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Society's Disaster or Blessing?**

Demikian surat tugas ini kami sampaikan, untuk dilaksanakan dengan sebaik-baiknya dan penuh tanggung jawab.

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We need to address our Nation's mounting garbage problem by generating less garbage, particularly paper waste.

- Wendell H. Ford

Wendell Hampton Ford, 1924-2015, was an American politician from Kentucky. He served for twenty-four years in the U.S. Senate and was the 53rd Governor of Kentucky. He was the first person to be successively elected lieutenant governor, governor and United States senator in Kentucky history.



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[p.09]

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[p.12]

Indonesia's rising Food Waste Society's disaster or blessing?



By Dr. Dina Nurul Fitria, S.E, M.T

Food waste is a Responsible Consumption and Production issue for SDG 12. Thus, alternative solutions to food waste in food production and food leftovers in food consumption along food supply chain systems should be a worldwide priority.

"Food waste" per se is defined by no regulations in Indonesia. For the FAO, "food waste" means the quantity of excess material left over from food manufacturing as well as leftovers after meals; these are tied to seller and consumer actions. (Parfit, 2010).

The food supply chain is a series of farming enterprises, post-harvest activities, storage, processing, all the way to industrial and household end-customers. At each stage there is food loss on the production side.

On the other hand, the food waste supply chain for end-consumers includes food processed production chain points, food storage in accordance with health and food safety standards and food disposal, influenced by religious, cultural and hygiene rules.

The World Bank Atlas of Sustainable Development Goals 2023 database illustrates this: <https://datatopics.worldbank.org/sdgoal-12-responsible-consumption-and-produce>

[tion#c1](#), Sustainable consumption is called for in SDG 12, stipulating that edible resources should not be thrown away, but rather recycled and handled in a productive manner. If neither production nor consumption is sustainable, then economic output will be curtailed, which will lead to an increase in pollution and greenhouse gas emissions, as well as a loss of biodiversity.

In point of fact, SDG 12 is the only one of the Sustainable Development Goals to have an indicator set on a framework that is expressly aimed at private sector enterprises. This indicator can be found in SDG target 12.6.1. This indicator measures the number of businesses that describe their progress towards reaching environmental, social, and governance-related objectives, by including information on sustainability in their annual reports.

Because a significant portion of the food that is produced is never really eaten, one of the Sustainable Development Goals (SDG) goal 12.3 urgently calls on citizens all around the globe to reduce food waste. Manufacturing and storage conditions account for the majority of food waste in nations with lower standards of living. The consumer is responsible for a major portion of waste in both North America and

Europe. This means that families in both regions end up throwing out a large quantity of the food that they have purchased.

The situation existing in Indonesia is shown in Figure 1. If we could cut down on the amount of food that is never eaten but discarded, we would require fewer natural resources for production, storage, and transportation, which would put society on a road towards greater sustainability.

Agri-food Supply Chain

The following conceptions of loss and waste have been used for reasons of measurability and consistency with other statistical definitions, in order to comply with the FAO operational framework (FAO, 2018), defined as follows:

1. Food losses include all of the crop and livestock human-edible commodity quantities that, directly or indirectly, completely exit the post-harvest/slaughter, production/supply chain by being discarded, incinerated or in any other way, and do not re-enter in any other utilization (such as animal feed, industrial use, etc.), up to, and excluding the retail level. Food losses are an important aspect of the global food system. Therefore, any

losses that occur during storage, transit, and processing, including those that occur to imported amounts, are taken into account. Losses include the commodity as a whole with its non-edible parts.

2. Food waste occurs from the retail to the final consumption/demand stage.

Gustavsson et al (2011) of the Swedish Institute for Food and Biotechnology (SIK) conducted research on behalf of the FAO, to compare high/medium income nations with low-income countries, regarding global food losses. This investigation featured a breakdown of food losses and waste on a worldwide scale, as well as the supply chain for several commodity food categories, such as cereals, fruit and vegetables, roots and tubers, oilseeds and pulses, meat, fish and shellfish and dairy products.

The assessment of food losses in Europe (including Russia), North America, Oceania, industrialized Asia and Sub-Saharan Africa, included such food items as fruits, vegetables, roots, tubers, meat, fish and seafood. Despite losses in fruits, vegetables, oilseeds, pulses, meat, fish and seafood in West and Central Asia, North Africa, South and Southeast Asia, and Latin America, the losses were still significant.

icant.

It is worth noting that cereals, roots, tubers, fruits, vegetables, fish and seafood are essential items for consumption in Europe (including Russia), North America, Oceania, and industrialized Asia. Surprisingly, the percentage of grains, fruits and vegetables wasted in these regions is similar to other areas.

Indonesian food loss in the production side of the food supply chain is primarily the result of the inefficiency of farm businesses in managing the procurement of means of production, power supply, harvest processing, storage after harvest, and transportation expenses. This issue not only leads to food loss but also contributes to the increased cost of food.

Similarly, poor food quality assurance, stability of supply, distribution management, timely delivery, cost efficiency, product appearance, and compliance with product standards such as ISO series, halal status and sustainability are major causes of food waste on the consumer side. Pricing concerns and promotions also need to be addressed.

To effectively manage food waste, high-cost economies in the purchase of agricultural production elements across the food supply chain as a whole must be eliminated.

Establishing an ecosystem that covers the entirety of the food supply chain is essential. This ecosystem should address various issues, including the quality of the agricultural industry's human resources, the availability of agricultural infrastructure, information technology and its supporting systems, agricultural financing and production innovations that shape food consumption patterns. (Fitria, 2018).

The composition of food waste in Indonesia is dominated by organic waste from agriculture, such as leftovers from individual consumption, waste leaves from trees, food material residues wasted due to expiration or non-compliance with food safety standards, fruit skins, vegetable peels, egg shells, edible animal bones and skin, and edible animal fat. In addition, Indonesians throw away a significant amount of food that can still be consumed.

From Disaster to Blessings

Home is where the food supply chain comes to an end. Waste that occurs in the home throughout making, storing, and eating food is referred to as "food waste". Some causes for this include behavioral variables, particular food preferences, storage techniques and improper preparation for grocery shopping. First and foremost, there are

the three behavioral components, as follows: 1. Most households are uninformed about the quantity of food that is wasted, the issues that are caused by food waste and the financial advantages that come from purchasing food judiciously. 2. The family does not have a firm understanding of how to make effective use of food. 3. Households do not understand the importance of eating food and do not believe that it is vital to do so.

Some bits of food that contain nutrients are thrown away because of factors such as personal choice or preference. For instance, apple peels and hard pieces of bread are two examples of such portions of food. Inadequate planning, for instance, results in the purchase of an excessive amount of food, most of which is then wasted because it is never consumed (Wahyono, 2017).

The methods used to store food may cause it to lose its nutritional quality, such as storing it in circumstances that are less than ideal or in inadequate packaging, both of which increase the likelihood that the food will spoil or get damaged.

To ensure the food waste management, effectively transforming it from disaster to blessings, first we should provide an ecosystem of agrifood supply chain end-to-end mechanism, and the second, we should set priorities on responsible consumption behavior for ourselves to the community at large.

On the farm side, vertically-linked business systems provide a number of benefits, most notably an improvement in productivity and the ability to participate in a wider range of activities. These benefits are particularly beneficial for smaller businesses. Vertical integration is an example of a sort of institutional innovation in the agricultural sector. The goal is to meet the requirements of both local and international markets with agricultural goods such that a significant amount of additional value may be derived from those items.

The vertically-integrated business system has an inverse link between the effectiveness of business specialization and the extent to which it engages in business diversification. This is because of the flexibility with which it manages both family labor and rental labor and resources. This flexibility is essential for small farms because it allows them to better manage price risk.

In order to do this, the integrated business system will need to be joined in a form of collaboration in the future. This will allow for the regulation of different business contract schemes, beginning with manufacturing and continuing through processing and harvesting. As a consequence of the increased level of specialization provided by the different types of businesses, this will assure general economic well-being. Collaborating in co-operative containers of the farmers' group requires taking into consideration not only transaction costs between



the labor force and the owner, but also the transaction costs of selling agricultural goods with added value.

A structural obstacle that contributes to high transaction costs is the difficulties that small businesses have when attempting to develop integrated business systems. For small businesses to have more access to the assets, information, services and markets, they need to enhance their revenues; one of the most important strategies is to reduce the high transaction costs they face. The most important tool for implementing this fundamental approach is institutional innovation; many forms of vertical integration of processing and marketing exist, each with a particular emphasis on lowering specific transaction costs. Agricultural contracts are one example of a kind of vertical integration that combines the processing and selling of agricultural goods and strives to boost agricultural output that has high added value.

Another kind of vertically-integrated company system is one that involves the diversification of economic scope, often known as ecological diversification, as well as the specialization in the technological efficiency of small businesses. This farm system is distinguished by the fact that it combines the cultivation of commercial crops with food crops for sustenance, which is one of its hallmarks. The dynamic processes of business systems that are integrated in size and specialization have the ability to exert an influence on output productivity potential and combined technical efficiency.

In order to mitigate food loss at the farm level, certain measures are required. The allocation of resources towards the enhancement of infrastructure, packaging and

transportation, as well as the cultivation of knowledge and capabilities among food chain operators to effectively implement food safety measures, and the promotion of a conducive investment environment for agribusiness.

The objective is to establish contract farming connections between processors and farmers, marketing cooperatives, and enhanced market infrastructure. The practice of pre-packing and contract packing. The use of reconditioned second-hand packing equipment has resulted in improved crop output and quality via the advancements in precision farming techniques.

The Start-up Opportunity of Food Waste Management

As a part of a community, young people in particular are responsible for net zero food loss and waste, including sustainability information delineating advancements made towards attaining environmental, social, and governance objectives. The Internet of Things 4.0 gives the potential variability in the quality and pertinence of the information, inclusion in the indicator of SDG 12 Responsible Consumption and Production, is contingent upon a firm satisfying a minimal criterion, such as the disclosure of its greenhouse gas emissions, waste production, recycling methodologies, energy efficiency, and other relevant factors. The system approach is a recognized technique used for problem-solving purposes.

Through the process of determining a specific set of requirements and then developing an efficient operating system, the objective of meeting those demands may be achieved.

The process involves the exam-

ination of requirements, the development of problem statements and the identification of a system. The system approach is distinguished by the presence of a structured planning technique. The use of mathematical models, qualitative reasoning, optimization techniques and computer implementation. This analysis aims to determine the effect of using information technology in order to mitigate or decrease a certain phenomenon or issue.

The development of a decision-making information system necessitates the use of risk management practices. The company exhibits vertical integration. The formulation of alternatives necessitates the undertaking of impact analysis. The use of knowledge in ongoing practical activities. This analysis aims to determine the effect of using information technology in order to mitigate or decrease a certain phenomenon or issue.

The development of a decision-making information system necessitates the use of risk management practices. The company exhibits vertical integration. The inclusion of impact analysis is necessary in order to develop alternative solutions. The application of knowledge in the context of ongoing agricultural practices is generated. The objective method is centered on system design and serves as its first point of reference.

The entirety. The objective of using the system method is to acquire a viable alternative collective. An appropriate method should be established to effectively address the stated requirements and dis-selection (Eriyatno, 1999).

The components inside the system must exhibit differentiation, based on their respective functions and purposes. In the examination of these requirements, the first step involves the articulation of demands, followed by the subsequent establishment of a stage.

The evolution of the aforementioned requirements. This pertains to the identification of the interplay between the reactions that emerge from a decision-maker and the trajectory of the system. The process of identification may include several sources of information, such as survey results, expert opinions, discussions, field observations and other relevant sources. The examination of individual requirements. The components may be delineated as follows, as stated by Rachman (2011):

1) Farmers: This sector ensures the preservation of employment opportunities for farmers, while also contributing to the enhancement of their income and welfare. Additionally, it facilitates the marketing of agricultural output and ensures a stable and appropriate selling price for their products.

2) Merchants/suppliers of raw materials: This group benefits from the ease of acquiring necessary

products or raw materials, which in turn enables them to optimize their sales.

3) Agro-industrial sector: Companies operating in this sector are assured of their survival due to the availability of raw materials, ensuring a continuous production process. Moreover, they are able to meet market demand, achieve high profit margins, and benefit from efficient distribution and marketing facilities.

4) Government: The government benefits from increased regional income and currency stability as a result of agricultural sector activities. Additionally, agricultural products that adhere to quality standards contribute to overall economic growth and create more employment opportunities.

5) The consumer seeks product price stability and affordability, product quality that aligns with pricing and convenience in acquiring the items.

6) Investors consider many factors when making investment decisions, including the potential of a high rate of profit, a rapid return on investment and the level of investment risk involved.

Ultimately, the integration of sustainable agriculture and food innovation, encompassing the entire supply chain from on-farm production to final consumption, in order to achieve net zero food waste, is crucial for ensuring sustainability and enhancing environmental performance. This will progressively emerge as a significant determinant of competitiveness for both businesses and communities.

In the pursuit of achieving the Demographic Dividend by 2045, it is seen that the younger population has significant influence. This demographic group, characterized by their youthfulness, not only contributes to the development of a skilled workforce but also exhibits a growing inclination towards making choices on their place of residence, based on variables associated with a high standard of living. These aspects are closely tied to the concept of sustainable communities.

Many of the activities falling within the purview of "sustainability" are currently being undertaken by communities.

Effectively incorporating profound aspects of sustainability into an economic growth plan takes a significant amount of effort and a thorough understanding of the subject matter. The implementation of sustainability plans necessitates extensive coordination across many organizations.

One of the challenges encountered in managing food waste inside homes pertains to technical issues. These issues develop due to a lack of information among people, families, businesses, government sectors, and the general public about proper waste processing methods.

This might be attributed to the

government's limited dedication, resources and dissemination of information in this regard. The phenomenon of food waste is a significant issue that warrants attention and analysis. The mitigation of these issues may be achieved via enhancing the comprehension of the significance of food waste management, as well as implementing a comprehensive and integrated waste management infrastructure.

It is imperative for all relevant stakeholders, including governments, the corporate sector and individuals to collectively take action in order to foster greater sustainability in production and consumption patterns. Failure to do so has the potential to jeopardize advancements in other objectives. The depletion of natural capital by nations poses challenges in attaining SDG 13, which pertains to climate change mitigation, as well as impeding advancements towards SDG 7, which focuses on the transition to clean energy sources. Additionally, this depletion jeopardizes the prospects of long-term economic development outlined in SDG 8. Enhancements in these domains may contribute to the promotion of sustainability in urban areas, as outlined in Sustainable Development Goal 11, as well as in other sectors, as emphasized in Sustainable Development Goal 9 (World Bank 2023).

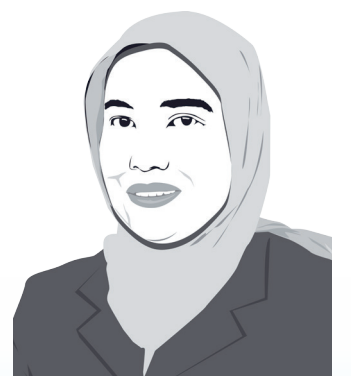
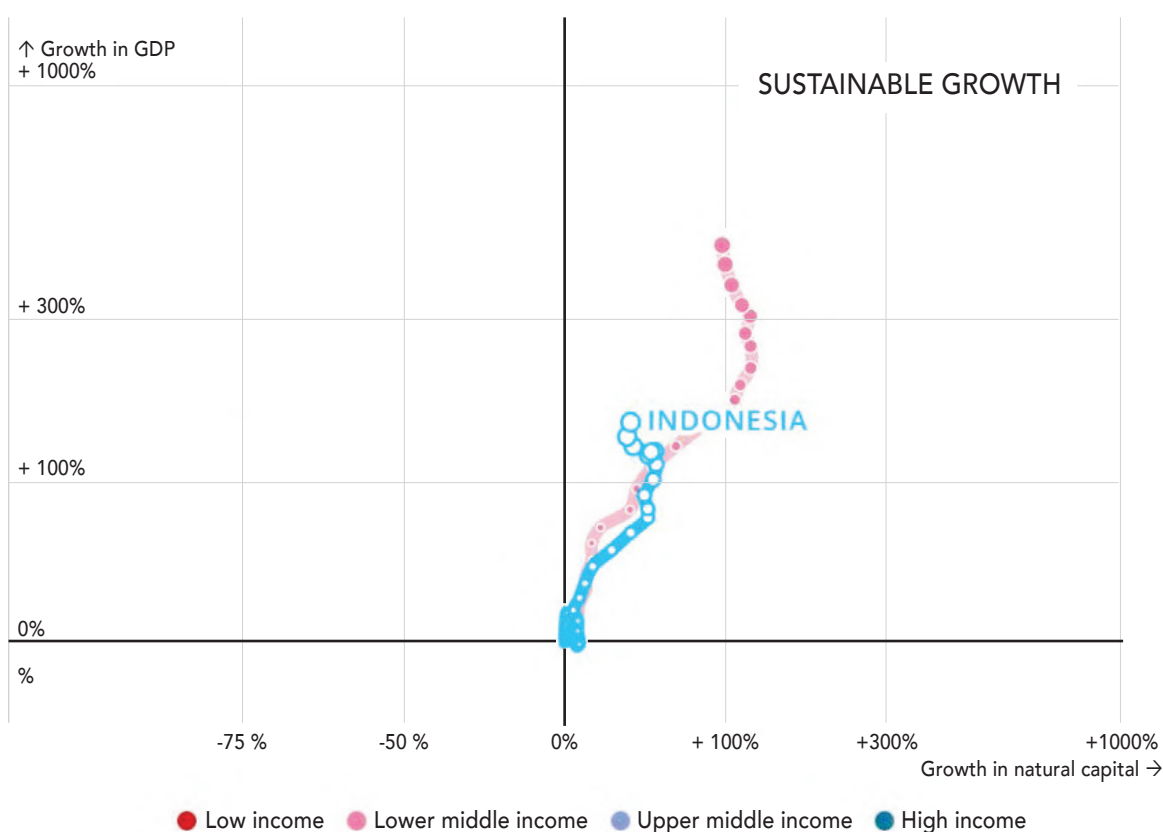
As the FAO is deeply concerned about a lack of data, the loss percentages for each of these products may be further divided into loss percentages based on the stage of the value chain. It is expected that loss percentages at each stage of the segmented value chain are nationally representative, while there are underlying distributions of different actors at each stage. The intricacy of this issue necessitates its breakdown into more manageable components, which may then be consolidated.

Every step in the process will incur losses that may be categorized as either significant and substantial in relation to the overall losses in the chain, which can be quantified or computed, or as relatively less important and retained with a temporary value based on expert judgement and other evaluations. The most effective approach for quantifying losses and guaranteeing consistency across different phases and periods is via the use of a sample survey that employs objective measuring techniques.

The estimation of losses at each step will be conducted for various commodities and inputted into the information system for the purpose of monitoring trends and levels. It is acknowledged that certain countries may only have access to estimated loss percentages for each commodity chain. However, since data collection efforts often occur at lower levels, such as through annual farm surveys, a method was required to aggregate and transmit the data to a national level.

Commencing at any point in time is always a viable option. **10**

Figure 1. Indonesian Atlas of Sustainable Development Goals 2023 (World Bank)



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