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### Circular Gastronomy in Hospitality Operations: An Embedded Qualitative Case Study from Bali

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# Circular Gastronomy in Hospitality Operations: An Embedded Qualitative Case Study from Bali

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**Abstract.** Circular gastronomy, the integration of circular economy principles into culinary operations, provides a strategic response to sustainability challenges in hospitality, particularly in Bali where mass tourism intensifies environmental pressures. This study explores its implementation at Natya Hotels & Resorts Bali through observations and in-depth interviews with executive chefs. Using an embedded qualitative case study design, data were collected through observations and semi-structured interviews with three executive chefs across three Natya Hotels & Resorts properties in Bali. Findings reveal a triadic model comprising material cascade utilization, kitchen efficiency (portion control, FIFO, energy-saving practices), and community-based symbiosis in waste redistribution and composting. The resorts achieved F&B waste below 5%, significantly lower than the industry average of 20–30%, while generating 10–15% cost savings, empowering local SMEs, and preserving culture through Balinese cooking classes. The alignment of corporate policies with local government regulations further creates an enabling environment for circular practices. Despite challenges in transparency and scalability, the study demonstrates how embedded circularity integrates economic, ecological, and socio-cultural benefits, offering a replicable blueprint for sustainable hospitality and contributing to SDG 12.3 and SDG 8.9.

**Keywords:** Bali; Circular gastronomy; community-based tourism; sustainable hospitality; waste reduction.

## Introduction

In an era where sustainability is becoming increasingly important, the tourism and hospitality industries are required to adopt environmentally friendly practices. A concept that has emerged in recent discourse is circular gastronomy, which integrates circular economy principles into the culinary arts. This concept is known as the circular economy, which aims to optimize resource productivity and minimize waste. The circular economy achieves this by closing, slowing, and narrowing material and energy cycles (Geissdoerfer et al., 2017). In the context of the hospitality industry, which is characterized by its substantial resource consumption and waste generation, the implementation of these principles is imperative to minimize environmental impact and enhance sustainability (Bux & Amicarelli, 2022).

Circular gastronomy can be defined as the application of circular economy principles to the culinary arts. This concept emphasizes sustainable food production, waste reduction, and the establishment of regenerative culinary systems that aim to minimize environmental impact while promoting social and economic sustainability (Nyberg et al., 2022). This concept not only addresses environmental issues but also enhances the dining experience by connecting consumers with sustainable food systems. For instance, practices such as reducing food waste, utilizing local and seasonal ingredients, and processing organic waste into compost have been identified in various studies as part of a circular gastronomy strategy (Ruiz-Real et al., 2019).

Bali, as a global tourist destination, faces significant environmental challenges due to high tourist volumes and associated resource consumption (Saputro et al., 2024; Astuti et al., 2024). According to data from the World Travel and Tourism Council (WTTC), the tourism and travel sector in Bali has a substantial impact on the regional economy, with millions of tourists visiting the island annually. However, this growth also brings environmental challenges, including increased waste production, water consumption, and carbon emissions (Wisnumurti et al., 2020). Consequently, the implementation of sustainable practices, such as circular gastronomy, has emerged as a pivotal element in safeguarding the continued viability of tourism in Bali, while ensuring environmental integrity.

Globally, there is an increasing trend toward sustainable tourism, with travelers becoming more aware and opting for eco-friendly accommodations and experiences (Maniktala & Sharma, 2024). According to a report by Booking.com (2021), 81% of travelers expressed a desire to travel in a more sustainable manner, and 75% indicated a willingness to pay a premium for accommodations that are environmentally friendly. This condition is reinforced by several studies (Damigos, 2023; Nelson et al., 2021; Pulido-Fernández & López-Sánchez, 2016), indicating that tourists are seeking green-based destinations and hospitality industries for sustainability. In this context, the implementation of circular gastronomy in the hospitality industry confers a dual benefit: it is both environmentally beneficial and has the potential to appeal to travelers who prioritize environmental sustainability.

Despite the growing popularity of the concept of circular gastronomy, its application in the hospitality industry, particularly in Bali, remains under-explored. Natya Hotels & Resorts, a preeminent Bali-based hospitality enterprise, operates numerous distinguished hotels and resorts, including the Natya Resort Ubud, Natya River Sidemen, Natya Hotel Kuta, Natya Hotel Gili Trawangan, Natya Hotel Tanah Lot, and Natya Villa Jimbaran. This paper presents a case study of particular interest. This phenomenon can be attributed to the strategic positioning of Natya Hotels & Resorts' properties, which are situated within the cultural and natural landscapes of Bali. Natya Hotels & Resort boasts a distinctive offering, characterized by its luxurious facilities and distinctive culinary experiences. This offering has the potential to serve as a model for the integration of circular gastronomy practices into hotel operations. However, the specific information regarding the implementation of circular gastronomy at Natya Hotels & Resort remains limited, necessitating further research to comprehend the model, the challenges it faces, and the benefits that can be derived.

A comprehensive review of the extant literature reveals several studies that have focused on human resources, including those by Sri Wahyudi & Sudibya (2016) at Natya Hotel Kuta and Wenten et al (2024) at Natya Resort Ubud. The latter study, in particular, provides a general overview of green practices in restaurants. However, it does not address the formation of the model within the conceptual framework of circular gastronomy. The research gap concerning circular gastronomy practices, particularly at Natya Hotels and Resorts, has prompted researchers to examine the implementation model, challenges, and benefits obtained from a field exploration perspective. An analysis of practices such as the Balinese cooking class and dining experiences such as floating meals demonstrates the potential for integrating circular gastronomy elements, including the use of local ingredients and waste reduction. However, given the absence of primary data, this research will depend on general principles and analogous case studies from the hospitality industry. For instance, research has shown that large hotel chains like IHG and Accor have effectively reduced food waste by up to 20% through systems like Winnow (Ruiz-Real et al., 2019).

The objective of this study is to explore the application of circular gastronomy in hotel operations. The study will focus on Natya Resort Ubud, Natya Hotel Kuta, and Natya Villa Jimbaran, Bali, which are known for their luxurious experiences and Balinese culture. Circular gastronomy, an integration of circular economy principles into culinary arts, aims to reduce waste, optimize resource use, and enhance sustainability. This is a critical concern in Bali, given the environmental pressures from mass tourism. The objectives of this research encompass three

main aspects: first, identifying applicable circular gastronomy models, such as zero-waste approaches, the use of local and seasonal ingredients, and waste processing into compost, which have proven effective in the hospitality sector according to a literature review (Amicarelli et al., 2024; Bittner et al., 2024a; Bux & Amicarelli, 2022; Julião et al., 2019; Sorin & Sivarajah, 2021). Thirdly, the evaluation of the benefits, including waste and emissions reduction, operational efficiency, and enhancing the resort's image as a responsible entity, which can attract environmentally conscious tourists.

The findings of this study are particularly salient within the context of Bali, a region that is heavily reliant on tourism. The research findings are expected to provide valuable insights for tourism and hospitality industry stakeholders to adopt circular gastronomy practices, serve as a reference for other resorts and restaurants in Bali to implement sustainable culinary practices, and support the Sustainable Development Goals (SDGs), particularly SDG 12 (Responsible Production and Consumption). This research is also expected to stimulate academic discussion on the role of circular gastronomy in achieving global sustainability goals, providing a foundation for local government policies and initiatives to support sustainable tourism in Bali, as suggested in the article on the concept of circular gastronomy.

Despite the growing literature on circular economy practices in hospitality, empirical studies explaining how circular gastronomy is operationalized within a unified governance system across multiple tourism contexts remain scarce, particularly in Global South destinations such as Bali.

## Concept and Hypothesis

### Circular Gastronomy as an Extension of the Circular Economy in Hospitality

Circular gastronomy is a concept that integrates circular economy principles into the culinary arts, with a focus on recovery, redesign, and the creation of a sustainable future. This concept integrates food production, consumption, and waste management into a closed-loop system, thereby reducing environmental impact while fostering social and economic benefits (Nyberg et al., 2022). In the context of the hospitality industry, circular gastronomy involves practices such as waste reduction, the use of local and seasonal ingredients, and the conversion of organic waste into compost. These practices aim to create a regenerative culinary system (Grèzes-Bürcher & Grèzes, 2023). Moreover, circular gastronomy enhances the gastronomic experience by fostering consumer awareness and engagement with sustainable food systems, thereby reinforcing the cultural and ethical dimensions of dining. In this sense, circular gastronomy does not only function as an environmental management strategy, but also as a driver of innovation, competitiveness, and differentiation within the hospitality and tourism industries.

Unlike conventional sustainability approaches that often focus on end-of-pipe waste management, circular gastronomy adopts a systemic perspective in which food production, processing, consumption, and disposal are interconnected components of a closed-loop system (Grèzes-Bürcher & Grèzes, 2023). In hospitality contexts, this approach positions kitchens not merely as operational units but as strategic sites for sustainability innovation, where culinary creativity, efficiency, and environmental responsibility intersect. As such, circular gastronomy functions not only as an environmental management strategy but also as a mechanism for value creation, differentiation, and experiential enhancement in tourism destinations.

### Operational Circularity in Hospitality Food Systems

A substantial body of literature identifies operational circularity as the core dimension of circular gastronomy in hospitality. This dimension encompasses practices such as food waste prevention, portion control, FIFO (First-In-First-Out) inventory management, cascade utilization of by-products, and energy- and water-efficient kitchen technologies (Julião et al., 2019; Bittner et al., 2024a).

Recent research in the field of circular gastronomy in the hospitality industry has revealed the implementation of various strategies, including reduction, reuse, and recycling (Bittner et al.,

2024b). For instance, case studies of prominent hotel chains, including IHG, Accor, Meliá Hotels International, and NH Hotel Group, illustrate the implementation of this strategy in operational practices. IHG employs the Winnow system to reduce food waste by up to 20%. Similarly, Accor has achieved a 6.1% reduction in water consumption, 5.6% reduction in energy use, and an 8.3% reduction in CO<sub>2</sub> emissions from 2015 to 2018 (Maia et al., 2024). Furthermore, Meliá Hotels International implements the Eco-Touch program, which prioritizes recycling, reuse, and eco-friendly design, resulting in an increase in environmental certifications from 149 in 2015 to 180 in 2018 (Bowen et al., 2024). Collectively, these cases illustrate that the transition toward circular gastronomy is not only feasible but also strategically advantageous, as it enables hotels to reduce environmental footprints, comply with evolving regulatory frameworks, enhance brand reputation, and create value for both consumers and stakeholders through responsible resource management.

However, much of the existing literature emphasizes technologically intensive solutions and large-scale corporate contexts, often overlooking smaller-scale or culturally embedded operational models. This gap suggests the need for qualitative, process-oriented studies that examine how operational circularity is enacted in destinations where technological investments may be limited but cultural knowledge and culinary skills are abundant.

### **Governance and Institutional Embeddedness of Circular Gastronomy**

Beyond operational practices, scholars increasingly recognize governance and institutional embeddedness as critical enablers of circular economy implementation in hospitality (Kirchherr et al., 2023; Strippoli et al., 2024). Governance mechanisms include corporate sustainability policies, certification schemes, regulatory frameworks, and public-private collaboration, all of which shape the incentives and constraints under which hotels operate.

Research indicates that hotels operating within supportive regulatory environments and coherent corporate governance structures are more likely to institutionalize circular practices rather than treat them as ad hoc initiatives (Sorin & Sivarajah, 2021). For instance, environmental regulations, waste management mandates, and local sourcing incentives can reinforce internal sustainability standards, creating a hybrid governance model that aligns business objectives with public policy goals.

In the context of developing tourism destinations, governance embeddedness becomes particularly salient. Weak enforcement, fragmented policy frameworks, and limited infrastructure often constrain circular economy adoption (Ellen MacArthur Foundation, 2012). Consequently, empirical studies that explore how hospitality firms navigate and align with local governance structures, especially at the regional or municipal level remain limited. This underscores the relevance of case-based research examining how circular gastronomy is institutionalized within specific regulatory and cultural settings.

### **Socio-cultural Embeddedness and Community Integration**

An emerging strand of literature emphasizes the socio-cultural dimension of circular gastronomy, highlighting the role of local knowledge, traditions, and community participation in sustainable food systems (Kim & Hall, 2020; Balderas-Cejudo et al., 2025). In tourism destinations, gastronomy is not only a functional service but also a cultural expression that shapes visitor experiences and local identity.

In Bali, culinary practices are deeply intertwined with cultural philosophies such as *Tri Hita Karana*, which emphasizes harmony between humans, nature, and the spiritual realm (Saputro et al., 2024). Studies on Balinese culinary tourism demonstrate that traditional food systems, farm-to-table practices, and community-based cooking experiences contribute to both cultural preservation and sustainable tourism development (Sukerti & Marsiti, 2020; Wulandari et al., 2024).

Integrating circular gastronomy within such socio-cultural contexts allows hospitality firms to transform waste management and sourcing practices into mechanisms for community empowerment. The utilization of local ingredients, partnerships with farmers and micro-

enterprises, and redistribution of organic waste for composting or animal feed exemplify how circular practices can generate social value alongside environmental benefits. Nevertheless, empirical research that explicitly connects circular gastronomy to cultural embeddedness and community symbiosis in hospitality remains scarce, particularly in Global South destinations.

### **Value Creation, Competitive Advantage, and Experiential Sustainability**

The final analytical dimension concerns value creation and competitive advantage derived from circular gastronomy. Prior studies indicate that sustainable restaurant and hotel practices positively influence brand image, customer loyalty, and willingness to pay, particularly among environmentally conscious travelers (Nelson et al., 2021; Damigos, 2023). From an economic perspective, resource efficiency and waste reduction can translate into tangible cost savings, reinforcing the business case for sustainability (Çalikoğlu & Sadowski, 2024).

Moreover, circular gastronomy enhances the experiential dimension of hospitality by engaging guests in narratives of sustainability, locality, and ethical consumption. Cooking classes, transparent sourcing information, and interactive dining concepts enable tourists to participate in sustainable food systems rather than merely consume them (Grèzes-Bürcher & Grèzes, 2023). This experiential sustainability aligns with contemporary tourism trends that prioritize authenticity, learning, and responsible travel (Maniktala & Sharma, 2024).

Despite these recognized benefits, existing research often treats value creation as an outcome rather than examining the underlying mechanisms through which circular gastronomy generates economic, social, and experiential value simultaneously. This limitation points to the need for integrative case studies that trace how operational, governance, and socio-cultural dimensions converge to produce competitive advantage in hospitality settings.

### **Research Gap and Conceptual Positioning of the Study**

In summary, the literature identifies circular gastronomy as a promising framework for enhancing sustainability in hospitality through operational efficiency, governance alignment, socio-cultural integration, and value creation. However, three critical gaps remain. First, empirical studies explaining how circular gastronomy is operationalized across multiple properties under unified governance are limited. Second, the role of local cultural values and community partnerships in shaping circular practices remains under-theorized. Third, most existing studies focus on large international chains or technologically advanced contexts, leaving Global South destinations underrepresented.

Addressing these gaps, the present study adopts an embedded qualitative case study approach to explore the implementation of circular gastronomy within Natya Hotels & Resorts in Bali. By examining operational practices, governance alignment, and community integration across different tourism contexts, this study contributes to a more nuanced understanding of circular gastronomy as a culturally embedded and institutionally supported sustainability strategy in hospitality.

## **Method**

### **Research Design**

This study adopts a single embedded qualitative case study design Yin (2018) to explore the implementation of circular gastronomy in hospitality operations. A case study approach is appropriate when the research aims to understand complex processes and contextualized practices rather than to test hypotheses or achieve statistical generalization. In this study, Natya Hotels & Resorts is treated as a theoretically revelatory case, as it represents an organization that has actively integrated sustainability principles into its culinary operations within a culturally rich tourism destination.

The embedded design allows analysis across multiple operational units (three hotel properties) within a single organizational governance structure. This approach enables analytical generalization by examining how circular gastronomy principles are operationalized consistently

under unified corporate policies while accommodating contextual variation across different tourism settings (urban, resort, and coastal environments).

### **Case Selection and Sampling Strategy**

The case selection followed a purposive sampling strategy, guided by theoretical relevance rather than representativeness (Patton, 2014). Natya Hotels & Resorts was selected based on three criteria: (1) explicit commitment to sustainability and environmentally responsible hospitality practices; (2) unified corporate governance that standardizes operational and managerial decision-making; and (3) geographical dispersion of properties across distinct tourism contexts in Bali (Ubud, Kuta, and Jimbaran).

Within this organizational case, three properties Natya Resort Ubud, Natya Hotel Kuta, and Natya Villa Jimbaran were selected as embedded units of analysis. Although all properties operate under the same corporate umbrella, this homogeneity is treated as an analytical strength rather than a limitation, as it controls for governance-related variability and allows deeper examination of how circular gastronomy practices are enacted across different spatial and operational contexts. The objective of this study is not inter-chain comparison but theoretical elaboration of circular gastronomy implementation under controlled managerial conditions.

### **Data Collection Methods**

Non-participant observations were conducted using a structured checklist adapted from Nyberg et al. (2022) to systematically document circular gastronomy practices. The checklist covered seven operational categories: (1) sourcing and procurement, (2) storage and preservation, (3) preparation and cooking, (4) menu and service design, (5) waste management, (6) staff practices and organizational culture, and (7) documentation and communication. Observations were carried out in kitchens, storage areas, restaurants, and supporting facilities over a defined operational period. This method enabled direct assessment of daily practices related to food waste reduction, resource efficiency, by-product utilization, and sustainability communication. The use of a standardized checklist ensured consistency across sites and facilitated cross-case pattern identification within the embedded case design.

In-depth data were further collected through joint semi-structured interviews with key informants. Interviews were conducted with three executive chefs, each responsible for culinary strategy and operational decision-making at one of the selected properties. These informants were chosen due to their strategic roles in translating sustainability principles into daily culinary practices. The interviews were conducted in a joint format to encourage reflective dialogue among informants while maintaining a structured interview guide aligned with the study objectives. This format differs from focus group discussions, as interaction dynamics were not the primary unit of analysis; instead, emphasis was placed on eliciting expert insights into implementation models, operational challenges, and perceived benefits of circular gastronomy. Interview questions focused on: (1) the rationale and process of implementing circular gastronomy practices; (2) operational and organizational challenges encountered; and (3) environmental, economic, and social benefits derived from these practices. All interviews were audio-recorded with consent and transcribed verbatim for analysis.

### **Data Saturation & Data Analysis**

Thematic saturation was used as the criterion for determining adequacy of the qualitative data. Given the seniority of informants, the standardized governance structure, and the focused scope of inquiry, saturation was achieved when no new themes or substantive insights emerged across interviews and observation data (Creswell & Poth, 2016; Guest et al., 2006). The convergence of findings across the three properties further reinforced the sufficiency of the data for analytical purposes. Data analysis followed a qualitative thematic analysis approach (Braun & Clarke, 2006), supported by content analysis of observational data. The analysis proceeded in several stages. First, interview transcripts and observation notes were read repeatedly to achieve data familiarization. Second, initial codes were generated inductively based on recurring patterns

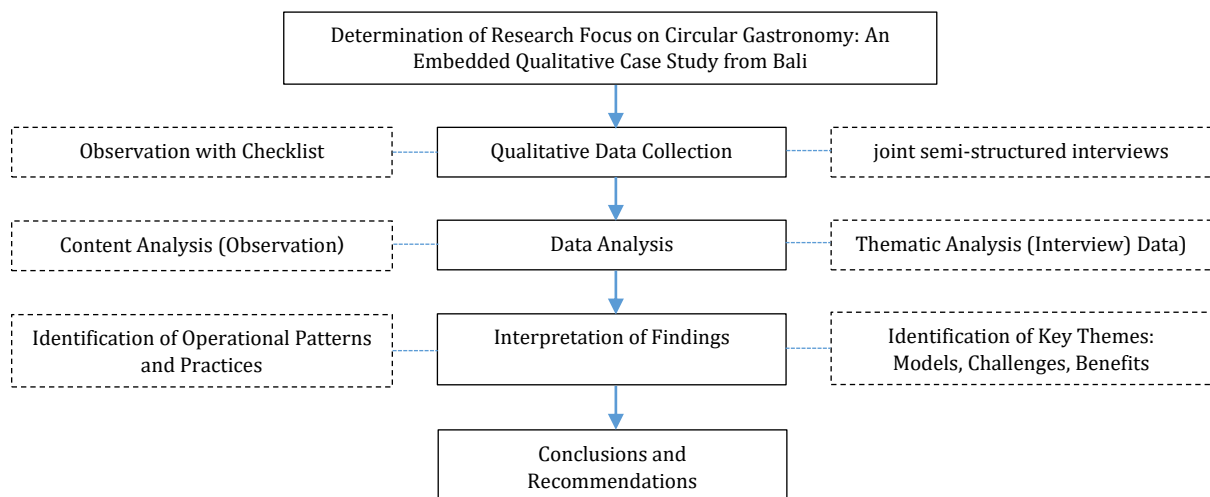
related to circular gastronomy practices. Third, codes were grouped into higher-order themes corresponding to models, challenges, and benefits of circular gastronomy implementation.

Observation data were analyzed using content analysis aligned with the checklist categories to identify operational patterns and levels of practice adoption. The integration of interview and observation data enabled triangulation and strengthened analytical depth by linking reported strategies with observed practices.

### Trustworthiness and Rigor

To ensure methodological rigor, this study applied established criteria for trustworthiness in qualitative research (Lincoln & Guba, 1980). Credibility was enhanced through methodological triangulation, combining observations and interviews to validate findings across data sources. Transferability was supported by providing thick descriptions of organizational context, operational settings, and cultural environment, allowing readers to assess applicability to similar contexts. Dependability was ensured through the use of a structured observation checklist, systematic data analysis procedures, and transparent documentation of research steps. Confirmability was addressed by grounding interpretations in empirical data and maintaining reflexive awareness of the researchers' role in data interpretation. Together, these strategies strengthen the reliability and transparency of the findings and support analytical generalization.

The sequence of actions undertaken in the present study is delineated below.



**Figure 1.** Research steps  
(Source: Researcher, 2025)

## Result and Discussion

### Results of Field Observations and In-depth Interviews

The present study analyzes the results of observations of circular gastronomy practices at Natya Resort Ubud, Natya Hotel Kuta, and Natya Villa Jimbaran, Bali, using a checklist instrument adapted from (Nyberg et al., 2022) that covers seven categories: sourcing and procurement, storage and preservation, processing and cooking, distribution and service, waste management, staff training and culture, and documentation and communication. An observational study was conducted at Natya Resort Ubud, Natya Hotel Kuta, and Natya Villa Jimbaran restaurant and kitchen to evaluate the extent to which circular practices are implemented in food and beverage (F&B) production operations. The objective of this analysis is to identify strengths, weaknesses, and opportunities to enhance sustainability, in accordance with the principles of the circular economy that prioritize reduction, reuse, and recycling (Geissdoerfer et al., 2017).

**Table 1.** The Following Report Presents the Findings of the Circular Gastronomy Practice Observation Checklist at Natya Hotels and Resorts.

Category	Code	Observed Activities	Results		Remarks
			Yes	No	
Material Sourcing and Procurement	MSP-01	Use of local/seasonal ingredients (visible organic, fairtrade labels)	✓		-
	MSP -02	Use of "imperfect" products (defective/oddly shaped fruits/vegetables)		✓	Maintain quality
	MSP -03	Utilization of by-products (fish bones, vegetable peels, whey, etc.)	✓		-
	MSP -04	Bulk purchases (minimal single-use packaging in the warehouse)		✓	Purchases in small amounts and routinely
Storage and Preservation	SP-01	Zero-waste storage system (separate containers for leftovers/stock/compost)	✓		-
	SP-02	Preservation techniques (fermentation, salting, dehydration)	✓		-
	SP-03	Implementation of the FIFO (First-In-First-Out) system to reduce spoilage	✓		FIFO is the top priority
Preparation and Cooking	PC-01	Utilization of whole ingredients (skin/stem used, e.g., carrot leaf pesto)	✓		-
	PC-02	Repurpose leftovers (e.g., toast crust → bread pudding, leftover vegetables → seafood samosa, spring roll).	✓		-
	PC-03	Use of energy-saving appliances (induction cookers, pressure cookers)	✓		Efficiency is a working principle
	PC-04	Use of low flow faucets for water conservation	✓		-
Menu and Service Design	MSD-01	The menu mentions recycled ingredients (e.g., fish bone broth, potato skin chips, etc.)		✓	-
	MSD-02	Small portion/shared plate options to reduce food waste	✓		All menus/portions are weighed to minimize waste.
	MSD-03	Environmentally friendly packaging (reusable/biodegradable) for wrapping	✓		Tidak menggunakan bahan dari plastik
Waste Management	WM-01	Waste sorting (composting, recycling, food donation)	✓		-
	WM-02	Food waste recording (diary/weight/volume chart)		✓	F&B waste tends to be very low
	WM-03	Creative use of waste (orange peels as a cleaner, coffee grounds as a scrub)	✓		Used by third parties (Gianyar area community)
Staff Practices and Culture	SPC-01	Waste reduction training guide/material preparation techniques displayed	✓		-
	SPC-02	Staff discussion on material optimization observed	✓		-

	SPC-03	The waiter explains the circular practice to the guest.	✓	-
Documentation and Communication	DC-01	Sertifikat keberlanjutan terlihat (e.g., Michelin Green Star, Green Globe)	✓	-
	DC-01	Supplier transparency (farmer/ingredient origin info on menu/wall)	✓	-

(Source: Researcher, 2025)

An analysis of the available data indicates that Natya Resort Ubud, Natya Hotel Kuta, and Natya Villa Jimbaran has successfully implemented a substantial number of circular gastronomy practices, particularly in the domains of processing and cooking (100% of activities implemented) and storage and preservation (100%). This category is indicative of strong operational efficiency, in accordance with the principles of the circular economy, which emphasize the reuse and reduction of resources (Geissdoerfer et al., 2017). The utilization of local and seasonal ingredients, in conjunction with the incorporation of by-products in the raw material sourcing and procurement category, has been demonstrated to support the local economy and mitigate environmental impact. This finding is consistent with research conducted on sustainable restaurants in Bali (Wenten et al., 2024). The involvement of the Gianyar community in waste utilization also strengthens the social dimension of sustainability, in accordance with SDG 12 (Responsible Production and Consumption).

However, several deficiencies were identified, particularly in the domains of documentation and communication (0% of activities implemented), indicating a lack of transparency about circular practices to guests and the public. This may result in a decline in the resort's appeal to environmentally conscious travelers, a demographic that has been increasing in recent years. According to a survey by Booking.com (2021), 81% of travelers express a preference for sustainable travel. Noncompliance with the utilization of "imperfect" products and bulk purchases also present opportunities for enhancement, although these decisions may be influenced by the resort's aesthetic and logistical standards. The absence of food waste tracking (WM-02) represents a notable deficiency, as quantitative data is imperative for the evaluation of circular initiatives' effectiveness. This assertion is supported by research conducted on waste management in hotel settings (Balderas-Cejudo et al., 2025).

In-depth interviews were conducted with the executive chefs of Natya Resort Ubud, Natya Hotel Kuta, and Natya Villa Jimbaran in the form of group discussions to gather further information related to the results of the observation checklist. The results of the checklist indicated that 15 of the 22 circular gastronomy activities were implemented in each restaurant and kitchen. The objective of these interviews was to ascertain the rationales underlying the implemented practices, to investigate the implementation challenges, and to assess the perceived benefits from an operational perspective. Utilizing a thematic approach grounded in the checklist categories, these interviews yielded contextual insights that enriched the observation findings, aligning with qualitative methods that prioritize in-depth interpretation (Creswell & Poth, 2018).

The study reveals that Natya Hotels & Resort Bali has successfully translated the principles of circular gastronomy into a set of integrated operational practices. At the production level, the resort applies a closed-loop culinary model in which food residues are systematically repurposed into new menu components. This approach, reinforced by precise portion control systems and strict adherence to FIFO (First-In-First-Out), not only ensures product quality and prevents spoilage but also reduces food costs by 10–15% while lowering the resort's carbon footprint. Beyond the kitchen, waste management demonstrates a symbiotic relationship with the local ecosystem. Organic residues are carefully separated into livestock feed and compost, with less than 5% of food and beverage waste passed to third parties—an achievement significantly below industry benchmarks. In this way, the resort transforms waste into productive resources, while simultaneously fostering stronger ties with local farmers and gardeners through resource exchange.

Sustainability at Natya Hotels & Resort Bali is also embedded in the architecture of operations, combining cultural transformation, spatial design, and technical mastery. Zero-waste cooking is cultivated as a behavioral norm through daily training and role modeling, while the kitchen layout is strategically organized to conserve energy through ergonomic design and the use of induction technology. Equally important, chefs' technical mastery in fire control enables energy efficiency without compromising food quality. At the same time, gastronomy becomes a medium for education and inclusivity. The resort demonstrates responsibility toward guest well-being through digital allergen documentation and adaptive menu adjustments, while cooking classes rooted in Balinese traditions allow visitors to engage with local food systems, from organic rice fields to homegrown spices, thereby creating immersive learning experiences in sustainability.

Finally, these practices are not isolated initiatives but are embedded within a wider policy framework. On the one hand, corporate guidelines institutionalize sustainability through measurable indicators such as waste-to-landfill ratio and local sourcing index. On the other, alignment with Government regulation like Gianyar Regency's regulations on accommodation management (Gianyar Regent Regulation No. 30/2020) and waste management based on local wisdom (Gianyar Regent Regulation No. 76/2023) ensures that sustainability practices are legitimized and supported structurally. Taken together, the case of Natya Hotels & Resort Bali illustrates how circular gastronomy can evolve into a holistic strategy which merging operational efficiency, ecological responsibility, community partnership, guest engagement, and regulatory compliance thus reinforcing Bali's position as a global hub for sustainable gastronomic tourism.

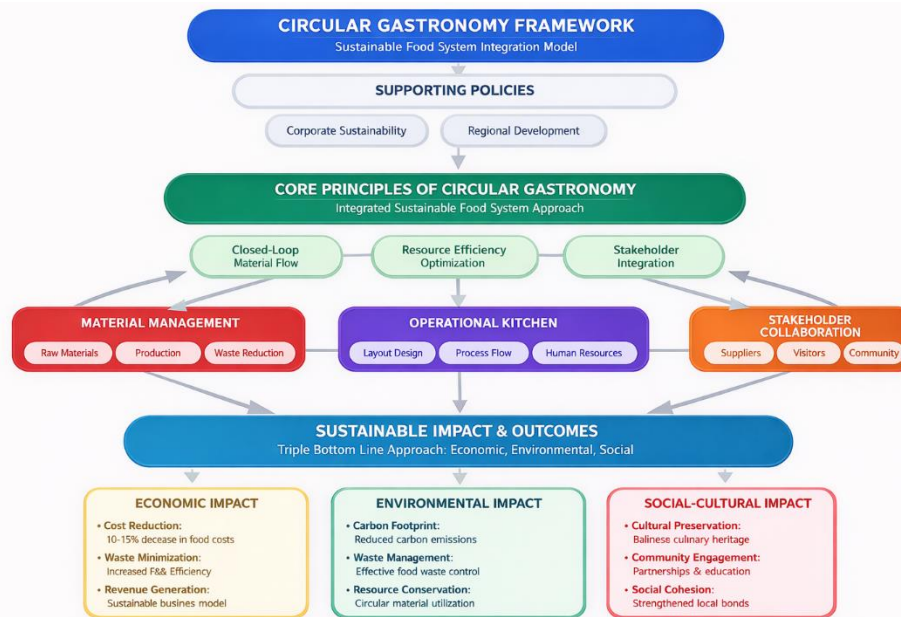
The findings of this study demonstrate that circular gastronomy at Natya Hotels & Resorts is not implemented as a series of isolated operational practices, but rather as an integrated socio-technical system embedded within organizational governance, cultural values, and local community networks. Empirically, the reduction of food and beverage waste to below 5%—significantly lower than the hospitality industry average of 20–30%, indicates that high levels of circularity can be achieved through process discipline (FIFO, portion control), culinary skills (by-product repurposing), and behavioral norms, rather than reliance on capital-intensive technological solutions alone.

From a theoretical perspective, these findings extend the concept of circular gastronomy (Nyberg et al., 2022) by illustrating how operational circularity, institutional alignment, and socio-cultural embeddedness converge within a hospitality setting. While prior studies emphasize technological monitoring systems and standardized corporate programs in large hotel chains, this case highlights a context-sensitive pathway in which cultural philosophy (*Tri Hita Karana*), chef-led innovation, and community partnerships play a central role in sustaining circular practices. This suggests that circular gastronomy should be conceptualized not merely as an operational framework, but as an embedded organizational capability shaped by place-based values and governance structures.

### **Discussion of Findings**

The implementation of circular gastronomy at Natya Hotels & Resort Bali provides significant theoretical contributions to the discourse on sustainable hospitality by demonstrating an integrated model of industry–community symbiosis that effectively reconciles the classic trade-off between operational efficiency and social inclusivity. This case illustrates the concept of *Embedded Circularity* (Kirchherr et al., 2023) emphasizing that the sustainability of food systems is not merely contingent upon technological interventions, but rather upon the organic interconnections between operational practices (e.g., portion control, FIFO application, fire control), organizational culture (e.g., zero-waste mindset), and local ecosystems (e.g., waste utilization by farmers, sourcing from MSMEs). The empirical evidence of food and beverage waste being reduced to less than 5% (Cattaneo et al., 2021) which significantly below the industry average of 20–30%, demonstrates that locally embedded practices, inspired by Balinese cultural values such as *Tri Hita Karana*, can achieve high rates of circularity without reliance on capital-intensive technological investments.

Furthermore, the convergence between corporate policies and Government regulatory framework reveals a hybrid governance mechanism that catalyzes systemic transformation. This synergy generates an enabling environment in which economic incentives (e.g., 10–15% food cost savings) are reinforced by regulatory instruments (Gianyar Regent Regulation No. 30/2020 and No. 76/2023) and strengthened by social capital (community cohesion). Such alignment produces a virtuous cycle that addresses key barriers to circular economy adoption, notably high upfront costs and weak stakeholder coordination (Ellen MacArthur Foundation, 2012; Strippoli et al., 2024). Practically, the Natya model offers a replicable blueprint for destinations in the Global South to simultaneously advance SDG 12.3 (food waste reduction) and SDG 8.9 (community-based sustainable tourism) through decentralized policy levers and local empowerment.



**Figure 2.** Circular Gastronomy Implementation Model at Natya Hotels and Resort  
(Source: Researcher, 2025)

This model (Figure 2) illustrates a symphony of multilevel policies where the convergence of Natya's corporate policies (waste-to-landfill ratio indicator, local sourcing index) and Government regulations (Gianyar Regent Regulation No. 30 of 2020 and No. 76 of 2023) create an enabling environment that serves as the structural foundation for the implementation of circular principles, as per the findings (Kirchherr et al., 2023) on policy catalysts in the circular economy transition. This symbiotic relationship, characterized by a dualistic top-down and bottom-up approach, is operationalized through a triad of interconnected components: (1) Material Management is instrumental in actualizing the concept of cascade utilization (Kalverkamp et al., 2017) through the transformation of by-products into new inputs, (2) Kitchen Operations integrates smart physical design, technical precision (e.g., fire control), and a zero-waste human resources culture as determinants of efficiency, and (3) Stakeholder Collaboration establishes a symbiotic ecosystem between farmers, SMEs, and the government to convert waste into socio-economic capital. This configuration generates a sustainability multiplier effect that confirms the triple bottom line proposition (Elkington, 1994): economic resilience through cost savings of 10–15% and strengthening of the local value chain, environmental regeneration through near-zero waste practices, and socio-cultural preservation through the transmission of Balinese culinary wisdom in cooking classes and menu design. This suggests that circular gastronomy is not merely an operational strategy but a paradigm.

This study makes several contributions to the literature on circular economy and sustainable hospitality. First, it contributes theoretically by advancing an embedded circular

gastronomy perspective, demonstrating that effective circularity in hospitality food systems emerges from the interaction between operational routines, organizational culture, and institutional governance. In contrast to dominant models that prioritize technological efficiency and scale, the findings show that culturally grounded and skill-based practices can achieve comparable, if not superior environmental outcomes in Global South tourism contexts.

Second, the study contributes empirically by providing a rare in-depth qualitative case of circular gastronomy implementation across multiple hotel properties operating under unified governance. The embedded case design reveals how standardized corporate sustainability policies can be flexibly enacted across diverse tourism settings (urban, resort, and coastal), thereby enriching understanding of how circular strategies are operationalized beyond single-site analyses.

Third, the study offers practical contributions for hospitality managers and policymakers. For practitioners, the findings highlight the strategic role of executive chefs as sustainability agents who translate abstract circular economy principles into everyday culinary practices. For policymakers, the alignment between corporate initiatives and local regulations illustrates how hybrid governance mechanisms can lower barriers to circular economy adoption by reinforcing incentives, legitimacy, and community participation. Collectively, these contributions position circular gastronomy as a viable pathway for achieving sustainability goals while preserving cultural authenticity and economic viability in tourism destinations.

Nevertheless, further research is necessary to examine the replicability, scalability, and holistic impacts of this model. Future inquiries should include: (1) comparative studies in destinations with differing socio-ecological contexts (e.g., coastal, rural, or urban areas) to identify critical contextual variables such as community structure, recycling infrastructure, and local governance capacity; (2) quantitative Life Cycle Assessment (LCA) to empirically validate environmental claims, including reductions in carbon footprint, water use, and waste streams across the supply chain; and (3) multi-sectoral resilience studies that assess the capacity of such models to withstand external disruptions, such as climate change, pandemics, and supply chain fluctuations, while also evaluating the long-term socio-economic benefits for local MSMEs. Such research would provide a robust evidence-based framework for transforming food systems within tourism, particularly in Global South contexts where resource constraints and community interdependencies shape pathways toward sustainability.

## Conclusion

The implementation of circular gastronomy at Natya Hotels and Resort, Bali demonstrates the effectiveness of an integrative model that aligns multi-level policies, locally grounded operations, and community collaboration. The convergence of corporate initiatives such as waste-to-landfill ratios and local sourcing indices with Government regulations has created an enabling environment for circular practices. Operationally, material cascade utilization, kitchen efficiency (fire control, FIFO), and stakeholder symbiosis reduced F&B waste to below 5%, far outperforming the industry average of 20–30%. This model further illustrates how circular gastronomy can simultaneously generate economic benefits (10–15% cost savings, support for local SMEs), ecological sustainability (near-zero waste, low-carbon footprint), and sociocultural preservation (cooking classes, *Tri Hita Karana*).

Based on these findings, the hospitality industry is advised to adopt an integrative sustainability strategy that combines managerial commitment to zero-waste culture, active collaboration with local SMEs to achieve >80% local sourcing, and the application of the 5R waste hierarchy involving communities as partners in resource recovery. Local governments should strengthen regulatory frameworks through specific circular gastronomy policies, fiscal incentives for hotels with waste levels below 10%, and collaborative platforms linking businesses, farmers, and compost processors. Future research should prioritize Life Cycle Assessment (LCA) to validate environmental impacts and develop a replicability framework across diverse destinations. Natya Resort thus offers a measurable blueprint for transforming food systems in

tourism, contributing directly to SDG 12.3 (food waste reduction) and SDG 8.9 (sustainable tourism).

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