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BACHELOR THESIS

*Sustainable practices in vegan restaurants in Yogyakarta
regarding food sourcing, food packaging and waste*

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I declare that this bachelor thesis has been composed solely by myself and I listed all used sources and literature.

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Abstract

This bachelor thesis examines sustainable practices in vegan restaurants within Yogyakarta, a city where only eight fully vegan establishments are identified. The research is framed within the context of sustainability in the food industry, focusing on specific practices related to food sourcing, food packaging, and waste management. The theoretical foundation explores the intersection of sustainability and the restaurant sector, emphasizing sustainable practices' social, economic, and environmental dimensions. Qualitative research methods are employed, primarily through surveys conducted with employees and owners of vegan restaurants. These surveys provide insights into the implementation and impact of sustainable practices within the selected establishments. The collected data is analyzed alongside a comprehensive literature review to highlight key findings and themes from the survey responses. By investigating how vegan restaurants in Yogyakarta integrate sustainability into their operations, this thesis contributes to understanding the practical challenges and opportunities in adopting sustainable practices within the local food service industry. The findings underscore the importance of sustainable sourcing, innovative packaging solutions, and effective waste management strategies in promoting environmental stewardship and societal well-being within the restaurant sector.

Keywords: Sustainability, sustainability practices, food industry, restaurant, Yogyakarta, Indonesia

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Introduction

In recent years, the global food industry has witnessed a significant shift towards sustainability, driven by concerns over environmental impact and consumer demand for ethically sourced products. Within this context, veganism has emerged as a prominent dietary choice advocating for reduced environmental footprint and animal welfare. However, in Yogyakarta, Indonesia, the presence of fully vegan restaurants remains sparse, with only eight identified establishments catering exclusively to vegan diets. This thesis explores the sustainable practices implemented by these restaurants, focusing on their approaches to food sourcing, packaging, and waste management.

The primary objective of this research is to understand how vegan restaurants in Yogyakarta integrate sustainability into their operational strategies. By examining their practices through qualitative research methods, including surveys with restaurant owners and employees, this study seeks to uncover the challenges faced and innovations implemented in pursuit of sustainable operations. Through a comprehensive literature review and analysis of survey data, this thesis aims to provide insights into the social, economic, and environmental impacts of these practices within the local food service industry.

This research is significant as it fills a gap in the existing literature concerning sustainability practices in vegan restaurants, particularly in a rapidly growing city like Yogyakarta. By identifying best practices and areas for improvement, this study aims to contribute practical recommendations for enhancing sustainability initiatives in the local restaurant sector. The findings are expected to inform policymakers, restaurant operators, and consumers, promoting greater awareness and adoption of sustainable practices that benefit businesses and the broader community.

1. Literature review

This literature review explores existing research on sustainable practices in the food service industry, focusing specifically on vegan restaurants. It aims to identify current knowledge gaps and opportunities for further research within Yogyakarta, Indonesia.

Sustainability in the restaurant industry has gained significant attention due to global environmental concerns and evolving consumer preferences towards ethical consumption (Smith et al., 2020). As a dietary choice, veganism aligns with sustainability principles by promoting plant-based diets that reduce environmental impact (Gossard et al. 2003). In Yogyakarta, the emergence of vegan restaurants reflects broader trends toward sustainable food practices while presenting unique challenges and opportunities within the local context.

This literature review is structured thematically, focusing on critical aspects of sustainability in vegan restaurants: food sourcing, food packaging, and waste management. Each theme will be explored by synthesizing relevant studies and research findings.

Food Sourcing

Sustainable restaurant sourcing practices involve local procurement, organic certifications, and direct relationships with producers to minimize environmental impact and support local economies (Hendrickson et al. 2020). The variability in implementing sustainable sourcing practices across different regions underscores the importance of understanding local contexts and supply chain dynamics (Ekechukwu 2024).

Food Packaging

Adopting biodegradable and recyclable packaging materials is critical to reducing the environmental footprint of restaurants (Asim et al. 2022). Case studies illustrate successful strategies and challenges in implementing eco-friendly packaging solutions in the food service sector (Verghese et al. 2012).

Waste Management

Effective waste management strategies, including composting and waste reduction measures, are essential for minimizing environmental impact in restaurant operations (Munir 2022). Barriers such as infrastructure limitations and regulatory challenges can hinder the adoption of sustainable waste practices in food service establishments (Carletto, Ferriani, and Silva 2022).

Sustainability in Vegan Restaurants

Vegan restaurants are crucial in promoting sustainability through plant-based diets that reduce greenhouse gas emissions and conserve natural resources (Garnett 2013). Case studies highlight the integration of sustainability principles into the operational strategies of vegan establishments worldwide (Gossard & York, 2019).

Conclusion of the Literature Review

This literature review provides foundational insights into current perspectives and challenges related to sustainability in vegan restaurants. It highlights the need for further

research into tailored strategies for promoting sustainability within Yogyakarta's vegan restaurant sector. The empirical research conducted in this thesis will explore how these theoretical insights manifest in practice, aiming to contribute to sustainable food practices in Yogyakarta.

2. Sustainability

According to the 1987 United Nations report "Our Common Future," also known as the "Brundtland Report," *sustainability* is defined as "an economic-development activity that meets the needs of the present without compromising the ability of future generations to meet their own needs " (WCED 1987). This concept, however, has been critiqued for needing to sufficiently address issues like population growth and the depletion of renewable resources (Heinberg 2010). Thus, sustainability should be seen as preventive and forward-thinking, focusing on preserving and protecting nature rather than maintaining a static state (Portney 2015).

Sustainability is intrinsically linked to the economy, as economic growth has historically led to the extensive use of natural resources. Sustainability aims to balance human advantage from nature with preserving resources for future use (Portney 2015). Some argue that it is more efficient to define sustainability by what it is not, emphasizing that it is not sustainable to threaten the environmental, social, and economic conditions that support growth (Thiele 2016). In "Sustainability" (2016), Thiele asserts that sustainability involves avoiding collapse and requires both preservation and creativity to adapt to change, making it a dynamic and evolving concept.

Basiago (1999) defines *sustainability* as maintaining a particular entity, result, or process over time. Most scholars and professionals in development interpret sustainability as enhancing and maintaining a sound economic, ecological, and social framework for human advancement (Tjarve and Zemite 2016; Mensah and Enu-Kwesi 2018; Thomas 2015). Stoddart (2011) views sustainability as the fair allocation of resources across generations while enabling socio-economic activities to operate within the limits of a finite ecosystem. Grant (2010) adds that sustainability involves responsibly allocating resources to achieve targeted social, economic, and environmental outcomes.

Ben-Eli (2015) describes sustainability as a dynamic equilibrium between population growth and the environment's carrying capacity, ensuring that the population does not irreversibly harm the environment. Thomas (2015) emphasizes that sustainability involves meeting human needs and desires without depleting all productive resources, raising questions about how to live sustainably in social and economic life.

Hák, Janoušková, and Moldan (2016) highlight that transforming the global economy, environment, and society within the planet's carrying capacity requires innovative approaches. The World Bank (2017) supports this view, advocating for creative methods to manage these realities. DESA-UN (2018) asserts that sustainability aims to balance and align the environment, economy, and society within the planet's life-supporting ecosystem capacities. Gossling-Goldsmiths (2018) argues that a meaningful definition of sustainability should focus on this dynamic alignment and equilibrium.

Mensah and Enu-Kwesi (2018) stress the importance of cross-generational equity, though predicting future generations' needs is challenging. Modern theories of sustainability strive to integrate and prioritize social, environmental, and economic models to address human challenges continually (Hussain, Chaudhry and Batool 2014; UNSD 2018). Economic models aim to utilize natural and financial capital sustainably; environmental models focus on biodiversity and ecological integrity; and social models work to uphold human dignity and well-being by improving political, cultural, religious, health, and educational systems (Acemoglu and Robinson 2012).

3. Sustainable Development

Sustainable development (SD) encompasses a range of definitions, interpretations, and meanings. SD means "development that can continue for a specified period or indefinitely" (Dernbach 1998 2003; Lele 1991; (Stoddart 2011). From a structural perspective, the concept can be observed as a combination of "sustainable" and "development," each having varied definitions based on different perspectives, leading to numerous interpretations of SD.

According to the National Sustainable Development Strategy, SD is a focused, long-term, comprehensive, and synergistic process that (i) affects the environment and all aspects of life at all levels; (ii) meets people's material, spiritual, biological, and social needs and interests; (iii) eliminates or significantly reduces interference that jeopardizes, damages, or destroys environments and life forms; (iv) does not overburden the nation; (v) conserves resources; and (vi) protects cultural and natural heritage (United Nations 2024). Scholarly literature defines SD as improving human well-being while ensuring the sustainability of the ecosystems that provide support (Willers 1994).

Pearce, Atkinson, and Dubourg (1994) define sustainable development (SD) as a trajectory where per capita consumption remains constant or increases over time. With the global population expanding, the significance of SD becomes increasingly apparent, as natural resources essential for fulfilling human needs and desires lag behind population growth. Hák et al. (2016) stress the prudent utilization of resources to ensure that current generations can meet their needs without jeopardizing the capacity of future generations to do the same. This underscores SD's objective to harmonize social advancement, environmental conservation, and economic prosperity.

Intergenerational equity, which recognizes the short- and long-term implications of sustainability and SD, is inherent in SD (Dernbach 1998; Stoddart 2011). Kolk (2016) suggests that this balance can be achieved by integrating social, environmental, and economic considerations into decision-making processes. While sustainability and SD frequently receive treatment as synonyms, they are distinct concepts. Diesendorf (2000) defines *sustainability* as the goal or outcome of the process known as sustainable development. Gray (2010) supports this by stating that "sustainability" refers to a state, whereas SD describes the process of achieving this state.

3.1. Pillars of Sustainable Development

Sustainable development and sustainability concepts encompass three key dimensions: social, economic, and ecological (or environmental) sustainability. These dimensions form the foundation of sustainability and sustainable development (Munier 2005; Basiago 1999). It is crucial to understand that sustainability is not about maintaining current affairs, as that would perpetuate environmental degradation and social inequalities (Buckingham 2007).

The three dimensions of sustainability are applied in various ways. Critical scientists often lead the most significant discussions about sustainability and sustainable development, particularly their theoretical applications. These researchers scrutinize the connections between economic practices and ecological and social issues. In contrast, much of the research in the economic and ecological realms of sustainability tends to be practical, focusing on environmental problems and their solutions.

Economic dimension

Economic sustainability refers to a production system that satisfies current consumption needs without jeopardizing the ability to meet those needs in the future (Lobo, Pietriga and Appert 2015). Historically, economists assumed an infinite supply of natural resources and believed that market efficiency and technological progress could compensate for resource depletion (Du and Kang 2016; Cooper and Vargas 2004). However, recognizing that resources are finite and not all can be replenished has prompted a reexamination of traditional economic theories (Basiago 1996, 1999; Du and Kang 2016).

Economies operate through production, distribution, and consumption activities, often guided by frameworks that distort values to the detriment of society and the environment (Cao 2017). Human survival relies on limited natural resources (Allen and Clouth 2012), and as the population grows, the demand for resources like food, clothing, and housing increases while the supply of these resources remains limited (Dernbach 2003).

Emphasizing economic growth ignores costs such as resource depletion and pollution, leading markets to damage the environment (Retchless and Brewer 2016; UNSD 2018). Therefore, economic sustainability necessitates equitable and financially responsible decision-making that incorporates all dimensions of sustainability (Zhai and Chang 2019).

Social dimension

Social sustainability encompasses equity, empowerment, accessibility, participation, cultural identity, and institutional stability (Daly 1992). It underscores that development should focus on people (Benaim and Raftis 2008), aiming to reduce poverty without causing environmental degradation or economic instability (Kumar, Raizada and Biswas 2014; Scopelliti et al. 2018). This concept directly links social issues, like poverty, with environmental sustainability (Farazmand 2016).

Achieving social sustainability involves promoting the development of individuals, communities, and cultures to ensure meaningful lives through provisions such as healthcare, education, gender equality, and global peace (Saith 2006). However, social sustainability is intricate due to social dynamics' less tangible nature than the more observable environmental and economic systems (Benaim and Raftis 2008; Saner, Yiu and Nguyen 2019). Practical social sustainability ensures that people are in conditions that uphold their ability to meet their needs (Everest-Phillips 2014).

Social sustainability creates environments where individuals can fulfill their needs, addressing obstacles that hinder this ability (Brodhag and Taliere 2006; Pierobon 2019). Understanding social dynamics from a systems perspective is essential (Lv 2018). It also involves issues like human rights, gender equity, public participation, and the rule of law, all of which foster peace and social stability necessary for sustainable development (Gray 2010; Guo 2017).

Environmental dimension

Environmental sustainability centers on preserving a productive and resilient natural environment essential for supporting human life. It prioritizes maintaining ecosystem integrity and respecting the environment's carrying capacity (Brodhag and Taliere 2006). This involves the sustainable utilization of natural resources for economic purposes and managing waste to prevent environmental degradation (Goodland and Daly 1996). Sustainable practices entail

harvesting resources at rates that allow for natural regeneration and emitting waste at levels the environment can assimilate (Diesendorf 2000; Evers 2018).

Unchecked growth exerts increasing pressure on the Earth's resources, challenging the notion that technological progress alone can sustain exponential growth. Climate change exemplifies the necessity for sustainable practices through its manifestations, such as rising atmospheric and ocean temperatures, sea-level rise, ocean acidification, and increased greenhouse gases (Du and Kang 2016).

Climate change also threatens biodiversity by altering species' reproductive cycles, migration patterns, and distributions (Kumar et al. 2014). While the complete impacts of global warming are not yet fully understood, societies must adapt to these changes to ensure sustainability (Campagnolo et al. 2018). The rate of biodiversity loss currently surpasses natural extinction rates, with many species relocating due to climate change (UNSD 2018). By 2080, approximately 20% of coastal wetlands could disappear because of rising sea levels (UNSD 2018).

These challenges underscore the critical need for environmental sustainability to maintain a stable and resilient natural environment vital for human survival and development.

3.2. Sustainable Development Goals

Sustainable development aims to achieve human development goals while ensuring natural systems can continue to provide essential resources and ecosystem services (Cerin 2006). With global population growth and finite natural resources, the need for responsible resource use is increasingly recognized.

Implemented from 2000 to 2015, the Millennium Development Goals (MDGs) aimed to organize international efforts toward vital social goals (Breuer, Janetschek and Malerba 2019). The Sustainable Development Goals (SDGs) were created because, despite tremendous progress, not all Millennium Development Goals were met. The SDGs were introduced as a component of the UN 2030 Agenda to ensure well-being, eradicate poverty, and protect the environment (Taylor 2016). They cover 17 objectives, such as ending hunger and poverty, guaranteeing access to sustainable energy, clean water, and sanitary conditions, encouraging decent work and education, encouraging innovation and resilient infrastructure, lowering inequality (particularly gender-based inequality), and protecting ecosystems while battling climate change (Hylton 2019; Saner et al. 2019).

Adopted by 193 countries in January 2016, the SDGs strive to foster economic growth, social inclusion, and environmental sustainability (United Nations 2024). They emphasize collaboration among governments, private sectors, academia, and civil society to make sustainable decisions for future generations (Breuer et al. 2019).

Across their 17 goals, the SDGs address issues like hunger, health, education, gender equality, water and sanitation, energy, economic growth, industry, infrastructure, sustainable cities, consumption and production patterns, climate change, natural resources, and justice. These themes, people, planet, prosperity, peace, and partnerships, are integrated into the goals. (Hylton 2019; Guo 2017; Zhai and Chang 2019). The triple bottom line—economic, environmental, and social dimensions—of the SDGs, in contrast to the MDGs, adopts a holistic approach and calls for national governments around the globe to direct policy-making and strategic planning (Scheyvens et al. 2016; Paoli and Addeo 2019). According to Scheyvens et

al. (2016), these objectives are global in scope and pertain to every nation. They emphasize the shared duty of sustainable development.

4. Indonesia and Sustainability

Indonesia, home to over 275 million people and the fourth most populous country globally is one of the top ten emitters of global greenhouse gasses (World Resources Institute, Friedrich et al. 2023). The country's rich natural resources (UNFCCC 2022) significantly contribute to its emissions through land use activities. Deforestation and the clearance of carbon-rich peatlands for agricultural development, particularly for oil palm plantations, are significant sources of these emissions (Groom et al. 2022; The World Bank Group and Asian Development Bank 2021). Land use emissions account for more than half of Indonesia's total greenhouse gas emissions (The Ministry of National Development Planning/National Development Planning Agency (Bappenas 2019), a critical factor in its high ranking as an emitter. The energy sector's reliance on fossil fuels also contributes to about one-quarter of the country's total emissions (Carbon Brief and Dunne 2019).

Indonesia is highly susceptible to climate hazards and particularly vulnerable to climate change impacts (The World Bank Group and Asian Development Bank 2021). According to the 2023 INFORM Risk Index, Indonesia ranks 48th out of 191 countries regarding risk from climate hazards such as flooding, droughts, and heatwaves (European Commission 2023). The frequency and intensity of these hazards are expected to increase as climate change progresses. With a large low-elevation coastal population, ranked fifth globally, Indonesia is especially vulnerable to flooding and sea-level rise, which could severely affect communities living in coastal areas and the agricultural and fishing industries (Neumann et al. 2015). For instance, Jakarta, the capital city on Java's island, is considered the world's most vulnerable city to environmental threats (Environmental et al. 2021). Projections suggest that by 2050, up to 95% of Jakarta's coastal areas could be submerged due to sea-level rise (The World Bank Group and Asian Development Bank 2021). Given that most of Indonesia's population resides in coastal areas, particularly in Java, many communities, especially rural ones, face increased risks from climate change-related hazards such as tidal floods and storms (Rudiarto et al. 2018).

Indonesia's geographical location also makes it highly susceptible to extreme heat resulting from global warming (Matthews et al. 2017; Mora et al. 2017). In 2015, the El Niño phenomenon reduced rainfall in parts of Indonesia's Borneo and Sumatra islands, causing drought and intensifying seasonal fires (NASA and Jenner 2016). This situation highlights the vulnerability of Indonesia's agriculture to climate change. The East and West Nusa Tenggara provinces, particularly drought-prone, face significant food insecurity risks (USAID 2022). For example, rice production, a crucial food staple in Indonesia, is susceptible to the timing and duration of the wet season. El Niño events, which can delay rainfall, increase the likelihood of annual rice shortages. These events are expected to become more frequent due to climate change (The World Bank Group and Asian Development Bank 2021).

Indonesia's vast tropical rainforests make it one of the most biodiverse countries globally (Margono et al. 2014). However, deforestation and forest loss, including the degradation of peatlands, primarily due to agricultural expansion like palm oil plantations and illegal logging, pose significant threats to these carbon-rich forests and Indonesia's climate change mitigation efforts (Earth.Org and Shahreen 2022). Between 2001 and 2021, Indonesia experienced the loss of more than 28 million hectares of forest coverage, an extent surpassing the size of the United Kingdom. (Global Forest and Watch 2023). The degradation and

deforestation of mangroves have been particularly impactful, accounting for 10% of the country's forestry-related greenhouse gas emissions despite only 2.6% of Indonesia's total forest area (Budi Arifanti et al. 2022).

Additionally, the rise in wildfires in recent years has further increased carbon emissions and threatened forest preservation. The 2019 fires, mainly in peatlands, emitted twice as much carbon pollution as fires in the Amazon that same year (Mongabay and Jong 2019). To combat these issues, the Indonesian government has implemented new land use policies, including a moratorium on new permits and enhanced preservation of forests and peatlands through improved sustainability management (UNFCCC 2022). In 2015, President Jokowi launched a social forestry program to provide legal access to 12.7 million hectares of forests, involving land rezoning, capacity building, and enhancing value chains for sustainable livelihoods (The World Bank 2021).

Indonesia is home to approximately 50–70 million Indigenous people, constituting about 18–25% of the total population (IWGIA n.d.). The loss of land has significantly impacted Indigenous communities, threatening their homes, identity, culture, access to food and water, economic structures, and overall well-being. Indigenous populations (Masyarakat Adat) are particularly affected by deforestation and forest loss, mainly due to the development of oil palm plantations (Human Rights and Watch 2019). Land conflicts are common and frequently linked to oil palm plantations, often resulting in the forced displacement of Indigenous people from their homes and communities (Human et al. 2019). Criticism has been directed at the government and corporations for failing to protect Indigenous rights and allowing extensive forest clearance for oil palm expansion (Human et al. 2019). In response, the Nusantara Fund was launched in May 2023, marking Indonesia's first program to directly support Indigenous populations and local communities (Mongabay and Jong 2023). The fund seeks to raise \$20 million from donors to enable Indigenous and local communities to map, protect, and rehabilitate millions of acres of land.

Indonesia focuses on advancing clean energy sources as a central element of its national policy, aiming to guide the nation toward decarbonization. Despite its significant role as a top global coal producer and the largest gas supplier in Southeast Asia, Indonesia aims to emerge as a significant global producer of biofuels (IEA n.d.; UNFCCC 2022). The country has set ambitious targets to reduce emissions by approximately 32% unilaterally or up to 43% with international assistance, surpassing the benchmarks established by the Paris Climate Agreement (Reuters 2022). In November 2022, Indonesia joined the Just Energy Transition Partnership (JETP) during the G20 summit. This partnership was established with international lenders and G7 nations to diminish reliance on fossil fuels and enhance the adoption of renewable energy sources. Over the next five years, a substantial USD 20 billion funding commitment is anticipated to facilitate the early retirement of coal-fired power plants (Mongabay and Jong 2022).

Additionally, the Asian Development Bank (ADB) will integrate climate change adaptation and mitigation strategies into its infrastructure investments in Indonesia, aligning with Indonesia's target of achieving 23% renewable energy production by 2025 (The World Bank Group and Asian Development Bank 2021). ADB's initiatives will support gas-fired power plants in Indonesia to serve as backup capacity for intermittent renewable energy usage and to phase out diesel reliance. Indonesia boasts substantial solar photovoltaic and wind energy potential, which could be leveraged extensively (The World Bank Group and Asian Development Bank 2021).

A successful national strategy in Indonesia must consider the public's beliefs, attitudes toward climate change, perceptions of risk, and responses to environmental issues, including their values and behaviors. The actions of Indonesian citizens, consumers, and communities will significantly influence the outcome of this strategy. It is crucial to comprehend how Indonesians perceive and react to climate change and environmental challenges, encompassing their knowledge, beliefs, and levels of support, as well as areas where there may be misunderstanding, disbelief, or opposition. This understanding is pivotal for practical education and communication efforts to garner more outstanding public support and demand for climate policies (The World Bank Group and Asian Development Bank 2021).

Between June 7 and July 30, 2021, researchers from Development Dialogue Asia, Yale Program on Climate Change Communication, Communication for Change, and Kantar Indonesia surveyed 3,490 Indonesian adults (ages 16+). The study aimed to gauge public awareness and beliefs about climate change and environmental risks like deforestation and forest fires. Alarmingly, 76% had limited knowledge or had never heard of global warming. Only 29% correctly attributed global warming primarily to human activities, while 23% believed it resulted equally from human activities and natural changes. Despite concerns about deforestation (80%) and forest fires (81%), few engaged in environmental activism, such as donating to groups or participating in demonstrations. These findings emphasize the need for targeted education and increased public engagement to bridge Indonesia's awareness-action gap and promote effective environmental stewardship (Yale School of the Environment 2024).

5. Sustainability and Food Industry

Economic Sustainability and the Food Industry

Achieving economic sustainability in the food sector involves navigating numerous factors to ensure profitability while responsibly managing resources and societal impacts. According to Agnusdei and Coluccia (2022), it is crucial for manufacturing systems to meet current consumption needs without compromising future requirements. This balance is fundamental for long-term stability and profitability, as highlighted by Warshawsky (2016), who emphasizes the broader economic implications of sustainability in the food industry.

Economic sustainability in the Indonesian food sector requires a multifaceted approach. Key strategies include sustainable manufacturing and value chains, ethical business practices, technological innovation, and reviving local foods. Investing in resilient value chains and fair pricing practices can enhance the industry's sustainability (MDPI 2022; Tridge 2024). Addressing food waste is critical, as it reduces costs, enhances efficiency, and mitigates risks (Tridge 2024).

Governance in the food sector requires companies to weigh profits against the interests of stakeholders such as customers, shareholders, and farmers (Govindan 2018). Sustainable economic strategies, including fair pricing, technological investments, and resilient value chains, are integral to maintaining economic viability (Gloet and Samson 2022). Zhou, Pullman, and Xu (2022) stress the importance of ethical business practices like transparency and fair labor. Promoting transparency and fair labor practices is essential (MDPI 2022; Tridge 2024). Aligning with consumer demand for ethically and sustainably produced food further supports long-term economic sustainability (Tridge 2024; GAIN 2024).

Addressing challenges such as food waste is paramount. Shad et al. (2019) highlight the economic benefits of sustainable practices in reducing costs, enhancing efficiency, and mitigating risks. These practices promote environmental stewardship and bolster market competitiveness, appealing to ethical consumer preferences (Benton and Bailey 2019).

Technological advances are crucial in enhancing productivity and competitiveness. Investing in sustainable technologies can drive these improvements (MDPI 2022; GAIN 2024). Utilizing digital platforms to shorten food supply chains and expand market access for local producers is effective (GAIN 2024). Implementing regenerative agriculture practices can boost productivity and sustainability (GAIN 2024).

Consumer demand for ethically and sustainably produced food is reshaping the food industry. Environmental concerns, climate change awareness, animal welfare, and health considerations influence purchasing decisions and supply chain practices (Baiano 2021). Meeting this demand requires adopting sustainable farming methods, ensuring transparency, and aligning with consumer values (Lehoux et al. 2021).

Reviving local foods leverages Indonesia's biodiversity and food heritage to support a more sustainable food system (GAIN 2024; UN Indonesia 2024). Improving supply chain integration and productivity and using data and technology for local foods can enhance sustainability (GAIN 2024). Shortening supply chains reduces emissions and waste while providing economic opportunities in rural areas (GAIN 2024).

Economic sustainability in the food sector necessitates integrating financial considerations with social and environmental responsibilities. Businesses that embrace sustainable practices enhance profitability and operational efficiency while contributing positively to society and the environment. By adopting these strategies, Indonesian food businesses can enhance their economic sustainability and contribute to broader environmental and social goals aligned with the Sustainable Development Goals (UN Indonesia 2024). Balancing profits with responsible practices is critical to long-term success in the evolving food industry.

Economic sustainability in the Indonesian food sector aligns closely with several Sustainable Development Goals (SDGs), as it involves a multifaceted approach that integrates financial, social, and environmental considerations. Specifically, SDG 1 (No Poverty) is endorsed through investments in resilient value chains and fair pricing practices that enhance income stability for farmers and workers. SDG 2 (Zero Hunger) is addressed by reducing food waste and ensuring efficient, equitable access to nutritious food. Technological innovations and sustainable manufacturing practices promote SDG 9 (Industry, Innovation and Infrastructure) by driving industrial efficiency and competitiveness. As emphasized by SDG 8 (Decent Work and Economic Growth), ethical business practices and fair labor ensure fair wages and safe working conditions, thereby fostering economic growth. Aligning with consumer demand for sustainably produced food and reducing emissions through shorter supply chains support SDG 12 (Responsible Consumption and Production) and SDG 13 (Climate Action). Reviving local foods and integrating supply chains help preserve biodiversity and reduce environmental footprints, contributing to SDG 15 (Life on Land) and SDG 11 (Sustainable Cities and Communities) by promoting sustainable rural and urban development. Collectively, these strategies enhance the Indonesian food industry's sustainability, aligning it with global goals for a more equitable, resilient, and sustainable future.

Social Sustainability and the Food Industry

Sustainability in the Indonesian food industry encompasses far more than just environmental considerations; it involves complex interactions among society, the food sector, and the global community, as highlighted by De Bakker & Dagevos (2012) and Arvidsson Segerkvist et al. (2020). This perspective emphasizes that food is not merely a commodity but a fundamental human necessity, impacting public health, social justice, and cultural identity (Tseng et al. 2022; Martín-Martín et al. 2023).

The social dimension of food sustainability in Indonesia is underscored by issues such as obesity in urban areas and malnutrition in rural regions, affecting health disparities across the country (Zhong, Wang and Cui 2021). The food industry operations significantly influence societal well-being, including impacts on national healthcare systems (Shelke et al. 2009).

Equitable access to nutritious and culturally relevant food is critical for social sustainability in Indonesia (Latino et al. 2023). Inequalities in food access disproportionately affect marginalized communities, exacerbating social disparities (Bowen et al. 2021). Grieger et al. (2022) argue for inclusive food systems that address food insecurity as a central social issue.

Labor rights and fair working conditions are essential to social sustainability in the Indonesian food sector. This includes fair wages, safe environments, and protections against discrimination (Ariza et al. 2019; Bruzelius and Seeleib 2023). Ensuring supply chain transparency and ethical labor practices is crucial for maintaining dignity and well-being among food industry workers (Warhurst and Knox 2022).

The food industry's impact on local communities in Indonesia varies widely, encompassing both positive outcomes, such as employment and cultural preservation, and negative impacts, like environmental degradation and food insecurity (Cottrell et al. 2019). The food industry can contribute positively to economic growth and community well-being by addressing these complexities.

Addressing food insecurity and ensuring equitable access to nutritious food in Indonesia demands collaborative action involving the government, organizations, and communities (El Bilali et al. 2019). Key strategies include establishing social safety nets, advancing agricultural development, promoting education on balanced diets, minimizing food waste, and empowering marginalized groups, particularly women (Pawlak and Kołodziejczak 2020). These integrated efforts aim to build a sustainable food system that fosters resilience and equitable food access for all individuals and communities.

Achieving sustainability in the Indonesian food sector necessitates a holistic approach that considers social dimensions alongside environmental and economic factors. By addressing these interconnected challenges, stakeholders can work towards a food system that is fair, inclusive, and sustainable for all.

Social sustainability in the Indonesian food industry aligns with several Sustainable Development Goals (SDGs) by addressing complex societal issues and promoting equitable practices. SDG 2 (Zero Hunger) and SDG 3 (Good Health and Well-being) are targeted through efforts to reduce malnutrition in rural areas and combat obesity in urban regions, ensuring equitable access to nutritious food and improving public health. SDG 5 (Gender Equality) and SDG 10 (Reduced Inequalities) are supported by empowering marginalized groups, particularly women, and addressing inequalities in food access. Promoting fair wages, safe working

conditions, and protections against discrimination aligns with SDG 8 (Decent Work and Economic Growth), ensuring dignified labor practices. Efforts to foster inclusive food systems and establish social safety nets contribute to SDG 11 (Sustainable Cities and Communities) by enhancing community resilience and well-being. By emphasizing the cultural significance of food and promoting transparency in supply chains, the industry also supports SDG 12 (Responsible Consumption and Production). These integrated strategies foster a fair, inclusive, and sustainable food system that positively impacts local and global communities.

Environmental Sustainability and the Food Industry

Environmental sustainability in the Indonesian food industry focuses on maintaining ecological integrity and resilience to support human life while balancing social and economic dimensions (Brodhag and Taliere 2006). Achieving this requires strategic approaches integrating environmental preservation with societal well-being and economic viability (Ding 2008; Swart, Raskin and Robinson 2004).

Indonesia's food production, distribution, and consumption substantially strain natural resources like land, water, and energy, and population growth worsens (Fan and Brzeska 2014). The Indonesian food sector is progressively embracing sustainable practices and integrating circular economy principles to address these environmental challenges. This strategy focuses on minimizing waste, repurposing by-products, and encouraging the use of recyclable packaging (Korhonen, Honkasalo and Seppälä 2018; Moreau et al. 2017).

Greenhouse gas emissions from agriculture, processing, transportation, and waste management within Indonesia's food supply chain substantially contribute to climate change (Panchasara et al. 2021). Mitigating these emissions demands a comprehensive approach that includes sustainable agricultural practices, improved transportation efficiency, adoption of renewable energy sources, and encouragement of plant-based diets (Crippa et al. 2021; Oruma et al. 2021). These strategies are essential to reducing the environmental impact of food production and promoting climate resilience in the Indonesian agricultural sector.

Land and water usage in food production are critical issues affecting environmental sustainability in Indonesia. Challenges include habitat loss, water scarcity, and pollution from agricultural runoff (Mohanavelu et al. 2021; Francaviglia et al. 2023). Solutions involve sustainable practices like agroecology, efficient irrigation, and integrated water management to mitigate environmental degradation and ensure resource efficiency (Pereira et al. 2020).

Biodiversity loss and ecosystem degradation are exacerbated by agricultural expansion and intensive farming practices in Indonesia, necessitating biodiversity-friendly policies and ecosystem restoration efforts (Balogh & Jamber 2020; Watson et al. 2019). Adopting agroecological approaches and supporting biodiversity conservation can help preserve ecological balance within Indonesian food production systems.

Waste generation and management present complex challenges in Indonesia, with the food industry generating substantial waste throughout its supply chain (Ncube et al. 2021). Effective waste reduction strategies involve source reduction, recycling, composting, and innovative waste-to-energy technologies (Huang et al. 2021; Alonso et al. 2021). Collaboration among stakeholders is crucial to implement these strategies and transition towards a more sustainable and circular economy.

Achieving environmental sustainability in the Indonesian food industry requires concerted efforts across sectors and disciplines. By integrating sustainable practices, reducing

environmental footprints, and promoting resource efficiency, the Indonesian food industry can contribute to a resilient and environmentally responsible food system for future generations.

Environmental sustainability in the Indonesian food industry aligns with multiple Sustainable Development Goals (SDGs), emphasizing the need to balance ecological integrity with social and economic well-being. SDG 12 (Responsible Consumption and Production) is supported by the industry's adoption of circular economy principles, which focus on waste minimization, repurposing by-products, and promoting recyclable packaging. SDG 13 (Climate Action) is addressed through strategies to mitigate greenhouse gas emissions, such as sustainable agricultural practices, improved transportation efficiency, renewable energy adoption, and promoting plant-based diets, which collectively enhance climate resilience. Efficient land and water usage practices, including agroecology, efficient irrigation, and integrated water management, align with SDG 6 (Clean Water and Sanitation) and SDG 15 (Life on Land), addressing water scarcity, habitat loss, and pollution from agricultural runoff. Biodiversity-friendly policies and ecosystem restoration efforts support SDG 15 by preserving ecological balance and promoting conservation. Waste management strategies involving source reduction, recycling, composting, and innovative waste-to-energy technologies contribute to SDG 11 (Sustainable Cities and Communities) by reducing environmental footprints and enhancing resource efficiency. Collaborative efforts across sectors and disciplines are essential to achieve these goals, ensuring the Indonesian food industry evolves into a resilient and environmentally responsible sector that contributes positively to sustainable development for future generations.

6. Role of Sustainable Practices in Achieving Sustainability:

Sustainable practices are crucial in achieving sustainability across environmental, social, and economic dimensions. Here are some key ways sustainable practices contribute to sustainability goals:

- **Food Sourcing:** Choosing locally grown, organic, and seasonal ingredients reduces carbon emissions from transportation and supports local farmers.
- **Packaging Materials:** Using biodegradable, compostable, or reusable packaging reduces landfill waste and environmental pollution.
- **Waste Management:** Implementing recycling, composting, and food waste reduction strategies minimizes environmental impact and contributes to circular economy principles.

6.1. Local Food Sourcing

As the need for environmentally and socially conscious food systems rises, sustainable agriculture becomes increasingly important. Local food markets, where producers sell straight to customers, are essential because they cut out intermediaries, minimize transportation and storage needs, protect biodiversity, encourage traditional farming methods, and strengthen rural economies (Garnett et al. 2013; FAO 2013). They cultivate community relationships through direct contact, improving transparency, and offer fresh, nutrient-dense, minimally processed food cultivated sustainably (Levkoe et al. 2013). (Hassanein 2003).

Local food marketplaces, such as farmers' markets and farm-to-table eateries, help small-scale farmers find direct markets, which reduces carbon emissions and boosts local economies (Martinez et al. 2010). According to Hinrichs and Lyson (2007), these markets promote sustainable farming methods and boost the local economy. Building a resilient and sustainable food system requires understanding the function of local food markets.

Definitions of Local Food and Local Market

Local food has various definitions. However, it is generally considered food produced and consumed within a specific geographic area, often within a 100-mile radius. This proximity typically ensures fresher produce and positively impacts the local economy. As global food trade increases, local food has expanded to include food grown within one's region or country (Demirbaş 2023).

In a local market, producers sell their goods directly to consumers, usually regularly, weekly, or monthly, and often in public spaces like parks or town squares. These markets offer various products, including fresh produce, meats, dairy products, and crafts. Local markets enable consumers to connect with local producers and learn about the origins of their food and other goods (Low and Vogel 2009; Hinrichs 2003).

How Can Local Markets Impact Local Economies?

Local markets, such as farmers' markets, significantly influence the economy by boosting employment, income generation, entrepreneurship, and community development. They serve as meeting places for families and entrepreneurs, offering local foods and crafts, which drives economic growth. Throsby (2001) found that local markets positively impact income and economic development in rural areas.

Supporting local businesses at farmers' markets keeps money within the community, encouraging more production and economic growth. Locally sourced foods are often cheaper to produce, allowing farmers to sell at fair prices, benefiting both consumers and producers.

Farmers' markets are valuable for low-income communities, providing access to affordable, healthy foods. They also create jobs and foster entrepreneurship, especially in retail, food services, and crafts (Porter and Ketels 2009). Increased revenue from local shoppers enables small businesses to create more jobs.

Local markets provide a platform for artisans to showcase unique arts and crafts, often not found in traditional stores, facilitating direct interaction with customers. Environmentally, local foods reduce travel needs, cutting emissions and saving resources.

Local markets promote micro and small enterprise development by connecting producers directly with consumers (Katharinafm 2021). They also foster community development by strengthening social interactions and cohesion (McHugh et al. 2015). These markets preserve cultural identity and heritage, attracting tourists and contributing to cultural tourism (Getz and Carlsen 2000).

Benefits of Local Food Markets for Consumers

Local food markets provide consumers with many advantages that enhance their culinary experience and their connection to the community. Firstly, these markets offer produce renowned for its superior flavor and freshness, as selections are based on taste rather than durability for long-distance transport. The research underscores that consumers often perceive locally sourced foods as fresher and more palatable compared to those from large retail outlets (Jarosz 2008). Moreover, local markets boast a rich diversity of seasonal products, including fruits, vegetables, meats, and other locally sourced goods, thereby promoting biodiversity and encouraging a varied diet (Hinrichs 2003). Beyond taste and variety, these markets foster transparency and food safety by facilitating direct interactions between consumers and producers. This direct relationship allows shoppers to inquire about farming methods and handling practices, ensuring greater accountability in food production (Onwuegbuzie et al. 2014).

Furthermore, the proximity of local markets ensures that products are harvested or prepared shortly before sale, preserving their nutritional value and freshness. Studies indicate that local foods retain higher levels of nutrients due to shorter times between harvest and consumption (Gussow and Clancy 1986). Finally, shopping at local markets offers consumers a deeper connection to their food sources and community. Individuals gain insights into cultivation practices by engaging directly with farmers and producers, fostering trust and a sense of community (Lyson 2004; Allen et al. 2003). In essence, local food markets enrich the culinary experience with fresh, flavorful foods and strengthen community ties through shared values of sustainability and local support.

6.1.1. SUSTAINABILITY IN THE LOCAL FOOD MARKET

This section evaluates the environmental, economic, and social sustainability of local food markets.

Environmental sustainability

Local food markets contribute significantly to environmental sustainability by reducing greenhouse gas emissions associated with long-distance transportation and promoting sustainable farming practices. Research indicates that purchasing locally sourced food can substantially lower carbon footprints linked to transportation (Min et al. 2019). Local markets also tend to prefer organic or low-input farming techniques, which reduce the use of synthetic pesticides and fertilizers known to be harmful to the environment. (Hinrichs 2003; Devaux et al. 2019).

The shorter supply chains characteristic of local food systems also contribute to environmental benefits by reducing the energy consumption related to transportation, refrigeration, and packaging (Coley et al. 2009). Many local food items, particularly produce, are sold without excessive packaging at farm stands, and customers often use reusable bags, thereby reducing waste, particularly plastic waste (Streit 2021). Additionally, local produce typically requires less processing than its commercially produced counterparts, minimizing waste while preserving food quality.

Supporting local farmers who employ sustainable practices also plays a crucial role in environmental conservation. These practices help maintain green spaces and farmland, enhance biodiversity, support essential pollinators, and contribute to cleaner air, water, and soil (Streit 2021). Overall, local food markets reduce pollution and waste associated with packaging,

processing, and transportation and support a sustainable agricultural system that benefits both consumers and the environment.

Local food markets contribute to SDG 13 (Climate Action) by reducing greenhouse gas emissions from transportation and promoting sustainable farming practices. They also support SDG 15 (Life on Land) by preserving biodiversity, minimizing pollution, and fostering cleaner environments through sustainable agriculture.

The presence of local food markets has a notable impact on supporting environmental sustainability. This is achieved by reducing greenhouse gas emissions from transportation and encouraging sustainable farming practices, including organic methods. This aligns mainly with SDG 13 (Climate Action) and SDG 15 (Life on Land). They also reduce energy consumption and minimize waste related to packaging, thus supporting SDG 7 (Affordable and Clean Energy) and SDG 12 (Responsible Consumption and Production). Additionally, by preserving biodiversity, supporting pollinators, and enhancing air, water, and soil quality, local food markets further contribute to the goals of SDG 15 (Life on Land), SDG 6 (Clean Water and Sanitation), and SDG 11 (Sustainable Cities and Communities).

Economic sustainability

Purchasing local food offers numerous advantages to the local economy, benefiting businesses throughout the supply chain. According to the Farmers Market Coalition (2020), local markets are pivotal in job creation, retaining money within the community, and providing fair market opportunities for small-scale farmers, thereby sustaining local agriculture and preserving farmland. Martinez et al. (2010) further demonstrate that direct-to-consumer sales at local food markets significantly contribute to economic development by supporting farmers and small-scale food producers.

Similar to how a stimulus package stimulates a national economy, spending within one's community can enhance the local economy. Studies indicate that local food purchases have a multiplier effect, increasing employment, income, and overall community prosperity (Canfora 2016; Arabska 2018; Streit 2021; Apostolos 2022). Local businesses create job opportunities for community members and reinvest their earnings in other local establishments, thereby strengthening the regional economy.

Purchasing local food supports Sustainable Development Goals (SDGs) such as SDG 8 (Decent Work and Economic Growth) by creating local job opportunities and promoting economic resilience. It also contributes to SDG 2 (Zero Hunger) by ensuring access to nutritious food and supporting sustainable agriculture practices that preserve farmland and local food systems.

Social sustainability

Local food markets serve as vibrant social spaces where consumers can directly engage with farmers, producers, and fellow community members, fostering a sense of connection and belonging. This direct interaction allows consumers to gain insights into farming practices, cooking techniques, and the stories behind the food they purchase (Hinrichs 2003). By supporting local food markets, individuals contribute to the economic well-being of their community. These markets benefit farmers, artisans, and small-scale food producers, many family-owned or operated by local entrepreneurs. The revenue generated circulates within the community, enhancing economic resilience and creating local job opportunities (Martinez et al. 2010).

Developing personal relationships with farms and food producers is a profoundly satisfying aspect of buying locally. It fosters a sense of community and provides opportunities to learn about sustainable farming methods, which can deepen one's appreciation for the food they consume. This personal connection to food cultivates satisfaction and mindfulness, similar to the experience of using a cherished family recipe. By purchasing food directly from farmers and local purveyors, individuals expand their understanding of agriculture and forge stronger connections to their food.

Socially, local food markets contribute positively to community engagement by providing equitable access to nutritious food and fostering social interactions. They promote healthier lifestyles by encouraging fresh, local food consumption and supporting relationships between producers and consumers. Overall, local food markets play a crucial role in enhancing social sustainability by strengthening community bonds and promoting a shared commitment to local economies and sustainable food systems.

Local food markets are vital in advancing social sustainability by encouraging community involvement and ensuring fair access to healthy food, thereby supporting SDG 2 (Zero Hunger) and SDG 3 (Good Health and Well-being). Furthermore, they boost local economies by creating economic opportunities for small-scale farmers and artisans, directly contributing to SDG 8 (Decent Work and Economic Growth) and SDG 12 (Responsible Consumption and Production).

Significance of Local Vegetable Sourcing in Indonesia

In Indonesia, sourcing local vegetables is extremely important in dealing with the difficulties brought about by rapid urbanization and changing dietary habits. As urban populations overgrow, creating strong links between urban food needs and rural producers becomes increasingly essential for sustainability and economic strength.

One key aspect is the preservation of dietary diversity. Indonesia boasts a rich array of local vegetable crops, encompassing 228 varieties well-suited to the local environment (Food et al. Group 2015). Encouraging the consumption of these indigenous vegetables supports dietary variety among urban populations, contrasting with resource-intensive diets that are less adapted (Natawidjaja 2007; Rikolto n.d.).

Another critical benefit is supporting small-scale farmers. Vegetable production in upland areas significantly contributes to local economies across Indonesia (Arsanti and Böhme 2016). Promoting local vegetable sourcing supports small-scale farmers, which is vital for rural communities amid ongoing urban migration trends (Giyarsih et al. 2024; Rikolto n.d.).

Moreover, shifting to diets centered around locally sourced vegetables offers environmental advantages. This includes mitigating greenhouse gas emissions linked to long-distance transportation and reducing food losses and packaging waste (Natawidjaja 2007; Rikolto n.d.). Shortening supply chains supports the development of sustainable food systems in the context of urbanization.

Regarding food security, local vegetable crops provide viable alternatives to address fluctuations in food prices and potential scarcity, enhancing food security in urban areas (Rijanta et al. 2013; Colozza and Avendano 2019).

Consumer preferences also play a significant role. Indonesians prefer local vegetables due to affordability, freshness, and perceived quality (Munarso and Mulyawanti 2019; Arsil

2013). Increasing the sourcing of local vegetables supports economic sustainability and enhances consumer satisfaction.

In conclusion, promoting the sourcing of local vegetables in Indonesia contributes to supporting small-scale farmers, enhancing food security, reducing environmental impact, and promoting healthier diets amidst urbanization. Leveraging Indonesia's diverse range of local vegetables presents opportunities to build resilient food systems that benefit urban consumers and rural communities.

Local food sourcing in Yogyakarta

Yogyakarta City needs help meeting its vegetable supply locally due to limited agricultural space and increasing urbanization. As urban areas expand, agricultural lands are increasingly converted into settlements. Consequently, many of Yogyakarta's vegetable needs are sourced from neighboring rural areas and regions beyond the Special Region of Yogyakarta.

In the study by Budiman, L. S., and A. Musthofa. (2023), among the 15 studied vegetable commodities—cabbage, napa cabbage, beans, tomatoes, carrots, cucumbers, eggplants, chayotes, shallots, garlic, spinach, water spinach, cayenne pepper, red chili, and yardlong beans—only spinach and water spinach are locally produced in sufficient quantities within Yogyakarta. These two vegetables are particularly suited for cultivation in small spaces such as polybags or garden plots, making them feasible for household production.

However, the city still relies on external sources for the remaining 13 commodities, including four vegetables—napa cabbage, tomatoes, eggplants, and cayenne pepper—produced locally but fall short of meeting local demand. These vegetables are also supplied from areas outside Yogyakarta.

The Giwangan Main Market is a crucial hub for vegetable distribution in Yogyakarta. It primarily sources produce from districts such as Kejajar, Ngablak, Dukun, Kaliangkrik, Muntilan, Selo, Getasan, and Parakan outside the Special Region of Yogyakarta.

In summary, while Yogyakarta manages to produce spinach and water spinach locally, most other vegetable needs are fulfilled through imports from surrounding rural districts and regions outside the province.

Supply Chain and Inventory Management

The study by Guritno, Adi Djoko, Rika Fujianti, and Dinovita Kusumasari. (2015) on supply chain factors and inventory management practices among fresh vegetable suppliers in Yogyakarta identifies two primary inventory strategies: inventory speculation for non-unique products and inventory postponement for unique fresh vegetable products. Approximately 80% of suppliers cultivate non-unique plants such as cabbage, squash, leeks, pak choi, chicory, and small cherry tomatoes. These vegetables have predictable demand patterns and relatively stable consumer preferences, resulting in a reliable and predictable supply chain with positive lead times. Suppliers in this category wield strong bargaining power due to their numerous sources (over 50 farmers). Therefore, inventory postponement is deemed the most suitable strategy for managing inventory.

In contrast, the remaining 20% of suppliers focus on growing unique varieties, including broccoli, lettuce, green lettuce, beetroot, red spinach, and kailan. These vegetables exhibit fluctuating demand levels that are challenging to predict despite stable consumer preferences.

The supply chain for these unique vegetables experiences unreliable lead times, given the variability in delivery quantities and the limited number of farmers supplying them. Consequently, suppliers in this category have weaker bargaining power. Here, inventory speculation is considered the appropriate inventory management strategy to mitigate the risks associated with uncertain demand and supply fluctuations.

Overall, modern markets emerge as the preferred distribution channel for fresh vegetables, followed by regular and franchise restaurants. Traditional markets rank lowest in popularity among suppliers in Yogyakarta.

Sustainability of Urban Vegetable Farming

Dewanggi, Rafika Putri, Irham, and Hani Perwitasari's (2022) primary focus is to assess the sustainability of urban vegetable farming in Yogyakarta City, examining ecological, economic, and social dimensions. The research involves 60 farmers from Jetis and Danurejan Districts, analyzing farmers' characteristics, farming techniques, and perceptions of sustainability.

The study reveals that urban vegetable farming in Yogyakarta City is considered entirely sustainable based on farmers' perceptions. Most farmers surveyed are above 50 years old and possess higher levels of education. Farmers' age and the size of their landholdings significantly influence the sustainability of their farming practices.

Regarding ecological sustainability, both Jetis and Danurejan Districts are categorized as sufficiently to very sustainable, with Jetis scoring higher on the sustainability index. Farmers attribute their positive perception of sustainability to the accessibility of production inputs, particularly in Jetis, supported by funds from farmer group competitions.

Overall, the average percentage of farmers who perceive the sustainability of vegetable farming in Yogyakarta as sufficiently sustainable is 74.69. This positive perception is bolstered by favorable environmental conditions conducive to agricultural cultivation.

Furthermore, based on score intervals, the study distinguishes farmers' perceptions into good and bad categories. Remarkably, 100% of surveyed farmers in Yogyakarta hold a favorable perception of vegetable farming sustainability in urban settings from an ecological standpoint, illustrating unanimous positivity among respondents. None of the farmers expressed negative perceptions in this regard.

In conclusion, the study underscores the generally positive outlook of Yogyakarta's farmers towards the ecological sustainability of urban vegetable farming, highlighting the importance of supportive environmental conditions and access to resources in enhancing agricultural sustainability.

Consumer Preferences and Consumption Patterns

The study focuses on exploring consumption patterns and consumer preferences for tropical vegetables in the Special Region of Yogyakarta, Indonesia. It emphasizes their nutritional benefits despite relatively low consumption rates in the region. Key objectives include identifying the most popular tropical vegetables, understanding preferred attributes, and analyzing their impact on consumer choices.

According to the study by Hardyastuti, S., & Perwitasari, H. (2020), the highest to lowest tropical vegetables ranked by consumption rate are purple eggplant, long beans,

cucumber, tomato, and chili. Consumer preferences for these vegetables are influenced by various attributes such as freshness, hygiene, convenience, nutritional benefits, color, packaging, size, taste, organic status, labeling, and texture. Among these, tomatoes are favored the most, followed by long beans, purple eggplants, chili, and cucumbers.

Consumers of tropical vegetables in Yogyakarta are observed across various modern and traditional markets. Demographic characteristics of these consumers include gender, age, marital status, education level, and occupation. Shopping activities predominantly involve women, highlighting shopping as a domestic responsibility. However, 2.6% of men participate in shopping activities, often choosing modern markets due to their perceived cleanliness and image.

Age distribution among consumers ranges widely, from 22 years to 69 years, with the average consumer falling within a productive age range. Education level correlates with nutritional awareness, with most consumers completing more than 12 years of education (high school and above). Regarding occupation, 75.7% of vegetable consumers are employed, while the remainder includes homemakers who manage household finances sourced from family members' earnings.

Overall, the study provides insights into the dynamic preferences and demographic characteristics of consumers purchasing tropical vegetables in Yogyakarta. It underscores the importance of understanding consumer behavior and preferences in promoting the region's consumption of nutritious tropical vegetables.

Indonesian initiatives regarding food sourcing

Indonesia has several initiatives to promote local food sourcing and sustainable food systems:

The government has included strategies to increase consumption of local and nutritious foods in its 2020-2024 National Medium-Term Development Plan (The Jakarta Post 2021). This includes a focus on reviving local food production and diversity, which can reduce greenhouse gas emissions and food waste and strengthen local communities (The Jakarta Post 2021).

The government is also working to boost productivity through regenerative agriculture practices that rebuild soil health and reduce emissions rather than relying on chemical fertilizers (The Jakarta Post 2021). Implementing this will require education and capacity building for farmers (The Jakarta Post 2021).

The government is developing a food systems dashboard at the policy level to provide local policymakers with data to improve nutrition and sustainability (The Jakarta Post 2021). WWF-Indonesia has also supported the government in advancing climate commitments and developing GHG mitigation strategies for the palm oil sector, a significant driver of deforestation (WWF n.d.).

Additionally, a SWITCH-Asia project promotes sustainable and equitable local food systems in Indonesia by building producer capacity, facilitating market access, and engaging consumers and governments (Switch-Asia n.d.).

In Indonesia, the rise of agri-tech e-commerce platforms like Sayurbox, Tanihub, Aruna, and Jala is reshaping the agricultural sector by facilitating direct connections between traditional farmers and urban consumers through digital innovation (The Jakarta Post 2021).

Founded in 2016 by Rama Notowidigdo and Amanda Cole, Sayurbox has expanded from its original role as a direct-to-consumer platform to become a technology-driven grocery service and B2B supplier. Operating primarily in West Java, Surabaya, and Bali, Sayurbox purchases sustainably grown produce from local farmers and distributes it via its app and website to consumers, supermarkets, and beverage manufacturers (The Jakarta Post 2021).

Beyond commerce, Sayurbox empowers farmers by providing market insights and educational workshops to optimize production and reduce waste. The platform promotes sustainability by selling visually imperfect produce at reduced prices, minimizing food waste, and promoting responsible consumption (The Jakarta Post 2021). Aligned with Sustainable Development Goals (SDGs) such as SDG 2 (Zero Hunger) and SDG 12 (Responsible Consumption and Production), Sayurbox aims to improve food security, decrease agricultural waste, and foster inclusive economic growth in rural areas (The Jakarta Post 2021).

Similarly, OkeJack is a local digital initiative in Papua, Indonesia, designed to support smallholder farmers, particularly women, in effectively marketing their agricultural products and developing a sustainable local food system (GAIN 2021; SGP Indonesia 2020). Utilizing an online platform, OkeJack shortens the supply chain between farmers in Papua's forested areas and consumers, facilitating wider distribution of surplus food and reducing food waste (GAIN 2021). Focused on connecting and marketing agricultural products from women farmers, OkeJack enhances market access and contributes to revitalizing local food systems through digital integration and regenerative agricultural practices (SGP Indonesia 2020).

Sayurbox and OkeJack demonstrate how digital platforms revolutionize Indonesia's agricultural sector. These initiatives enhance market opportunities for farmers and promote sustainable practices to address global challenges such as food security and environmental impact. Through technology adoption and collaborative efforts, these platforms lead toward a more resilient and inclusive agricultural landscape in Indonesia.

6.2. Food packaging in the food industry

Food packaging is essential in the restaurant industry as it guarantees food products' safety, quality, and convenience. (Alert Packaging 2024). It protects food from contamination, extends shelf life, and facilitates transportation and storage (Alert Packaging 2024; Goswami 2019). Adequate packaging maintains the food's temperature and freshness, enhancing the overall dining experience, whether in-house or as a takeaway option (Alert Packaging 2024). Moreover, packaging serves as a medium for branding and communication, providing information about the food, ingredients, and brand values (Alert Packaging 2024).

The global packaging industry is enormous, with billions of units produced annually (EIT Food 2024). A significant portion of this market is dedicated to food packaging, driven by the demand for convenience and ready-to-eat meals (EIT Food 2024). Food packaging is ubiquitous in restaurants, particularly those offering takeaway and delivery services, with a mid-sized restaurant potentially using thousands of takeaway boxes, cutlery sets, and other packaging materials each month (Select Equip 2024).

The global food packaging industry has witnessed significant growth, with its market size reaching an impressive USD 480 billion in 2023 (Syed 2024). Food packaging accounts for almost 35% of the global packaging market, making it the largest application segment (Plastemart 2024).

As an emerging Asian Pacific economy, Indonesia is playing catch-up to the packaging technologies and food supply chain management seen in more developed nations (Plastemart 2024). The demand for food packaging in Indonesia is driven by the rapid growth of the food delivery sector, urbanization, and a burgeoning middle class (Syed 2024). This has led to increased use of various packaging materials in Indonesian restaurants, particularly in urban centers like Jakarta and Yogyakarta. Some critical packaging materials include plastic, paper, biodegradable materials, banana leaves, bamboo baskets, and reusable containers.

The Challenges of Plastic Waste in Indonesia

Indonesia, with a population of 250 million, is the world's second-largest plastic polluter after China. Annually, the country produces approximately 64 million tonnes of plastic waste, with a staggering 3.2 million tonnes ending up in the sea (FairPlanet n.d.; SEA Circular 2020). Plastic carry bags alone contribute significantly, amounting to around 10 billion bags, totaling 85,000 tonnes, released into the environment each year (United Nations Environment Programme n.d.).

Indonesia's food and beverage sector, speedy food chains, and street vendors play a crucial role in exacerbating the nation's plastic waste crisis. These establishments heavily rely on single-use plastic packaging such as bags, containers, cutlery, cups, lids, and straws (Arisman n.d.; IPEN 2021). This reliance contributes significantly to the substantial generation of plastic waste, impacting urban areas like Jakarta, where plastic waste constitutes 34% of daily waste, and natural environments like rivers and oceans (FairPlanet n.d.; Arisman n.d.).

The environmental implications are severe, with plastic debris from food packaging contaminating beaches and marine habitats, posing threats to wildlife and ecosystems (Arisman n.d.). Economically, plastic pollution in the Asia-Pacific region alone costs industries such as tourism, fishing, and shipping an estimated \$1.3 billion annually (Arisman n.d.).

Plastic remains Indonesia's predominant food packaging material due to its durability, cost-effectiveness, and versatility (Select Equip 2024). However, its environmental footprint is substantial, with millions of tons of plastic waste entering oceans and landfills yearly (Select Equip 2024). The country's plastic waste management is critically inadequate, with only a tiny fraction—10%—being recycled, exacerbating pollution concerns and ecological impacts (Plastic Collective 2021; SEA Circular).

Indonesia's extensive plastic pollution profoundly threatens its coastal and marine ecosystems, endangering approximately 82% of the nation's reef areas (SEA Circular). As the world's second-largest contributor to marine plastic litter after China, Indonesia annually leaks between 0.48 and 1.29 million tons of plastic into the oceans, further compounding environmental degradation (SEA Circular).

Moreover, plastic pollution in Indonesian rivers, among the world's most polluted, contaminates soil, compromises water quality, and poses risks to wildlife (Plastic Circles 2023; Plastic Collective 2021). This contamination permeates the food chain, affecting aquatic and terrestrial ecosystems alike.

The production of plastic packaging in Indonesia consumes significant resources and contributes substantially to greenhouse gas emissions, exacerbating climate change (Statista 2021). Due to its durability, plastic persists in the environment for centuries, releasing toxic chemicals during its slow decomposition process (Statista 2021).

Plastic packaging dominates Indonesia's plastics market, constituting nearly half (49.6%) of all plastic applications (SEA Circular). The packaging industry has experienced rapid growth, with projections indicating a rise from 1.1 billion units in 2016 to 130.3 billion units by 2021 (SEA Circular). Addressing these challenges requires comprehensive strategies to reduce plastic consumption, improve waste management practices, and promote sustainable alternatives to mitigate environmental and economic impacts.

Alternative food packaging

Given plastic's environmental impact, several sustainable alternatives are being adopted, including biodegradable materials, paper, banana leaves, and reusable containers (EIT Food 2024).

Each alternative material offers distinct benefits, such as reduced environmental impact, recyclability, and compostability (EIT Food 2024). Customer perception of takeaway packaging is increasingly leaning towards sustainability, with many consumers showing a preference for eco-friendly alternatives and being willing to pay a premium for sustainable packaging (EIT Food 2024).

1. Banana leaves

Banana leaves hold significant cultural and practical importance in Balinese and broader Indonesian contexts. In Bali, the tradition of using banana leaves to package traditional snacks has deep roots, reflecting a cultural ethos that values simplicity, functionality, and sustainability (Julianti 2014). This practice dates back to ancient times when natural materials like leaves, bark, and animal skins were used for various purposes, emphasizing their availability and eco-friendly nature (Surata, Gata, and Sudiana 2015).

Banana leaves in Balinese culture extend beyond culinary applications; they are integral to religious rituals and ceremonies, underscoring their versatile role in local traditions (Surata, Gata, and Sudiana 2015). These leaves are favored for their ability to be easily shaped into various forms through different folding techniques, making them ideal for packaging a variety of traditional snacks (Rahmadhia, Santoso, and Supriyadi 2019).

Despite the environmental benefits of banana leaf packaging—such as biodegradability and minimal ecological impact—plastic has increasingly supplanted natural materials due to cost, convenience, and availability (Noviadji 2014). This shift is exacerbated by challenges such as the scarcity of natural packaging materials and the need for processing (Rahmadhia, Santoso, and Supriyadi 2019).

Efforts to reduce plastic use, exemplified by Bali's Governor Regulation No. 97 of 2018, aim to curb single-use plastic waste but face implementation challenges (Peraturan Daerah Provinsi Bali 2020). Interviews reveal a generational gap in traditional snack-making skills and knowledge, posing a threat to cultural preservation (Hendradewi, Enggriani, and K 2018).

Banana leaves, particularly Batu banana leaves (*Musa balbisiana*), are highly valued for their quality and antioxidant properties, which benefit packaged snacks (Rahmadhia, Santoso, and Supriyadi 2019). These leaves are sourced from specific regions like Payangan in Gianyar Regency, known for their broad, intact sheets that do not stain snacks (Winarno and Octaria 2020).

Packaging traditional snacks with banana leaves embodies Balinese cultural wisdom, encompassing aesthetic, health, economic, and preservation values (Natadjaja and Yuwono 2017). This cultural capital shapes social practices and market dynamics, ensuring the continuity of traditional packaging amidst evolving consumer preferences (Adnyana 2018).

In conclusion, documenting and preserving these traditional practices is crucial for maintaining cultural identity and sustainability in Bali. These efforts support local communities and can inspire modern innovations in environmentally friendly packaging solutions (Widari and Prasiasa 2022). Designers in visual communication can draw upon this rich tradition to promote the positive environmental impact of banana leaf packaging across Indonesia.

2. Besek (a bamboo woven basket)

Bamboo is a far better material for woven baskets like besek than plastic for several key reasons. Firstly, bamboo is biodegradable, meaning it decomposes naturally over time without leaving harmful residues, unlike plastic, which takes centuries to break down and causes significant pollution (Shop Without Plastic 2023; The Bamboo Bae 2023).

In addition, bamboo is a highly renewable resource, as it is one of the fastest-growing plants, capable of growing up to 3 feet per day. It can be harvested repeatedly without damaging the plant, in stark contrast to plastic derived from limited fossil fuels (Shop Without Plastic 2023; The Bamboo Bae 2023). (PLAGIARISM)

Furthermore, producing bamboo has a much smaller carbon footprint than producing plastic. Bamboo forests absorb carbon dioxide and release more oxygen than typical trees, thus benefiting the environment (The Bamboo Bae 2023).

Bamboo's strength and versatility make it ideal for creating durable and long-lasting baskets like besek. In longevity and sustainability, it outperforms single-use plastic alternatives, providing a practical and environmentally friendly solution for packaging and transporting goods (Shop Without Plastic 2023; The Bamboo Bae 2023).

Moreover, bamboo has significant cultural importance, especially in places like Bali, where besek bamboo baskets have been used traditionally for many years. Opting for bamboo instead of generic plastic packaging helps maintain cultural heritage and supports sustainable practices rooted in local traditions (Jurnal ISI DPS 2023).

In conclusion, bamboo is a superior material for woven baskets like besek due to its biodegradability, renewability, minimal environmental impact, durability, and cultural significance. These benefits collectively make bamboo a more sustainable alternative to plastic, supporting environmental conservation efforts and promoting sustainable practices (Shop Without Plastic 2023; The Bamboo Bae 2023; Jurnal ISI DPS 2023).

3. Reusable containers

Reusable takeaway containers offer substantial environmental benefits compared to single-use disposable containers, primarily through reduced greenhouse gas emissions and resource conservation when integrated into efficient reuse systems. Studies highlight that reusable containers can achieve carbon footprint parity with single-use options after as few as 6-13 uses, with subsequent uses delivering net positive environmental gains (Spranger 2023; Eunomia 2023). By minimizing plastic waste and supporting a circular economy model, reusable containers conserve raw materials and eliminate the challenges of adequately disposing of single-use items (Taimela 2024). Effective implementation of reusable container

systems hinges on addressing consumer behavior, establishing robust cleaning protocols, and optimizing container design, often facilitated by strategies like deposit schemes and convenient return options (Taimela 2024). Overall, the research underscores that reusable takeaway containers represent a pivotal strategy in mitigating environmental impacts such as plastic pollution and resource depletion when integrated thoughtfully into sustainable practices (Spranger 2023; Eunomia 2023).

4. Biodegradable materials

Biodegradable packaging, such as cassava and other natural materials, presents a promising solution for reducing environmental impact in the food industry. Unlike traditional plastic packaging, which persists for decades or centuries, biodegradable alternatives decompose naturally within a defined timeframe, contributing significantly less to waste and pollution (TIPA 2023). This eco-friendly approach not only supports a circular economy by converting packaging waste into compost that enriches soil and aids in food production (Patek Packaging 2023) but also addresses consumer concerns about environmental sustainability.

Biodegradable food packaging offers additional benefits beyond waste reduction. It is non-toxic and free from harmful chemicals, ensuring safer interactions with food products than conventional plastics (National Flexible 2022). Studies have shown that biodegradable materials can enhance food safety by extending shelf life and maintaining product quality, which is crucial for reducing food waste (Shershneva 2022). Moreover, the transition to biodegradable packaging aligns with global efforts to mitigate climate change, as these materials typically have a lower carbon footprint throughout their lifecycle than petroleum-based plastics (Patek Packaging 2023).

Despite these advantages, challenges persist in the widespread adoption of biodegradable packaging. The initial cost of transitioning from traditional plastics remains a barrier for many businesses, notably smaller enterprises (Patek Packaging 2023). Additionally, while advancements have improved the durability and performance of biodegradable materials, maintaining packaging integrity under various handling conditions and environmental factors continues to require innovation (Shaikh, Yaqoob, and Aggarwal 2021).

In conclusion, biodegradable packaging represents a crucial step for the food industry towards sustainability. By reducing waste, enhancing food safety, and supporting a circular economy, these materials offer a viable alternative to traditional plastics. Continued research and development efforts are essential to address existing challenges and expand the adoption of biodegradable packaging across the industry (National Flexible 2022; TIPA 2023). As consumer awareness and regulatory pressures increase, businesses prioritizing environmental responsibility through biodegradable packaging will likely gain a competitive edge in a more sustainable future (Shershneva 2022).

Indonesian sustainable packaging brands

After recognizing the urgent need for sustainable packaging solutions, several Indonesian brands have emerged as pioneers in eco-friendly alternatives. These brands spearhead efforts to reduce plastic waste by innovating with biodegradable materials, reusable packaging, and other sustainable practices.

1. Avani

Avani, an Indonesian company, has positioned itself as a leader in tackling the issue of single-use plastics through innovative and sustainable products made from cassava and cornstarch. Their extensive range includes biodegradable takeaway cups, boxes, wooden cutlery, bags, and paper straws catering to the food, beverage, and hospitality industries. Operating on a closed-loop circular economy model, Avani aims to maximize resource efficiency and regenerate materials at the end of their lifecycle (AIM2Flourish 2024; Avani Eco 2024).

One of Avani's notable products is their FDA-approved paper straws, which are HACCP certified and feature a plant-based inner wax coating for enhanced durability. These straws provide a sustainable alternative to plastic, addressing environmental concerns while meeting stringent safety standards. Similarly, Avani's chlorine-free Kraft paper food boxes offer a lower carbon footprint alternative to plastic containers, supporting sustainable practices in food packaging (AIM2Flourish 2024; Avani Eco 2024).

Avani's innovation extends to their bagasse tableware, crafted from sugarcane fiber waste. This tableware line is durable, microwavable, and freezable, offering functional benefits alongside environmental advantages. Importantly, these products require less energy than traditional paper items, converting agricultural waste into valuable, sustainable goods (AIM2Flourish 2024; Avani Eco 2024).

The standout innovation from Avani is their cassava bags, which present a compostable and biodegradable solution to conventional plastic bags. Made primarily from cassava starch with no petroleum-based components, these bags break down completely without leaving harmful microplastics. They can be reused multiple times and degrade naturally in various environments, including composting setups and landfills, within a few months (Avani Eco 2024).

Avani's commitment to sustainability has addressed environmental concerns and made a significant social impact, particularly in Bali, where plastic waste is a pressing issue. Since their inception, Avani has replaced substantial volumes of hazardous plastics with eco-friendly alternatives, earning international recognition through initiatives like the #IAMNOTPLASTIC movement (AIM2Flourish 2024; Avani Eco 2024).

Aligned with the UN Sustainable Development Goals, Avani's initiatives contribute significantly to SDG 12 (Responsible Consumption and Production) by promoting sustainable consumption patterns and reducing plastic pollution. Moreover, their efforts support SDG 14 (Life Below Water) by safeguarding marine ecosystems from plastic contamination (AIM2Flourish 2024; Avani Eco 2024).

From a business perspective, Avani follows the Triple Bottom Line approach, balancing social, environmental, and economic considerations. Their expansion plans include increasing global adoption of green solutions and reducing carbon footprints through expanded exports. Leveraging the influx of international tourists in Bali, Avani continues to raise awareness and inspire more businesses and individuals to adopt sustainable practices, further amplifying their impact (AIM2Flourish 2024; Avani Eco 2024).

2. Evoware

Evoware leads the charge against plastic pollution by offering innovative, sustainable products spanning straws, cutlery, bags, and packaging crafted exclusively from renewable sources like seaweed, cassava, rice, sugarcane, bamboo, and areca. These materials are selected

for their environmental advantages, including biodegradability and compostability, which underscore Evoware's dedication to fostering a circular economy (Evoware 2019-2022; Rethink Plastic 2024).

For instance, seaweed is used in eco-friendly packaging that dissolves in water, offering a natural decomposition process (Evoware 2019-2022). Cassava provides water-soluble and water-resistant options for bags that biodegrade within 90-180 days (Rethink Plastic 2024). Rice-based biodegradable straws decompose quickly and are safe for consumption by animals and humans (Evoware 2019-2022). Sugarcane is transformed into versatile food containers suitable for both hot and cold foods and microwave use (Rethink Plastic 2024). Bamboo is locally sourced and handcrafted into reusable and compostable straws and cutlery (Evoware 2019-2022). Areca is compressed into bowls, plates, and spoons, providing convenient alternatives to traditional plastic food containers (Rethink Plastic 2024).

Evoware's sustainability strategy is deeply rooted in the United Nations Sustainable Development Goals (SDGs) 11 (Sustainable Cities and Communities), 12 (Responsible Consumption and Production), 13 (Climate Action), and 14 (Life Below Water). They focus on achieving climate circularity by replacing single-use plastics with compostable alternatives made from renewable resources (Evoware 2019-2022; Rethink Plastic 2024). By integrating sustainability into their product design and supply chain, Evoware creates circular products that can be reused, recycled, or composted, thus minimizing environmental impact (Evoware 2019-2022).

In terms of impact, Evoware has significantly contributed to reducing plastic waste globally. They have replaced millions of units of plastic straws, containers, bags, cutlery, and cups with their sustainable alternatives, showcasing their tangible environmental footprint (Evoware 2019-2022; Rethink Plastic 2024).

Beyond product innovation, Evoware engages actively with communities, businesses, governments, schools, and individuals through initiatives like the Rethink Plastic campaign. This initiative aims to raise awareness about the harmful effects of single-use plastics and promote the adoption of environmentally friendly alternatives (Evoware 2019-2022; Rethink Plastic 2024).

In summary, Evoware's approach exemplifies a holistic commitment to sustainability through innovative product development, adherence to global sustainability goals, significant reductions in plastic waste, and proactive community engagement. Their efforts mitigate environmental harm and foster sustainable practices that support healthier livelihoods and ecosystems worldwide.

3. Plépah

Plépah, a local Indonesian manufacturer, produces sustainable packaging from betel nut husks. Their innovative packaging is waterproof and fireproof and suitable for microwave and oven use. Crafted from eco-conscious materials, these sustainable containers are perfect for storing dry goods and can be easily cleaned with a moist cloth. They decompose within 60 days, addressing environmental concerns over plastic waste (Kemenparekraf 2024).

The initiative supports farmers and local communities by using agricultural waste to create biodegradable packaging, providing them a sustainable income. This effort is particularly crucial given the rise in plastic food packaging waste during the pandemic. Around 1,000 smallholder farmer families and unskilled worker households benefit from this project, gaining

new income sources as material collectors and packaging producers. Women receive flexible working hours, and local youth interested in innovative design are offered learning and job opportunities (IKEA Social Entrepreneurship 2024).

Emphasizing design, innovation, and community empowerment, Plépah collaborates with IKEA mentors and Instellar experts to expand its product lines into the cosmetics and fashion industries. This collaboration aims to promote eco-friendly packaging solutions further (IKEA Social Entrepreneurship 2024).

Operating in Mendis Village, South Sumatra, the Plépah Project utilizes areca palm sheaths, typically discarded. These sheaths are molded into compostable plates and packaging, reducing plastic consumption and providing economic opportunities. The project employs a micro-manufacturing approach, ensuring a decentralized, adaptable production system suitable for remote areas (RSA 2021).

The initiative involves local communities in production and collaborates with village-owned enterprises and cooperatives, ensuring community ownership and benefits. Since its inception, local people's awareness of environmental issues has increased, as evidenced by adopting Plépah products during community events. With support from the RSA's Catalyst Seed Award, Plépah aims to scale its impact by strengthening village enterprises, increasing community participation, and forming partnerships with local governments (RSA 2021).

The Plépah initiative in Indonesia aligns closely with several Sustainable Development Goals (SDGs), particularly SDG 12 (Responsible Consumption and Production), which promotes sustainable consumption and production patterns through biodegradable packaging made from agricultural waste. Additionally, it supports SDG 8 (Decent Work and Economic Growth) by creating sustainable livelihoods for local communities, including smallholder farmers and unskilled workers. It contributes to SDG 5 (Gender Equality) by offering flexible working hours to women involved in the initiative, promoting economic empowerment and social inclusion.

6.3. Waste and Waste Management in Food Industry

Waste generation and management present complex challenges in Indonesia, with the food industry generating substantial waste throughout its supply chain (Ncube et al. 2021).

The National Waste Management Information System (SIPSN) of the Ministry of Environment and Forestry noted that in 2023, the volume of waste generated in Indonesia reached 25 million tons (Sistem Informasi Pengelolaan Sampah Nasional n.d.). In 2023, 41,8 % of total generated waste was food and in the second place was plastic with 18,47% of total generated waste. 46,73% of waste was generated from households and 20,25% from businesses (Sistem Informasi Pengelolaan Sampah Nasional n.d.).

Restaurants in Indonesia generate a significant amount of food waste that contributes to the country's overall food waste problem:

A study found that a restaurant in Garut, Indonesia, generates 29.41 kg/day of food waste, with the most significant component being rice at about 70% of the total food waste (Munfarida and Arida 2023).

Another study estimated that food waste from restaurant consumers in Dramaga District, Bogor, was 127,541.36 kg/year, with rice (68%) being the most significant component (Munfarida and Arida 2023). Indonesia ranks fourth globally for the highest level of food waste, at 20.94 million metric tons in 2020. Indonesia produces 23-48 million tons of food waste annually, which amounts to 115-184 kilograms per person per year, according to Awaliyah and Zamzami in 2023. The food waste produced yearly in Indonesia could feed around 61-125 million people, equivalent to 29-47% of the country's population (Awaliyah and Zamzami 2023).

A study of restaurants in Jakarta found that not all restaurants have proper food waste disposal procedures, such as separating and weighing food waste. Restaurants cited challenges in controlling food waste from guests and raising staff awareness on reducing food waste (Nathalia, Hapsara, and Pramono 2024).

In summary, restaurants in Indonesia generate substantial amounts of food waste, with estimates ranging from tens of thousands to millions of kilograms per year. This waste has significant environmental, economic, and social impacts, highlighting the need for restaurants to implement comprehensive food waste reduction strategies.

Ways how to minimize food waste in restaurants

Several key strategies can be implemented effectively to minimize food waste in restaurants.

- Conducting a food waste audit is essential to identify primary sources of waste, enabling restaurants to track and document wastage trends (Gschnitzer 2021; Guinn n.d.).
- Implementing proper food storage practices, such as avoiding over-ordering, FIFO rotation, ensuring correct temperature control, and labeling stored foods, helps reduce spoilage (Gschnitzer 2021; Petty 2016).
- Improving portion control by offering smaller sizes and planning menus around seasonal ingredients also helps minimize waste (Gschnitzer 2021; Lavu 2024).
- It is crucial to train staff on food handling and repurposing edible food waste (Guinn n.d.; Petty 2016).
- Establishing partnerships with local charities to donate excess food and considering composting or other waste diversion methods further enhances sustainability efforts (Lavu 2024; Petty 2016).
- Technology like POS systems for better inventory and ordering management supports these efforts (Lavu 2024).

By adopting these practices comprehensively, restaurants can significantly reduce food waste, lower costs, and contribute positively to more sustainable food systems.

Examples of Indonesian restaurants implementing sustainable practices

1. Ijen, Bali

Ijen, situated in Kerobokan, Bali, is recognized as Indonesia's pioneering zero-waste restaurant. It implements sustainable practices across all operations, including architecture, food production, and serving methods. Ijen's commitment to environmental stewardship exemplifies a comprehensive approach to sustainability (Greeneration 2024).

The restaurant's eco-friendly design incorporates flooring made from a blend of cement, broken glass, and plates, while its furniture and interior decorations are made from recyclable wood. Such sustainable architectural choices are uncommon in the culinary sector, positioning Ijen as a benchmark for other establishments (Generation 2024).

In its food production process, Ijen procures raw materials from local farmers and fishermen, guaranteeing that its vegetables and fish are fresh and sustainably sourced. The restaurant partners with suppliers that do not use single-use plastic packaging, thereby minimizing environmental harm. Additionally, the food is prepared using firewood, which imparts a distinctive flavor and supports its commitment to sustainability (Greeneration 2024).

These practices align with several United Nations Sustainable Development Goals (SDGs). For example, by procuring ingredients from local sources, we are advancing SDG 12 (Responsible Consumption and Production), fostering sustainable farming methods, minimizing food transportation distances, and reducing the carbon footprint. Ijen's commitment to eliminating single-use plastics and efficiently managing waste aids in achieving SDG 14 (Life Below Water) and SDG 15 (Life on Land) by safeguarding aquatic and land ecosystems against pollution. Additionally, their dedication to using recyclable materials and adhering to eco-friendly construction techniques supports SDG 11 (Sustainable Cities and Communities), promoting the growth of green and sustainable urban infrastructure.

2. Burgreens Jakarta

Burgreens, a prominent chain of vegetarian restaurants across Indonesia, incorporates environmentally friendly practices throughout its establishments. It maintains food quality consistency with a centralized kitchen and uses biodegradable cassava bags, wooden utensils, and paper straws to minimize its ecological footprint. Burgreens prioritizes sourcing ingredients from local farmers, bolstering community agriculture (Greeneration 2024).

Burgreens' sustainable practices, aligned with SDG 12 (Responsible Consumption and Production), aim to reduce waste and promote sustainable sourcing. By prioritizing eco-friendly operations, Burgreens enhances environmental sustainability and inspires customers to embrace sustainable lifestyles and contribute to local economies.

3. ECAPS, Jakarta

ECAPS, situated in Kemang Raya, Jakarta, is a standout example of sustainability in dining, led by Eko Priharseno and Audrey Bernanda of Aedi Interior Design Bureau. The restaurant adopts a holistic zero-waste approach and integrates sustainability into its operations (Indonesia Design 2024).

Designed by Aedi Interior, ECAPS utilizes recycled materials like shampoo bottles for decking, repurposed fruit crates for herb gardens, and discarded architectural elements for vibrant marble flooring. Interior furnishings are creatively crafted from household waste, underscoring a solid commitment to upcycling and waste reduction (Indonesia Design 2024).

Beyond its aesthetic innovations, ECAPS features an organic herb garden and collaborates with Waste4Change Indonesia to implement RDF technology for composting and recycling all organic waste. This initiative promotes renewable energy and significantly reduces landfill waste (Indonesia Design 2024).

The menu at ECAPS highlights fresh, non-GMO ingredients with a diverse selection of local and international dishes. Indoor seating accommodates 20 guests, while an outdoor area amidst lush greenery caters to 30, complemented by a General Store promoting sustainable products (Indonesia Design 2024).

ECAPS' dedication to sustainability aligns closely with several UN Sustainable Development Goals, including SDG 12 (Responsible Consumption and Production), SDG 7

(Affordable and Clean Energy), and SDG 11 (Sustainable Cities and Communities). ECAPS sets a pioneering example of environmental responsibility in the food and beverage industry through its innovative and sustainable design.

4. ViaVia, Yogyakarta

ViaVia Jogja operates multiple establishments, including a restaurant, travel agency, guest house, bakery, fair-trade shop, and art space, all emphasizing sustainability. They implement eco-friendly practices to minimize their environmental footprint and enhance community well-being (ViaVia Jogja 2024). The restaurant has adopted a policy against single-use plastics, uses energy-saving devices, and employs eco-friendly materials. They prioritize sourcing from local communities and women, promoting social equity (ViaVia Jogja 2024). Culinary offerings include certified organic rice and vegetables, free from MSG and palm oil, with a wide array of vegetarian, vegan, and gluten-free options (ViaVia Jogja 2024). By 2024, ViaVia Jogja aims to transition to a 100% cage-free egg supply chain and ensure food safety by washing vegetables with safe drinking water (ViaVia Jogja 2024). Their waste management strategy involves composting organic waste, utilizing upcycled shopping bags, and focusing on waste reduction and recycling efforts (ViaVia Jogja 2024). These practices are aligned with UN Sustainable Development Goals such as SDG 12 (Responsible Consumption and Production), SDG 3 (Good Health and Well-being), and SDG 5 (Gender Equality), reflecting their commitment to environmental sustainability and community health.

These examples demonstrate how restaurants in Indonesia are prioritizing sustainability and contributing to a more environmentally conscious and socially responsible food industry.

7. The Impact of Veganism on Sustainable Development Goals: From Health to Environment

The philosophy of veganism, which is based on avoiding animal products—especially in the diet—complements the UN's Sustainable Development Goals (SDGs). This complex alignment impacts the goals of hunger, health, sustainable consumption, and the environment (RELX 2024).

Starting with SDG 2 (Zero Hunger), veganism offers a potential solution to global food scarcity. When considering land, water, and energy requirements, plant-based diets are usually more resource-efficient than animal-based diets. Particularly in regions where food scarcity is expected, this efficiency may be crucial in feeding the world's expanding population (RELX 2024).

In SDG 12 (Responsible Consumption and Production), veganism promotes a more sustainable food production system. It reduces waste and uses natural resources wisely. Animal agriculture uses a lot of water and land and has a big ecological impact. A plant-based diet can significantly reduce the impact of food production on the environment (RELX 2024).

Veganism is also directly related to SDG 3 (Good Health and Well-being). A carefully structured vegan diet can offer a variety of health advantages. Not only is it higher in certain nutrients and lower in saturated fats, but it may also help prevent heart disease, obesity, and certain cancers. A balanced vegan diet that includes a range of fruits, vegetables, legumes, nuts, and seeds must be required to meet nutritional requirements (RELX 2024).

Veganism is also crucial in supporting SDG 13 (Climate Action). Rearing animals for food is a major source of greenhouse gas emissions, which are a driving force behind climate

change. Adopting a vegan diet can reduce the carbon footprint associated with food consumption by decreasing the need for animal products (RELX 2024).

Veganism plays a crucial role in protecting biodiversity and ecosystems, especially in SDG 14 (Life Below Water) and SDG 15 (Life on Land). The practice of animal farming has a considerable impact on deforestation, habitat loss, and species extinction, which in turn affects terrestrial and aquatic ecosystems. By adopting a vegan diet and reducing the intake of animal products, we can mitigate these environmental damages and support sustainable practices (RELX 2024).

The work that Peter Scarborough does serves as an example of this. During his research, he discovered that the dietary habits of vegans affected greenhouse gas emissions by 25.1% of high meat-eaters, land use by 25.1%, water use by 46.4%, eutrophication by 27.0%, and biodiversity by 34.3% in comparison. There is a clear correlation between animal-based food consumption and its impact on the environment, which suggests that the former should be reduced (Scarborough 2023).

Several studies have already highlighted how “vegan diets” contribute to reducing problems considered critical to health – such as type-2 diabetes and heart attacks –and to promote sustainability – primarily by reducing greenhouse-gas emissions and protecting biodiversity, land, and water resources (Aleksandrowicz et al. 2016; Pimentel and Pimentel 2003; Berners-Lee et al. 2012; Leitzmann 2003; Fox 1999; Baroni et al. 2007; Carlsson-Kanyama and Gonzalez 2009; Hallstrom et al. 2015). The most recent report of the Lancet Commission on Food, Planet, and Health suggested that “many studies have assessed environmental effects of various diets, with most finding decreasing effects with increased replacement of animal source foods with plant-based foods” (Willet et al. 2019:25). According to this report, “vegan and vegetarian diets were associated with the greatest reductions in greenhouse-gas emissions and land use and greatest reductions in water use.” (Willet et al. 2019: 25).

The benefits of veganism for the Sustainable Development Goals are numerous. It tackles crucial topics like environmental preservation, responsible consumption, hunger, and health. People can contribute to a more equitable and sustainable world by adopting a plant-based diet and coordinating individual decisions with larger global objectives for a better future (RELX 2024).

7.1. Historical Shifts in Indonesian Diet: From Traditional Practices to Modern Influences

Indonesia had abundant vegetable resources (Reid 1988), and animals such as pigs, deer, water buffalo, banteng, chickens, dogs, fish, and seafood were part of the diet (Reid 1988; Boomgaard and Henley 2021). However, meat and fish were mainly consumed by royalty, as these foods were considered superior and believed to provide great strength (Boomgaard and Henley 2021). Meat was expensive (Reid 1988), and families owned only a few animals, depending on their wealth (Barwegen 2005). They ate meat only when the animals could no longer work the fields (Reid 1988), became too old for transportation, or were sacrificed during cultural events (Boomgaard and Henley 2021; Reid 1988). The archipelago became part of a significant trade route with India, China, and the Middle East and was influenced by Buddhism and Hinduism. For Buddhists and Hindus, killing animals brought insufficient merit, so meat was consumed only if the animal died naturally (Reid 1988). The ports of kingdoms on Sumatra and Java began importing and exporting animals, particularly cattle (Ricklefs 2010; Reid 1988).

Muslim traders arrived in the fifteenth century, leading to the rise of powerful Islamic coastal states and the mass conversion of Indonesians to Islam. Despite this, several indigenous beliefs, traditions, and Hindu-Buddhist practices were retained (Ricklefs 2010). Islam views pigs, frogs, snakes, and dogs as unclean or haram (Boomgaard and Henley 2021). Consequently, many non-Muslims also began to avoid these animals, suspecting something suspicious about consuming them (Reid 1988). While Bali and some areas of Sumatra continued to include pig meat in their diets, pigs largely vanished from other regions (Boomgaard and Henley 2021). Muslims replaced dog and pig meat with meat from small livestock (Reid 1988), which gained popularity in filling the dietary gap. Despite this, meat played a relatively minor role in the Indonesian diet, with only 160 to 350 grams consumed monthly (Barwegen 2005).

With the arrival of Dutch powers in the archipelago, the demand for livestock grew. Different kinds of animals were needed for transportation and agriculture, and the demand for meat and milk grew, although Indonesia had no milk-drinking culture (Barwegen 2005). Cattle and horses were imported from India, The Netherlands, and Australia, and practices such as crossbreeding and artificial insemination emerged in Indonesia. With the increasing number of livestock, the prestige value disappeared. Only meat- and milk-producing cattle kept some prestige value because they were expensive and difficult to keep. After independence, Indonesia tried to become self-sufficient in milk and meat (Barwegen 2005).

The daily consumption of animal products seems like a new development, where the historical diet did not consist of meat and fish daily. With the arrival of Islam and Western influences, the meat-producing livestock rapidly grew, and the demand for meat increased, which led to the changing of Indonesians 'traditional' diet. It might have led to the development of interest in vegetarianism/veganism due to the significant changes it caused concerning their diet, the environment, and animal situations, as well as better knowledge about these consequences.

7.2. Differences in the VEG in Indonesia-Indonesia/global-discuss it together

Since the first millennium BC, Jainism, Buddhism, and later Hinduism in India, alongside philosophical developments in the eastern Mediterranean, embraced the vegetarian lifestyle (Editors of Encyclopaedia Britannica 2024). Hindus and Buddhists held the belief in the reincarnation of souls and the accrual of negative karma through killing. Pythagoras, the Greek philosopher (530 BC), adopted vegetarianism to maintain the purity of the soul, reject the mingling of animals and humans, and challenge the opulence among the elite. Plato and Aristotle also adopted a vegetarian lifestyle (Dombrowski 1984), influencing philosophical movements like Theosophy, rooted in Gnosticism, in which Plato played a significant role (Williams 2024), and Neoplatonism. However, it was not until 1875 that the Theosophical Society was established in New York, marking a spiritual movement inspired by Eastern philosophies. (Tollenaere 1996) Theosophists argue that meat consumption has detrimental effects on both body and soul, leading to illness and the adoption of animal-like characteristics (Blavatsky 2024).

During the Age of Enlightenment, the concepts of ethics, morals, and human rights emerged. Animal rights became a concept as well after the 1822 Act to Prevent the Cruel Treatment of Cattle and the formation of the Royal Society for the Prevention of Cruelty to

Animals (RSPCA) in 1824 by Richard Martin in England (RSPCA 2024). Several animal rights and welfare movements were founded, and they began to support a vegetarian diet.

The world's first Vegetarian Society was founded in England in 1847. The Alcott House and the Bible Christian Church formed it. The term 'vegetarian' was created to replace 'Pythagoreans' (IVU 2024). Vegetarians could choose to exclude dairy and eggs. In 1944, Donald Watson invented the term 'vegan' to describe a diet consisting of no animal products (The Vegan Society 2002).

Formulated in 1944, the Vegan Society describes veganism as "a philosophy and lifestyle aimed at avoiding, to the fullest extent feasible and practical, any exploitation or harm to animals for food, clothing, or any other reason. It extends to encourage the growth and adoption of alternatives free from animal use for the advantage of animals, humans, and our planet. Regarding what one eats, it means abstaining from all food items that are completely or partially derived from animals." (Vegan Society 2008).

Veganism encompasses a lifestyle that abstains from all animal-derived foods, including meat, dairy, eggs, and honey. Additionally, it aims to avoid products made from animals, such as leather and strives to minimize the use of items tested on animals (The Vegan Society 2008).

The Vegetarian Society spread and inspired other countries to form their societies and combine ones, such as the International Vegetarian Union (IVU), which organizes the World Vegetarian Festival, congresses, and seminars and introduced International Meat-Free Monday and World Vegan Friday.

7.3. Vegetarian and Vegan Organizations in Indonesia: Promoting Plant-Based Lifestyles

Indonesia has a vegetarian organization/association called the Indonesia Vegetarian Society (IVS). Indonesia Vegetarian Society (IVS) is a non-profit Indonesian vegetarian organization established in Jakarta on August 8, 1998. IVS has been a member of the International Vegetarian Union since 1999. IVS was established with the organization's objectives to (1) disseminate information about vegetarianism in Indonesia and (2) develop universal love and save the world's life through vegetarianism. IVS activities in its mission to promote vegetarianism, IVS organizes a range of activities, including (1) a vegetarian seminar featuring speakers ranging from nutritionists, doctors to clergy, (2) festivals and cooking demonstrations introducing vegetarian recipes, (3) Consultation on vegetarian life, and (4) blood donation and social activities (Putri 2018).

There is also a vegan organization/association called The Vegan Society of Indonesia (VSI). It is a non-profit vegan organization (excluding dairy, eggs, and honey) in Indonesia, founded in Jakarta on August 8, 2009. VSI has been a member of the International Vegetarian Union (IVU) since 2010 and a member of the World Vegan Organisation (WVO) since 2017 (IVS 2024).

Based on the information on their website, there are four main objectives of this organization: (1) disseminate and socialize information about vegan living in Indonesia, (2) educate the public about the "connection between meat-based diets and the effects of global warming.", (3) pioneer a Movement for Renewal to create a new Culture and Civilization: a world based on universal love, transcending ethnicity, race, religion, and social class, while respecting and loving all forms of life; (4) actively assist the Government in addressing various

issues related to malnutrition in society through various nutrition education and counseling initiatives, based on the latest "Four Pillars of Health" concept (IVS 2024).

In Indonesia, approximately 1 percent of the population, or about 2.5 million individuals, identify as vegans. This demographic shift towards vegetarianism is influencing a significant expansion in the plant-based food industry. The Vegan Society of Indonesia reports that by May 2023, the number of vegetarian and vegan dining establishments in the country has surpassed 2,000 (IVS 2024).

7.4. Motivations for Adopting Veganism: Insights from Recent Research

Veganism is part of a plant-based diet. Many studies on plant-based diets focus on vegetarianism or diets that emphasize more vegetables over meat.(e.g. Fox and Ward 2008; Hamilton 2006; Hussar and Harris 2010). For this reason, understanding motivations for switching to a vegan diet has been limited.

Research conducted by Ghaffari focused on the motivations of people who identified as vegan. (Ghaffari 2022) The seven reasons for a vegan diet outlined in his research are as follows: hedonistic, ethical, animal rights, economics, health, and animal empathy. (Ghaffari 2022) The study revealed that factors like animal safety (animal empathy, animal rights), ethics, and accountability (personal accountability, environmental protection) had a noteworthy impact on adopting vegan diets. These findings align with earlier Hussar and Harris's (2010) and Fox and Ward (2008) studies. (Ghaffari 2022) The findings of this study contradict earlier research, which identified health and economic reasons as significant factors in the decision to switch to a vegan diet (Campbell and Campbell 2006; Campbell and Jacobson 2013; Hamilton 2006). The survey results of this study demonstrate that hedonic motives outshine health and economic motivations. (Ghaffari 2022) The findings indicate that veganism is viewed as a lifestyle philosophy centered on self-actualization and values related to personal growth for vegans. Following a vegan diet is seen as a pathway to reaching both ultimate and practical objectives, making it a driving force behind their way of life. (Ghaffari 2022)

7.5. The Rise of Veganism in Indonesia: Trends, Growth, and Cultural Influences

Vegetarians and vegans constitute a minority of the population in several nations, ranging from 1 to 3 percent in Australia and New Zealand, 3 to–9 percent in North America and Europe, and 8.5 percent in Israel (Qian et al. 2019). In Indonesia, there are approximately 2 million vegetarians or vegans. That may not seem like much for a country of 260 million people, but veganism is becoming increasingly popular among health-conscious Indonesians (The Jakarta Post 2018). However, according to DuPont Nutrition and Bioscience and IPSOS, demand for plant-based products is expected to grow steadily over the next five years, particularly in the Asia-Pacific market.

According to Euromonitor, there is a higher number of Indonesian vegetarians because of the rise of the Buddhist and Hindu populations. The article also states that from 2012-2017, meat became the second-fastest-growing consumer spending food category, influenced mainly by the income rise. The article argues that even though this is true, more Indonesians are becoming significantly more health-conscious and are influenced by governmental health campaigns and easier access to health-related information online. Particularly, middle-to-upper urban Indonesian consumers are migrating towards healthier diets. (FoodNavigator Asia 2018)

In Indonesia, the interest in plant-based food is increasing quickly. The Global Vegetarian Index published by Oliver's Travel reveals that Indonesia is considered one of the

best countries to enjoy vegetarian food; the country is ranked 16th out of the 20 highest in Vegetarian-Friendly Countries (Oliver's Travels 2017). The article states that Indonesia's annual meat consumption per capita(kg) is 11.6. The number of People Per Vegetarian Restaurant is 603,000, and Indonesia's Global Vegetarian Index Score is 280. One of the comparison methods for this ranking is the number of vegetarian-friendly restaurants. This shows that Indonesia has many markets that can be entered by plant-based product industries and can support people willing to switch to a plant-based diet. (Oliver's Travels 2024)

Based on The Global Vegetarian Index published by Oliver's Travel, the number of vegetarian restaurants in 2017 was 438. (Oliver's Travels 2024) According to the Vegan Society of Indonesia (VSI), as of May 2023, there are over 2,000 vegetarian and vegan restaurants in Indonesia. (IVS 2024)

Bali, Indonesia, is renowned as a haven for plant-based travelers, boasting over 200 vegan and vegan-friendly restaurants. However, according to the World Vegan Organization, Jakarta, the capital city on the island of Java, has recently gained recognition as the second most vegan-friendly city in Indonesia. Data from the online restaurant locator Happy Cow reveals that Jakarta is home to 74 vegan and vegan-friendly eateries. These establishments range from budget-friendly to upscale dining options and offer diverse cuisines, including fast food, pizza, and traditional Indonesian dishes (Livekindly 2024).

7.6 Cultural Heritage and Vegan Cuisine: Traditional Indonesian Dishes Adapted for Plant-Based Diets

Indonesia's vegan culinary landscape offers a splendid array of options, allowing plant-based enthusiasts to savor a delicious and wholesome experience that speaks to the heart of this beautiful nation's traditions.

Most traditional Indonesian food is either already vegan or can be made quickly. According to multiple articles (Jungle Inn Bukit Lawang 2024; Discova 2024), there are at least ten vegan-friendly traditional Indonesian foods.

Gado gado, for instance, is a popular local dish consisting of vegetables, boiled potatoes, tempeh or tofu, peanut sauce, and eggs. By omitting the eggs, the dish becomes entirely plant-based. Traditional Indonesian dishes include sayur lodeh, sate lilit, ketoprak, pecel, and tempeh. It is worth noting that warungs, which are small restaurants and cafes commonly found in Indonesia, frequently offer tempeh, tofu, and an abundance of vegetables at very affordable prices (Jungle Inn Bukit Lawang 2024).

Indonesia is renowned for its rich culinary heritage and diverse traditional dishes. Although Indonesian cuisine is not inherently vegan, it features various plant-based options due to several key factors. Firstly, cultural and religious influences play a significant role. The majority of Indonesians practice Islam and Hinduism. Islamic dietary laws prohibit pork, and the Hindu population in Bali promotes a vegetarian lifestyle, making vegan and vegetarian options readily available. Secondly, the abundance of plant-based ingredients in Indonesia's tropical climate supports cultivating a wide range of fruits, vegetables, legumes, and grains easily incorporated into vegan meals. Thirdly, the influence of Buddhist and Chinese cuisines has introduced numerous vegan-friendly dishes, such as vegetarian dumplings, noodle dishes, and vegetable stir-fries. Additionally, growing health and environmental awareness has contributed to the rise of vegan-friendly restaurants, coffee shops, and food options throughout Indonesia. Lastly, the influx of international tourists has further encouraged the availability and diversity of vegan options (Jungle Inn Bukit Lawang 2024).

Foreign tourist arrivals in Indonesia surged by 19.86% year-on-year, reaching 1.04 million in March 2024, reflecting a steady recovery in the tourism sector (Trading Economics 2024). To cater to the diverse needs of these visitors, numerous restaurants and coffee shops in tourist areas now offer vegan and vegetarian options, accommodating various dietary

preferences and restrictions (Jungle Inn Bukit Lawang 2024). The widespread availability and popularity of vegan foods in Indonesia can be attributed to the abundance of plant-based ingredients, cultural and religious influences, and evolving dietary trends (Jungle Inn Bukit Lawang 2024).

8. Practical part

Restaurant profile

Based on the Happy Cow website and my own research, there are 8 fully vegan restaurants in the Yogyakarta region.

1. LN Fortunate Coffee

The vegan bakery and coffee cafe franchise originated in Hsinchu, Taiwan, and operates outlets across Southeast Asia. The "LN" stands for "Loving Nature," whose principal philosophy is that all earthly creatures are one family. Each location is individually operated, and menu selections may vary. Serves coffee, tea, and other drinks (with plant milk); vegan ice cream, cakes, freshly baked pieces of bread; meals and savories. Cuisine types range from Asian dishes like rice and noodles to Western ones like burgers, pasta, and sandwiches. (HappyCow 2024) LN Fortunate Coffee in Yogyakarta is near Malioboro Street. It offers Indonesian and European dishes. They also offer vegan pastries and cakes. The prices are from 15.000 rupiah to 35.000 rupiah.

2. Black Forest Coffee

A vegan restaurant with many appetizers, main dishes, and desserts. This restaurant offers noodles, burgers, curries, soups, and cake—a vegan restaurant near the main tourist street in Yogyakarta, Prawirotaman. Black Forest Coffee has a variety of Indonesian and European dishes. This restaurant offers many appetizers, main dishes, and desserts. The prices are from 20.000 rupiah to 40.000 rupiah.

3. Veganissimo

This restaurant serves Indonesian and Chinese food. A set menu is available every day, but they also have a new menu for each day, but in less quantity. During Ramadan, Idul-Fitri, or any other significant celebration in Indonesia, this restaurant offers a special menu and desserts. The prices vary from 15.000 rupiah to 25.000 rupiah. A typical lesehan (eating on the floor) dining is available.

4. RM vegetarian Lusidus

Lusidus restaurant offers Indonesian and European dishes. The prices are from 10.000 rupiah to 25.000 rupiah.

5. Somayoga VEGAN

Soma Yoga Warung Vegetarian is located in a rice field in Yogyakarta. It serves typical Indonesian dishes and imitates meat with ingredients such as mushrooms. The price of a main dish varies, going from 10,000 to 25.000 rupiah.

6. Simple Plant Kitchen

A vegan restaurant and art space, it offers vegan food, including Indonesian dishes, burgers, tempeh, mushroom steaks, and pasta. No added MSG or palm oil was used. It also has juices and beer. A small shop sells t-shirts and stickers and offers leaflets about animal rights. The food prices range from 15.000 rupiah to 35.000 rupiah.

7. Loving Hut

Loving Hut is a fast-food chain located in several cities in Indonesia. It imitates Indonesian, other Asian, and Western meat dishes. Prices vary, going from 15.000 to 25.000 rupiah. At the moment, Loving Hut Jogja is under reconstruction.

8. Vegan Padang Damai

Vegan Padang Damai is located on the 3rd floor of the Malioboro shopping center. Padang is a typical local food from Sumatra island that consists mostly of meat. Vegan Padang Damai offers vegan alternatives such as vegan gulai, vegan rendang, or vegan sate padang. Prices for single items are around 10-15.000 rupiah, and for the main food, it is 20-25.000 rupiah.

Methodology

The methodology of this bachelor's thesis focuses on obtaining data and information regarding sustainable practices in vegan restaurants in Yogyakarta. The research aim, data collection process, and methods and procedures are presented for both the theoretical and practical parts of the study. The thesis's theoretical section entails reviewing pertinent sources and analyzing the data, which is then employed in the practical section using qualitative research as the selected methodology.

Principles of Qualitative Research and Research Approach

This qualitative research is based on investigating the sustainable practices used in vegan restaurants in Yogyakarta. Qualitative research is suitable for this study because it allows for an in-depth understanding of the practices, motivations, and challenges these restaurants face.

The primary research methods employed in this study are surveys, follow-up questions via WhatsApp or Instagram, and a literature review. This mixed-method approach allows for comprehensive data collection and analysis, providing breadth and depth to the study.

Research objective

The primary goal of this research is to investigate the extent to which vegan restaurants in Yogyakarta implement sustainable practices. This includes examining sustainable practices related to food sourcing, packaging materials, and waste management. The study aims to identify the specific sustainable practices these restaurants implement and to explore the motivations and struggles associated with adopting these practices.

Selection of participants for the research

The purposive sampling approach was employed to select participants for this study. Participants were chosen based on specific attributes related to the research focus. Criteria included that all selected restaurants must be located in Yogyakarta and operate as fully vegan establishments. This criterion was determined based on personal experience residing in Yogyakarta and being familiar with the vegan dining options. Additionally, the vegan status of each restaurant was verified through sources such as HappyCow and confirmed through direct inquiry with restaurant management. Contact with restaurant representatives was established via WhatsApp and Instagram social networks.

Survey Design

The survey, conducted in the formal Indonesian language and validated by an Indonesian professor, consisted of 19 questions. The participants were asked three close-ended and 16 open-ended questions to provide detailed answers to explore sustainable practices, motivations, and barriers. Questions covered sourcing practices, waste management, and perceptions of sustainability. Participants were assured of voluntary participation, and confidentiality was not explicitly mentioned. Responses were followed up to clarify and ensure accuracy. This approach was essential to gather insights from establishments committed to veganism and potentially engaged in sustainable practices.

Analysis of Survey Questionnaire

Six of the eight vegan restaurants in Yogyakarta conducted the survey. One restaurant that did not conduct the survey is under reconstruction, and I was unable to contact it. Another restaurant that did not fill out the survey had technical problems with the survey.

Question 1. What is the name of the restaurant?

Participants were asked to provide the name of their restaurant to establish clear identification. The survey participants include Fortunate Coffee, Black Forest Coffee, Veganissimo, RM Vegetarian Lusidus, Somayoga VEGAN, and Simple Plant Kitchen.

Question 2. Are you familiar with the term sustainability or sustainable practices/green practices?

The study began by assessing participants' familiarity with sustainability. Based on the responses gathered from the surveyed vegan restaurants in Yogyakarta regarding their familiarity with sustainability or sustainable practices, the majority indicated a solid understanding of these concepts. Fortunate Coffee, Black Forest Coffee, Veganissimo, RM Vegetarian Lusidus, and Somayoga VEGAN all agreed that they are familiar with sustainability or green practices. Additionally, Simple Plant Kitchen expressed a firm agreement, demonstrating a high level of awareness and likely integration of sustainable principles into their operational strategies. These responses collectively highlight a positive awareness and engagement with sustainability among the surveyed restaurants, underscoring their commitment to environmentally responsible practices within the vegan dining sector in Yogyakarta.

Question 3. Where do you source your ingredients?

Restaurants detailed their sourcing practices for ingredients, which included options like supermarkets, Indomaret, local markets within and outside Yogyakarta, their garden, or other specified sources. Several distinct patterns emerge based on the survey responses from the vegan restaurants in Yogyakarta regarding their ingredient sourcing practices.

Fortunate Coffee, Black Forest Coffee, Veganissimo, and RM Vegetarian Lusidus all emphasized sourcing their ingredients primarily from local markets within the Special Region of Yogyakarta. Black Forest Coffee specifically noted importing seitan meat from abroad and sourcing from local brands alongside local market purchases. In contrast, Somayoga VEGAN sources ingredients from local markets outside the Special Region of Yogyakarta and their garden. RM Vegetarian Lusidus also mentioned supplementing their supply with homegrown chilis and spices. Simple Plant Kitchen adopts a multifaceted approach by using produce from

their garden, occasionally sourcing from friends' gardens, and purchasing additional items such as tofu and tempeh from residents who make these products.

These responses highlight a commitment to local sourcing and community-based agriculture among Yogyakarta's vegan restaurants, contributing to sustainable practices by supporting local farmers, reducing food miles, and promoting fresher, seasonal ingredients. This approach aligns with environmental sustainability and fosters stronger ties within the local food ecosystem.

Question 4. Why does this restaurant source ingredients from the place you mentioned above?

For the research question on why vegan restaurants in Yogyakarta choose to source their ingredients from specific locations, the responses highlight diverse motivations and considerations. Fortunate Coffee prioritizes supporting local farmers, while Black Forest Coffee values the affordability, efficiency in transportation, and freshness of vegetables from local markets. Veganissimo opts for local sourcing primarily due to cost-effectiveness, and RM Vegetarian Lusidus shares similar reasons for affordability and freshness. Somayoga VEGAN emphasizes the quality of ingredients sourced directly from farmers and convenience as key factors. Meanwhile, Simple Plant Kitchen finds local sourcing cost-effective and ensures ingredients from their garden are free from preservatives or chemical fertilizers, contributing to reduced plastic waste and ecosystem maintenance.

These insights indicate that while economic factors such as cost and efficiency play a significant role, considerations of quality, sustainability, and supporting local communities are also pivotal in shaping ingredient-sourcing practices among vegan restaurants in Yogyakarta. Such practices foster sustainable food systems and environmental stewardship within the local culinary landscape.

Question 5. Does this restaurant source its ingredients from local markets? If yes, please name the markets.

The participating restaurants provided insightful details in response to the question about sourcing ingredients from local markets. Fortunate Coffee obtains its ingredients from Beringharjo Market, while Black Forest Coffee sources theirs from Krapyak Market. Veganissimo relies on ingredients from Gowok and Demangan Markets, and RM Vegetarian Lusidus is precisely procured from Gowok Market. Somayoga VEGAN chooses either the Prambanan Morning Market or farmers in Magelang for their ingredients. Simple Plant Kitchen occasionally sources from Niten Market, Giwangan Market, and Prawirotaman Market.

These responses highlight a diverse sourcing strategy among the surveyed vegan restaurants in Yogyakarta. They commit to local markets, supporting community suppliers and ensuring ingredient freshness. This approach aligns with sustainable practices by reducing carbon footprint and strengthening regional agricultural economies. This information underscores the restaurants' dedication to ethical sourcing, enhancing their sustainability credentials. These establishments contribute to the local economy by choosing local markets while prioritizing quality and freshness in their menu offerings.

Question 6. What specific foods does this restaurant source from local markets?

When asked about the specific foods they procure from local markets, the vegan restaurants in Yogyakarta shared detailed insights into their ingredient-sourcing practices. Fortunate Coffee primarily focuses on sourcing vegetables from local markets, ensuring freshness, and supporting local suppliers. Black Forest Coffee listed a diverse range of dishes

sourced from local markets, including cap cai (stir-fried vegetables), jamur geprek (smashed mushrooms), penyetan (smashed fried dish), soto (soup), and rawon (Indonesian beef soup), highlighting their reliance on market-fresh ingredients for their menu items. Veganissimo emphasized a comprehensive approach to sourcing, mentioning capcai (stir-fried mixed vegetables), tempeh, tofu, and an array of vegetables such as green mustard greens, white mustard greens, bitter melon, purple eggplant, fresh eggplant, green beans, long beans, corn, broccoli, cauliflower, carrots, and potatoes. They also noted specialty items like bitter mustard greens, cucuwis, and kailan sourced from specific markets. RM Vegetarian Lusidus sources tofu, tempeh, and a variety of vegetables, including carrots, green beans, cauliflower, broccoli, cabbage, jipang, eggplant, mustard greens, white mustard greens, and potatoes. They mentioned no significant challenges in their sourcing process, reflecting a stable supply chain. Somayoga VEGAN purchases various vegetables from a local kiosk in Yogyakarta, sourced from farmers in Magelang, ensuring freshness and affordability. They also procure mustard greens, broccoli, carrots, and cabbage from markets outside Yogyakarta.

Additionally, they grow herbs and greens in their garden, enhancing their sustainability efforts. Simple Plant Kitchen acquires lettuce, onions, garlic, iceberg, and purple cabbage from local markets. They also maintain a garden where they cultivate sweet potatoes, basil, passion fruit, chili, ginseng leaves, pandan, papaya, Japanese papaya leaves, bowlan leaves, and earth betel. They further supplement their offerings with butterfly pea flowers from a friend's garden.

These detailed responses underscore the commitment of these vegan restaurants to sourcing fresh, local ingredients. By supporting local markets and cultivating their produce, these establishments ensure the quality and authenticity of their dishes and contribute to sustainable agricultural practices and community resilience. This approach aligns with their overarching goals of promoting sustainability and supporting local economies, making informed choices about ingredient sourcing a cornerstone of their operational philosophy.

Question 7. Does this restaurant offer seasonal menus based on the available ingredients in Yogyakarta?

When queried about offering seasonal menus based on locally available ingredients in Yogyakarta, the responses varied among the vegan restaurants. Black Forest Coffee stands out for affirming that they offer seasonal menus, adapting their offerings based on ingredient availability. Conversely, Fortunate Coffee, Veganissimo, and RM Vegetarian Lusidus indicated that they do not adjust their menus seasonally, suggesting a consistent menu throughout the year. Somayoga VEGAN mentioned that they maintain a static menu with consistently available items. Simple Plant Kitchen also aligns with Black Forest Coffee by offering seasonal menus and showcasing flexibility in their culinary offerings to align with the seasons and local produce availability.

Question 8. Do you offer traditional Indonesian recipes on your menu? Why?

The vegan restaurants in Yogyakarta provided insightful responses regarding the inclusion of traditional Indonesian recipes on their menus. Fortunate Coffee includes these dishes to introduce customers to local cuisine more easily. Black Forest Coffee incorporates Indonesian recipes to cater to local preferences while attracting tourists interested in authentic Indonesian food. Veganissimo features dishes like gudeg and Padang rice and unique items during cultural festivals, such as vegan lontong opor for Eid al-Fitr and bakcang for the dragon boat festival. Although not daily, RM Vegetarian Lusidus offers Indonesian staples like nasi gudeg and nasi uduk. Somayoga VEGAN focuses on Traditional Javanese cuisine, highlighting dishes such as lontong opor during Eid celebrations. Simple Plant Kitchen includes a variety of

traditional Indonesian dishes like rawon, soto Betawi, and rendang, meeting the high demand for these menu items and sharing recipes with interested visitors.

Question 9. What type of packaging materials does this restaurant use for packaging orders?

In response to the question about packaging materials used for orders, the vegan restaurants in Yogyakarta offered varied practices. Fortunate Coffee utilizes paper boxes for its packaging needs. Based on observed experiences, every time a meal has been eaten at this restaurant or food has been ordered to go; it has been noted that they utilize biodegradable bags and straws. Black Forest Coffee opts for biodegradable bags alongside paper boxes. Veganissimo uses a combination of plastic bags and paper boxes for their packaging solutions. RM Vegetarian Lusidus also employs plastic bags and paper boxes. Somayoga VEGAN prefers eco-friendly options such as banana leaves and paper boxes and occasionally uses plastic. Simple Plant Kitchen emphasizes sustainability with packaging choices that include banana leaves and compostable materials from Avani.

Additionally, Simple Plant Kitchen notes specific practices: for dine-in, they use plates, while for takeaways, they refrain from providing plastic and offer wooden spoons for an additional charge. They also provide Avani packaging for an extra fee, although some customers prefer to bring their containers, as communicated via WhatsApp. This analysis provides insight into each restaurant's diverse approaches regarding packaging materials for their orders, reflecting their commitment to sustainable practices and customer preferences.

Question 10. Why does this restaurant use these specific materials for takeout orders?

The vegan restaurants in Yogyakarta provided diverse reasons for choosing packaging materials for takeout orders. Fortunate Coffee cited effectiveness as their primary consideration for using paper boxes. Black Forest Coffee emphasized sustainability and convenience as key factors in choosing biodegradable bags and paper boxes. Veganissimo uses plastic bags and paper boxes because of the lower price. RM Vegetarian Lusidus highlighted convenience as the main driver for using plastic bags and paper boxes. Somayoga VEGAN chose eco-friendly options such as banana leaves, paper boxes, and occasionally plastic for more straightforward options to streamline operations. Simple Plant Kitchen prioritized environmental friendliness and cost considerations, offering Avani biodegradable packaging while encouraging customers to bring their containers to reduce waste.

These responses underscore each restaurant's approach to balancing practicality, sustainability, and customer preferences in their packaging choices for takeaway orders.

Question 11. What types of straws and utensils does this restaurant use for takeout orders?

The vegan restaurants in Yogyakarta provided varied responses about the types of straws and utensils used for takeout orders, reflecting their environmental considerations and customer preferences. Fortunate Coffee opts for biodegradable straws. Black Forest Coffee offers both plastic and bamboo straws. Veganissimo uses plastic straws, while RM Vegetarian Lusidus provides plastic utensils only upon customer request. Somayoga VEGAN offers utensils only upon request, highlighting a reduction in single-use items. Simple Plant Kitchen stands out by not providing straws, encouraging a reduction in plastic consumption. Additionally, they offer wooden cutlery for an extra charge, aimed at promoting sustainability through reusable alternatives.

These responses illustrate each restaurant's approach to balancing convenience with environmental consciousness in choosing straws and utensils for takeout orders.

Question 12. How does this restaurant manage the waste it produces?

The vegan restaurants in Yogyakarta each employ unique strategies to manage the waste they produce and minimize their environmental footprint. Fortunate Coffee segregates its waste into organic and inorganic categories for proper disposal. Black Forest Coffee uses biodegradable bags and paper boxes for packaging, emphasizing sustainability and convenience. Veganissimo opts for plastic bags alongside paper boxes for packaging, prioritizing cost-effectiveness. RM Vegetarian Lusidus employs plastic bags and paper boxes, with plastic items provided only upon request to reduce waste. Somayoga VEGAN uses eco-friendly materials like banana leaves, paper boxes, and occasionally plastic, simplifying their packaging approach. Simple Plant Kitchen employs banana leaves and compostable packaging from Avani to enhance their environmental friendliness, encouraging customers to bring their containers for takeaway orders to minimize waste. Fortunate Coffee offers biodegradable options for straws and utensils to align with their sustainability goals. Black Forest Coffee provides plastic and bamboo straws and utensils catering to different preferences. Veganissimo uses plastic straws, focusing on cost efficiency. RM Vegetarian Lusidus offers plastic utensils only upon request to reduce single-use plastics. Somayoga VEGAN provides straws and utensils only upon request, promoting minimal waste generation. Simple Plant Kitchen refrains from providing straws and offers wooden cutlery for an additional charge, emphasizing environmental consciousness.

These practices highlight each restaurant's commitment to sustainable operations, focusing on waste reduction, recycling, and responsible use of materials to support environmental conservation efforts in Yogyakarta.

Question 13. In your opinion, is implementing sustainable practices in Indonesia difficult or easy? Can you tell me why?

In exploring the implementation of sustainable practices in Indonesia, the vegan restaurants in Yogyakarta provided insightful perspectives. Fortunate Coffee expressed that implementing sustainability is not accessible due to the challenge of changing entrenched habits. Black Forest Coffee elaborated on the difficulty, citing higher costs of environmentally friendly materials, low awareness of sustainability issues among the public, and the limited availability of sustainable alternatives as significant barriers. Veganissimo highlighted the apathy towards sustainability among many individuals and the need for more infrastructure to support sustainable efforts. RM Vegetarian Lusidus noted that the task is challenging due to widespread disinterest and a lack of accessible information. Somayoga VEGAN emphasized the importance of education in shaping perceptions of difficulty with sustainability, stressing the need for accurate information dissemination. Lastly, Simple Plant Kitchen acknowledged that while adopting sustainable practices can be daunting, it is imperative to address the environmental impact of plastic waste, particularly its detrimental effects on wildlife and ecosystems.

These diverse perspectives underscore the multifaceted challenges faced by restaurants in Yogyakarta when endeavoring to integrate sustainable practices. These challenges include ingrained behavioral patterns, economic considerations related to sustainable materials, insufficient awareness, and the critical need for improved educational initiatives and infrastructure to support sustainable transitions in Indonesia.

Question 14. Does this restaurant make its menu sustainable? Can you tell me how?

Examining menu sustainability practices among selected vegan restaurants in Yogyakarta revealed significant response variation, highlighting diverse approaches and firm commitments to environmental stewardship. Fortunate Coffee indicated they still need to implement specific sustainability measures into their menu offerings, suggesting a potential area for future development. On the other hand, Black Forest Coffee highlighted their practice of not disposing of used cooking oil down the drain and instead selling it for recycling. This approach demonstrates a proactive step towards sustainability by minimizing waste and promoting recycling efforts within their operations. Veganissimo expressed uncertainty regarding their menu sustainability efforts, indicating a potential opportunity for them to explore and clarify their practices in this area. RM Vegetarian Lusidus emphasized their efforts towards sustainability by growing chili and various kitchen spices at home.

Additionally, they source vegetables from local markets, integrating sustainability into their ingredient sourcing strategy. Somayoga VEGAN described an ongoing process of annual reviews and adjustments to their menu to incorporate innovations and enhance sustainability practices. They highlighted their commitment to continuous improvement and innovation in aligning their menu with sustainability principles. Simple Plant Kitchen affirmed its commitment to sustainability by creating menus that utilize local ingredients. They prioritize readily available ingredients in nature, emphasizing taste and health benefits while reducing environmental impact.

These insights into menu sustainability practices among the surveyed vegan restaurants underscore the diverse approaches and stages of development in integrating sustainability into culinary operations. Each restaurant's efforts reflect a blend of environmental consciousness, practicality, and ongoing adaptation to enhance sustainability in their menu offerings.

Question 15. Do you think this restaurant implements sustainable practices?

The survey yielded diverse perspectives in exploring the implementation of sustainable practices among vegan restaurants in Yogyakarta. Fortunate Coffee strongly agreed that they implement sustainable practices, suggesting high confidence in their efforts to integrate environmental considerations into their operations. Black Forest Coffee indicated a less intense agreement regarding implementing sustainable practices, hinting at potential areas where they may seek improvement or face challenges in sustainability initiatives. Veganissimo also expressed a less intense agreement regarding implementing sustainable practices, indicating that they may perceive gaps or opportunities for enhancement in their sustainability efforts. RM Vegetarian Lusidus affirmed their agreement to implement sustainable practices, suggesting confidence in integrating environmental considerations into their restaurant operations. Somayoga VEGAN similarly agreed that they implement sustainable practices, reflecting their commitment to sustainability in their operational strategies and practices. Simple Plant Kitchen agreed to implement sustainable practices, highlighting a robust commitment to environmental stewardship and sustainability in their restaurant operations.

These responses provide insights into the varying degrees of confidence and commitment among the surveyed vegan restaurants in Yogyakarta regarding implementing sustainable practices. Each restaurant's perception reflects their ongoing efforts and dedication to integrating environmental sustainability into their business models.

Question 16. What motivates this restaurant to implement/maintain sustainable practices?

Various motivations emerged when asked what motivates vegan restaurants in Yogyakarta to implement and maintain sustainable practices, reflecting the diverse but unified

commitment to sustainability among these establishments. Fortunate Coffee's primary motivation is to preserve the environment, demonstrating a fundamental commitment to environmental stewardship. Black Forest Coffee aims to reduce waste that could pollute the environment, reflecting a concern for minimizing the detrimental impact of waste on ecological health. Veganissimo is motivated by reducing environmentally unfriendly materials wherever possible, highlighting a proactive approach to minimizing environmental harm. RM Vegetarian Lusidus aims to contribute to a better Earth, underscoring its broad and aspirational vision for global environmental well-being. Somayoga VEGAN is inspired by the "Go Green, Save The Planet " motto and the philosophy that everything returns to the Universe without animal products, emphasizing a holistic and philosophical commitment to environmental and universal harmony. Simple Plant Kitchen's motivation is to ensure that nature is well preserved, wildlife is happier, and ecological balance is maintained to prevent destruction, reflecting a deep ecological concern and a comprehensive understanding of sustainability.

These motivations reveal various environmental concerns and philosophical commitments among vegan restaurants. Each restaurant's motivation highlights its unique perspective on the importance of sustainable practices, illustrating a collective effort towards preserving and enhancing the natural environment.

Question 17. What are the problems/barriers/difficulties in implementing/maintaining sustainable practices in this restaurant? Can you give examples?

The vegan restaurants in Yogyakarta identified various problems, barriers, and difficulties in implementing and maintaining sustainable practices. Fortunate Coffee cited that some sustainable materials are more expensive, which poses a significant barrier to their implementation. Black Forest Coffee highlighted three main issues: the expense of sustainable materials, the rarity of suppliers who provide such materials, and a general lack of awareness about sustainability among the public and within the supply chain. Veganissimo did not specify any particular difficulties, indicating uncertainty in their response. RM Vegetarian Lusidus mentioned the challenge of reducing plastic use, especially for takeaway food and online sales. This indicates a specific operational hurdle in maintaining sustainability while meeting the demands of their business model. Somayoga VEGAN pointed out issues related to human resources, noting that only some individuals have the same level of awareness or commitment to sustainability. They emphasized that many people need to understand the importance of healthy food and the broader goal of preserving the Earth, highlighting a need for better education and awareness. Simple Plant Kitchen reported societal and perceptual challenges, noting that many people view sustainable practices as strange and complicated. To address this, they have started providing light education and consistently sharing information to raise awareness and encourage more sustainable behaviors among their customers and community.

Given responses indicate a range of obstacles these restaurants face, from economic and logistical challenges to issues of awareness and perception, underscoring the multifaceted nature of the barriers to sustainability in the restaurant industry in Yogyakarta.

Question 18. Do you think implementing sustainable practices is too expensive for restaurants?

The responses from vegan restaurants in Yogyakarta regarding whether implementing sustainable practices is too expensive reflect various opinions and experiences. Fortunate Coffee believes implementing sustainable practices is "a bit expensive," indicating a moderate financial burden. Black Forest Coffee strongly agrees that sustainable practices are costly. They highlight that good quality biodegradable packaging is significantly more expensive, sometimes up to 2-3 times the cost of regular packaging. Veganissimo finds implementing sustainable

practices "quite troublesome," implying that the cost and effort required are substantial. RM Vegetarian Lusidus is uncertain, suggesting that the expense may vary and is possibly high. Somayoga VEGAN offers a nuanced view, stating that the perception of expense depends on individual understanding, benefits, and education. They believe that the cost varies with each person's understanding and education on the benefits of sustainable practices. Simple Plant Kitchen takes a philosophical stance, arguing that the natural resources necessary for sustainability are available but have been made expensive by human practices. They assert that implementing sustainable practices should be relatively inexpensive and that the high costs result from human economic systems.

These varied responses indicate that while some restaurants find sustainability costs prohibitive, others believe that broader economic and educational contexts influence the perceived expense. The range of perspectives highlights the complexity of implementing sustainable practices in the restaurant industry, where financial, educational, and perceptual factors play significant roles.

Question 19. Can you give examples of sustainable practices in this restaurant?

The survey responses provided detailed examples of sustainable practices implemented by vegan restaurants in Yogyakarta, showcasing a range of strategies to promote environmental sustainability. Fortunate Coffee employs several sustainable practices, including environmentally friendly straws, food boxes, and plastic bags. They also practice waste separation, dividing organic and inorganic waste to facilitate recycling. Black Forest Coffee focuses on packaging, using paper boxes and biodegradable plastic materials to reduce their environmental impact. Veganissimo highlights its commitment to recycling, particularly the recycling of organic waste, which helps minimize its environmental footprint. RM Vegetarian Lusidus engages in multiple sustainable practices, such as collecting used plastic for recycling at waste banks, growing some types of vegetables in-house, and sourcing ingredients from local markets. They also minimize plastic usage by only providing plastic spoons upon request. Somayoga VEGAN emphasizes a comprehensive approach to sustainability, rooted in their long-term commitment to a Pure VEGAN lifestyle. Their practices are driven by a philosophy of not harming other living beings and promoting a healthy and noble lifestyle, encapsulated in their motto: "Go Green & Save The Planet." Simple Plant Kitchen implements sustainability through their "Nabati Nusantara" program, which educates communities in villages and schools. They distribute plant-based food samples and recipes to encourage more people to adopt a plant-based diet, thus promoting sustainability on a broader scale.

These examples illustrate diverse sustainable practices, ranging from waste management and eco-friendly packaging to educational outreach and local sourcing. Each restaurant's approach reflects its unique philosophy and operational capabilities, contributing to Yogyakarta's more sustainable food service industry.

Conclusion

This thesis aimed to examine sustainable practices in vegan restaurants within Yogyakarta, where only eight fully vegan establishments are identified.

Firstly, the theoretical exploration in this bachelor thesis has delved into critical facets of sustainability within the context of Yogyakarta's vegan restaurant sector. The study has comprehensively understood sustainability as a multifaceted concept encompassing environmental, social, and economic dimensions. By examining sustainable development principles and their application in the food industry, particularly in vegan establishments, we have identified critical practices such as local food sourcing, sustainable food packaging, and

efficient waste management strategies. Moreover, the thesis has underscored the growing significance of veganism in Indonesia, highlighting its role in promoting ethical consumption and environmental stewardship. This theoretical framework not only elucidates the complexities and challenges faced by vegan restaurants in adopting sustainable practices but also underscores their potential contributions to broader sustainability goals within the local culinary landscape of Yogyakarta.

In the practical part of this bachelor thesis, an in-depth investigation into sustainable practices among vegan restaurants in Yogyakarta was undertaken using qualitative research methods. Through surveys and follow-up communication via WhatsApp and Instagram, insights were gathered from six of the eight identified vegan establishments in the region. The study focused on understanding the implementation of sustainable practices related to food sourcing, packaging materials, and waste management. These practices varied widely among the restaurants, reflecting diverse motivations and challenges in adopting sustainable approaches. The findings not only highlight the commitment of these restaurants to veganism but also underscore the complexities involved in integrating sustainability into their operational frameworks. Overall, this practical exploration contributes nuanced perspectives on how vegan restaurants in Yogyakarta navigate and innovate toward more sustainable practices, enriching the discourse on environmental responsibility within the local culinary landscape.

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List of Appendices

Appendix 1: Survey Questionnaire

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SURVEY

Hello.

My name is Bianka Orendášová and I am a university student from the Czech Republic. I lived 2 years in Yogyakarta, where I was a UGM student at FIB. I am writing my bachelor thesis about sustainability practices in vegan restaurants in Yogyakarta. The aim of the study is to find out if vegan restaurants in Yogyakarta implement sustainable practices in their businesses, what specific practices they do and what are their motivations and barriers.

I would be very thankful, if you find time to fill out this survey. The survey has 19 questions. Please be honest and write as much as you want- the more the better.

I would also like to mention that it is completely voluntary for you to fill out the survey but if you do, It would be a big help for me.

Sustainable practices are for example- sourcing of local food, reducing waste and plastic, using biodegradable bags, supporting the local farmers, composting, organic food, use reusable tableware (not single use utensils), Turning off lights and water faucets when not in use.

Q1: What is the name of the restaurant?

Q2: Are you familiar with the term sustainability or sustainable practices/green practices?

Q3: Where do you source your ingredients? (vegetables, fruit, tempeh,...)

-Supermarket, Indomaret,...

-local markets in Special Region of Yogyakarta

-local markets outside Special Region of Yogyakarta

-our own garden

-other (specify)

Q4: Why does this restaurant source ingredients from the place you mentioned above? (it is cheaper, more convenient, the ingredients are better quality, and I want to support Indonesian farmers...)

Q5: Does this restaurant source its ingredients from local markets? If yes, please name the markets.

Q6: What specific foods does this restaurant source from local markets? (types of vegetables, fruits, ...)

Q7: Does this restaurant offer seasonal menus based on the available ingredients in Yogyakarta? Q8: Do you offer traditional Indonesian recipes on your menu? Why?

Q8: Do you offer traditional Indonesian recipes on your menu? Why?

Q9: What type of packaging materials does this restaurant use for packaging orders? (for example - plastic bags, biodegradable bags, paper boxes, bamboo baskets with banana leaves,...)

Q10: Why does this restaurant use these specific materials for takeout orders? (e.g., aiming for sustainability, cost-effectiveness, convenience,...)

Q11: What types of straws and utensils does this restaurant use for takeout orders? (e.g., plastic, biodegradable, provided only upon request,...)

Q12: How does this restaurant manage the waste it produces? (recycling, composting,...)

Q13: In your opinion, is implementing sustainable practices in Indonesia difficult or easy? Can you tell me why? (e.g., expensive, inexpensive, lack of concern, unable to find enough information,...)

Q14: Does this restaurant make its menu sustainable? Can you tell me how?

Q15:Do you think this restaurant implements sustainable practices?

Q16:What motivates this restaurant to implement/maintain sustainable practices?

Q17:What are the problems/barriers/difficulties in implementing/maintaining sustainable practices in this restaurant? Can you give examples?

Q18:Do you think implementing sustainable practices is too expensive for restaurants?

Q19: Can you give examples of sustainable practices in this restaurant?

Q1: The name of the restaurant	Their answer:
	Fortunate Coffee
	Black Forest Coffee
	Veganissimo
	RM vegetarian Lusidus
	Somayoga VEGAN
	Simple Plant Kitchen
Loving Hut	-
Vegan Padang Damai	-

Q2:Are you familiar with the term sustainability or sustainable practices/green practices?	Their answer:
Fortunate Coffee	Agree
Black Forest Coffee	Agree
Veganissimo	Agree
RM vegetarian Lusidus	Agree
Somayoga VEGAN	Agree
Simple Plant Kitchen	Very agree
Loving Hut	-
Vegan Padang Damai	-

Q3:Where do you source your ingredients? (vegetables, fruit, tempeh,...) -Supermarket, Indomaret,... -local markets in Special Region of Yogyakarta -local markets outside Special Region of Yogyakarta -our own garden -other (specify)	Their answer:
Fortunate Coffee	Local markets in the Special Region of Yogyakarta

Black Forest Coffee	Local markets in the Special Region of Yogyakarta Seitan meat is imported from abroad and from local brands
Veganissimo	Local markets in the Special Region of Yogyakarta
RM vegetarian Lusidus	Local markets in the Special Region of Yogyakarta Garden-chillies, spices
Somayoga VEGAN	Local markets outside the Special Region of Yogyakarta Own garden
Simple Plant Kitchen	We utilize ingredients from our garden, but sometimes also from friends' gardens, and ingredients that we don't have in our garden we buy at traditional markets. Sometimes, we also buy from local residents who make products like tofu and tempeh.
Loving Hut	-
Vegan Padang Damai	-

Q4: Why does this restaurant source ingredients from the place you mentioned above? (it is cheaper, more convenient, the ingredients are better quality, and I want to support Indonesian farmers...)	Their answer:
Fortunate Coffee	Supporting local farmers
Black Forest Coffee	Vegetables from local markets are cheaper, more efficient (transport), and fresh
Veganissimo	Cheaper
RM vegetarian Lusidus	Cheaper and fresh
Somayoga VEGAN	Good quality directly from farmers & convenient
Simple Plant Kitchen	Besides being cheaper, utilizing ingredients from the garden ensures they are free from preservatives or chemical fertilizers, and using garden produce can also reduce plastic waste and help maintain the ecosystem.
Loving Hut	-
Vegan Padang Damai	-

Q5:Does this restaurant source its ingredients from local markets? If yes, please name the markets.	Their answer:
Fortunate Coffee	Beringharjo Market
Black Forest Coffee	Krapyak Market
Veganissimo	Gowok and Demangan Markets
RM vegetarian Lusidus	Gowok Market
Somayoga VEGAN	Prambanan Morning Market or from farmers in Magelang
Simple Plant Kitchen	Sometimes Niten Market, Giwangan Market, and Prawirotaman Market
Loving Hut	-
Vegan Padang Damai	-

Q6:What specific foods does this restaurant source from local markets? (types of vegetables, fruits, ...)	Their answer:
Fortunate Coffee	Vegetables
Black Forest Coffee	Cap cai (stir-fried vegetables), jamur geprek, penyetan, soto, rawon
Veganissimo	<p>Capcay, tempeh, tofu, and various vegetables Green mustard greens, white mustard greens, bitter melon, purple eggplant, fresh eggplant, green eggplant, green beans, long beans, corn, green beans, broccoli, cauliflower, carrots, potatoes, etc.(WA)</p> <p>hard to source- Bitter mustard greens, cucuwis and kailan are special at the Pathuk and Kranggan markets(WA)</p>
RM vegetarian Lusidus	<p>Tofu, tempeh, and all vegetables Carrots, green beans, cauliflower, broccoli, cabbage, jipang, eggplant, mustard greens, white mustard greens, potatoes (WA)</p> <p>hard to source- none (WA)</p> <p>Growing chili and some kitchen spices at home</p>

Somayoga VEGAN	<p>Various vegetables</p> <p>Somayoga buys vegetables from a Kiosk in Jogja but this kiosk sources vegetables from Magelang farmers.-these vegetables are fresher and cheaper.(WA)</p> <p>Market outside Jogja- Mustard Greens, Broccoli, Carrots, Cabbage, Cabbage(WA)</p> <p>Garden: We tried planting things like Mint Leaves, tried Cassava Leaves, Lettuce Leaves and the process & tried a little bit like Orange Leaves, Bay Leaves etc. Because we have limited land that we can reach. (WA)</p> <p>hard to source- none(WA)</p>
Simple Plant Kitchen	<p>Market-Lettuce, onions, garlic, iceberg lettuce, purple cabbage</p> <p>Their garden- sweet potato, basil, passion fruit, chili, ginseng leaves, pandan, papaya, Japanese papaya leaves, bowlan leaves, earth betel (WA)</p> <p>Garden: butterfly pea flowers from a friend's garden(WA)</p>
Loving Hut	-
Vegan Padang Damai	-

Q7: Does this restaurant offer seasonal menus based on the available ingredients in Yogyakarta?	Their answer:
Fortunate Coffee	No
Black Forest Coffee	Yes
Veganissimo	No
RM vegetarian Lusidus	No
Somayoga VEGAN	No, they always have the same items and are easily available
Simple Plant Kitchen	Yes
Loving Hut	-
Vegan Padang Damai	-

Q8:Do you offer traditional Indonesian recipes on your menu? Why?	Their answer:
Fortunate Coffee	Yes, to make it easier to introduce local cuisine.
Black Forest Coffee	Yes, because Indonesian people are more familiar with local dishes. Meanwhile, customers like tourists are more interested in typical Indonesian food rather than familiar menus.
Veganissimo	Yes, such as gudeg, Padang rice, and nasi lemak. On Eid al-Fitr, we make lontong opor(vegan)(WA) For the dragon boat festival, we make bakcang
RM vegetarian Lusidus	Yes, but not every day. - Nasi gudeg, Nasi uduk(WA)
Somayoga VEGAN	Yes, Somayoga VEGAN highlights Traditional Javanese dishes. On Eid al-Fitr, we make lontong opor (vegan)(WA)
Simple Plant Kitchen	Yes, because traditional menus are also highly sought after. Additionally, we can share recipes with every visitor who wants to know them. -Rawon, Soto Betawi, Bongko mento, Garang asem, Nasi goreng kecobrang, tongseng, soto sukoarjo, rendang, more
Loving Hut	-
Vegan Padang Damai	-

Q9:What type of packaging materials does this restaurant use for packaging orders? (for example - plastic bags, biodegradable bags, paper boxes, bamboo baskets with banana leaves,...)	Their answer:
Fortunate Coffee	Paper boxes
Black Forest Coffee	Biodegradable bags and paper boxes
Veganissimo	Plastic bags and paper boxes
RM vegetarian Lusidus	Plastic bags and paper boxes
Somayoga VEGAN	Banana leaves, paper boxes, plastic
Simple Plant Kitchen	Banana leaves, eco-friendly, and compostable from Avani

	dine in- plates take away- do not provide plastic, there are wooden spoons (additional charge), Avani packaging (extra charge)- people do not like it so some of them bring their own containers (WA)
Loving Hut	-
Vegan Padang Damai	-

Q10: Why does this restaurant use these specific materials for takeout orders? (e.g., aiming for sustainability, cost-effectiveness, convenience,...)	Their answer:
Fortunate Coffee	More effective
Black Forest Coffee	More sustainable, more convenient
Veganissimo	Cheaper
RM vegetarian Lusidus	More convenient
Somayoga VEGAN	Simpler and less complicated
Simple Plant Kitchen	To be more environmentally friendly and because it's expensive, so that people can bring their own containers when they want to buy for takeaway, encouraging customers to be more aware of the waste produced.
Loving Hut	-
Vegan Padang Damai	-

Q11: What types of straws and utensils does this restaurant use for takeout orders? (e.g., plastic, biodegradable, provided only upon request,...)	Their answer:
Fortunate Coffee	Biodegradable
Black Forest Coffee	Plastic and bamboo
Veganissimo	Plastic
RM vegetarian Lusidus	Plastic, but only provided upon request
Somayoga VEGAN	Provided only upon request

	cutlery- plastic (I did order from them)
Simple Plant Kitchen	We do not provide straws -they provide wooden cutlery for additional cost(WA)
Loving Hut	-
Vegan Padang Damai	-

Q12:How does this restaurant manage the waste it produces? (recycling, composting,...)	Their answer:
Fortunate Coffee	Separating organic and inorganic waste
Black Forest Coffee	Using waste disposal services
Veganissimo	Trash collectors pick up the organic waste and turn it into compost
RM vegetarian Lusidus	Plastic that can still be used will be stored for reuse. Plastic that cannot be reused will be collected for recycling at a waste bank
Somayoga VEGAN	We give it to those who specialize in managing it, picked up twice every Sunday
Simple Plant Kitchen	Sort waste, recycle, and compost
Loving Hut	-
Vegan Padang Damai	-

Q13:In your opinion, is implementing sustainable practices in Indonesia difficult or easy? Can you tell me why? (e.g., expensive, inexpensive, lack of concern, unable to find enough information,...)	Their answer:
Fortunate Coffee	Not easy, because it involves changing something that has become a habit.
Black Forest Coffee	Difficult because environmentally friendly materials are usually more expensive, awareness

	of sustainability is still low, and the availability of sustainable materials is still rare.
Veganissimo	Many still don't care and facilities are inadequate.
RM vegetarian Lusidus	Quite difficult due to lack of concern and insufficient information.
Somayoga VEGAN	It depends on who understands the level of difficulty or ease; there must be good and accurate EDUCATION.
Simple Plant Kitchen	If not accustomed, it can be difficult, but we must consider the environment so that we become more concerned about the excessive plastic waste generated, which is already starting to damage nature and threaten the creatures within it, especially wildlife, which is very distressing. It has a very significant impact on wildlife.
Loving Hut	-
Vegan Padang Damai	-

Q14:Does this restaurant make its menu sustainable? Can you tell me how?	Their answer:
Fortunate Coffee	Not yet for our menu
Black Forest Coffee	Not disposing of used cooking oil down the drain. Selling used oil for recycling.
Veganissimo	Not sure
RM vegetarian Lusidus	Growing chili and some kitchen spices at home, buying vegetables at the local market
Somayoga VEGAN	For now, yes and no. Every year we make corrections, introspections, and improvements in every year's menu book for new innovations and creativity.
Simple Plant Kitchen	Yes, creating menus that use local ingredients and are available in nature is tastier and healthier, and using available ingredients.
Loving Hut	-
Vegan Padang Damai	-

Q15:Do you think this restaurant implements sustainable practices?	Their answer:
Fortunate Coffee	Very agree
Black Forest Coffee	Less agree
Veganissimo	Less agree
RM vegetarian Lusidus	Agree
Somayoga VEGAN	Agree
Simple Plant Kitchen	Very agree
Loving Hut	-
Vegan Padang Damai	-

Q16:What motivates this restaurant to implement/maintain sustainable practices?	Their answer:
Fortunate Coffee	To preserve the environment
Black Forest Coffee	To reduce waste that could pollute the environment
Veganissimo	As long as we can reduce it, we reduce the use of environmentally unfriendly materials
RM vegetarian Lusidus	For a better Earth
Somayoga VEGAN	Go Green, Save The Planet & everything returns to the Universe with No Animal Products, Preserving the Universe ...
Simple Plant Kitchen	So that nature is well preserved, wildlife is happier and balanced to prevent destruction.
Loving Hut	-
Vegan Padang Damai	-

Q17:What are the problems/barriers/difficulties in implementing/maintaining sustainable practices in this restaurant? Can you give examples?	Their answer:
Fortunate Coffee	Some sustainable materials are more expensive

Black Forest Coffee	These sustainable materials are expensive, suppliers are still rare, and there is a lack of awareness regarding this matter
Veganissimo	Not sure
RM vegetarian Lusidus	To reduce the use of plastic, especially for takeaway food/online sales
Somayoga VEGAN	Human Resources, where not every individual is as frequency as above, like Go.VEGAN, they don't have awareness for Healthy Food, everything for our health & this Earth planet we must take care of.
Simple Plant Kitchen	Many people sneer and consider it strange and complicated, so we start by providing light education and always sharing anything.
Loving Hut	-
Vegan Padang Damai	-

Q18:Do you think implementing sustainable practices is too expensive for restaurants?	Their answer:
Fortunate Coffee	A bit expensive
Black Forest Coffee	Yes, the price of good quality biodegradable packaging (easily degradable) is much higher, up to 2 - 3 times more.
Veganissimo	It's quite troublesome
RM vegetarian Lusidus	Possibly
Somayoga VEGAN	It depends on the understanding, benefits, and education that each individual receives, which are different for each person.
Simple Plant Kitchen	Actually, everything is available in nature, it's just humans who make it expensive.
Loving Hut	-
Vegan Padang Damai	-

Q19: Can you give examples of sustainable practices in this restaurant?	Their answer:
Fortunate Coffee	Using environmentally friendly straws, food boxes, and plastic bags, separating organic and inorganic waste for recycling.
Black Forest Coffee	Using paper boxes and biodegradable plastic packaging.
Veganissimo	Recycling organic waste.
RM vegetarian Lusidus	Collecting used plastic for recycling at waste banks, growing some types of vegetables ourselves, shopping at local markets, only providing plastic spoons when requested.
Somayoga VEGAN	Being able to sustain a long-term Pure VEGAN, Go Green & Save The Planet lifestyle must begin with the food we prepare without having to harm other living beings, so that all creatures can feel happiness. Be VEGAN, live back to a Healthy & Noble Lifestyle, Amen.
Simple Plant Kitchen	With the presence of the "Nabati Nusantara" program, providing education to villages, schools, etc., by distributing plant-based food samples and providing recipes so that many people know and follow.
Loving Hut	-
Vegan Padang Damai	-