Agencies	Funding Sources	
							Short-Term: 2025-2029	Medium-Term: 2030-2034	Long-Term: 2035-2039	Indonesia Emas 2040-2045				
1.1	Strengthening regulations for managing Food Loss and Surplus Food and providing legal protection for Donors and Food Recovery Organizations (FRO)	1. Developing regulations for the reduction and management of Food Loss and Surplus Food and providing legal protection for Donors and Food Recovery Organizations (FRO)	1. Regulate the management of Food Loss and Surplus Food at the Bali Provincial level 2. Provide legal protection for Donors and Food Recovery Organizations (FRO)	1.1.A The existence of policy regulations on the management of Food Loss and Surplus Food, along with legal protection for Donors and Food Recovery Organizations (FRO)	No specific regulations currently govern the reduction and management of Food Loss and Surplus Food, nor is there legal protection for Donors and Food Recovery Organizations (FRO).	N/A	1 provincial-level regulation specifically governs Food Loss and Surplus Food management, including legal protection for Donors and Food Recovery Organizations (FRO).					DPRD Regional Authority (Governor/ Mayor/Regent) Regional Secretary Bali Provincial Agencies - DKLH - Distanpangan - Diskelkan - Disparda - Disperindag - Diskop UKM	Regency/City Agencies -DKLH -Distanpangan -Diskelkan	State Budget (APBN), Regional Budget (APBD), and other lawful funding sources following applicable regulations.
1.2	Strengthening regulations for source separation of Food Waste	2. Assisting and socializing the creation of waste management regulations (pararem) in traditional villages 3. Assisting and socializing the creation of village regulations (perdes) for waste management in administrative villages	1. Enhance the implementation of waste segregation at the source, including households, non-households, the food and beverage industry, retail, markets, and HORECA, through applicable village regulations	1.2.A Number of traditional village (pararem) regulations on waste separation at the source	Pararem that have been established: • Buleleng Regency: 6 out of 170 total villages (0.03%) • Jembrana Regency: 18 out of 64 total villages (0.3%) • Bangli Regency: 0 out of 168 total villages (0%) • Badung Regency: 4 out of 122 total villages (0.03%) • Gianyar Regency: 5 out of 273 total villages (0.01%) • Tabanan Regency: 5 out of 349 total villages (0.01%) • Karangasem Regency: 4 out of 190 total villages (0.02%) • Klungkung Regency: 2 out of 122 total villages (0.01%) • Denpasar City: 1 out of 35 total villages (0.03%) Total Pararem: 45	45 Pararem (3%)	409 Pararem (27%)	773 Pararem (51%)	1137 Pararem (75%)	1500 Pararem (100%)	Traditional Village Council / Majelis Desa Adat (MDA) - MDA District - MDA Regency/City - MDA Province Traditional Village/Desa Adat Bali Provincial Agencies - DPMA	Bali Provincial Agencies - DKLH - Distanpangan	State Budget (APBN), Regional Budget (APBD), and other lawful funding sources following applicable regulations.	

Strategy I. Strengthening Regulations for Food Loss, Surplus Food, & Food Waste Management; and Legal Protection for Donors and Food Recovery Organizations (FRO)													
No	Action Plan Recommendations	Proposed Program	Objectives	Indicator	Existing Condition	Existing Condition 2024	Milestone				Primary Agencies	Supporting Agencies	Funding Sources
							Short-Term: 2025-2029	Medium-Term: 2030-2034	Long-Term: 2035-2039	Indonesia Emas 2040-2045			
					<p>Total Traditional Villages: 1,500 (2023)</p> <p>Source: DPMA (2023)</p>								
				<p>1.2.B Number of administrative village (Perdes) regulations on waste separation at the source</p>	<p>Many village regulations (Perdes) on waste management have been established:</p> <ul style="list-style-type: none"> • Buleleng Regency: 125 out of 129 total villages (96%) • Jembrana Regency: 35 out of 41 total villages (85%) • Bangli Regency: 58 out of 68 total villages (85%) • Badung Regency: 40 out of 46 total villages (86%) • Gianyar Regency: 57 out of 64 total villages (89%) • Tabanan Regency: 121 out of 133 total villages (90%) • Karangasem Regency: 74 out of 75 total villages (98%) • Klungkung Regency: 52 out of 53 total villages (98%) • Denpasar City: 25 out of 27 total villages (92%) <p>Total Perdes: 587 Total Administrative Villages & Sub-districts: 636 & 80 (2023)</p> <p>Source: PERDES based on village website research, 2024</p>	578 Perdes (90.88%)	592 Perdes (93%)	606 Perdes (95%)	620 Perdes (97%)	636 Perdes (100%)	<p>Administrative Village</p> <p>Bali Provincial Agencies - DPMD - DPMDUKcapil</p>	<p>Regency/City Agencies - DPMD - DLH</p>	State Budget (APBN), Regional Budget (APBD), and other lawful funding sources following applicable regulations.
1.3	<p>Enhancing coordination among stakeholders concerning Food Loss, Surplus Food, and Food Waste</p>	<p>4. Establishing Working Groups (Pokja) or special task forces for managing Food Loss, Surplus Food, and Food Waste</p> <p>5. Organizing coordination meetings among stakeholders regarding Food Loss, Surplus Food, and Food Waste to discuss monitoring and evaluation results, best practices, and potential collaborative efforts to enhance management</p>	<p>1. Improve coordination among stakeholders related to Food Loss, Surplus Food, and Food Waste with measurable and periodic monitoring and evaluation.</p>	<p>1.3.A The Existence of working groups/task forces overseeing the management of Food Loss, Surplus Food, and Food Waste</p>	<p>No working groups/task forces have been established to oversee the management of Food Loss, Surplus Food, and Food Waste.</p>	N/A	<p>1 working group/task force overseeing the management of Food Loss, Surplus Food, and Food Waste.</p>				<p>Regency/City Agencies - DLH - Distanpangan - Diskelkan - Dispar</p>	<p>Bali Provincial Agencies - DKLH - Distanpangan - Diskelkan - Dispar - Bappeda - Disperindag</p>	State Budget (APBN), Regional Budget (APBD), and other lawful funding sources following applicable regulations.

Strategy I. Strengthening Regulations for Food Loss, Surplus Food, & Food Waste Management; and Legal Protection for Donors and Food Recovery Organizations (FRO)													
No	Action Plan Recommendations	Proposed Program	Objectives	Indicator	Existing Condition	Existing Condition 2024	Milestone				Primary Agencies	Supporting Agencies	Funding Sources
							Short-Term: 2025-2029	Medium-Term: 2030-2034	Long-Term: 2035-2039	Indonesia Emas 2040-2045			
				1.3.B The Existence of coordination meetings among stakeholders related to Food Loss, Surplus Food, and Food Waste	No coordination meetings have been held among stakeholders related to Food Loss, Surplus Food, and Food Waste.	<ul style="list-style-type: none"> Coordination meetings and Focus Group Discussions (FGD) have been held at the provincial level in Bali regarding Surplus Food and Food Waste (FLW) to initiate FLW reduction efforts. These meetings have been conducted based on available budgets and stakeholder agreements. No meetings or FGDs have been held concerning Food Loss. 	4 coordination meetings per year.	4 coordination meetings per year.	4 coordination meetings per year.	4 coordination meetings per year.	Bali Provincial Agencies - DKLH - Distanpangan	Bali Provincial / Regency / City Agencies - Diskelkan - Bappeda - DPMA - DPMDUKcapil - Disperindag - Diskop UKM - Disparda - Disdikpora - DinsosP3A - DLH - Distanpangan - MDA Traditional & Administrative Village Farmers/ Fishermans/ Stockbreeders Educational Institutions/ Academia Associations of Food Loss, Surplus Food, and Food Waste-Related Stakeholders (e.g., PHRI) NGOs	State Budget (APBN), Regional Budget (APBD), and other lawful funding sources following applicable regulations.

Table 3.2 Strategy II. Optimizing Funding for Food Loss, Surplus Food, & Food Waste Management

STRATEGY II. Optimizing Funding for Food Loss, Surplus Food, & Food Waste Management

Optimizing funding for Food Loss, Surplus Food and Food Waste handling is carried out to support the realization of a sustainable Food Loss, Surplus Food and Food Waste management system. This strategy is carried out with comprehensive budget planning based on needs, activity mapping, and funding targets, both for direct management and supporting activities, such as licensing fees, certification, research/studies, and pilot projects. In addition, the development of alternative funding options such as People's Business Credit (KUR) and insurance, as well as socialization and mentoring to increase funding accessibility, is also carried out.

STRATEGY II. Optimizing Funding for Food Loss, Surplus Food, & Food Waste Management

No	Action Plan Recommendation	Proposed Program	Objectives	Indicator	Existing Condition	Existing Condition 2024	Milestone				Primary Agencies	Supporting Agencies	Funding Sources
							Short-Term: 2025-2029	Medium-Term: 2030-2034	Long-Term: 2035-2039	Indonesia Emas 2040-2045			
2.1	Optimize funding to support the implementation of Food Loss, Surplus Food, and Food Waste Management.	1. Prepare budget plans for Food Loss, Surplus Food, and Food Waste Management.	Improve structured and sustainable Food Loss, Food Waste, and Food Waste Management systems through comprehensive budget planning, identification of alternative funding options, socialization, and mentoring to increase funding accessibility.	2.1.A Amount of funding to manage Food Loss, Food Waste and Food Waste Management	Food Loss - Total P3HP Program Funds: IDR 696,841,852 (APBD Fund) Source: LKJIP Distanpangan, 2023	Food Loss: IDR 696,841,852 Surplus Food: IDR 130,800,000 Food Waste: ± IDR 23,772,089,586.71	Baseline study of funding needs for Food Loss, Food Waste and Food Waste Management, as well as mapping of activities and funding targets; Study on the development of alternative funding options and creation of milestone targets for increased funding for the management of Food Loss, Food Waste and Food Waste Management				Inspectorate Bali Provincial Agencies Regency/City Agencies - Bappeda - DKLH - Distanpangan - Diskelkan MDA Regency/City Traditional & Administrative Village	Bali Provincial Agencies - DPMA - DPMDUkcapil - Diskopukm - Disperindag - Disparda - Disdikpora Educational Institutions/Academia Associations of Food Loss, Surplus Food, and Food Waste Stakeholders (e.g., PHRI) NGOs	State Budget (APBN), Regional Budget (APBD), and other lawful funding sources following applicable regulations.
		2. Assistance accessing alternative funding options for managing Food Loss, Surplus Food, and Food Waste Management.											
		3. Prepare a budget plan for licensing and certification-related Food Loss management activities.											
4. Prepare a budget plan for the development of studies and pilot projects	2.1.C Amount of grants for the development of studies and pilot projects related to the	There is no monitoring and evaluation system regarding the amount of funding for the development of studies and pilot projects related to the	N/A	Baseline study of the need for the amount of licensing / certification funds related to Food Loss and Food Waste	Inspectorate Bali Provincial Agencies	Associations of Food Loss, Surplus Food, and Food	State Budget (APBN), Regional Budget (APBD), and other lawful funding sources following applicable regulations.						

STRATEGY II. Optimizing Funding for Food Loss, Surplus Food, & Food Waste Management

No	Action Plan Recommendation	Proposed Program	Objectives	Indicator	Existing Condition	Existing Condition 2024	Milestone				Primary Agencies	Supporting Agencies	Funding Sources
							Short-Term: 2025-2029	Medium-Term: 2030-2034	Long-Term: 2035-2039	Indonesia Emas 2040-2045			
		related to managing Food Loss, Surplus Food, and Food Waste Management.		management of food loss, food waste and food waste management	management of food loss, surplus food, and food waste.		Management Activities and the creation of milestone targets					Waste Stakeholders (e.g., PHRI) NGOs	
		5. Preparation of a budget plan for People's Business Credit (KUR) for Balinese farmers 6. Socialization of Agricultural People's Business Credit (KUR) Accessibility		2.1.D Total KUR budget disbursed to farmers in Bali	KUR distribution in 2023 is around 17.44-21% from 2021-2023 Source: Directorate General of Treasury (DJPb) KUR Agriculture Bali, 2021 , Directorate General of Treasury (DGTB) KUR Agriculture Bali, 2022 and Regional and Provincial SEZDA Formulation Group Team Bali, 2023	21% of Agricultural KUR Distributed by 2023	±23% Agricultural KUR disbursed per year	±25% Agricultural KUR disbursed per year	±27% Agricultural KUR disbursed per year	±29% Agricultural KUR disbursed per year	- Financial Institutions (Banks) in Bali - Distanpangan	Bali Provincial Agencies - Distanpangan	
		7. Socialization of Accessibility of Rice Farming Business Insurance (AUTP) & Cattle & Buffalo Business Insurance (AUTS)		2.1.E Total land area registered for Rice Farming Business Insurance (AUTP)	The number of farmers' land area registered with Rice Farming Business Insurance (AUTP) is around 21%. Source: AUTP Target and Realization Data Bali, 2022 - 2024	21% Land Area registered with AUTP	±25% Land area registered with AUTP per year	±30% Land area registered with AUTP per year	±35% Land area registered with AUTP per year	±40% Land area registered with AUTP per year	Insurance Agency - JASINDO	Bali Provincial Agencies - Distanpangan	
				2.1.F Group Insurance for Cattle & Buffalo (AUTS)	Number of Definitive Participants List of Cattle / Buffalo Business Insurance (AUTS / K) around 154 Livestock Groups	154 Animal Group per year	Increase of ±13% in AUTS registered livestock groups per year	Increase of ±16% in AUTS registered livestock groups per year	Increase of ±19% of AUTS registered livestock groups per year	Increase of ±22% of AUTS registered livestock groups per year	Insurance Agency - JASINDO	Regency/City Agencies - Distanpangan	

Table 3.3 Strategy III. Capacity Building based on *Sad Kerthi* and social Participation in Food Loss, Surplus Food, & Food Waste Management, Source-based Sorting, and Utilization of Local Food Products

STRATEGY III. Capacity Building based on *Sad Kerthi* and Social Participation in Food Loss, Surplus Food, & Food Waste Management, Source-based Sorting, and Utilization of Local Food Products

Capacity building is carried out to support better food management. Capacity building for food workers in each supply chain is carried out through training on the implementation of Good Agricultural Practices (GAP), Good Handling Practices (GHP), and Good Manufacturing Practices (GMP) according to SNI, related certification assistance, and the development of food products and marketing of the results. The training and mentoring can increase the value of the product which is expected to improve their absorption in the market. Meanwhile, capacity building for communities and business owners is carried out through education related to food management, utilization of surplus food, and handling food waste based on the local wisdom of *Sad Kerthi*. This strategy is also carried out by increasing participation in the management of Food Loss, Surplus Food, and Food Waste and the utilization of local food products. The absorption of local food products will reduce the potential amount of food wasted.

STRATEGY III. Capacity Building based on <i>Sad Kerthi</i> and social Participation in Food Loss, Surplus Food, & Food Waste Management, Source-based Sorting, and Utilization of Local Food Products													
No	Action Plan Recommendation	Proposed Program	Objectives	Indicator	Existing Condition	Existing Condition 2024	Milestone				Primary Agencies	Supporting Agencies	Funding Sources
							Short-Term: 2025-2029	Medium-Term: 2030-2034	Long-Term: 2035-2039	Indonesia Emas 2040-2045			
3.1	Training for Production (Harvesting), Post-harvest and Storage, Processing and Packaging processes	1. Assistance, training, socialization of the application of Good Agricultural Practices (GAP), GHP, and GMP according to SNI 2. Data collection on the number of training participants Good Agricultural Practices (GAP), Good Handling Practices (GHP) dan Good Manufacturing Practices (GMP)	1. Support the implementation of Good Agricultural Practices (GAP), Good Handling Practices (GHP) and Good Manufacturing Practices (GMP) in accordance with SNI to maintain the quality of local food products so as to increase the absorption of local food products. 2. Increasing the absorption of local food ingredients as ingredients/materials for products developed by Farmer Groups/ SMEs/ Cooperatives/ BUMDes	3.1.A Number of trainings on the application of GAP, GHP, GMP according to SNI (SNI 22000; SNI CPPOB; CPPOB)	GAP: there are 24 trainings/year in 5 regencies/cities GHP: 12 trainings/year in 5 regencies/cities GMP : N/A Source: Amount of GAP and GHP Training by Distanpangan, 2024 Amount of GAP and GHP Training by BSIP, 2024	GAP: 24 training GHP: 12 training GMP : N/A	GAP: 52 training GHP: 42 training GMP: There was training on GMP implementation in 2 regencies/ city	GAP: 81 training GHP: 72 training GMP : There was training on GMP implementation in 4 regencies/ city	GAP : 109 training GHP:102 training GMP : Terdapat There was training on GMP implementation in 6 regencies/ city	GAP: 137 training GHP: 132 training GMP : There was training on GMP implementation in 9 regencies/ city	Regency/City Agencies - Distanpangan - Dinkes BRIDA Private Sector	Bali Provincial Agencies - Distanpangan - BSIP - BBPOM - UPTD BLK-IP - P4S Development Partners (National and International Experts)	State Budget (APBN), Regional Budget (APBD), and other lawful funding sources following applicable regulations.
				3.1.B Number of participations that apply GAP, GHP, GMP according to SNI (SNI CPPOB; CPPOB)	GAP: From 2022 to 2023, 15% of Subak that participated in GAP training were recorded. GHP: From 2022 to 2023, 6% of Subak participated in the GHP training by GMP : N/A Source: Distanpangan GAP and GHP Data, 2022-2023 BSIP GAP Data, 2022-2023	GAP: 15% Subak GHP: 6% Subak GMP : N/A	GAP: 25% Subak GHP: 16% Subak GMP : 10% Subak	GAP: 35% Subak GHP: 26% Subak GMP : 20% Subak	GAP: 45% Subak GHP: 36% Subak GMP : 30% Subak	GAP: 55% Subak GHP: 46% Subak GMP : 40% Subak	Regency/City Agencies - Distanpangan - Dinkes BRIDA Private Sector	Bali Provincial Agencies - Distanpangan - BSIP - BBPOM - UPTD BLK-IP - P4S	
		3.1.C Number of Prima certifications in Bali		There are 71 Prima Certifications in 63 farmer businesses from 2011-2022 Source: Web Prima Certification Field , 2011-2022	71 Prima Certification in Farming Business	76 Prima Certification in Farming Business	82 Prima Certification in Farming Business	88 Prima Certification in Farming Business	94 Prima Certification in Farming Business	Regency/City Agencies - Distanpangan	Bali Provincial Agencies - Distanpangan		
		3.1.D Number of Certified Livestock Products		Service Standard for Issuance of Seedling Certificate (SKLB) : Livestock Product Safety: N/A	N/A	N/A	N/A	N/A	N/A	Regency/City Agencies -Distanpangan	Bali Provincial Agencies - Distanpangan		

STRATEGY III. Capacity Building based on *Sad Kerthi* and social Participation in Food Loss, Surplus Food, & Food Waste Management, Source-based Sorting, and Utilization of Local Food Products

No	Action Plan Recommendation	Proposed Program	Objectives	Indicator	Existing Condition	Existing Condition 2024	Milestone				Primary Agencies	Supporting Agencies	Funding Sources
							Short-Term: 2025-2029	Medium-Term: 2030-2034	Long-Term: 2035-2039	Indonesia Emas 2040-2045			
		5. Assistance in fish and seafood processing certification		3.1.E Number of Certified Fishery Products	151 Certificate of Processing Feasibility (SKP) Source: Renstra of Bali Fisheries and Marine Affairs Agency 2018-2023	151 SKP	157 SKP	162 SKP	167 SKP	172 SKP	Regency/City Agencies - Diskelkan	Bali Provincial Agencies - Diskelkan	
		6. Assistance to Farmer Groups/UMKM/Cooperatives/ BUMDes to develop local food-based products		3.1.F Number of assistance for local food product development (number of farmer groups/umkm/cooperatives/bumdes)	There are 50 subaks that have received assistance to develop local food products. Source: Distanpangan, 2024	50 Subaks assisted for Local Food Development	60 Subaks assisted for Local Food Development	70 Subaks assisted for Local Food Development	80 Subaks assisted for Local Food Development	90 Subaks assisted for Local Food Development	Regency/City Agencies - Distanpangan - Disperindag BRIDA Private Sector NGOs	Bali Provincial Agencies - Distanpangan - Disperindag - Diskop UKM Development Partners (National and International Experts)	
		7. Food product marketing assistance		3.1.G Number of KWT (Women Farmers Group) product marketing trainings	There has been no training on marketing KWT (Women Farmers Group) products	N/A	Product marketing training for the Women Farmers Group	Product marketing training for the Women Farmers Group	Product marketing training for the Women Farmers Group	Product marketing training for the Women Farmers Group	Regency/City Agencies - Distanpangan - Disperindag - Diskop UKM	Bali Provincial Agencies - Distanpangan Development Partners (National and International Experts)	
3.2	Increased education related to food management , food loss utilization, and food waste handling to the public and business owners	8. Socialization and assistance related to food management which includes daily consumption planning, avoiding food waste and utilization of surplus food in households and non-households. 9. Outreach program to students regarding mindful eating culture 10. Data collection on the number of education, socialization or assistance related to food management and utilization of surplus food 11. Development of a standardized teaching material/curriculum that serves as a reference for environmental cadres/other educators, categorized based on the target recipients of	1. Increase awareness and skills for better food management (planning daily consumption, and avoiding food waste), utilization of leftover food through donation or in collaboration with Food Recovery Organizations, and handling food waste at: 1. household or communal level to children and the elderly 2. Food business owners (HORECA, Retail, other food/beverage industries)	3.2.A Number of campaigns and education on Food loss and Surplus Food Management	Target Education Recipients Number of Customary Villages: 1500 Number of Food and Beverage Industries : 2658 Number of HORECA : 15026 Number of Retailers & Distributors : 13696 Number of Education Facilities (Schools) : 5045 Number of Posyandu : 4848 Source: DPMA, 2023 BPS Kab Jembrana, 2023 BPS Kab Tabanan, 2023 BPS Kab Badung, 2023 BPS Kab Gianyar, 2023 BPS Kab Klungkung, 2023 BPS Kab Bangli, 2023 BPS Kab Karangasem, 2023 BPS Kab Buleleng, 2023 BPS Kota Denpasar, 2023 BPS Provinsi Bali, 2023	N/A	Traditional Village: 375 Food and Beverage Industry : 665 HORECA : 3,757 Retail & Distributors : 3,424 Educational Facilities : 1,265 Posyandu : 1,212 (25%)	Traditional Village: 750 Food and Beverage Industry : 1,330 HORECA : 7,514 Retail & Distributors : 6,848 Educational Facilities : 2,525 Posyandu : 2,424 (50%)	Traditional Village: 1,125 Food and Beverage Industry : 1,995 HORECA : 11,271 Retail & Distributors : 10,272 Educational Facilities : 3,785 Posyandu: 3,636 (75%)	Traditional Village: 1,500 Food and Beverage Industry : 2,658 HORECA : 15,026 Retail & Distributors : 13,696 Educational Facilities : 5,045 Posyandu: 4,848 (100%)	Regency/City Agencies - Distanpangan - DPMA - Disperindag - Disparda - Disdikpora MDA Regency/City Traditional & Administrative Village Educational Institutions/ Academia NGOs Private Sector BRIDA	Bali Provincial Agencies - Distanpangan - DPMA - Disperindag - Disparda - Disdikpora Family Empowerment and Welfare Movement Team (TPPKK) Bali Educational Institutions/ Academia	State Budget (APBN), Regional Budget (APBD), and other lawful funding sources following applicable regulations.

STRATEGY III. Capacity Building based on *Sad Kerthi* and social Participation in Food Loss, Surplus Food, & Food Waste Management, Source-based Sorting, and Utilization of Local Food Products

No	Action Plan Recommendation	Proposed Program	Objectives	Indicator	Existing Condition	Existing Condition 2024	Milestone				Primary Agencies	Supporting Agencies	Funding Sources
							Short-Term: 2025-2029	Medium-Term: 2030-2034	Long-Term: 2035-2039	Indonesia Emas 2040-2045			
		education (such as schools, communities, HORECA). 12. Socialization and assistance related to the handling of Food Waste in Households and Non-Households such as composting, making eco-enzyme, cultivation of Black Soldier Fly (BSF) maggot, cooperation with TPS3R or other third parties. 13. Data collection on the number of education, socialization or assistance related to Food Waste handling efforts that have been carried out		3.2.B Number of Food Waste management campaigns and education	Target Education Recipients Number of Customary Villages: 1500 Number of Food and Beverage Industries : 2658 Number of HORECA : 15026 Number of Retailers & Distributors : 13696 Number of Education Facilities (Schools) : 5045 Number of Posyandu : 4848 Source: DPMA, 2023 BPS Kab Jembrana, 2023 BPS Kab Tabanan, 2023 BPS Kab Badung, 2023 BPS Kab Gianyar, 2023 BPS Kab Klungkung, 2023 BPS Kab Bangli, 2023 BPS Kab Karangasem, 2023 BPS Kab Buleleng, 2023 BPS Kota Denpasar, 2023 BPS Provinsi Bali, 2023	N/A	Traditional Village: 375 Food and Beverage Industry : 665 HORECA : 3,757 Retail & Distributors : 3,424 Educational Facilities : 1,265	Traditional Village: 750 Food and Beverage Industry : 1,330 HORECA : 7,514 Retail & Distributors : 6,848 Educational Facilities : 2,525 (50%)	Traditional Village: 1,125 Food and Beverage Industry : 1,995 HORECA : 11,271 Retail & Distributors : 10,272 Educational Facilities : 3,785 (75%)	Traditional Village: 1,500 Food and Beverage Industry : 2,658 HORECA : 15,026 Retail & Distributors : 13,696 Educational Facilities : 5,045 (100%)	Regency/City Agencies - DKLH - Distanpangan - DPMA - Disperindag - Disparda - Disdikpora MDA Regency/City Traditional & Administrative Village Educational Institutions/Academia NGOs Private Sector BRIDA	Bali Provincial Agencies - DKLH - Distanpangan - DPMA - Disperindag - Disparda - Disdikpora Development Partners (National and International Experts)	
				3.2.C Increased sorting from waste management facility customers	There is no detailed data collection regarding the results of sorting from sources, especially from customers of waste management facilities.	N/A	Existing condition study of waste sorting level at the source & from waste management facility customers to be able to develop waste sorting targets per year in 9 cities / districts of Bali Province				Regency/City Agencies - DKLH - Distanpangan - DPMA - Disperindag - Disparda - Disdikpora MDA Regency/City Traditional & Administrative Village Educational Institutions/Academia NGOs Private Sector BRIDA	Bali Provincial Agencies - DKLH - Distanpangan - DPMA - Disperindag - Disparda - Disdikpora	State Budget (APBN), Regional Budget (APBD), and other lawful funding sources following applicable regulations.

STRATEGY III. Capacity Building based on *Sad Kerthi* and social Participation in Food Loss, Surplus Food, & Food Waste Management, Source-based Sorting, and Utilization of Local Food Products

No	Action Plan Recommendation	Proposed Program	Objectives	Indicator	Existing Condition	Existing Condition 2024	Milestone				Primary Agencies	Supporting Agencies	Funding Sources
							Short-Term: 2025-2029	Medium-Term: 2030-2034	Long-Term: 2035-2039	Indonesia Emas 2040-2045			
3.3	Increased participation of HORECA, food & beverage industry, retail/convenience stores, markets, other non-households and households in the management of food loss, surplus food, and food waste.	14. Socialization and assistance related to handling Food Loss, Surplus Food, and Food Waste 15. Data collection on the number of food & beverage industries, HORECA, markets, commerce/retail, other non-households and traditional villages/village offices/sub-districts that implement food loss management and surplus food utilization programs.	Participation of HORECA, food & beverage industries, retail/convenience stores, markets, other NRTs and households in the management of food loss, surplus food, and food waste.	3.3.A Data collection on the number of food & beverage industries, HORECA, markets, commerce/retail, other non-households and households that implement food loss and surplus food management programs.	Food and Beverage Industry: N/A (implemented) out of 2658 (total existing) Hotels : 45 (implemented) out of 3895 (total existing) Restaurants & Cafes : N/A (implemented) out of 3233 (total existing) Retail : 3 (implemented) out of 13696 (total existing) Traditional Village : N/A (implemented) out of 1500 (total existing) Source: BPS Kab Jembrana (2023) BPS Kab Tabanan (2023) BPS Kab Badung (2023) BPS Kab Gianyar (2023) BPS Kab Klungkung (2023) BPS Kab Bangli (2023) BPS Kab Karangasem (2023) BPS Kab Buleleng (2023) BPS Kota Denpasar (2023) BPS Provinsi Bali (2023) SOS, 2024	Food and Beverage Industry: N/A Hotels: 45 (1.15%) Restaurants & Cafes: 200 (6.15%) Retail: 3 (0.021%) Traditional Village: N/A	Food and Beverage Industry: 664 Hotels: 1,008 Restaurants & Cafes: 817 Retail: 3,423 Traditional Village: 375 (25%)	Food and Beverage Industry: 1,288 Hotels: 1,971 Restaurants & Cafes: 1,627 Retail: 6,846 Traditional Village: 750 (50%)	Food and Beverage Industry: 1993 Hotel: 2934 Restaurants & Cafes: 2437 Retail: 10269 Traditional Village: 1125 (75%)	Food and Beverage Industry: 2,658 Hotels: 3,895 Restaurants & Cafes: 3,247 Retail: 13,696 Traditional Village: 1,500 (100%)	Regency/City Agencies - DLH - Distanpangan - Disperindag - Disparda - Diskop UKM	Bali Provincial Agencies - Distanpangan - DKLH - Disparda - Disperindag - Diskop UKM - Diskes - BBPOM	State Budget (APBN), Regional Budget (APBD), and other lawful funding sources following applicable regulations.
		16. Data collection on the number of non-households, food & beverage industries, HORECA, markets, commerce/retail, other non-households and traditional villages/village offices/sub-districts that implement food waste management programs.		3.3.B Data collection on the number of food & beverage industries, HORECA, markets, commerce and, households that implement the Food Waste management program	Food and Beverage Industry: N/A (implemented) out of 2658 (total existing) Hotels : 50 (implemented) out of 3895 (total existing) Restaurants & Cafes : 7 (implemented) out of 3233 (total existing) Retail: 2 (implemented) out of 13696 (total existing) Traditional Village : 45 (implemented) out of 1500 (total existing) Source: BPS Kab Jembrana (2023) BPS Kab Tabanan (2023) BPS Kab Badung (2023) BPS Kab Gianyar (2023) BPS Kab Klungkung (2023) BPS Kab Bangli (2023) BPS Kab Karangasem (2023) BPS Kab Buleleng (2023) BPS Kota Denpasar (2023) BPS Provinsi Bali (2023) SOS, 2024 Hotel Waste Management, 2022 Restaurantn&Cafe, 2023, Restaurant, 2019	Food and Beverage Industry: N/A Hotels: 50 (1.3%) Restaurants & Cafes: 7 (0.2%) Retail: 2 (0.01%) Traditional Village: 45 (3%)	Food and Beverage Industry: 664 Hotels: 962 Restaurants & Cafes: 817 Retail: 3,423 Traditional Villages: 408	Food and Beverage Industry: 1,288 Hotels: 1,924 Restaurants & Cafes: 1,627 Retail: 6,846 Traditional Villages: 771	Food and Beverage Industry: 1,993 Hotels: 2,886 Restaurants & Cafes: 2,437 Retail: 1,0269 Traditional Village: 1,134	Food and Beverage Industry: 2,658 Hotels: 3,895 Restaurants & Cafes: 3,247 Retail: 13,696 Traditional Village: 1,500	Regency/City Agencies - DLH - Distanpangan - Disperindag - Disparda - Diskop UKM	Bali Provincial Agencies - DKLH - Distanpangan - Disparda - Disperindag - Diskop UKM Family Empowerment and Welfare Movement Team (TPPKK) Bali	

STRATEGY III. Capacity Building based on *Sad Kerthi* and social Participation in Food Loss, Surplus Food, & Food Waste Management, Source-based Sorting, and Utilization of Local Food Products

No	Action Plan Recommendation	Proposed Program	Objectives	Indicator	Existing Condition	Existing Condition 2024	Milestone				Primary Agencies	Supporting Agencies	Funding Sources
							Short-Term: 2025-2029	Medium-Term: 2030-2034	Long-Term: 2035-2039	Indonesia Emas 2040-2045			
3.4	Increased utilization & availability of local food products	17. Educational campaign to the public in using local food products	Maximize the utilization of local food products to reduce the potential amount of wasted food.	3.4.A Increased community expenditure per capita/month on local food products	Increased public expenditure from 2015-2019, namely Food Commodities: 7.19% Livestock Commodities: 5.56% Horticulture Commodities: 3.89% Fishery Commodities: 5.42% Source: Per capita Community Expenditure, Distanpangan, 2020	Food Commodities: 7.19% Livestock Commodities: 5.56% Horticulture Commodities: 3.89% Fishery Commodities: 5.42%	Food Commodities: 7.19% Livestock Commodities: 5.56% Horticulture Commodities: 3.89% Fishery Commodities: 5.42%	Food Commodities: 7.19% Livestock Commodities: 5.56% Horticulture Commodities: 3.89% Fishery Commodities: 5.42%	Food Commodities: 7.19% Livestock Commodities: 5.56% Horticulture Commodities: 3.89% Fishery Commodities: 5.42%	Food Commodities: 7.19% Livestock Commodities: 5.56% Horticulture Commodities: 3.89% Fishery Commodities: 5.42%	Regency/City Agencies - Disperindag - Distanpangan	Bali Provincial Agencies - Disperindag - Distanpangan - TPPKK - Diskelkan MDA Provincial Agencies PHDI Provincial Agencies	State Budget (APBN), Regional Budget (APBD), and other lawful funding sources following applicable regulations
		18. Data collection on the number and types of local food products in each district/city.		3.4.B Number of local food ingredients	Food: There are 3 types of local food Horticulture : There is 7 types of local horticulture Plantation : There is 1 type of local plantation Fisheries : There are 2 types of local fish Livestock : There are 4 types of local meat and eggs Food Industry : There are 3 types of local food industry Source: Sigapura Bali, 2023	20 types of local food	45 types of local food	70 types of local food	95 types of local food	120 types of local food	Regency/City Agencies - Distanpangan - Diskelkan	Bali Provincial Agencies - Distanpangan - Diskelkan - BSIP Bureau of Public Procurement and Economy (Biro PBJEK)	
		19. Data collection on the amount of production of each type of productive local food in the district / city 20. Guidance and supervision of the development of staple food sources according to regional potentials		3.4.C Production growth of each type of local food (%)	Food: Average food production growth of 20% Horticulture: Average horticultural production growth of 31% Plantation: Average plantation production growth of 3% Fisheries: Average fisheries production growth of 22% Livestock: Average livestock production growth of 30% Food Industry: Average food industry growth of 20% Source: SiGapura, 2022 - 2023	Food: 20% Horticulture: 31% Plantation: 3% Fisheries: 22% Livestock: 30% Food Industry: 20%	Food: 40% Horticulture: 47% Plantation: 20% Fisheries: 40% Livestock: 45% Food Industry: 40%	Food: 60% Horticulture: 63% Plantation: 40% Fisheries: 60% Livestock: 60% Food Industry: 60%	Food: 80% Horticulture: 79% Plantation: 60% Fisheries: 80% Livestock: 75% Food Industry: 80%	Food: 95% Horticulture: 95% Plantation: 80% Fisheries: 95% Livestock: 90% Food Industry: 95%	Regency/City Agencies - Distanpangan - Diskelkan	Bali Provincial Agencies - Distanpangan - Diskelkan - BSIP	
		21. Data collection on local food reserves 22. Monitoring and evaluation in the fulfillment of local food reserves		3.4.D % Fulfillment of local food reserves (Rice)	Provincial and Regency/City Governments in 2024 on average are able to fulfill at least 50% of their annual food reserve target (rice). Source: Distanpangan Bali, 2024	Min. 50% compliance with food reserves from target (rice)	Min. 50% compliance with food reserves from target (rice)	Min. 50% compliance with food reserves from target (rice)	Min. 50% compliance with food reserves from target (rice)	Min. 50% compliance with food reserves from target (rice)	Regency/City Agencies - Distanpangan	Bali Provincial Agencies - Distanpangan	
		23. Strengthening food price stability control		3.4.E Bali Food Inflation and Regional Inflation of Bali Province	Bali Food inflation in 2018 5.60% (Bali RPJMD) and in 2023 7.02% in the fourth quarter of 2023 (Bali Province Economic Report February 2024); there is an increase in inflation of 1.42% (yoy) from 2018 to 2023. Source: RPJMD Bali 2018-2023 Laporan Perekonomian Provinsi Bali, February 2024	Food Inflation: 7.02% Regional Inflation: 2.77%	Food Inflation: 7%±1% (yoy) Regional Inflation: 2%±1%(yoy)	Food Inflation: 7%±1% (yoy) Regional Inflation: 2%±1%(yoy)	Food Inflation: 7%±1% (yoy) Regional Inflation: 2%±1%(yoy)	Food Inflation: 7%±1% (yoy) Regional Inflation: 2%±1%(yoy)	Bali Provincial Agencies - Distanpangan Regional Inflation Control Team (TPID)	Regency/City Agencies - Distanpangan - BPS - Disperindag Bureau of Public Procurement and Economy (Biro PBJEK)	

Table 3.4 Strategy IV. Improvement of Supporting Facilities for Food Loss, Surplus Food, & Food Waste Management

STRATEGY IV. Improvement of Supporting Facilities for Food Loss, Surplus Food, & Food Waste Management

Improvement of supporting facilities for Food Loss, Surplus Food, & Food Waste management is carried out by improving supporting facilities and infrastructure in each supply chain, including Production, Post-harvest and Storage, Processing and Packaging, Distribution and Marketing as well as optimizing Food Loss, Surplus Food, and Food Waste management facilities. Improvement of supporting facilities and infrastructure is carried out to maintain product quality in each supply chain so that it is absorbed more in the market and reduces the potentially wasted food. Meanwhile, the optimization of Food Loss, Surplus Food, and Food Waste management facilities is carried out to increase the capacity of both surplus food utilization and food waste management.

Strategy IV. Improvement of Supporting Facilities for Food Loss, Surplus Food, & Food Waste Management													
No	Action Plan Recommendations	Proposed Programs	Objectives	Indicator	Initial Conditions	Existing 2024	Period				Primary Agencies	Supporting Agencies	Funding Sources
							Short Term 2025-2029	Medium Term 2030-3034	Long Term 2035-2039	Golden Indonesia 2040-2045			
4.1	Improvement of supporting facilities and infrastructure for Production, Post-harvest and Storage, Processing and Packaging processes	Productions											
		1. Program for the provision and development of agricultural facilities production processes according to the required specifications	Minimize food product scattering and food damage during production.	4.1.A Number of Agricultural Equipment and Machinery (ALSINTAN) Production	RMU: 153 Units Number of Post Machines: 253 Units Large Combine Harvester: 1 Unit Medium Combine Harvester: 3 Units Small Combine Harvester: 6 Units Power tresher: 147 Units Packing Tools: 1 Unit Vertical Tub Dryer: 5 Units Color Sorter: 1 Unit There are 1,137 postharvest tools and machines (ALSINTAN) in 9 regency / cities Source: Data RMU Distanpangan, 2023 Distanpangan Postharvest Equipment Data, 2019-2023 Data tools Postharvest, 2019-2023	1,137 unit	1,560 unit	1,984 unit	2,407 unit	2,830 unit	Bali Provincial Agencies - Distanpangan	Regency/City Agencies - Distanpangan	APBN, APBD, and other legal sources of funds in accordance with statutory provisions
		4. Program for the provision and development of fishing gear		4.1.B Number of fishing gear distributed	Number of Marine Fishing Gear Units: 13,4363 Number of PUD Fishing Gear Units: 10,091 Source: Statistic KKP Fishing Gear, 2022	Number of Marine Fishing Gear: 134,363 Number of PUD Fishing Gears: 10,091	Marine Fishing Gear: 167,954 PUD Fishing Gear : 12,614	Marine Fishing Gear: 201,545 PUD fishing gear : 15,137	Marine Fishing Gear: 235,135 PUD Fishing Gear : 17,659	Marine Fishing Gear: 268,726 PUD Fishing Gear : 20,182	Bali Provincial Agencies - Diskelkan	Regency/City Agencies - Diskelkan	
		6. Existing data collection and needs for Farmer's Business Roads		4.1.C Improved road access	Pavement Road: 7703.82 km Unpaved Road: 447.36 km Others : 544.52 km Total not yet paved: 991.88 km Source: BPS Bali In Figures, 2023	447,36 km	7951,79 km	8199,76 km	8447,73 km	8695,70 km	Regency/City Agencies - DISPUPRKIM	Bali Provincial Agencies - DISPUPRKIM - Distanpangan	
	8. Harvest productivity data collection		4.1.D Yield productivity (tons/ha)	Food Crop Commodities: Average productivity/year from 2018-2023 is 101.55 tons/ha (10%) Horticultural Commodities: Average productivity/year in 2023 is 57.38 tons/ha (10%) Plantation Commodities: Average	Food: 101.55 ton/ha (10%) Horticulture: 57.38 ton/ha (10%)	Food Plants: 164 ton/ha (38.1%) Horticulture: 74 ton/ha (22.5%)	Food Plants: 227 ton/ha (55.3%) Horticulture: 90 ton/ha (36.2%)	Food Plants: 290 ton/ha (65%) Horticulture: 106 ton/ha (53%)	Food Plants: 353 ton/ha (71.2%) Horticulture: 122 ton/ha (53%)	Regency/City Agencies - Distanpangan - Diskelkan	Bali Provincial Agencies - Distanpangan - BSIP - BPS		
	9. Data collection on agricultural land area per commodity												
	10. Harvest data collection per commodity												

Strategy IV. Improvement of Supporting Facilities for Food Loss, Surplus Food, & Food Waste Management													
No	Action Plan Recommendations	Proposed Programs	Objectives	Indicator	Initial Conditions	Existing 2024	Period				Primary Agencies	Supporting Agencies	Funding Sources
							Short Term 2025-2029	Medium Term 2030-3034	Long Term 2035-2039	Golden Indonesia 2040-2045			
					productivity / year from 2018 - 2022 is 1.05 tons / ha (10%) Fisheries: Average production from 2020 - 2022 is 134,378 tons/year (10%) Livestock: Average production from 2020 - 2022 is 89,540 tons/year (10%) Source: Data Distanpangan, 2024	Agriculture: 1.05 ton/ha (10%) Fisheries: 134,378 ton/tahun (10%) Farm: 89,540 ton/tahun (10%)	Agriculture: 2 ton/ha (47.6%) Fisheries: 268,756 ton/tahun (50%) Farm: 119,387 ton/tahun (25%)	Agriculture: 3 ton/ha (65.1%) Fisheries: 403,134 ton/tahun (66%) Farm: 149,233 ton/tahun (40%)	(45.9%) Agriculture: 4 ton/ha (73.8%) Fisheries: 537,512 ton/tahun (75%) Farm: 179,080 ton/tahun (50%)	Agriculture: 5 ton/ha (79.1%) Fisheries: 671,890 ton/tahun (80%) Farm: 208,927 ton/tahun (57.14%)			
Postharvest & Storage													
		11. Program for the provision and development of agricultural support facilities for post-harvest & storage processes 12. Income % utilization of agricultural support facilities post-harvest & storage process 13. Data collection on the number of subak/farmer groups that received assistance in the use of agricultural facilities for post-harvest processing & storage 14. Increase in the number of integrated processing centers and data collection on their capacity 15. Management and maintenance of established integrated processing centers	Minimize food product scattering and food damage during post-harvest and storage.	4.1.E Number of integrated processing centers (warehouse, dryer)	There are 31 integrated processing horticulture centers Source: Distanpangan, 2018-2022	31 Unit	62 Unit	93 Unit	124 Unit	155 Unit	Bali Provincial Agencies - Distanpangan - BSIP	Regency/City Agencies Distanpangan	State Budget (APBN), Regional Budget (APBD), and other lawful funding sources following applicable regulations
		16. Increasing the number of cold storage and data collection on its capacity 17. Management and maintenance of cold storage that has been built		4.1.F Number of cold storage (Unit)	Horticulture: There are 5 Cold Storage already available from 9 Districts / Cities Fisheries: There are 6 cold storages available from 9 districts / cities Source: Sharpening Discussion with Government Province and Regency/City, 2024	Horticulture: 5 Cold Storage Perikanan: 6 Cold Storage	Horticulture : 6 Cold Storage Perikanan : 7 Cold Storage	Horticulture : 7 Cold Storage Perikanan : 8 Cold Storage	Horticulture : 8 Cold Storage Perikanan : 9 Cold Storage	Horticulture : 9 Cold Storage	Bali Provincial Agencies - Distanpangan - Diskelkan	Regency/City Agencies - Distanpangan - Diskelkan	

Strategy IV. Improvement of Supporting Facilities for Food Loss, Surplus Food, & Food Waste Management													
No	Action Plan Recommendations	Proposed Programs	Objectives	Indicator	Initial Conditions	Existing 2024	Period				Primary Agencies	Supporting Agencies	Funding Sources
							Short Term 2025-2029	Medium Term 2030-2034	Long Term 2035-2039	Golden Indonesia 2040-2045			
Processing and Packaging													
		18. Data collection on the number, capacity, and managers of downstream processing for each commodity	Increase the absorption of food ingredients by further processing into diversified food products	4.1.G Number of Processing Facilities (Facilities that can store crops for min. 3 years) in related commodities	There is no data collection on the number of processing facilities (3-year durability) on commodities	N/A	Presence of min. 1 number of processing facilities (3-year durability) for each commodity				Bali Provincial Agencies - Distapangan - BSIP	Regency/City Agencies - Distapangan	State Budget (APBN), Regional Budget (APBD), and other lawful funding sources following applicable regulations
		19. Increase in the number of slaughterhouses (RPH) and data collection on their capacity 20. Management and maintenance of slaughterhouses (RPH)	Provision of supporting facilities to support food management, especially improving the quality and safety of meat so that it is more absorbed in the market and reduces wasted food.	4.1.H Number of Slaughterhouses (RPH)	There are 20 government (11 units) and private (8 units) abattoirs available in 8 districts/cities. Source: Data RPH Distapangan 2024	20 Units	22 Units	24 Units	26 Units	27 Units	Bali Provincial Agencies - Distapangan	Regency/City Agencies - Distapangan	
Distribution & Marketing													
		21. Development of harvest center markets based on superior commodities City/Regency	Supporting distribution and price stabilization as well as absorption of food products to reduce food loss, surplus food, and food waste.	4.1.I Number of Market Centers for Harvested Products Based on Leading Commodities Regency / City	List of Market Centers in Bali Province; Food Commodities (Food, Horticulture, Plantation): 3 Market Centers in Denpasar City, Klungkung & Tabanan Regencies Livestock Commodities: 1 Central Market in Badung Regency Fishery Commodities: 2 Central Markets in Badung, & Karangasem Districts	6 Market Centers in Districts/Cities			Addition of 1 Livestock Commodity Center Market in Denpasar City	Each City/Regency has a Market Center for Leading Products	Regency/City Agencies - Disperindag - Distapangan - Diskelkan	Bali Provincial Agencies - Disperindag - Distapangan - Diskelkan	State Budget (APBN), Regional Budget (APBD), and other lawful funding sources following applicable regulations
		22. Development of Regional Owned Enterprises (BUMD) as a buffer for food needs and distribution of Krama Bali's food production.		4.1.J Number of BUMD Food	In addition to the province, the regencies/cities in Bali that have food Perumda are Tabanan, Buleleng, Badung, Denpasar, and Jembrana. Source: Number of Food Corporations Pangan in Bali	5 Cities/Cities already have Food Perumda	Food Perumda in 9 districts/cities				Regency / City BUMD / Perumda Regency/City Agencies - Disperindag - Distapangan	Provincial BUMD/ Perumda Bali Provincial Agencies - Disperindag - Distapangan	
		23. Expert assistance to develop Subak cooperatives in the field of food crop, horticulture and plantation commodity businesses		4.1.K Number of Active Subak Cooperatives in Agriculture, Plantation, Animal Husbandry,	Agricultural cooperatives = 89 units (72 active, 17 inactive) Plantation cooperatives = 7 units (6 active, 1 inactive) Livestock cooperatives = 17 units (12 active, 5 inactive) Fishing cooperatives = 18 units (15 active, 3 inactive)	Number of Subak Cooperatives : Active: 105 Inactive: 26	Reduced number of inactive Subak Cooperatives			None Number of Inactive Subak Cooperatives	Regency/City Agencies - Diskop UKM	Bali Provincial Agencies - Diskop UKM	

Strategy IV. Improvement of Supporting Facilities for Food Loss, Surplus Food, & Food Waste Management													
No	Action Plan Recommendations	Proposed Programs	Objectives	Indicator	Initial Conditions	Existing 2024	Period				Primary Agencies	Supporting Agencies	Funding Sources
							Short Term 2025-2029	Medium Term 2030-3034	Long Term 2035-2039	Golden Indonesia 2040-2045			
				Fishermen, Forestry commodity business sectors	Source: Diskop UKM Bali (2022)								
4.2	Optimization of food loss, surplus food, and food waste management facilities	Consumption											
		24. Data collection on the number of Food Recovery Organization	Improving salvage and distribution of food waste through Food Recovery Organization (FRO)	4.2.A Total Food Recovery Organization (FRO)	Number of Existing Food Recovery Organization: 1 (Scholars of Sustenance/SOS) which already serves Denpasar City (South Denpasar), Badung Regency (South Badung), Gianyar Regency (Ubud). Source: SOS, 2023 Food Recovery Organization Needs: 1 Food Recovery Organization is needed that can be the main guardian of activities to save food loss and utilize leftover food per city/district.	1 FRO	2 FRO	4 FRO	8 FRO	9 FRO	Regency/City Agencies - Distanpangan Private Sector NGOs Associations of Food Loss, Surplus Food, and Food Waste Stakeholders (e.g., PHRI)	Bali Provincial Agencies - Distanpangan	APBN, APBD, and other legal sources of funds in accordance with statutory provisions
		25. Increasing the number of facilities and infrastructure or increasing the capacity of Food Loss and Food Waste management such as TPS 3R, TPST, and other alternatives. 26. Data collection on the number and management capacity of TPS 3R and TPST 27. Management and maintenance of TPS 3R and TPST that have been built. 28. Assistance for waste management workers at TPS 3R and TPST	The existence of adequate facilities to support the revamping and improvement of the Food Loss and Food Waste management system.	4.2.B Number of TPS 3R built	Total TPS - 3R in Bali (278) Total Active: 195 TPS3R Total Dinas Villages: 636 (1 village has 1 TPS 3R) Source: DKLH, 2024 TPS 3R that meets the criteria of the Technical Guidelines for TPS 3R PUPR; *Description: 1. Capacity of at least 400 households 2. Minimum area of 200 m2 3. Mixed waste disposal unit 4. Mixed waste sorting unit 5. Organic waste processing unit (including organic waste shredder) 6. Inorganic/recycling waste processing/collection unit 7. Residual waste processing/containment unit 8. Warehouse/storage container for solid/liquid compost/bio gas/recycled waste/residual waste, 9. Gerobak/motor pengumpul sampah	278	397 (62%)	516 (81%)	635 (99%)	636 (100%)	Settlement Infrastructure Center (BPPW) Bali Traditional & Administrative Village Bali Provincial Agencies - Bappeda Bali - DISPUPRKim Bali - DKLH Bali Regency/City Agencies - Bappeda - Dinas PU - DLH	Regency/City Agencies - Disparda - DMPD Educational Institutions/Academia NGOs Private Sector	
		4.2.C Number of TPSTs built	Number of Existing TPST : 7 Denpasar - Kesiman Kertalangu TPST - TPST Tahura - Padangsambian Kaja TPST Klungkung - Toss Klungkung	7	8	9	10	12	BPPW Bali Provincial Traditional & Administrative Village Bali Provincial Agencies - Bappeda - DISPUPRKim - DKLH	Regency/City Agencies - Disparda - DMPD Educational Institutions/Academia NGOs	APBN, APBD, and other legal sources of funds in accordance with statutory provisions		

Strategy IV. Improvement of Supporting Facilities for Food Loss, Surplus Food, & Food Waste Management

No	Action Plan Recommendations	Proposed Programs	Objectives	Indicator	Initial Conditions	Existing 2024	Period				Primary Agencies	Supporting Agencies	Funding Sources
							Short Term 2025-2029	Medium Term 2030-3034	Long Term 2035-2039	Golden Indonesia 2040-2045			
					Badung - Samtaku TPST - Mengwitani TPST Jembrana - TPST Jembrana Cities / Districts of Bali Province that do not yet have TPST facilities: Gianyar, Tabanan, Karangasem, Bangli, Buleleng Source: DKLH, 2024						Regency/City Agencies - Bappeda - Dinas PU - DLH	Private Sector	
		29. Data collection on alternatives to food Loss, Surplus Food, & Food Waste management in each district/city.		4.2.D Implementati on of alternatives for managing Food Loss, Surplus Food, & Food Waste	- Biopore Hole Activity Implementor: 1. School: 215 out of 4981 2. Traditional Village: 36 out of 1500 - Modern Teba Implementation 1. Gianyar District - Existing BSF Cultivation Unit: 8 Denpasar: 1. BSf Buyung Dewata 2. Office of PT Bala Biotech Indonesia 3. Madefficient 4. Pomogan Tabanan 1. PT Maggot Indonesia Bersih 2. Maggot Bali Bersih Gianyar 1. Magi Farm Buleleng 1. juragan maggot - Number of Eco Enzym Community in Denpasar City: 4 Source: DKLH, 2024	9 District/ City	9 District/ City	9 District/ City	9 District/ City	9 District/ City	Regency/City Agencies - DLH - Distanpangan - Disperindag - Diskop UKM - Disparda - Disdikpora Educational Institutions/ Academia NGOs Private Sector	Bali Provincial Agencies - DKLH - Distanpangan - DPMA - DPMDDukcapil - Disdikpora - Disparda - Diskop UKM NGOs	APBN, APBD, and other legal sources of funds in accordance with statutory provisions

Table 3.5 Integration of Data Management System for Food Loss, Surplus Food, & Food Waste

STRATEGY V. Integration of Data Management System for Food Loss, Surplus Food, & Food Waste

One form of monitoring to measure performance in Food Loss, Surplus Food, and Food Waste management is through the collection of relevant data according to established standards or methods. The information from this collected data serves as a foundation for the development of future programs or policies. Data collection on the management of Food Loss, Surplus Food, and Food Waste is conducted through an Integrated Food Loss, Surplus Food, and Food Waste Information System, serves as monitoring form of policy makers. The transparency of data and public information can also create opportunities for the public to enhance their participation in Food Loss, Surplus Food, and Food Waste management.

No	Action Plan Recommendations	Proposed Programs	Objectives	Indicator	Initial Conditions	Existing 2024	Period				Primary Agencies	Supporting Agencies	Funding Sources
							Short Term 2025-2029	Medium Term 2030-3034	Long Term 2035-2039	Golden Indonesia 2040-2045			
5.1	Integrated Information System for Food Loss, Surplus Food, and Food Waste	1. Establishment of a Publicly Accessible Information System for funding, generation data, and management of Food Loss, Surplus Food, and Food Waste, in accordance with the data collection standards set in national policies	Enhancing data accuracy that supports the Food Loss, Surplus Food, and Food Waste management, and cross-agency or sectoral integration to ensure comprehensive and mutually supportive data	5.1.A Integrated information system related to funding, generation data, reduction, and utilization of Food Loss, Surplus Food, and Food Waste	Currently, there is no integrated information system related to funding sources, data on generation, reduction, and utilization of Food Loss, Surplus Food, and Food Waste.	N/A	The existence of an integrated information system related to funding, data collection on the generation, reduction and utilization of food loss, food waste and food waste according to the platform and data collection standards set out in the national policy.	3 cities/ regencies have submitted the report needed in national platform of Food Loss, Surplus Food, and Food Waste	6 cities/ regencies have submitted the report needed in national platform of Food Loss, Surplus Food, and Food Waste	9 cities/ regencies have submitted the report needed in national platform of Food Loss, Surplus Food, and Food Waste	Regency/City Agencies - DLH - Distanpangan - Diskelkan - Diskominfos - BPS	Bali Provincial Agencies - Bappeda - DPMA - DPMDDukcapil - Disperindag - Diskop UKM - Disparda - DKLH - Distanpangan - Diskelkan - Diskominfos	State Budget (APBN), Regional Budget (APBD), and other lawful funding sources in accordance with applicable regulations.
		2. Guidance on how to use the data collection platform for potential users		5.1.B Amount of reduced Food Loss at the production (harvesting) stage, post-harvest and storage, and processing and packaging									
		3. Data collection on the generated Food Loss (based on the Food Balance Sheet), Surplus Food, and Food Waste in accordance with the data collection standards set in national policies	Improving performance in the implementation of Food Loss, Surplus Food, and Food Waste responsible management in accordance with applicable regulations										
		4. Data collection on Food Loss generation for key commodities in each city/regency											
		5. Data profiling of Food Loss, Surplus											

		Food, and Food Waste implementers	Improving performance in the implementation of Food Loss, Surplus Food, and Food Waste responsible management in accordance with applicable regulations	<p>5.1.C Amount of Surplus Food recovered</p> <p>Potential Amount of Food Surplus in Bali: 187 tons/day Source: FLW Regional Study in West Java, Central Java, & Bali, 2021</p> <p>Amount of recovered Surplus Food by SOS: 5 tons/day Source: SOS, 2024</p>	0.22% recovered Surplus Food	50% recovered Surplus Food	58% recovered Surplus Food	67% recovered Surplus Food	75% recovered Surplus Food	Regency/City Agencies - Distanpangan	<p>Bali Provincial Agencies - Distanpangan</p> <p>Associations of Food Loss, Surplus Food, and Food Waste Related Stakeholders (e.g., PHRI)</p> <p>Private Sector</p> <p>NGOs</p> <p>Educational Institutions/ Academia</p>	State Budget (APBN), Regional Budget (APBD), and other lawful funding sources in accordance with applicable regulations.
				<p>5.1.D Amount of Food Waste generation reduced from the food & beverage industry, HORECA, markets, retails, and households</p> <p>Food Waste Generation in Bali in 2023 Total Waste Generation in Bali: 3,367.77 tons/day Food Waste (FW) (22.55%, SIPSN): 759.43 tons/day</p> <p>Source: DKLH Bali, 2024</p>	759.43 tons/day	50% reduction of Food Waste in each city/ regency	58% reduction of Food Waste in each city/ regency	67% reduction of Food Waste in each city/ regency	75% reduction of Food Waste in each city/ regency	Regency/City Agencies - DLH	<p>Bali Provincial Agencies - Bappeda - DPMA - DPMDDukcapil - Disperindag - Diskop UKM - Disparda - Disdikpora - DKLH</p> <p>Associations of Food Loss, Surplus Food, and Food Waste Related Stakeholders (e.g., PHRI)</p> <p>Traditional & Administrative Villages</p> <p>Private Sectors</p> <p>NGOs</p> <p>Educational Institutions/ Academia</p>	

Table 3.6 Strategy VI. Research and Development in Food Loss, Surplus Food, & Food Waste Management

STRATEGY VI. Research and Development in Food Loss, Surplus Food, & Food Waste Management

Research and Development of Food Loss, Surplus Food, & Food Waste management is carried out by compiling a comprehensive profile of supply and demand including technology needs, in the food management industry; development of upstream-downstream cooperation commitment schemes and cross-sectoral food processing provision; determination of the Highest Retail Price (HET) by the Bali Provincial Government for local food ingredients that are not set by the Central Government. In addition, the development of SOPs & innovations in processing off-grade products into food products with more selling value was carried out to increase the absorption of off-grade or ugly food products. Innovation development is also carried out in the form of pilot projects and utilization of technology for smart farming.

STRATEGY VI. Research and Development in Food Loss, Surplus Food, & Food Waste Management													
No	Action Plan Recommendations	Proposed Programs	Objectives	Indicator	Initial Conditions	Existing 2024	Period				Primary Agencies	Supporting Agencies	Funding Sources
							Short Term 2025-2029	Medium Term 2030-2034	Long Term 2035-2039	Golden Indonesia 2040-2045			
6.1	Comprehensive profiling of supply and demand, including technology, in the food processing industry to shorten supply chains and maintain price stabilization/conformity of food products.	1. Data collection and mapping/profiling of upstream and downstream supply and demand in food processing	1. Enhancing data on supply, demand, and technology needs to support food management 2. Providing transparency in food product pricing 3. Improving farmers' capabilities in food management	6.1.A Existence of a technology supply and demand profile for food processing	Lack of upstream downstream food processing supply demand profile	N/A	The existence of upstream downstream food processing supply demand profiles in 3 cities / regencies of Bali Province	The existence of upstream downstream food processing supply demand profiles in 5 cities / regencies of Bali Province	The existence of upstream downstream food processing supply demand profiles in 7 cities / regencies of Bali Province	The existence of upstream downstream food processing supply demand profiles in 9 cities / regencies of Bali Province	Regency/City Agencies - Disperindag - Distanpangan	Bali Provincial Agencies - Distanpangan - Disperindag - Diskop UKM	State Budget (APBN), Regional Budget (APBD), and other lawful funding sources in accordance with applicable regulations
		2. Filling in market and food price information systems through SiGapura or other official platforms											
		3. Data collection and mapping/profiling of technology needs to bridge the supply-demand gap	2. Providing transparency in food product pricing 3. Improving farmers' capabilities in food management	6.1.B Existence of a technology supply and demand profile for food processing	There is no supply demand profile of food processing technology	N/A	The existence of a supply demand profile of food processing technology in 3 cities / regencies of Bali Province	The existence of a supply demand profile of food processing technology in 5 cities / regencies of Bali Province	The existence of a supply demand profile of food processing technology in 7 cities / regencies of Bali Province	The existence of a supply demand profile of food processing technology in 9 cities / regencies of Bali Province	Regency/City Agencies - Disperindag - Distanpangan	Bali Provincial Agencies - Distanpangan - Disperindag - Diskop UKM	
4. Assistance, training, and dissemination on market analysis for farmers, livestock breeders, and fishermen	6.1.C Number of training sessions on market analysis for farmers, livestock breeders, and fishermen Source: Discussion on Sharpening Badung Agriculture Service 2024	No market analysis training for farmers											N/A
5. Ensuring the supply and purchase of agricultural products through a commitment to collaboration between farmers, livestock breeders, and fishermen with			Providing price certainty and stability to farmers, as well as supporting the overall sustainability of the agricultural sector	6.2.A Existence of programs ensuring agricultural, livestock, and fisheries yields	Agriculture: There is 1 agricultural product assurance program from 9 districts/cities. Livestock: N/A Fisheries: N/A Source: Discussion on Sharpening	Agriculture: 1 agricultural product assurance program in Badung district Livestock: N/A	Agriculture: Mapping and guaranteeing off-takers of agricultural, livestock and fishery products in 3 cities / regencies of Bali Province	Agriculture: Mapping and guaranteeing off-takers of agricultural, livestock and fishery products in 5 cities / regencies of Bali Province	Agriculture: Mapping and guaranteeing off-takers of agricultural, livestock and fishery products in 7 cities / regencies of Bali Province	Agriculture: Mapping and guaranteeing off-takers of agricultural, livestock and fishery products in 9 cities / regencies of Bali Province	Regency/City Agencies - Distanpangan - Disperindag	Bali Provincial Agencies - Distanpangan - Disperindag - Diskop UKM	

STRATEGY VI. Research and Development in Food Loss, Surplus Food, & Food Waste Management													
No	Action Plan Recommendations	Proposed Programs	Objectives	Indicator	Initial Conditions	Existing 2024	Period				Primary Agencies	Supporting Agencies	Funding Sources
							Short Term 2025-2029	Medium Term 2030-3034	Long Term 2035-2039	Golden Indonesia 2040-2045			
		off-takers, including local governments			Badung Agriculture Service 2024	Fisheries and Marine: N/A							
		6. Development of Regional-Owned Enterprises (BUMD) to establish partnerships with agricultural, livestock, fisheries, and maritime businesses		6.2.B Number of agricultural, livestock, and fisheries businesses collaborating with Regional-Owned Enterprises (BUMD)	Data on the number of agricultural businesses that cooperate with BUMD: N/A Data on the number of livestock businesses that cooperate with BUMD: N/A Data on the number of fishery businesses that cooperate with BUMD: N/A	N/A	An increase in the number of agricultural, livestock and fishery businesses that cooperate with BUMDs	An increase in the number of agricultural, livestock and fishery businesses that cooperate with BUMDs	An increase in the number of agricultural, livestock and fishery businesses that cooperate with BUMDs	An increase in the number of agricultural, livestock and fishery businesses that cooperate with BUMDs	Bali Regional Inflation Control Team (TPID) Regency / City BUMD / Perumda Regency/City Agencies - Distanpangan	Provincial BUMD/ Perumda Bali Provincial Agencies - Distanpangan - Diskelkan	
6.3	Determination of the Highest Retail Price (HET) for local foodstuffs that are not set by the Central Government.	7. Determination of the Highest Retail Price (HET) for local food products not set by the Central Government 8. Dissemination of the applicable Highest Retail Price (HET)		6.3.A Determination of the Highest Retail Price (HET) for local food products not established by the Central Government Source: Bapanas Food Prices, 2024	There are 20 food products that have been set the Highest Retail Price (HET) in Indonesia.	20 food products	Determination of price ceiling by the Bali Provincial Government for local food that is not set by the Central Government.				Regency/City Agencies - Distanpangan - Disperindag	Bali Provincial Agencies - Distanpangan - Disperindag - Diskop UKM	State Budget (APBN), Regional Budget (APBD), and other lawful funding sources in accordance with applicable regulations
6.4	Development of SOPs & innovation in processing off-grade products into valuable food products	9. Assistance, training, and dissemination regarding technical guidelines for selling off-grade products 10. Data collection on the number of assistance sessions and the number of farmer groups/subak participating in off-grade food material processing 11. Assistance with facilities for	Development of innovations to manage off-grade food and enhance quality to reduce food loss and increase the market value of food products	6.4.A Existence of technical guidelines for selling off-grade products	No technical guidance on off-grade sales	N/A	There is a min. 1 socialization on technical guidelines for off-grade sales per year	There is a min. 1 socialization on technical guidelines for off-grade sales per year	There is a min. 1 socialization on technical guidelines for off-grade sales per year	There is a min. 1 socialization on technical guidelines for off-grade sales per year	Regency/City Agencies - Distanpangan - Disperindag	Bali Provincial Agencies - Distanpangan - Disperindag	State Budget (APBN), Regional Budget (APBD), and other lawful funding sources in accordance with applicable regulations

STRATEGY VI. Research and Development in Food Loss, Surplus Food, & Food Waste Management													
No	Action Plan Recommendations	Proposed Programs	Objectives	Indicator	Initial Conditions	Existing 2024	Period				Primary Agencies	Supporting Agencies	Funding Sources
							Short Term 2025-2029	Medium Term 2030-2034	Long Term 2035-2039	Golden Indonesia 2040-2045			
		processing off-grade food materials											
		12. Campaign to save food loss through gleaning activities to beneficiaries and givers		6.4.B Existence of off-grade food material processing	There is no data collection on off-grade food processing	N/A	The existence of off-grade food processing in 2 cities / regencies of Bali Province	The existence of off-grade food processing in 4 cities / regencies of Bali Province	The existence of off-grade food processing in 6 cities / regencies of Bali Province	The existence of off-grade food processing in 9 cities / regencies of Bali Province	Regency/City Agencies - Distanpangan - Disperindag	Bali Provincial Agencies -Distanpangan - Disperindag	
				6.4.C Number of participants in off-grade food material processing	There is no data collection on the amount of participation in off-grade food processing	N/A	Data collection on participation in off-grade food processing	Data collection on participation in off-grade food processing	Data collection on participation in off-grade food processing	Data collection on participation in off-grade food processing	Regency/City Agencies - Distanpangan - Disperindag	Bali Provincial Agencies - Distanpangan - Disperindag - Diskop UKM	
				6.4.D Number of gleaning activities as an effort to salvage off-grade food materials	There is no data collection on Gleaning activities in Bali Province.	N/A	There is gleaning activity every year	There is gleaning activity every year	There is gleaning activity every year	There is gleaning activity every year	Regency/City Agencies - Distanpangan	Bali Provincial Agencies - Distanpangan	
6.5	Development of research and studies on the management of food loss, surplus food, and food waste	13. Research programs and studies to obtain data related to the management of food loss, surplus food and food waste such as qualitative studies of enabling conditions, causes and drivers.	Enhancing research and studies to support the implementation of food loss, surplus food, and food waste management across all cities and regencies in Bali Province	6.5.A Number of research studies and publications related to the management of food loss, surplus food, and food waste	Surplus Food = 293 journals Food Waste = 4 journals Source: Udayana and Warmadewa University Publications 2022-2024	297	The existence of studies related to the management of Food Loss, Surplus Food, and Food Waste in Bali	The existence of studies related to the management of Food Loss, Surplus Food, and Food Waste in Bali	The existence of studies related to the management of Food Loss, Surplus Food, and Food Waste in Bali	The existence of studies related to the management of Food Loss, Surplus Food, and Food Waste in Bali	Regency/City Agencies - DKLH - Distanpangan - BRIDA Educational Institutions/ Academia NGOs Private Sector	Bali Provincial Agencies - DKLH - Distanpangan - BRIDA Educational Institutions/ Academia	State Budget (APBN), Regional Budget (APBD), and other lawful funding sources in accordance with applicable regulations
		14. <i>Pilot projects related to managing food loss, surplus food, and food waste, as well as business modeling for integrated food systems and waste management.</i>		6.5.B Number of pilot projects for developing food loss, surplus food, and food waste management	Gianyar: Ketewel village, Sukawati village, Bona village, Taro village, Lembeng village Jembrana: Mendoyo Dangin Tukad Village, Belimbing Sari Village Badung: Tanjung Benoa Traditional Village and Gulingan Village Tabanan: Bengkel Village Buleleng: Bakti Segara Village Source: DKLH Bali, 2024	Pilot project related to food waste management in 5 regencies	The existence of min. 1 pilot development of food loss, surplus food, and food waste in 7 cities/regencies	The existence of min. 1 pilot development of food loss, surplus food, and food waste in 9 cities/regencies				Regency/City Agencies - DKLH - Distanpangan - BRIDA Educational Institutions/ Academia	Bali Provincial Agencies - DKLH - Distanpangan - BRIDA Educational Institutions/ Academia

STRATEGY VI. Research and Development in Food Loss, Surplus Food, & Food Waste Management													
No	Action Plan Recommendations	Proposed Programs	Objectives	Indicator	Initial Conditions	Existing 2024	Period				Primary Agencies	Supporting Agencies	Funding Sources
							Short Term 2025-2029	Medium Term 2030-3034	Long Term 2035-2039	Golden Indonesia 2040-2045			
6.6	Smart Farming development in sustainable agriculture development	15. Data collection on the number of farmers implementing smart farming in Bali 16. Development of smart farming technology in Bali	Utilizing technology to support agriculture	6.6.A Number of farmers implementing smart farming in Bali	6 Farmers developing smart farming in 5 regencies/city Source: Smart Farming Mimba Farm 2024, Smart Farming PMK Gobleg 2022, Smart Farming PMK Sayram Garden 2023, Drone Technology Denpasar 2024	6 farmers in 5 regencies/city	There are 7 farmers developing smart farming in 6 regencies/ city	There are 8 farmers developing smart farming in 7 regencies/ city	There are 9 farmers developing smart farming in 8 regencies/ city	There are 10 farmers developing smart farming in 9 regencies/ city	Regency/City Agencies - Distanpangan - BRIDA Educational Institutions/ Academia NGOs Private Sector	Bali Provincial Agencies - Distanpangan - BSIP	State Budget (APBN), Regional Budget (APBD), and other lawful funding sources in accordance with applicable regulations

Table 3.7 Strategy VII. Implementation of Incentives and Disincentives for Food Loss, Surplus Food, & Food Waste Management

STRATEGY VII. Implementation of Incentives and Disincentives for Food Loss, Surplus Food, & Food Waste Management

The application of Incentives and Disincentives for Food Loss, Surplus Food, and Food Waste Management is carried out to relevant stakeholders (both households, non-households, and food workers) in the Management of Food Loss, Food Waste, and Food Waste in accordance with established regulations and performance indicators. The provision of incentives and disincentives, in addition to encouraging participation in SSP & Food Waste management efforts, is also a form of monitoring and evaluation carried out by policy makers.

STRATEGY VII. Implementation of Incentives and Disincentives for Food Loss, Surplus Food, & Food Waste Management													
No	Action Plan Recommendations	Proposed Programs	Objectives	Indicator	Initial Conditions	Existing 2024	Period				Primary Agencies	Supporting Agencies	Funding Sources
							Short Term 2025-2029	Medium Term 2030-2034	Long Term 2035-2039	Golden Indonesia 2040-2045			
7.1	Providing incentives and disincentives to stakeholders related to Food Loss, Surplus Food, and Food Waste Management in accordance with established regulations and performance indicators.	1. Providing incentives to stakeholders related to the management of Food Loss, Surplus Food, Food Waste based on applicable regulations	The existence of incentives and disincentives that support the absorption of local food products, responsible management of food loss, surplus food, and food waste in accordance with established regulations and performance indicators.	7.1.A Awards to stakeholders (households, non-households, farmers, fishermen, breeders) related to the management of food loss, surplus food, and food waste.	Regional Awards: 5 National Awards: 5 Source: - Regional: Perda 5/2020, Pergub 52/2021, Pergub 28/2020, Pergub 47/2019, Pergub 99/2018 - National: Permenparekraf 9/2021, Apresiasi Destinasi Pariwisata Indonesia (APDI) - Green Hotel Award, Indonesia Sustainable Tourism Awards (ISTA) Festival, Anugerah Desa Wisata Indonesia, Ministry of Trade - SNI Market Awards	N/A	There is a min. 1 award given to stakeholders related to food loss, surplus food, and food waste per year	There is a min. 1 award given to stakeholders related to food loss, surplus food, and food waste per year	There is a min. 1 award given to stakeholders related to food loss, surplus food, and food waste per year	There is a min. 1 award given to stakeholders related to food loss, surplus food, and food waste per year	Regency/City Agencies - DLH - Distanpangan - Diskelkan - Disparda - Disperindag - Diskop UKM Associations of Food Loss, Surplus Food, and Food Waste Related Stakeholders (e.g., PHRI)	Bali Provincial Agencies - DKLH - Distanpangan - Diskelkan - Disparda - Disperindag - Diskop UKM MDA Regency/City	State Budget (APBN), Regional Budget (APBD), and other lawful funding sources in accordance with applicable regulations
		2. Providing incentives related to Surplus Food management based on applicable regulations		7.1.B Incentives for Donors and Food Recovery Organization in accordance with applicable regulations (Example: tax incentives, operational technical assistance, etc.)	There are no incentives given to donors and Food Recovery Organization.	N/A	Implementation of incentives for Donors and Food Recovery Organization in accordance with applicable regulations			Bali Provincial Agencies - DKLH - Distanpangan - Diskelkan - Disparda - Disperindag - Diskop UKM	Regency/City Agencies - DLH - Distanpangan - Diskelkan - Disparda - Disperindag - Diskop UKM MDA Regency/City		
		3. Provision of disincentives based on applicable regulations		7.1.C The existence of sanctions in accordance with pararem and/or village regulations to stakeholders (Households and Non-Households) related to the management of Food Loss, Surplus Food, and Food Waste	Total registered pararems : 45 Recorded warning letters related to environmental pollution, especially garbage: N/A Source: DPMA, 2023	N/A	The existence of a sanction system in accordance with the pararem for stakeholders related to food loss, surplus food, and food waste			MDA Regency/City DPMA Bali Provincial Traditional Villages	Bali Provincial Agencies - DKLH - Distanpangan - Diskelkan MDA Provincial Agencies		



04

ALIGNMENT WITH NATIONAL AND REGIONAL AGENDAS

CHAPTER 4. Alignment of Strategy & Action Plan Formulation for Food Loss, Surplus Food, and Food Waste Management in Bali Province with National and Regional Agendas

In formulating recommendations for the Strategy and Action Plan for Food Loss, Surplus Food, and Food Waste Management in Bali Province, the connection between the policy recommendations and other planning documents, both at the national and regional levels, is identified. This identification is conducted to ensure that the formulated recommendations can support the goals of national agendas and align with policies currently being implemented in Bali Province. The following outlines the connection between the Strategy and Action Plan Recommendations for Food Loss, Surplus Food, and Food Waste Management in Bali Province with several planning documents, including (1) Sustainable Development Goals (SDGs), (2) Roadmap for Food Loss and Surplus Food Management, (3) Roadmap and National Action Plan for Circular Economy (RAN-ES) in Indonesia 2025-2045, (4) Regional Long-Term Development Plan (RPJPD) of Bali Province 2005-2025, (5) Regional Low Carbon Development Plan (RPRKD) of Bali Province, and (6) Roadmap for Economic Transformation of Bali Province.

Alignment with *Sustainable Development Goals (SDGs)*

The Sustainable Development Goals (SDGs) represent global and national commitments to improving societal well-being through 17 goals and targets for 2030, established by both developed and developing countries during the UN General Assembly in September 2015. Among these, **SDG 12: Responsible Consumption and Production** focuses on ensuring sustainable consumption and production patterns. The strategies and action plans for managing food loss, surplus, and food waste in Bali Province align with **Target 12.3, which aims to halve per capita global food waste at the retail and consumer levels and reduce food losses along production and supply chains, including post-harvest losses, by 2030⁵¹.**

Based on the Indonesia Sustainable Development Goals Roadmap for 2023–2030, aligned with Indonesia’s Vision 2045, several steps have been outlined to support food loss, surplus, and food waste reduction by 2030. These include transitioning to modern agriculture, developing the food and beverage industry, and promoting healthy and productive food consumption patterns. These objectives are also in line with the 2020–2024 National Medium-Term Development Plan (RPJMN), which emphasizes strategies such as increasing productivity and sustainable production techniques, improving the quality of food consumption, and managing food waste.

⁵¹ Bappenas (2023). Roadmap for Sustainable Development Goals 2023 – 2030.

The strategies and action plans for managing food loss, surplus, and food waste in Bali have been formulated to accommodate the **five key food loss, surplus, and food waste management strategies identified by research from Bappenas** including (1) Behavioral Change, (2) Improving Food System Support, (3) Strengthening Regulations & Optimizing Funding, (4) Utilization of Food Loss and Waste, (5) Development of FLW Study & Data Collection.

Efforts to achieve SDG 12 are closely linked to **SDG 2: Zero Hunger**, which aims to eliminate hunger, achieve food security and improved nutrition, and promote sustainable agriculture. Key recommendations from Indonesia SDGs Roadmap 2023–2030 that intersect with Bali’s food loss, surplus, and food waste management strategies include:

1. Accelerating reductions in food loss by utilizing appropriate technology for harvesting, processing, storage, and food distribution to retail levels.
2. Enhancing small-scale farmers’ access to financing, technology, innovation, input and output markets, and market information.
3. Strengthening the development of local food-based industries, particularly food SMEs, to ensure the availability of diverse and safe processed food products.
4. Promoting agricultural insurance for farmers and fishers to ensure income stability and provide production incentives.
5. Empowering women, youth, and small-scale farmers by improving skills, providing business support, and offering diverse economic opportunities across agricultural and food supply chains.
6. Reducing food waste by increasing public knowledge, awareness, and attitudes toward the economic, social, and environmental value of food, including supporting community initiatives such as food rescue, save food programs, and food banks.

Alignment with The Roadmap for Food Loss and Surplus Food Management

In 2024, the Government of Indonesia, through the Ministry of National Development Planning/Bappenas, released the **Roadmap for Food Loss and Surplus Food Management to Support the Achievement of Food Security Toward 2045 Golden Indonesia Vision**.

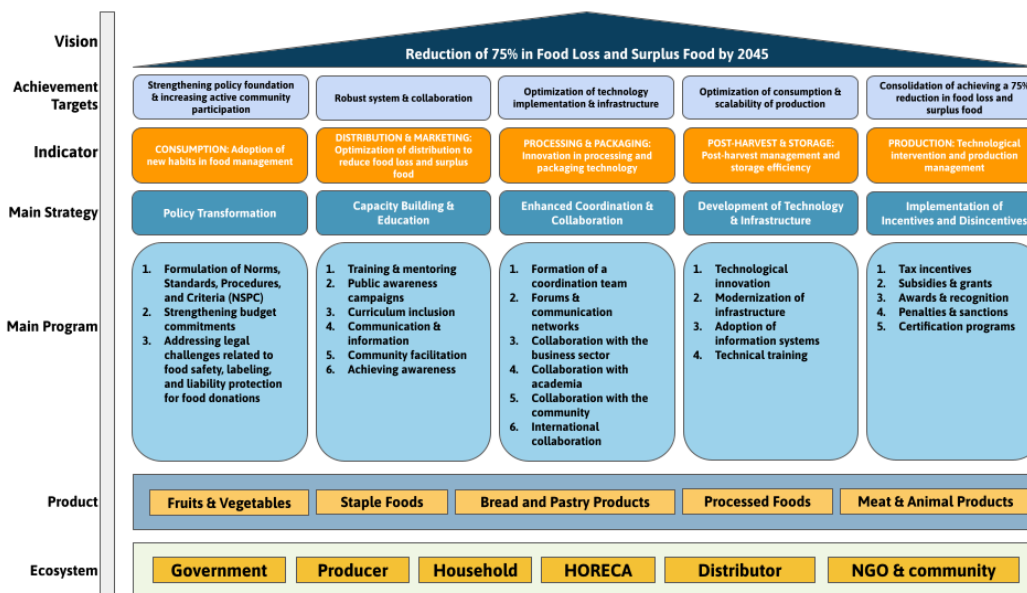


Figure 4.1 Roadmap of Food Loss and Surplus Food Reduction in Indonesia Framework⁵²

With this roadmap, Indonesia aims to **reduce food loss and surplus food by 50% in 2030 and 75% in 2045, using the optimistic strategy**. Meanwhile, **under the pessimistic strategy, the reduction target for Food Loss and Surplus Food is set at 35% by 2030 and 50% by 2045**⁵³. Based on this, the reduction of Food Loss, Surplus Food, and Food Waste in Bali is targeted following the targets set at the national level. In the Business-As-Usual (BAU) scenario, where it is assumed that there is no intervention to reduce Food Loss, Surplus Food, and Food Waste, the projected volume in Bali is expected to reach **1.4 million tons or 1,429 thousand tons** in 2045. The following graph compares Bali Province’s food loss, surplus food, and food waste generation in the BAU scenario with the generation using optimistic and pessimistic strategies.

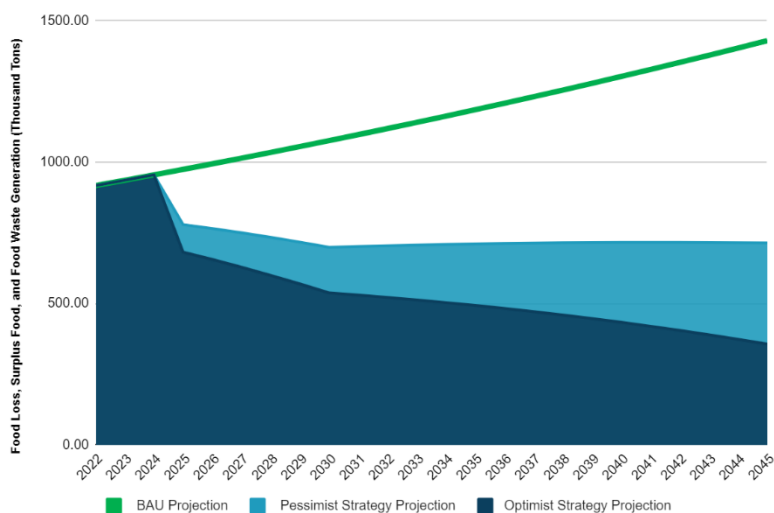


Figure 4.2 BAU and Strategy Projection of Food Loss, Surplus Food, and Food Waste Generation in Bali Province 2022-2045

⁵² Bappenas (2024). Roadmap for Food Loss and Surplus Food Management to Support the Achievement of Food Security Toward 2045 Golden Indonesia Vision.

⁵³ Bappenas (2024). Roadmap for Food Loss and Surplus Food Management to Support the Achievement of Food Security Toward 2045 Golden Indonesia Vision.

With the optimistic strategy, the Food Loss, Surplus Food, and Food Waste Generation in Bali Province is projected to reach **357 thousand tons** in 2045, a **reduction of 75%** compared to the BAU projection (projected without intervention).

Table 4.1 Optimistic Strategy Projection of Food Loss, Surplus Food, and Food Waste Generation in Bali Province

Optimistic Strategy						
Year	Food Loss		Surplus Food		Food Waste	
Existing (thousand tons/year) (2021)	497.29		185.18		194.76	
Target	Reduction (%)	Food Loss (thousand tons)	Reduction (%)	Surplus Food (thousand tons)	Reduction (%)	Food Waste (thousand tons)
2025	30.00%	388.71	30.00%	143.00	30.00%	150.39
2030	50.00%	306.54	50.00%	112.80	50.00%	118.64
2035	58.33%	281.35	58.33%	103.56	58.33%	108.92
2040	66.67%	247.37	66.67%	91.08	66.67%	95.79
2045	75.00%	203.50	75.00%	74.94	75.00%	78.82

Meanwhile, under the pessimistic strategy, the Food Loss, Surplus Food, and Food Waste Generation in Bali Province is projected to reach **714 thousand tons** in 2045, a **reduction of 50%** compared to the BAU projection (projected without intervention).

Table 4.2 Pessimistic Strategy Projection of Food Loss, Surplus Food, and Food Waste Generation in Bali Province

Pessimistic Strategy						
Year	Food Loss		Surplus Food		Food Waste	
Existing (thousand tons/year) (2021)	497.29		185.18		194.76	
Target	Reduction (%)	Food Loss (thousand tons)	Reduction (%)	Surplus Food (thousand tons)	Reduction (%)	Food Waste (thousand tons)
2025	20.00%	444.24	20.00%	163.42	20.00%	171.88
2030	35.00%	398.50	35.00%	146.64	35.00%	154.23
2035	40.00%	405.15	40.00%	149.13	40.00%	156.84
2040	45.00%	408.16	45.00%	150.28	45.00%	158.05
2045	50.00%	406.99	50.00%	149.88	50.00%	157.63

Alignment with The Roadmap and National Action Plan for Circular Economy in Indonesia 2025-2045

The circular economy (CE) is an economic model that applies a systemic approach to minimize resource use, design extended-use products, and return residuals from production and consumption processes to the value chain⁵⁴. The Roadmap and National Action Plan for Circular Economy in Indonesia focuses on five priority sectors, one of which is the **Food Sector**. The achievement of circular economy implementation in Indonesia is measured using 3 leading indicators:

⁵⁴ Bappenas (2024). The Roadmap and National Action Plan for Circular Economy in Indonesia 2025-2045.

1. Circular Input Rate

This indicator measures resource use efficiency in producing goods or services, including using recycled materials and reused inputs.

2. Usage Rate

This indicator measures the lifespan of a product before it is finished being used or consumed. Durable products contribute to the circular economy by extending the time between production and disposal, reducing resource extraction and disposal frequency.

3. Recycling Rate

This indicator shows how effectively a system manages residual products and materials that have reached the end of their useful life by converting them back into usable and valuable forms.

The following outlines the connection between implementing the Strategy and Action Plan for Food Loss, Surplus Food, and Food Waste Management in Bali Province and The Roadmap and National Action Plan for Circular Economy in Indonesia.

Table 4.3 Alignment between the implementation of the Strategy and Action Plan for Food Loss, Surplus Food, and Food Waste Management in Bali Province with The Roadmap and National Action Plan for Circular Economy in Indonesia

Indicator	Indication	Implementation	Food Sector Baseline	Implementation of CE in the Food Sector of Bali Province Baseline	Contribution of Bali's Food Loss, Surplus Food, & Food Waste Regional Action Plan to the Enhancement of National Food Sector CE Implementation by 2045
Circular Input Rate^a	On-farm/ Cultivation	<ul style="list-style-type: none"> % Utilization of organic fertilizer VS chemical fertilizer % Utilization of environmentally friendly packaging for food versus regular plastic bags 	2.88%	-	-
Usage Rate	<ul style="list-style-type: none"> Food Loss Surplus Food 	<ul style="list-style-type: none"> Overripe harvests processed into fruit preserves Commonly inedible parts of fish turned into crackers Surplus food recovery in HORECA 	0.0038%	0.22% ^b	0.72% ^c
Recycling Rate	Food Waste	Recycling of food waste into animal feed, compost, and Black Soldier Fly (BSF) cultivation	16.3%	7.51% ^d	0.60% ^e

^aThe indicator for the Circular Input Rate cannot be identified as this study does not review on-farm/cultivation activities, and data on bioplastic use in Bali is not yet available

^bRecovered Surplus Food in Bali Province divided by Surplus Food generation from regional project sampling (2021)

^cProjection of Surplus Food recovered in Bali Province 2045 (75% reduction) divided by Surplus Food generation in Indonesia 2045

^dRecycled Food Waste as compost and animal feed in Bali Province divided by Food Waste generation in Bali Province (SIPSN, 2023)

^eProjection of Food Waste reduced in Bali Province 2045 (75% reduction) divided by Food Waste generation in Indonesia 2045

Based on the table above, the targets for managing Food Loss, Surplus Food, and Food Waste in Bali Province align with the objectives outlined in the Circular Economy Roadmap and Action Plan for Indonesia, where:

1. Successful implementation of the targets could contribute 0.72% to the national food utilization rate.
2. It could also support 0.60% of the national food waste recycling rate.

Alignment with the Regional Long-Term Development Plan of Bali Province 2005-2025

The Regional Long-Term Development Plan (RPJPD) *Semesta Berencana* of Bali Province for 2005-2025 is a regional development planning document for Bali Province formulated in alignment with the National Long-Term Development Plan. This RPJPD is a guideline for developing the Regional Medium-Term Development Plan (RPJMD) for Bali Province every five years⁵⁵.

The vision for regional development in Bali Province, as outlined in the RPJPD *Semesta Berencana* of Bali Province 2005-2025, is “*Nangun Sat Kerthi Loka Bali*” which means “Maintaining the sanctity and harmony of Bali, to achieve a prosperous and happy life for the Balinese people, both physically and spiritually, following Bung Karno's Trisakti Principle: sovereign in politics, self-reliant in economy, and distinctive in culture, through structured, comprehensive, planned, directed, and integrated development within the framework of Republic of Indonesia based on the values of Pancasila, June 1st 1945”⁵⁶.

This vision is implemented through 22 missions of Bali's development, further detailed with objectives, targets, programs, and indicators outlined in the RPJMD *Semesta Berencana* of Bali Province for 2018-2023⁵⁷. The missions directly related to efforts for Food Loss, Surplus Food, and Food Waste management include:

a. **Mission 1: Ensuring adequate supply and quality of food, clothing, and housing for the lives of the Balinese people.**

The objective of this mission is to fulfil food needs, with one of its targets being to enhance Bali's food security. To achieve this objective, strategies outlined in the RPJMD include improving the quality, distribution, and accessibility of food for the community. This aligns with the efforts to manage Food Loss, Surplus Food, and Food Waste, as improved food quality and accessibility lead to higher food absorption, reducing both Food Loss and Surplus Food that would otherwise turn into Food Waste.

This study supports this mission with several strategy recommendations, such as **Strategy IV**, which focuses on improving supporting facilities from the production to the distribution and marketing

⁵⁵ Regional Regulation of Bali Province No.2/2019 on The Regional Long-Term Development Plan (RPJPD) *Semesta Berencana* of Bali Province for 2005-2025

⁵⁶ Regional Regulation of Bali Province Number 2 of 2019 on the Regional Long-Term Development Plan (RPJPD) *Semesta Berencana* of Bali Province for 2005-2025.

⁵⁷ Regional Regulation of Bali Province Number 7 of 2022 on Amendments to Regional Regulation Number 3 of 2019 on the Regional Medium-Term Development Plan (RPJMD) *Semesta Berencana* of Bali Province for 2018-2023.

stages, and **Strategy III**, which focuses on capacity building, including enhancing the skills of food workers and promoting the consumption of local food products.

b. Mission 2: Achieving food independence, increasing agriculture's added value and competitiveness, and improving farmers' welfare.

This mission aims to achieve food self-sufficiency and competitiveness in agriculture, with targets including improving the quality of agricultural products and enhancing human resources in the agricultural sector. In this study, this mission relates to **Strategy III** on capacity building and **Strategy IV** on improving supporting facilities to enhance food quality. Additionally, there is **Strategy VI** on research and development, which aims to increase the market value and absorption of food products, thereby reducing Food Loss and Surplus Food that would otherwise become Food Waste. **Strategy II** on optimizing funding and **Strategy VII** on incentives and disincentives also indirectly support Food Loss, Surplus Food, and Food Waste management efforts, which in turn helps improve farmers' welfare in line with Mission 2 of the RPJPD.

c. Mission 12: Strengthening the position, duties, and functions of Traditional Villages (*Desa Pakraman/Desa Adat*) in organizing the lives of the Balinese people, encompassing *Parahyangan, Pawongan, and Palemahan*.

In terms of governance structure, Bali is unique compared to other regions, as it has two types of village governance: administrative villages and cultural/traditional villages. The administrative village, *Desa Dinas*, runs administrative governance similar to villages outside Bali in general. Under *Desa Dinas*, there are sub-villages or *Dusun/Banjar Dinas*. The traditional village in Bali is called *Desa Adat* or *Desa Pakraman*, and under *Desa Adat*, there is *Banjar Adat*. The core elements of *Desa Adat* are based on the *Tri Hita Karana* philosophy (three causes of happiness or well-being), which includes (1) *Parahyangan* - harmonious relations between humans and God, (2) *Pawongan* - harmonious relations among humans, and (3) *Palemahan* - harmonious relations between humans and nature, including the environment, plants, and animals. Philosophically, the RPJPD of Bali Province for 2005-2025 is based on the *Tri Hita Karana* philosophy, which is further elaborated and operationalized in the local wisdom of *Sad Kerthi*. *Sad Kerthi* consists of six efforts to maintain the balance of the universe, including (1) purifying the soul (*atma kerthi*), (2) preserving forests (*wana kerthi*), (3) preserving clean water sources such as lakes (*danu kerthi*), (4) preserving the sea (*segara kerthi*), (5) maintaining dynamic social and environmental harmony (*jagat kerthi*), and (6) building the quality of human resources both individually and collectively (*jana kerthi*)⁵⁸.

⁵⁸ Regional Regulation of Bali Province Number 2 of 2019 on the Regional Long-Term Development Plan (RPJPD) Semesta Berencana of Bali Province for 2005-2025.

In this study, *Desa Adat* itself, as well as through the Advancement of Indigenous Peoples Agency/*Dinas Pemanjauan Masyarakat Adat* (DPMA) and the Traditional Villages Council/*Majelis Desa Adat* (MDA), is heavily involved as the responsible institution for each strategy. In **Strategy I**, regulatory strengthening is applied through formulating *pararem* (traditional village regulations). The involvement of *Desa Adat* in the strategy and recommendations in this study supports the objectives of Mission 12 of Bali's Development based on the RPJPD, which is the strengthening of traditional villages.

d. Mission 21: Developing the Balinese people's way of life, organizing regions, and maintaining a green, beautiful, and clean environment.

One of the objectives of this mission is to create a clean, green, and beautiful region. Based on the RPJMD of Bali Province for 2018-2023, some indicators for this mission are the percentage reduction and management of household waste. This study's seven strategy recommendations for Food Loss, Surplus Food, and Food Waste management can support Mission 21. Furthermore, there are targets for reducing Food Loss, Surplus Food, and Food Waste that align with the indicators of this mission. With integrated data collection (**Strategy V**), performance achievements are expected to be better measured and serve as a basis for future evaluations.

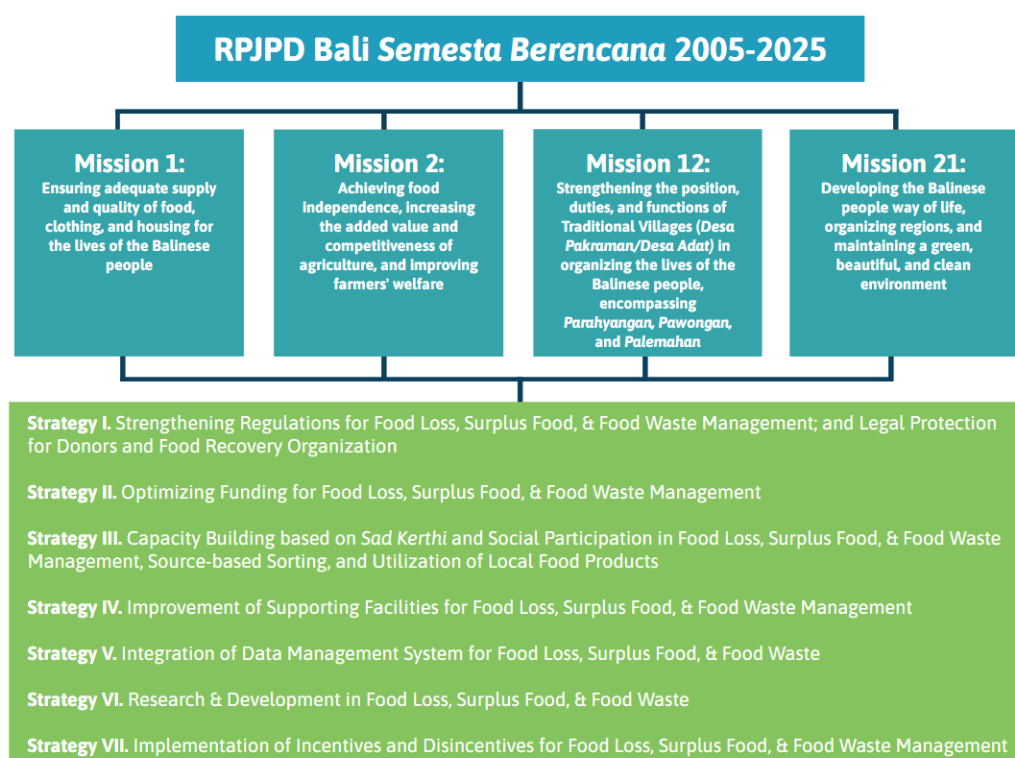


Figure 4.3 Alignment between Strategy and Action Plan for Food Loss, Surplus Food, and Food Waste Management in Bali Province with RPJPD of Bali Province for 2005-2025

Alignment with the Regional Low Carbon Development Plan of Bali Province

The Regional Low Carbon Development Plan (RPRKD) for Bali Province is a planning document that provides alternative policy strategies for the Bali regional government to pursue development that sustains

economic and social growth through low-emission development activities while minimizing the exploitation of natural resources⁵⁹.

The scope of analysis for the RPRKD in Bali Province covers **(1) Land-based sectors**, which include agriculture (paddy fields), farm, forestry, and coastal/marine subsectors; **(2) Energy-based sectors**, including energy and transportation subsectors; and **(3) Waste-based sectors**, covering solid waste and wastewater.

The RPRKD also includes an estimation of Greenhouse Gas (GHG) emission reduction based on two policy scenarios: fair and ambitious. Under the BAU scenario, Bali Province's emissions will reach around 10 million tons of CO₂eq by 2045. In contrast, emissions would decrease to 6 million tons CO₂eq under the fair scenario and drop further to 2 million tons CO₂eq under the ambitious scenario.

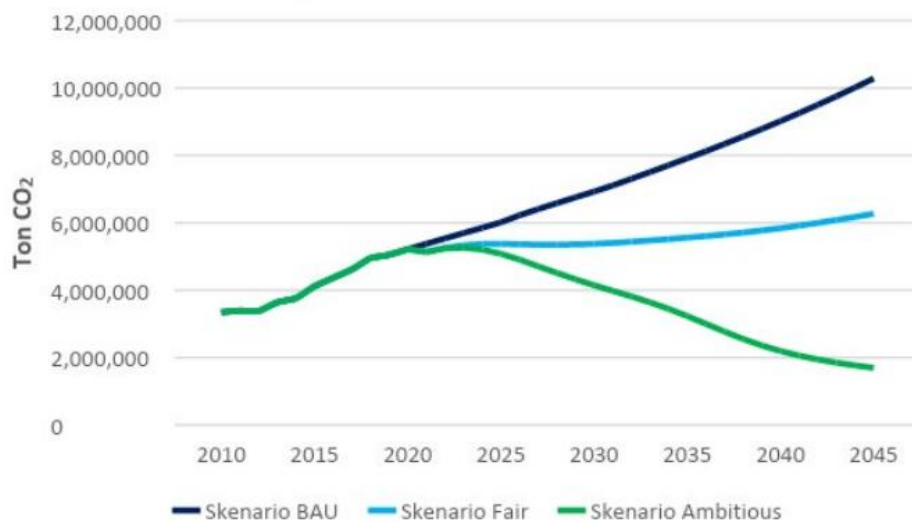


Figure 4.4 GHG Emissions Projection in Bali Based on RPRKD Bali Province⁶⁰

Efforts to manage Food Loss, Surplus Food, and Food Waste can support the emission reduction targets outlined in the RPRKD of Bali Province. Based on the reduction targets for Food Loss, Surplus Food, and Food Waste aligned with national targets in this study, under a pessimistic strategy, GHG emissions from Food Loss, Surplus Food, and Food Waste are projected to decrease by 50%, reaching 1.62 million tons CO₂eq compared to the BAU scenario's emission projection of 3.23 million tons CO₂eq by 2045. Meanwhile, under an optimistic strategy, GHG emissions from Food Loss, Surplus Food, and Food Waste will decrease by 75%, reaching 0.81 million tons of CO₂eq compared to the BAU scenario's emission projection by 2045.

⁵⁹ Bappenas and the Bali Provincial Government (2022). Regional Low Carbon Development Plan (RPRKD) of Bali Province.

⁶⁰ Bappenas and the Bali Provincial Government (2022). Regional Low Carbon Development Plan (RPRKD) of Bali Province.

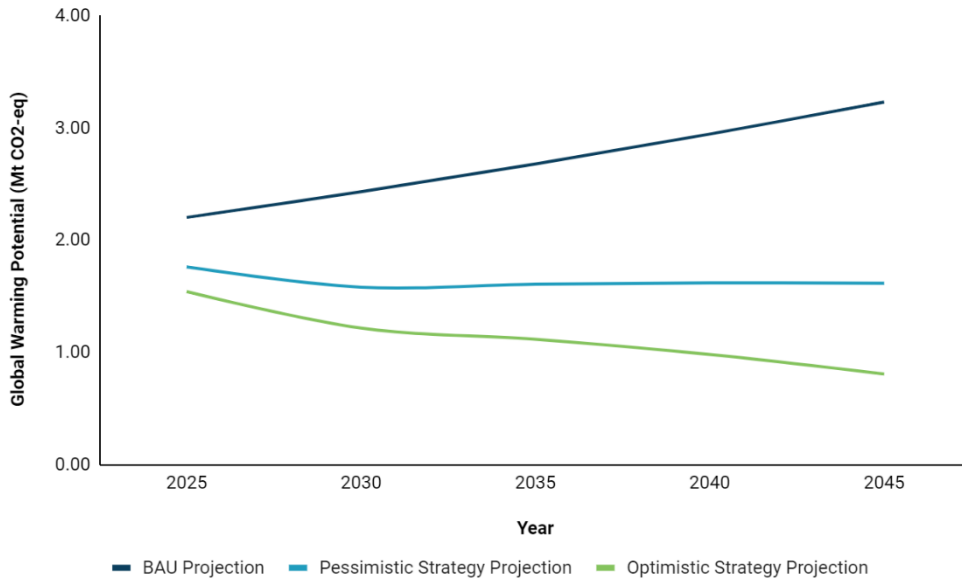


Figure 4.5 Projection of GHG Emissions from Food Loss, Surplus Food, and Food Waste Bali Province

Based on the subsectors in the RPRKD, efforts to manage Food Loss, Surplus Food, and Food Waste are related to the agricultural, farm, and solid waste subsectors. The following is an overview of the connection between the RPRKD subsectors of Bali Province and the Recommendations of Strategy and Action Plan for Food Loss, Surplus Food, and Food Waste Management in Bali Province.

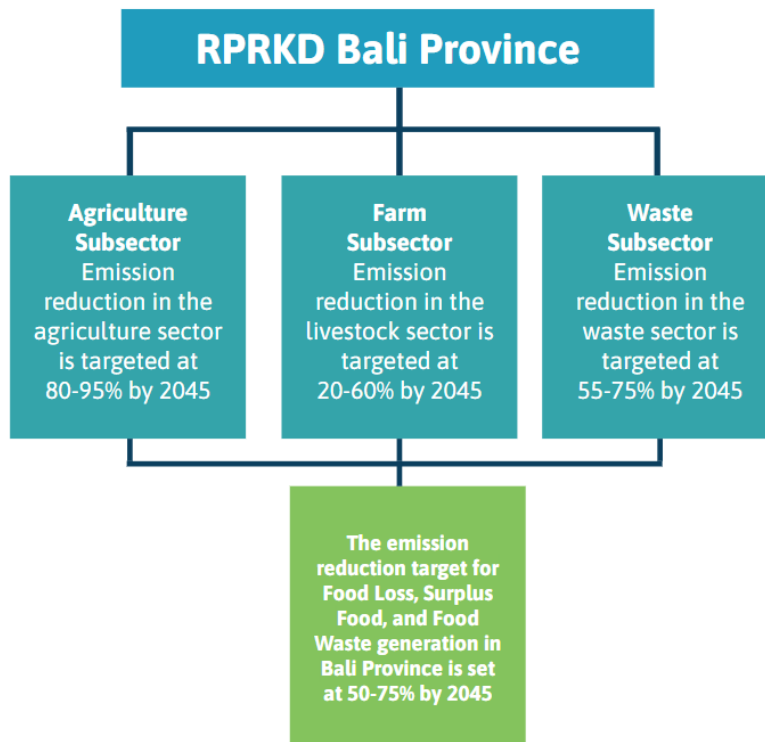


Figure 4.6 Alignment between Strategy and Action Plan for Food Loss, Surplus Food, and Food Waste Management in Bali Province with RPRKD of Bali Province

Alignment with the Roadmap for Economic Transformation of Bali Province

To achieve the economic recovery of Bali from the COVID-19 pandemic's impact and the medium to long-term economic transformation of Bali, the Ministry of National Development Planning/Bappenas, supported by the Regional Government of Bali Province, has developed the **Roadmap of Kerthi Bali Economic Towards a New Era of Bali: Green, Resilient, and Prosperous**⁶¹. The Bali Economic Transformation is an economic development process that encompasses six significant strategies: (1) Smart and Healthy Bali, (2) Productive Bali, (3) Green Bali, (4) Integrated Bali, (5) Bali Smart Island, and (6) Conducive Bali.

The *Kerthi Bali* Economic Roadmap is related to the Action Plan for Food Loss, Surplus Food, and Food Waste Management in Bali Province, where one of the efforts to increase productivity under strategy **(2) Productive Bali** is through Agriculture Modernization, which is a food sector included within the scope of this study. Additionally, several efforts under strategy **(3) Green Bali** related to Food Loss, Food Surplus, and Food Waste management include the Transformation of Waste Management, one of which is to develop food and waste management and a food bank system. Another step involves addressing the impacts of climate change by enhancing farmers' skills in sustainable agriculture practices, which includes managing sorted organic waste (food/kitchen waste and garden waste) into organic fertilizers.

The following is a general overview of the alignment between the Strategy and Action Plan for Food Loss, Surplus Food, and Food Waste Management in Bali Province with The Roadmap for Economic Transformation of Bali Province.

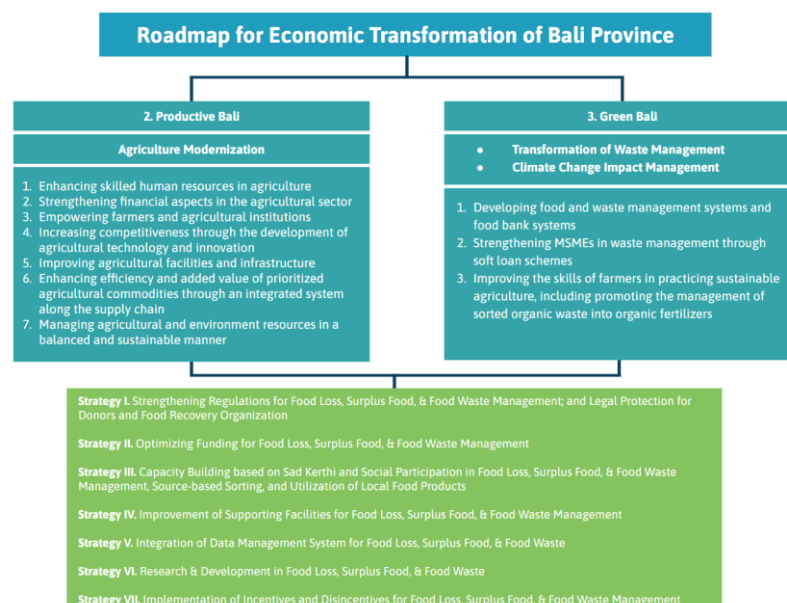


Figure 4.7 Alignment between Strategy and Action Plan for Food Loss, Surplus Food, and Food Waste Management in Bali Province with Roadmap for Economic Transformation of Bali Province

⁶¹ Bappenas and the Bali Provincial Government (2021). Roadmap for the Kerthi Bali Economy Towards a New Era of Bali: Green, Resilient, and Prosperous.



05

IMPLEMENTATION, MONITORING, EVALUATION & REPORTING

CHAPTER 5. Implementation, Monitoring, Evaluation, and Reporting within the Framework of the Strategy & Action Plan for Food Loss, Surplus Food, & Food Waste Management in Bali Province

To achieve the shared objectives, it is crucial to align the developed strategies with an effective coordination system among all stakeholders. This study incorporates action plans with indicators that specify lead and supporting agencies, reflecting stakeholder involvement. Beyond serving as lead and supporting entities, stakeholders are also target recipients of certain programs or indicators within the strategies or action plans. The indicators in the matrix can be utilized as KPIs for the government to monitor progress in reducing food loss, food surplus, and food waste.

To bridge the strategies with the stakeholder coordination system, the roles of each stakeholder are outlined into three primary categories: promoter, facilitator, and enabler, across various stages including implementation, monitoring, reporting, and evaluation.

Coordination and Institutional Framework for Implementation, Monitoring, Evaluation, and Reporting

Based on Law Number 25 of 2004 concerning the National Development Planning System (SPPN) and Government Regulation Number 39 of 2006, the national development planning cycle consists of four stages: Plan Preparation, Determination, Control of Plan Implementation, and Evaluation of Plan Implementation. Control, evaluation, and reporting (PEP) ensure that programs or activities run according to plan through monitoring and supervision. This regulation stipulates that the Ministry of National Development Planning/Bappenas is responsible for monitoring the implementation of central development programs through the Work Plan of Ministries/Agencies (Renja-K/L). At the regional level, the Governor, Regent/Mayor, and Heads of Provincial and Regency/City Government Agencies monitor the implementation of tasks according to their respective authorities. This monitoring includes realizing fund absorption, achieving output targets, and encountering challenges. The Strategy and Action Plan for the Management of Food Loss, Surplus Food, and Food Waste in Bali Province have been integrated into various planning documents, such as the FLW Management Roadmap, the Circular Economy National Strategy and Action Plan 2025-2045, Bali Provincial Long-Term Development Plan (RPJPD) 2005-2025, Bali Provincial Regional Development Plan (RPRKD), and the Bali Economic Transformation Roadmap.

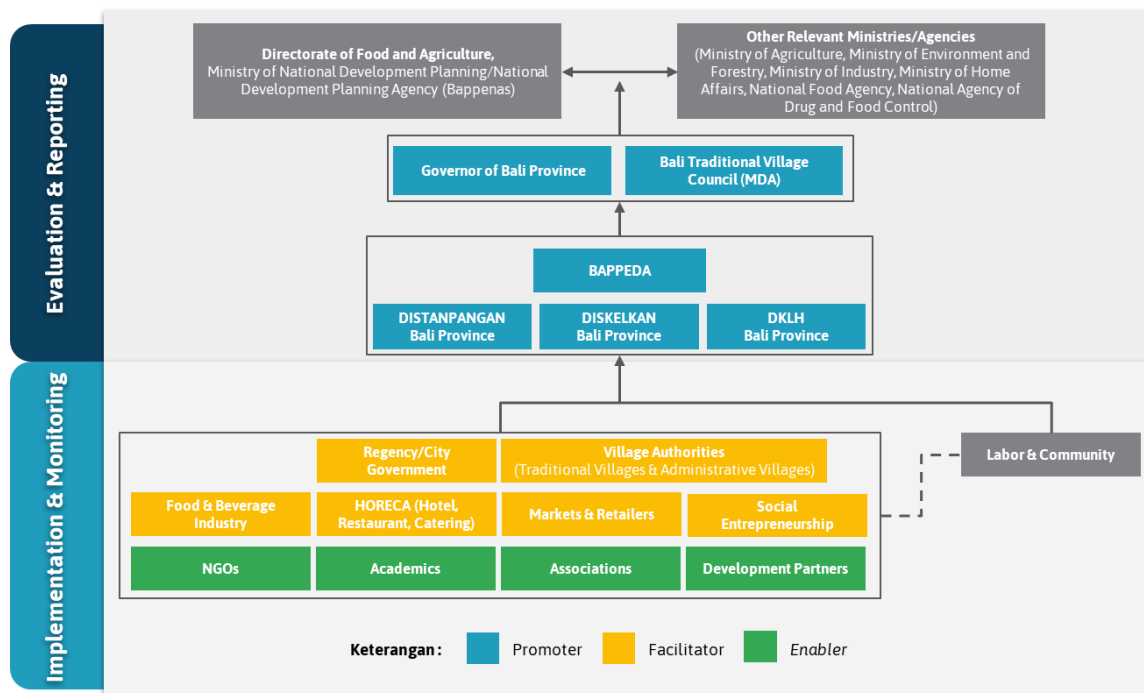


Figure 5.1 Coordination and Institutional Framework for Implementation, Monitoring, Evaluation, and Reporting of Strategy and Action Plan of Food Loss, Surplus Food, and Food Waste in Bali Province

In the implementation, monitoring, evaluation, and reporting of the Strategy & Action Plan for Food Loss, Surplus Food, and Food Waste Management in Bali Province, there are three leading roles: promoter, facilitator, and enabler;

1. Promoter:

- **Evaluation:** Assess the strategy's success by reviewing the achievement of predetermined indicators and adjusting the plan as needed.
- **Reporting:** Communicate the monitoring and evaluation results to relevant stakeholders and provide recommendations for improvement. The promoter ensures that the final report is accurate and helpful for continuous improvement.

2. Facilitator:

- **Implementation:** Provide mechanisms to ensure effective coordination among involved parties, address obstacles, and offer solutions for smooth strategy execution.
- **Monitoring:** Collect necessary data, ensure open communication, identify issues early, and facilitate resolution.

3. Enabler:

- **Implementation:** Provide the necessary resources, such as financial, technological, and informational support, and ensure that implementation needs are met, including technical training.

- **Monitoring:** Provide tools and technology to monitor strategy execution and ensure the monitoring process operates smoothly without technical issues.

These three roles complement each other to ensure that the strategy and action plan for managing Food Loss, Surplus Food, and Food Waste in Bali Province are implemented, monitored, evaluated and reported effectively and transparently.



06

CONCLUSION

CHAPTER 6. Conclusion

The amount of Food Loss, Surplus Food, and Food Waste generation in Indonesia from 2000 to 2019 reached 23–48 million tons/year, equivalent to 115–184 kg/capita/year⁶². In 2021, a regional study on Food Loss, Surplus Food, and Food Waste was conducted to obtain the latest data on **Food Loss, Surplus Food, and Food Waste generation, specifically in West Java, Central Java, and Bali Provinces**. The study's results showed that Food Loss, Surplus Food, and Food Waste generation in Bali reached 201.08 kg/capita/year, higher than the national range. The most significant proportion of food loss in Bali occurs at the production and consumption stages. The highest Food Loss, Surplus Food, and Food Waste generation in Bali were found in fruit commodities, followed by cereals and vegetables⁶³. Based on the previous result, a further study was conducted **to formulate strategy and action plan for managing Food Loss, Surplus Food, and Food Waste in Bali Province**.

Some direct causes and indirect drivers of Food Loss, Surplus Food, and Food Waste generation in Bali Province including:

Table 6.1 Causes & Drivers of Food Loss, Surplus Food, and Food Waste Generation in Bali Province

No	Causes & Drivers	Food Supply Chain Stage					Management Aspects
		Production	Post-harvest & Storage	Processing & Packaging	Distribution & Market	Consumption	
Direct Causes							
1	Facilities and Infrastructure Limitations	✓	✓	✓			Technical
2	Lack of Implementation of Good Agricultural Practice (GAP) and Good Handling Practice (GHP)	✓	✓	✓	✓		Technical
3	Poor Food Management Practices					✓	Social
Indirect Causes							
1	Limited Access to Infrastructure	✓	✓	✓			Technical
2	Lack of Information/Education for Food Workers and Consumers	✓	✓	✓	✓	✓	Social
3	Low Market Prices				✓		Financial
4	Lack of Regulation and Law Enforcement				✓	✓	Policy
5	Inefficient supply chain	✓	✓	✓	✓	✓	Institutional

Based on the Food Loss, Surplus Food, and Food Waste generated in Bali Province from 2016-2021, the total greenhouse gas (GHG) emissions generated annually ranged from 0.94 to 1.99 Mton CO₂eq, accounting for approximately 1.59% of the average national GHG emissions from SSP and food waste (85.14 Mton CO₂eq). The economic losses incurred reached IDR 6-10 trillion per year, equivalent to 4.4-7.0% of Bali's GDP annually. For surplus food, it is also edible food that is being discarded. The failure to utilize this edible portion resulting in the loss of potential nutritional value.

From the findings above, action plan for managing Food Loss, Surplus Food, and Food Waste in Bali Province has been developed with seven main strategies:

1. Strengthening Regulations for Food Loss, Surplus Food, & Food Waste Management; and Legal

⁶² Bappenas, WRI, Waste4Change dan UK-FCDO (2021). *Study Report on Food Loss and Waste in Indonesia*. Jakarta.

⁶³ Bappenas, Wrap, dan Waste4Change (2024). *Study Report Food Loss and Waste Regional – West Java, Central Java, and Bali (Unpublished Report)*. Jakarta.

- Protection for Donors and Food Recovery Organizations (FRO).
2. Optimizing Funding for Food Loss, Surplus Food, & Food Waste Management.
 3. Capacity Building based on *Sad Kerthi* and social Participation in Food Loss, Surplus Food, & Food Waste Management, Source-based Sorting, and Utilization of Local Food Products.
 4. Improvement of Supporting Facilities for Food Loss, Surplus Food, & Food Waste Management.
 5. Integration of Data Management System for Food Loss, Surplus Food, & Food Waste.
 6. Research and Development in Food Loss, Surplus Food, & Food Waste Management.
 7. Implementation of Incentives and Disincentives for Food Loss, Surplus Food, & Food Waste Management.

The seven strategies have been formulated with consideration of their urgency and will be implemented in parallel annually. Foremost, there is a need to strengthen regulations to ensure policies or legal frameworks that serve as the foundation for enforcing the reduction and management of Food Loss, Surplus Food, and Food Waste (Strategy I). These regulations will be derived from national-level regulations currently under development and will be adapted to Bali's specific conditions.

The next priority is optimizing funding, both for food management and food waste management (**Strategy II**). Funding can be sourced from various legitimate avenues or sources in compliance with applicable regulations and policies, as well as planned and allocated appropriately to support capacity building for stakeholders across the food chain, from producers to consumers (**Strategy III**) in managing food to reduce Food Loss, Surplus Food, and reducing Food Waste that will be disposed to landfill. Followed by improving facilities, whether by constructing new ones or upgrading existing infrastructure for food and food waste management (**Strategy IV**).

Subsequent steps involve monitoring these efforts through an integrated data system (**Strategy V**). Continuous research and development (**Strategy VI**) will be conducted to enhance the outcomes of implemented initiatives. Finally, the implementation of incentives and disincentives (**Strategy VII**) will complement these efforts, encouraging the reduction and management of Food Loss, Surplus Food, and Food Waste.

In 2024, the Government of Indonesia, through the Ministry of National Development Planning/Bappenas, released the **Roadmap for Food Loss and Surplus Food Management to Support the Achievement of Food Security Toward 2045 Golden Indonesia Vision**. With this roadmap, Indonesia aims to **reduce food loss and surplus food by 50% in 2030 and 75% in 2045, using the optimistic strategy**. Meanwhile, **under the pessimistic strategy, the reduction target for Food Loss and Surplus Food is set at 35% by 2030 and 50% by 2045**⁶⁴. Based on this, the reduction of Food Loss, Surplus Food, and Food Waste in Bali is targeted

⁶⁴ Bappenas (2024). Roadmap for Food Loss and Surplus Food Management to Support the Achievement of Food Security Toward 2045 Golden Indonesia Vision.

following the targets set at the national level. The following graph compares Bali Province’s food loss, surplus food, and food waste generation in the BAU scenario with the generation using optimistic and pessimistic strategies.

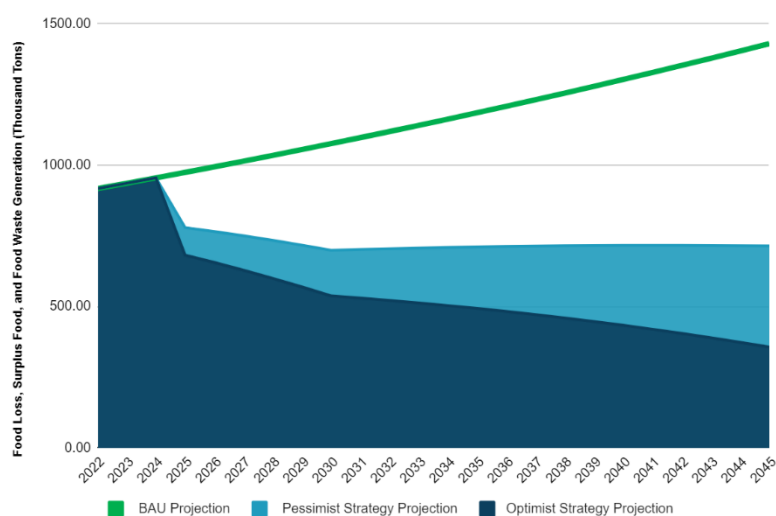


Figure 6.1 BAU and Strategy Projection of Food Loss, Surplus Food, and Food Waste Generation in Bali Province 2022-2045

Potential obstacles or limitations when implementing the proposed strategies and action plans such as:

Strategy	Potential Obstacles or Limitations	Ways to Address
I. Strengthening Regulations for Food Loss, Surplus Food, & Food Waste Management; and Legal Protection for Donors and Food Recovery Organizations (FRO).	Proposed regulations may face lengthy bureaucratic processes, lack of understanding or support from stakeholders, and potential conflicts with existing regulations.	Adopt a collaborative approach during regulation drafting, involve stakeholders early to ensure their needs are addressed, and harmonize new regulations with existing ones to avoid overlaps.
II. Optimizing Funding for Food Loss, Surplus Food, & Food Waste Management.	Difficulties in attracting investment from the private sector or CSR programs and limited regional budget allocations due to competing priorities.	Develop incentive schemes for funding contributions and advocate with government stakeholders to ensure related budgets are prioritized in regional development plans.
III. Capacity Building based on <i>Sad Kerthi</i> and social Participation in Food Loss, Surplus Food, & Food Waste Management, Source-based Sorting, and Utilization of Local Food Products.	Low interest and awareness among communities, limited access to training, and challenges in finding experts who can deliver culturally relevant training.	Use a community-based approach to identify specific needs, provide practical and relevant training, and engage local cultural or religious leaders to enhance trust and participation.
IV. Improvement of Supporting Facilities for Food Loss, Surplus Food, & Food Waste Management.	Challenges in facility development include limited land availability, land ownership conflicts, or resistance from the surrounding community to new facility construction.	Implement community-based approaches during the planning stage to increase public acceptance and ensure transparency and compliance in land acquisition processes.

Strategy	Potential Obstacles or Limitations	Ways to Address
V Integration of Data Management System for Food Loss, Surplus Food, & Food Waste.	The main challenges include lack of coordination among institutions holding disparate data and resistance to changes in data collection methods..	Establish cross-sectoral working groups responsible for system development and educate system users on its benefits to enhance adoption.
VI. Research and Development in Food Loss, Surplus Food, & Food Waste Management.	Limited funding for research, lack of collaboration with academic or private institutions, and a shortage of experts in food loss, surplus food, and food waste management.	Promote partnerships with universities and private sectors to share resources, leverage research funding from donors or CSR programs, and enhance training and incentives to attract researchers to this field.
VII. Implementation of Incentives and Disincentives for Food Loss, Surplus Food, & Food Waste Management.	Resistance from affected parties, difficulties in identifying effective types of incentives or disincentives, and limited data to measure their direct impact.	Conduct policy trials in specific areas to identify the most effective types of incentives/disincentives, collect baseline data to track success, and ensure transparent communication and outreach to gain public support.

More research can be conducted from this study by exploring several key areas such as: (1) research regarding **applicable tax incentives** for donors, food recovery organizations, and other stakeholders that contribute in reducing food loss, surplus food, and food waste; (2) A **system dynamics approach** to estimate the potential impacts of the formulated strategies, offering insights into their long-term effectiveness; (3) **cost-benefit analysis** of the proposed strategies would further clarify their economic feasibility and value; Additionally, (4) a research on top-down and bottom-up approaches for fostering collaboration and securing buy-in from stakeholders across different sectors in managing Food Loss, Surplus Food, and Food Waste.

Glossary and Abbreviations List

Cold storage	:	A room or warehouse specifically designed for certain temperature conditions is used to store various kinds of products, especially perishable products, to maintain their freshness.
Circular Economy (CE)	:	Economic model that applies a systemic approach to minimize resource use, design products for extended use, and return residuals from production and consumption processes to the value chain
Traditional Village	:	The unity of customary law communities in Bali that has an area, position, original structure, traditional rights, property, traditions, manners of community life for generations in the bond of a sacred place (<i>kahyangan tiga</i> or <i>kahyangan desa</i>), duties and authorities as well as the right to regulate and manage their households.
Downstream processing	:	Activities that aim to streamline all processes, such as producing and improving the target of the product and maximizing product income with minimal costs.
Eco-enzyme	:	The fermentation of organic waste, such as fruit and vegetable pulp, to which sugar (palm sugar, brown sugar, or cane sugar) and water are added.
FoodBank	:	An organization or institution that aims to collect, store and distribute food to people in need, especially those experiencing hunger or economic hardship. They work with various agencies, food stores, producers, and individuals to collect food donations and distribute them to those in need through an extensive distribution network.
Food Loss (FL)	:	A reduction in food quantity results from the decisions and actions of food suppliers in the food chain, excluding retail, food service providers, and consumers.
Food Waste (FW)	:	A decrease in the quantity of food resulting from the decisions and actions of retailers, food services, and consumers.
Food Recovery Organization (FRO)	:	The organization aims to save surplus food from waste and distribute it to the underprivileged.
Good Agricultural Practice (GAP)	:	Production systems should focus on ecologically sustainable and safe agriculture and non-toxic and high-quality products that contribute to maintaining food security.
Good Handling Practice (GHP)	:	Good post-harvest handling methods related to the application of technology and how to utilize the facilities and infrastructure used.
Good Manufacturing Practice (GMP)	:	Part of quality assurance ensures that products are manufactured consistently with quality standards appropriate for the intended animal use and following registration details and specifications.
Greenhouse Gas (GHG)	:	Gases that cause the greenhouse effect in the atmosphere. The greenhouse gases are carbon dioxide (CO ₂), sulfur dioxide (SO ₂), nitrogen monoxide (NO), nitrogen dioxide (NO ₂), methane gas (CH ₄), and chlorofluorocarbons (CFCs).
Food Balance Sheet (NBM)	:	The method used to analyze the situation of food availability in a country/region within a certain period is based on aspects of food supply and utilization.
Pararem	:	Rules or decisions of the Indigenous Village Paruman as the implementation of <i>awig - awig</i> or regulating new matters and/or resolving cases / <i>wicara</i> in the Indigenous Village
Life cycle assessment (LCA)	:	Way to assess the potential environmental impacts associated with a production process or service by quantifying and evaluating the consumption of natural resources and outputs to the environment at all stages of the product/service life cycle, from the extraction of raw materials to the disposal of waste.
Gross Domestic Product (PDB)	:	The market value of a country's goods and services in a given period.
Produk off-grade	:	Products that do not meet quality requirements.

RDF	:	<i>Refuse-derived fuel</i> alternative fuel is produced from the processing of non-hazardous solid waste, where organic and non-organic materials are separated. The nonorganic materials are used as fuel for energy generation, reducing dependence on fossil fuels and providing alternative solutions for waste management.
Recycling Rate	:	The system manages product scraps and end-of-life materials by converting them into a form that can be used and utilized.
Sad Kerthi	:	6 efforts to maintain the balance of the universe, which include (1) efforts to purify the soul (<i>atma kerthi</i>), (2) preserve forests (<i>wana kerthi</i>), (3) preserve clean water sources such as lakes (<i>danu kerthi</i>), (4) preserve the sea (<i>segara kerthi</i>), (5) maintain dynamic social and natural harmony (<i>jagat kerthi</i>), and (6) build the quality of human resources individually and collectively (<i>jana kerthi</i>).
Food Waste	:	Food waste that is not utilized and discarded, including spoiled or expired food and inedible parts of food.
Surplus Food	:	Food fit and safe for human consumption has the potential to be wasted as food waste at the distribution and consumption stages.
National Waste Management Information System (SIPSN)	:	Web system that manages data sourced from several databases integrated into a collection of Waste Management information.
Smart Farming	:	The concept of agriculture based on precision agriculture that utilizes automated technology supported by big data management, machine learning / artificial intelligence, and the Internet of Things (IoT) to improve the quality and quantity of production to optimize land resources, cultivation technology, human resources, and other production resources.
Subak	:	A water resource management system irrigates <i>uma</i> (rice field) or <i>abian</i> (field) agricultural areas.
Food Loss	:	Decrease in food quantity that occurs in producing, preparing, processing, manufacturing, preserving, packaging, repackaging, and/or changing the form of food.
Swakelola	:	An organization that provides household waste collection services.
TPS	:	A Waste Disposal Site is a designated location for collecting, sorting, and disposing of waste in an organized manner.
TP3R	:	Waste disposal sites that implement the 3R principles, namely Reduce, Reuse, and Recycle, to reduce the environmental impact of waste disposal.
TPST	:	An integrated waste processing site is equipped with facilities such as incinerators, composters, or other processing installations to manage waste efficiently.
TPA	:	Landfill, The area used as the final place for waste disposal, usually after processing and sorting in the previous places.
Tri Hita Karana	:	The three causes of happiness or well-being include (1) <i>Parahyangan</i> , which is a harmonious relationship between humans and God; (2) <i>Pawongan</i> , which is a harmonious relationship between fellow humans; and (3) <i>Palemahan</i> , which is a harmonious relationship between humans and nature which includes the environment, plants, and animals.
Ugly food	:	Refers to fruits, vegetables, or other foods with an imperfect or unusual physical appearance. This can include fruit with an odd shape, uneven-sized vegetables, or unusual foods due to cosmetic defects. While these foods are often just as nutritious as more “pretty” foods, they are frequently overlooked or discarded by manufacturers, retailers, or consumers due to their unappealing appearance.

Abbreviations List

ADD	: <i>Alokasi Dana Desa/ Village Fund Allocation</i>	Kemendag	: Kementerian Perdagangan / Ministry of Trade
ALSINTAN	: <i>Alat dan Mesin Pertanian/ Agricultural Equipment and Machinery</i>	KM	: Kilometer / Kilometer
APBDesa	: <i>Anggaran Pendapatan dan Belanja Desa/ Village Revenue and Expenditure Budget</i>	K3	: Kesehatan dan Keselamatan Kerja / Occupational Health and Safety
APBD	: <i>Anggaran Pendapatan dan Belanja Daerah/ Regional Revenue and Expenditure Budgets</i>	KKP	: Kementerian Kelautan dan Perikanan / Ministry of Maritime Affairs and Fisheries
APBN	: <i>Anggaran Pendapatan dan Belanja Negara/ National Revenue and Expenditure Budgets</i>	KTNA	: Kelompok Tani Nelayan Andalán / Reliable Fishermen Farmer Group
APD	: <i>Alat Pelindung Diri/ Personal Protective Equipment</i>	KUR	: Kredit Usaha Rakyat / People's Business Credit
APDI	: <i>Apresiasi Destinasi Pariwisata Indonesia/ Appreciation of Indonesian Tourism Destinations</i>	KWT	: Kelompok Wanita Tani / Women Farmers Group
APRINDO	: <i>Asosiasi Pengusaha Ritel Indonesia/ Indonesian Retailers Association</i>	LCA	: <i>Life Cycle Assessment</i>
AUTP	: <i>Asuransi Usaha Tani Padi/ Rice Farming Insurance</i>	LCDI	: <i>Low Carbon Development Initiative</i>
AUTS	: <i>Asuransi Usaha Ternak Sapi/Kerbau/ Cattle / Buffalo Business Insurance</i>	LKJIP	: Laporan Kinerja Instansi Pemerintah / Government Agency Performance Report
BaU	: Business As Usual	LSM	: <i>Lembaga Swadaya Masyarakat / Non-Governmental Organization</i>
Bappeda	: <i>Badan Perencanaan Pembangunan Daerah/ Local Development Planning Agency: Bali</i>	MDA	: <i>Majelis Desa Adat / Traditional Village Council</i>
Bappenas	: <i>Badan Perencanaan Pembangunan Nasional/ National Development Planning Agency</i>	Mton	: <i>Million ton</i>
BBPOM	: <i>Balai Besar Pengawas Obat dan Makanan/ Food and Drug Authority</i>	MSME	: Micro, Small and Medium Enterprises
BPPW	: <i>Balai Prasarana Permukiman Wilayah/ Regional Settlement Infrastructure Center</i>	N/A	: <i>Not Available</i>
BPS	: <i>Badan Pusat Statistik/ Central Bureau of Statistics</i>	NBM	: Neraca Bahan Makanan / Food Balance Sheet
BRIDA	: <i>Badan Riset dan Inovasi Daerah/ Regional Research and Innovation Agency</i>	NGO	: Non-Governmental Organization
BSF	: Black Soldier Fly	NRT	: Non Rumah Tangga / Non-Household
BSIP	: <i>Badan Standardisasi Instrumen Pertanian/ Agricultural</i>	P3HP	: Pasca Panen, Pengolahan, dan Pemasaran Hasil Pertanian / Post-harvest, Processing, and Marketing of Agricultural Products
		PDB	: Produk Domestik Bruto / Gross Domestic Product

	Instrument Standardization Agency		
BUMD	: <i>Badan Usaha Milik Daerah/ Regionally Owned Enterprises</i>	Perbup	: Peraturan Bupati / Regent Regulation
BUMDES	: <i>Badan Usaha Milik Desa/ Village Owned Enterprises</i>	Perda	: Peraturan Daerah / Regional Regulation
CE	: Circular Economy	Perdes	: Peraturan Desa / Village Regulation
CO₂eq	: Carbon dioxide equivalents	Pergub	: Peraturan Gubernur / Governor Regulation
CPPOB	: <i>Cara Produksi Pangan Olahan yang Baik/ Good Manufacturing Practice of Processed Food</i>	Perwal	: Peraturan Wali Kota / Mayor's Regulation
Dinkes	: <i>Dinas Kesehatan/ Public Health Agency</i>	Permenparekraf	: Peraturan Menteri Pariwisata dan Ekonomi Kreatif / Minister of Tourism and Creative Economy Regulation
DinsosP3A	: <i>Dinas Sosial Pemberdayaan Perempuan dan Perlindungan Anak/ Social Service, Women's Empowerment and Child Protection Agency</i>	PHDI	: Parisada Hindu Dharma Indonesia / Parisada Hindu Dharma Indonesia
Disdikpora	: <i>Dinas Pendidikan Kepemudaan dan Olahraga/ Education, Youth and Sports Agency</i>	PHRI	: <i>Perhimpunan Hotel dan Restoran Indonesia / Indonesia Hotels and Restaurants Association</i>
Diskelkan	: <i>Dinas Kelautan dan Perikanan/ Maritime Affairs and Fisheries Agency</i>	PJBEK	: <i>Biro Pengadaan Barang/Jasa dan Perekonomian / Bureau of Public Procurement and Economic Affairs</i>
Diskominfo	: <i>Dinas Komunikasi, Informatika, dan Statistik/ Communication, Information and Statistics Agency</i>	Posyandu	: Pos Pelayanan Terpadu / Integrated Service Post
Diskop UKM	: <i>Dinas Koperasi, Usaha Kecil dan Menengah/ Cooperatives, Small and Medium Enterprises Agency</i>	PSBS	: Pengelolaan sampah berbasis sumber / Source-Based Waste Manajemen
Disparda	: <i>Dinas Pariwisata/ Tourism Agency</i>	P3E	: <i>Pusat Pengendalian Pembangunan Ekoregion / Center for Environmental Development Control Ecoregion</i>
Disperindag	: <i>Dinas Perindustrian dan Perdagangan/ Industry and Commerce Agency</i>	PUD	: Perairan Umum Daratan / Inland Public Waters
DISPUPRKIM	: <i>Dinas Pekerjaan Umum, Penataan Ruang, Perumahan dan Kawasan Permukiman/ Public Works, Spatial Planning, Housing and Settlement Areas Agency</i>	RAN-ES	: Peta Jalan dan Rencana Aksi Nasional Ekonomi Sirkular / Nasional Circular Economy Roadmap and Action Plan
Distanpangan	: <i>Dinas Pertanian dan Ketahanan Pangan/ Agriculture and Food Security Agency</i>	RDF	: <i>Refuse Derived Fuel</i>
DJPb	: <i>Direktorat Jenderal Perbendaharaan/ Directorate General of Treasury</i>	Renstra	: Rencana Strategis / Strategic Plan
DKLH	: <i>Dinas Kehutanan dan Lingkungan Hidup/ Environmental and Forestry Agency</i>	RPH	: Rumah Potong Hewan / Slaughterhouse

DLH	: <i>Dinas Lingkungan Hidup/ Environment Agency</i>	RPRKD	: Rencana Pembangunan Rendah Karbon Daerah / Regional Low Carbon Development Plan
DPMA	: <i>Dinas Pemajuan Masyarakat Adat/ Advancement of Indigenous Peoples Agency</i>	RPJMD	: <i>Rencana Pembangunan Jangka Menengah Daerah / Regional Medium-Term Development Plan</i>
DPMDDukcapil	: <i>Dinas Pemberdayaan Masyarakat, Desa, Kependudukan dan Catatan Sipil Provinsi Bali/ Community Empowerment, Villages, Population and Civil Registry Agency</i>	RPJPD	: <i>Rencana Pembangunan Jangka Panjang Daerah / Regional Long-Term Development Plan</i>
DPRD	: <i>Dewan Perwakilan Rakyat Daerah/ Regional House of Representatives</i>	RT	: <i>Rumah Tangga / Household</i>
PADesa	: <i>Pendapatan Asli Desa/ Original Village Revenue</i>	Sekda	: <i>Sekretaris Daerah/ Regional Secretary</i>
FAO	: Food and Agriculture Organization	SiGapura	: <i>Sistem Informasi Harga Pangan Utama dan Komoditas Strategis / Information System for Main Food Prices and Strategic Commodities</i>
FGD	: Focus Group Discussion	SIPSN	: <i>Sistem Informasi Pengelolaan Sampah Nasional / National Waste Management Information System</i>
FL	: Food Loss	SKLB	: <i>Surat Keterangan Layak Bibit / Certificate of Seedling Worthiness</i>
FLW	: Food Loss and Waste	SKP	: <i>Sertifikat Kelayakan Pengolahan / Certificate of Processing Eligibility</i>
FPPS	: <i>Fasilitas Pemilahan dan Pengolahan Sampah/ Waste Sorting and Processing Facility</i>	SNI	: <i>Standar Nasional Indonesia / Indonesian National Standard</i>
FRO	: Food Recovery Organization	SOP	: Standar Operasional Prosedur / Standard Operating Procedure
FW	: Food Waste	SSP	: Susut dan Sisa Pangan / Food Loss and Surplus Food
GAP	: Good Agricultural Practice	SPPN	: Sistem Perencanaan Pembangunan Nasional
Gapoktan	: <i>Gabungan Kelompok Tani/ Farmers Group Association</i>	TOSS	: Tempat Olah Sampah Setempat / National Development Planning System
GHP	: Good Handling Practice	TPA	: Tempat Pemrosesan Akhir
		TPID	: <i>Tim Pengendalian Inflasi Daerah / Regional Inflation Control Team</i>
		TPPKK	: <i>Tim Penggerak Pemberdayaan dan Kesejahteraan Keluarga / Family Empowerment and Welfare Movement Team</i>
		TPST	: <i>Tempat Pengolahan Sampah Terpadu / Local Waste Management Site</i>

<p>GMP : Good Manufacturing Practice</p> <p>GHG : <i>Gas Rumah Kaca/</i> Greenhouse Gas</p> <p>HET : <i>Harga Eceran Tertinggi/</i> Highest Retail Price</p> <p>HOREKA : <i>Hotel, Restoran, dan Katering/</i> Hotels, Restaurants and Catering</p> <p>ISO : International Organization for Standardization</p> <p>ISTA : Indonesia Sustainable Tourism Awards</p> <p>JASINDO : Asuransi Jasa Indonesia / Insurance Services Indonesia</p>	<p>TPS 3R : <i>Tempat Pengelolaan Sampah Berbasis Reduce, Reuse, Recycle / Reduce, Reuse, Recycle-based Waste Management Sites</i></p> <p>TPS : Tempat Penampungan Sementara / Temporary Shelter</p> <p>UMKM : Usaha Mikro, Kecil, dan Menengah / Micro, Small, and Medium Enterprises</p> <p>UMR : Upah Minimum Regional / Regional Minimum Wage</p> <p>UNPAGE : <i>United Nations - Partnership for Action on Green Economy</i></p>
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