ECO-FRIENDLY BREW: CIRCULAR ECONOMY INITIATIVES AND OPERATIONAL EFFICIENCY OF COFFEE SHOPS IN SAN JOSE CITY, NUEVA ECIJA

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Abstract.

The growing trend of sustainable business models has made circular economy (CE) practices an essential strategy in the food and beverage service sector, particularly coffee shops. This study explored the relationship between CE initiatives and operational efficiency (OE) among 59 selected coffee shops in San Jose City, Nueva Ecija. It is guided by the framework on the key elements of OE, which aims to minimize waste and maximize output in people, processes, and technology, alongside the 2Ps of marketing—product and packaging—where CE is commonly practiced. The research focused on sustainable practices, using a descriptive-correlational design with a structured survey instrument distributed to coffee shop owners via simple random sampling, ensuring informed consent, confidentiality, and ethical considerations throughout the process. Results revealed that CE initiatives in Products ($\bar{x}$=2.74) and Packaging ($\bar{x}$=2.71) were moderately implemented, whereas OE was strongly evident in People ($\bar{x}$=3.38), Processes ($\bar{x}$=3.34), and Technology ($\bar{x}$=3.48). Pearson Correlation analysis showed a strong positive relationship between product-related CE practices and all aspects of operational efficiency—People (r=0.612, p=0.000), Process (r=0.608, p=0.000), and Technology (r=0.628, p=0.000).

In contrast, Packaging-related CE practices showed weaker but still positive correlations—People (r=0.358, p=0.005), Process (r=0.335, p=0.010), and Technology (r=0.420, p=0.001). The findings suggest that while sustainable packaging efforts contribute to environmental goals, product-related CE practices have a more direct and impactful impact on business efficiency, offering valuable insights to enhance sustainability and performance in small food service

businesses. The study concludes that there is a significant positive relationship between CE practices and OE.

Keywords: *Sustainable Practices, Coffee Shops, Products, Packaging, People, Process, Technology*

Introduction

Nowadays, sustainability is the focus across industries, with eco-friendly products and initiatives being introduced. Economically, from a business perspective, entrepreneurs/businesses are implementing new strategies (from planning to operations) to minimize waste produced or goods and services delivered to the market. Thinking in circular economy principles in product design, packaging, and beyond not only drives environmental goals but also improves internal operations, how people work, how processes flow, and how technology is leveraged to support sustainable practices.

Meanwhile, the coffee shop industry in the Philippines has also started incorporating eco-friendly efforts. This growth, however, necessitates a critical examination of how these establishments integrate sustainable practices to mitigate environmental impact and ensure long-term viability within the broader coffee value chain (Sachs et al., 2019). Specifically, an analysis of sustainability among coffee shops in the Philippines is crucial for understanding how local businesses address issues from bean sourcing to waste management, thereby contributing to an enhanced circular economy in the regional context (Frajenal, 2022). Moreover, these local coffee shops are a portion of coffee shop chains that have taken measures to become more sustainable, such as reducing plastic packaging, composting, and sourcing locally (Poddar, 2023). The growing consumer consciousness and interest in eco-friendly alternatives bring about this movement towards sustainability (Tamboli et al., 2023). According to Ko and Jeon (2024), many leading eco-conscious coffee chains promote environmentally friendly practices by utilizing recycled takeaway cups, offering organic food options, and encouraging the use of reusable mugs to cut waste. These measures demonstrate an increasing dedication to environmental conservation in Filipino coffee shop activities and how practices rooted in the circular economy help ensure the sustainability of both the environment and the business.

The Philippine coffee market, characterized by a diverse café culture and a growing appreciation for specialty coffee, has seen an increasing number of coffee shops serving as key intermediaries between producers and consumers (Tumanan & Lansangan, 2011). This expansion, while catering to evolving consumer preferences for coffee as both a product, also intensifies the need for these establishments to adopt sustainable practices (Tumanan & Lansangan, 2011). Distinct coffee shops aim to reduce consumption, promote recycling, and reuse materials (Mendoza et al., 2022). Natural products and marketing strategies, as well as eco-products like edible straws and recyclable cups, and how they are disposed of in coffee shops around the world, are already known and managed. This is particularly relevant given that the global coffee supply chain faces significant sustainability challenges that necessitate a holistic approach to sustainable development (Proença et al., 2022). Therefore, understanding the current state of sustainability adoption in Philippine coffee shops is essential for identifying effective strategies and policy interventions to foster a more resilient and responsible coffee industry (Malinao, 2022).

Escalating global challenges are pushing a shift from linear to sustainable economic models. The Circular Economy (CE) provides an alternative to the "take, make, dispose" system by focusing on resource reuse, waste reduction, and regeneration of natural systems. CE requires businesses to integrate environmental and social goals into their strategies rather than just focusing on profit. In the coffee industry, despite rising demand for sustainable products, challenges like emissions and inequality persist. Adopting circular practices in coffee shops can help address these issues by rethinking sourcing, operations, and waste management to minimize environmental impact.

The service industry, characterized by its intangible offerings and direct customer interactions, presents unique challenges and opportunities for operational efficiency compared to manufacturing or product-centric sectors (Kindström & Kowalkowski, 2014). Operational Efficiency (OE) refers to an organization's ability to deliver high-quality products or services with minimal resources or inputs; it involves people, processes, and technology (Dilshani et al., 2019). OE in this context refers to the optimization of resources—both human and technological—and the streamlining of processes to maximize output while minimizing waste and cost within a coffee shop business (Parthanadee & Buddhakulsomsiri, 2012). This efficiency is critical for maintaining competitiveness and profitability, particularly given the nature of the food and beverage industry (Geminarqi & Purnomo, 2023).

Consequently, evaluating operational efficiency extends beyond financial metrics to encompass a holistic assessment of customer satisfaction, internal process optimization, and an organization's growth capacity (Feng & Goli, 2023). It also involves leveraging technology, such as point-of-sale systems, to enhance service delivery and manage inventory effectively, thereby contributing to sustained operational excellence (Olayinka, 2021). For coffee shops, this requires running an effective, efficient operation, from sourcing and preparing to serving and managing waste, to save costs, save time, and improve output across the board without negatively impacting the quality of their products or the satisfaction of their customers. Effective integration ensures that technological tools support human capabilities and streamline processes rather than create additional complexity, which is pivotal for maintaining a competitive edge in a saturated market (Van Hoang et al., 2025).

Furthermore, a continuous improvement culture, supported by robust leadership and employee training, is essential for identifying and implementing innovative solutions to operational challenges (Zhang et al., 2023). This integrated perspective also emphasizes the critical role of human capital development, including job design, performance appraisal, and continuous training, in maximizing overall organizational performance (Liu et al., 2007). The unique demands of the coffee shop sector, including rapid service, product consistency, and a personalized customer experience, necessitate highly refined processes that minimize bottlenecks and enhance throughput (Villanueva et al., 2025). This involves meticulously designed workflows for everything from bean grinding and espresso pulling to order fulfillment and payment processing, all aimed at reducing wait times and improving service speed (Reyes et al., 2024).

Furthermore, this study may have important implications for the coffee industry and for entrepreneurs and coffee shop owners. Knowing where CE strategies stand on OE can direct the innovation of products and processes to improve both sustainability and business performance. These findings can inform future work on developing lower-footprint, higher-efficiency coffee shop operations consistent with global sustainability goals.

Despite extensive literature on the circular economy across many sectors, there is a knowledge gap about how this principle affects operational effectiveness in coffee shops. The current literature provides general insights into sustainable practices but does not explicitly address

their influence on key operational dimensions.

Hence, this study aims to fill this gap by examining coffee shop CE initiatives through product- and packaging-related strategies. Also, it seeks to evaluate the key elements of OE (people, process, and technology) evident in the coffee shop businesses. Lastly, it intends to examine the correlation between CE and OE. The results will confirm whether higher levels of CE practices are associated with better operational performance, thereby confirming or rejecting the research hypothesis.

Literature Review

The Evolution of Circular Economy (CE) Practices in the Coffee Industry

According to Keulen & Kirchherr (2020), the CE promises to provide an alternative to the current take-make-dispose economic model, which causes immense waste, high energy consumption, and the limited or non-use of disposables. There are some examples of CE implementation in the literature, but few focus on complex product value chains. Changes were aimed at both the production and consumption sides to minimize waste and connect across and beyond value chains, balancing ecological, social, and financial sustainability.

According to Agnieszka et al. (2023), optimizing waste resource efficiency through the CE framework emphasizes waste reduction, resource reuse, and the extraction of value from waste materials. It discusses the core principles of CE, including eliminating waste and pollution, circulating products and materials at their highest value, and regenerating nature. Additionally, Arora et al. (2021) discuss the CE as a conceptual model used in a closed-loop approach to enhance resource use and minimize waste. It highlights CE-related policies for solid waste management and how they can optimize local resources.

Sutherland & Kouloumpi (2022) discuss how the CE can contribute to multiple SDGs, including Goals 6 (clean water and sanitation), 7 (affordable and clean energy), and 12 (responsible production and consumption). It emphasizes the holistic benefits of implementing circular economy strategies. Moreover, Ortiz-De-

Montellano et al. (2023) provide an overview of how circular economy principles align with the SDGs, detailing how they can facilitate progress toward achieving clean water, affordable energy, and responsible production. It discusses the intrinsic relationship between these frameworks.

This stands in contrast to the linear economy, which is also known as the take-make-dispose approach, where resources are acquired, products are manufactured for sale, and any unnecessary materials are either incinerated or landfilled, limiting the ability to reduce waste from production and consumption or to derive value from that waste (Sariatli, 2017). To adopt the principles of the CE, there needs to be a shift away from the prevailing mindset that pushes linear business practices, towards one that focuses on sustainability and integrates closed-loop mindsets into the core of business models and industrial processes (Muranko et al., 2019).

Circular Economy Integration in Marketing Aspects of Coffee Shop Businesses

Products

The analysis of current practices in product management within coffee shop businesses revealed a significant emphasis on sourcing sustainably produced coffee beans and on implementing waste-reduction initiatives in brewing processes (Proença et al., 2022). Furthermore, many establishments are exploring the integration of upcycled coffee byproducts into new product lines, alongside adopting closed-loop systems to conserve water and energy (Maciejewski & Mokrysz, 2019). These efforts collectively demonstrate a burgeoning commitment to operationalizing circular economy principles, moving beyond mere resource efficiency towards a more holistic redefinition of product lifecycles within the coffee retail sector (Mesa et al., 2018). However, significant variations were observed in the extent of these practices, indicating that while awareness of circularity is growing, the systematic measurement and assessment of circular performance are not yet commonplace across the industry (Sassanelli et al., 2019). This highlights a critical need for standardized metrics and robust frameworks to evaluate the actual environmental and economic impacts of circular product management strategies, facilitating broader adoption and demonstrating tangible benefits to both businesses and consumers (Paiva, 2025).

Packaging

The assessment of current packaging practices in the coffee shop industry reveals a growing adoption of materials engineered for enhanced recyclability, compostability, and reusability, primarily driven by heightened consumer environmental consciousness and stringent regulatory pressures (Bigdeloo et al., 2021). Despite this progress, significant challenges persist in establishing robust collection and reprocessing infrastructures, which often limit the actual circularity achieved by these packaging innovations (Ada et al., 2023). Moreover, while many companies announce commitments to packaging that is fully recyclable or compostable, practical implementation often faces hurdles, including material compatibility and consumer education on proper disposal (Bocken et al., 2022). This gap between intent and actual circularity necessitates further research into the efficacy of current recycling and composting schemes for coffee-specific packaging materials, particularly those derived from coffee by-products (Hernández-Varela & Medina, 2023). For instance, while certain bioplastics derived from spent coffee grounds show promise for packaging applications, their industrial composting infrastructure remains underdeveloped in many regions, hindering their full circular potential (Karmee, 2017). Consequently, while the intent to transition to more sustainable packaging is clear, the current environment underscores the critical need for comprehensive life-cycle assessments to quantify environmental benefits and identify areas for further improvement accurately (Sazdovski et al., 2021).

Operational Efficiency Framework and Circular Economy

People

The adoption of circular economy models can significantly reshape the decision-making processes within coffee shop operations, leading to transformational changes in capabilities, work procedures, relationships, and technology (Jabbour et al., 2019). This holistic approach necessitates re-evaluating existing organizational structures and skill sets, demanding innovative training programs and incentive schemes to align employee behavior with circular objectives (Iacovidou et al., 2020). Such alignment can foster a workforce that is not only proficient in their daily tasks but also deeply committed to sustainable practices, ultimately enhancing the coffee shop's competitive advantage and environmental stewardship (Jones & Comfort, 2021). Moreover,

integrating circular economy principles into human resource management can lead to novel talent acquisition approaches that prioritize candidates with a strong commitment to sustainability and innovative problem-solving.

Process

The adoption of innovative waste processing techniques and sustainable management standards that extend beyond simple food waste to encompass a broader spectrum of operational outputs (Martin-Rios et al., 2022). This includes exploring closed-loop systems for materials, energy, and water, as well as implementing remanufacturing and recycling programs for packaging and used equipment (Da-wei et al., 2021). These process optimizations aim to significantly reduce the environmental footprint of coffee shop operations while simultaneously improving resource utilization and cost-effectiveness. This transition towards a restorative and regenerative economic cycle necessitates systemic redesign, organizational, and institutional changes, leading to sustainability profits (Manca et al., 2020). This shift moves beyond mere compliance, enabling businesses to decouple value creation from resource depletion and waste generation, thereby enhancing long-term resilience and market competitiveness (Zanoletti et al., 2021). Furthermore, the continuous improvement of these processes through data analytics and feedback loops will be essential for sustained efficiency gains and for identifying new circular opportunities. This includes a focus on maximizing resource value and extending product lifecycles, thereby reducing reliance on virgin materials and minimizing waste generation (Upadhayay et al., 2024).

Technology

Advanced technologies help coffee shops become more circular by improving resource tracking, waste management, and customer engagement. Tools like digital inventory systems, AI-driven sorting, and supply chain technologies optimize operations and support sustainability goals by reducing waste and increasing efficiency.

Sustainability Practices in Coffee Shops and Their Environmental and Economic Impacts through CE Strategies

In today's era of sustainability and eco-awareness, coffee plays a role in creating a more sustainable world. A transition towards sustainability must shape growth to meet the needs of the present

without compromising future development (Steffen et al., 2015).

A critical effort in this direction is the Sustainable Development Goals (SDGs), through which the UN aims to address the complex issues faced by the CE concept and its impact.

Companies, researchers, and interested customers are paving the way for the next phase of environmental sustainability worldwide. The circular economy paradigm is emerging, enabled by legislative reforms and cutting-edge technologies. It holds the potential to reshape the global economy and alter our relationship with the natural world, including coffee (Joshi, 2023). By turning waste back into raw materials for the subsequent production stage, the circular economy seeks to close the loop in our industrial system, reducing resource consumption and environmental degradation (Pike, 2018). According to Goodrich (2016), *"sustainability has progressed dramatically from the late 1990s to now. Even though the circular economy offers a better framework to assist businesses in integrating sustainability into their business plan, it is also the most challenging component".*

Waste Management and Resource Efficiency in Coffee Shops

According to Marwah and Marwah (2022), coffee production generates more than 23 million tons of garbage annually, from the pulp of fresh coffee cherries to the packaging that transports the roasted beans to baristas. Used coffee grounds, which we discard in the trash after each fresh drink, are the most obvious example of this waste at the consumer end of the supply chain. Furthermore, Cabauatan et al. (2022) discuss how resource efficiency, such as conserving water and using energy-efficient equipment, has been incorporated by some coffee shops in the country.

Waste management is a significant challenge worldwide. Industrial waste treatment and management are essential to prevent environmental pollution and health hazards to humans and animals. Many government and non-government organizations are taking initiatives in this regard. Agro-based industries, such as the coffee industry, also generate both water and solid waste. Proper treatment and management of this waste are required to protect human beings and animals from health problems. Coffee certification programs also include the criteria for environmental protection and waste management (Muthamma & Shankarappa, 2020).

Methods

This study used a quantitative research design, specifically employing a descriptive-correlational approach to determine the relationship between CE practices—specifically, products and packaging—and OE in terms of people, processes, and technology among the selected coffee shops in San Jose City.

The study utilized a structured survey questionnaire developed through an extensive review of available literature to identify variables, which were subsequently reviewed for relevance and appropriateness. The questionnaire was then divided into three sections, each related to a research aim: Part I collects respondents' socio-demographic information. Part II focused on CE practices specifically in terms of product and packaging, rated on a 4-point Likert Scale from 4: Not Implemented to 1: Fully Implemented, while Part III focused on OE (particularly on people, process, and technology) through agreement levels (4: Strongly Agree to 1: Strongly Disagree). A pre-test involving 20 coffee shop owners in Science City of Muñoz and Lupao, Nueva Ecija, validated the instrument using Cronbach's Alpha, with all constructs scoring a=0.918; hence, they were considered reliable. Moreover, applying Slovin's formula, a sample of 59 out of 69 identified coffee shop businesses in San Jose City was selected using simple random sampling. In this regard, data were collected from coffee shops that have been in operation for more than 2 years to ensure the reliability and relevance of the findings.

During data collection, coffee shop owners were given informed consent to ensure confidentiality and encourage honest, detailed responses. The survey questionnaire was distributed in printed form and included clear instructions to guide respondents in providing accurate information about CE practices and their internal business operations. Throughout this phase, participants are closely monitored to ensure timely responses are submitted, and any concerns or questions are addressed promptly. The respondents may skip any items they find uncomfortable. Ethical considerations strictly ensured their rights, including the right to withdraw at any time.

For data analysis, the study employed descriptive statistics to summarize and interpret data collected from coffee shop owners. Frequency, Mean, Standard Deviation, and Percentages will be used to determine the circular economy initiatives and operational efficiency of coffee shops in San Jose City. Lastly, inferential statistics, specifically Pearson's r, were used to investigate the correlation between circular

economy initiatives and the operational efficiency of coffee shops.

Results and Discussion

Circular Economy Initiatives

1. Products

Table 1 presents the Circular Economy Initiatives of Coffee Shops by the Products they offer. Based on the results in Table 1, the highest-rated circular economy initiatives by coffee shops, in terms of products, were partnering with local suppliers to reduce transport-related emissions, with a mean of 3.07 (SD=0.58), indicating moderate implementation. This implies that coffee shops prioritize building relationships with local suppliers, enabling them to assess their carbon footprints and strengthen community-based production. The relatively low standard deviation indicates similar perceptions, which were commonly practiced across coffee shops.

Meanwhile, the lowest mean rating was for incorporating upcycled or repurposed coffee grounds, at 2.49 (SD=0.80), indicating partial implementation. This result suggests that some of these coffee shops may not fully engage in or implement this practice due to limited technical knowledge, limited resources, and low consumer demand. The standard deviation primarily reflects variability in implementation, suggesting that only a few coffee shops are actively adopting upcycling, while others remain hesitant.

Implementing circular economy (CE) initiatives in coffee shops, particularly in product design and use, represents a pragmatic approach to sustainable consumption and production. As industries increasingly pivot toward regenerative systems, coffee shops—integral components of urban food economies—are beginning to embed CE principles into their operational models. The data gathered, with an aggregate weighted mean of 2.74, reflects a moderate level of implementation, suggesting that while the transition to circularity is underway, there remains considerable room for development and optimization. This moderate engagement signifies a conscious yet non-transformative commitment to sustainability within the product dimension of circular practices.

While coffee shops have adopted CE initiatives to a moderate

extent in product terms, the findings suggest a transitional phase marked by both commitment and constraint. As Maciejewski & Mokrysz (2019) note, many establishments are exploring the integration of upcycled coffee by-products into new product lines, while adopting closed-loop systems to conserve water and energy. However, significant variations were observed in the extent of these practices, indicating that while awareness of circularity is growing, the systematic measurement and assessment of circular performance are not yet commonplace across the industry (Sassanelli et al., 2019). These results echo the view that circularity is not merely a set of practices but a transformative cultural shift requiring coordinated efforts across the value chain.

In line with this, coffee shops can advance sustainability through their strength, such as supplier partnerships. This also reinforces the notion that adoption of the circular economy in the food and beverage industry is gradually increasing, requiring policy support, consumer awareness, and technological solutions. Hence, for these businesses to move from moderate to high implementation, there should be an intervention in the form of training and collaboration with sustainability networks.

Table 1. *Circular Economy Initiatives of Coffee Shops in terms of Products*

STATEMENT	WEIGHTED MEAN	SD	VERBAL INTERPRETATION
1. I ensure that my coffee shop uses ethically sourced coffee beans.	2.76	0.80	Moderately Implemented
2. I use reusable or refillable containers to store ingredients in the shop.	2.53	0.84	Moderately Implemented
3. I incorporate upcycled or repurposed coffee grounds into other valuable products.	2.49	0.80	Partially Implemented

4. I include food or drinks in the menu that are made from surplus or leftover ingredients.	2.88	0.70	Moderately Implemented
5. I offer plant-based or environmentally sustainable alternatives in our product lineup.	2.81	0.71	Moderately Implemented
6. I find ways to reuse leftover brewed coffee for other purposes, such as cooking or composting.	2.68	0.78	Moderately Implemented
7. I regularly measure and monitor food and beverage waste in the shop.	2.69	0.75	Moderately Implemented
8. I design and select products that help reduce our environmental impact.	2.68	0.78	Moderately Implemented
9. I partner with local suppliers to lessen transport-related emissions.	3.07	0.58	Moderately Implemented
10. I repurpose waste by-products from our offerings for other operational uses, such as fertilizers.	2.85	0.85	Moderately Implemented
Weighted Mean	2.74		**Moderately Implemented**

Legends: 3.26-4.00: Fully Implemented, 2.51-3.25: Moderately Implemented

1.76-2.50: Partially Implemented 1.00-1.75: Not Implemented

2. Packaging

Table 2 highlights the Circular Economy Initiatives of Coffee Shops in San Jose City, focusing on Packaging. In line with the results shown in Table 2, the highest-rated circular economy initiative in packaging is the use of recycled-material packaging, with a mean of 2.90 (SD=0.78), and was interpreted as moderately implemented. This suggests that coffee shops are focused on sourcing packaging that reduces environmental impact through recycling methods. The standard deviation also implies that recycled packaging is a common and feasible practice within the industry.

However, with a mean of 2.61 (SD=0.87), a compostable or biodegradable packaging material and the avoidance of single-use plastic packaging were interpreted as moderately implemented. This indicates that coffee shops recognize the importance of these practices, while full adoption may be hindered by cost, availability, or customer acceptance of new packaging alternatives. The high deviation indicates variability in implementation, with some shops adopting these practices while others still rely on conventional materials.

The integration of circular economy (CE) principles into coffee shops' packaging practices reveals a moderate yet intentional alignment with sustainability goals. The overall weighted mean of 2.71 suggests that these establishments are moderately implementing circular strategies in packaging, an essential dimension of environmental performance in the foodservice industry. Packaging, often responsible for a significant share of environmental waste, serves as a critical touchpoint where circularity can be applied in a visible, practical way. The data reflects an encouraging trend: coffee shop operators are not only aware of the environmental impacts of packaging but are also taking tangible steps to minimize those impacts through material innovation, supplier alignment, and customer engagement.

Coffee shops are progressively engaging with the circular economy through packaging-related strategies, demonstrating awareness and moderate practice of sustainability principles. Consequently, while the intent to transition to more sustainable packaging is clear, the current environment underscores the critical need for comprehensive life-cycle assessments to quantify environmental benefits and identify areas for further improvement accurately (Sazdovski et al., 2021). To accelerate this transition, additional investments in eco-design, circular procurement, and consumer

education are imperative. Moreover, while many companies announce commitments to packaging that is fully recyclable or compostable, practical implementation often faces hurdles, including material compatibility and consumer education on proper disposal (Bocken et al., 2022). Such actions will not only reduce environmental impacts but also position coffee shops as active contributors to the regenerative economy.

Overall, the results imply that while these coffee shops are gradually adopting sustainable packaging practices, they may be affected by increasing innovation and a lack of policy support. The findings highlight the need for supply chain collaboration and affordable and accessible compostable packaging. Hence, to achieve higher levels of implementation of the circular economy, these businesses must invest in both structural and behavioral support for alternative packaging practices.

Table 2. *Circular Economy Initiatives of Coffee Shops in terms of Packaging*

STATEMENT	WEIGHTED MEAN	SD	VERBAL INTERPRETATION
1. I use compostable or biodegradable materials for our packaging.	2.61	0.87	Moderately Implemented
2. I encourage customers to bring their reusable cups or containers.	2.64	0.85	Moderately Implemented
3. I avoid using single-use plastics in all our packaging.	2.61	0.87	Moderately Implemented
4. I ensure that our packaging materials are made from recycled content.	2.90	0.78	Moderately Implemented

5. I choose packaging that is reusable or refillable whenever possible.	2.69	0.95	Moderately Implemented
6. I collect and sort packaging waste for proper recycling.	2.66	0.80	Moderately Implemented
7. I purchase bulk items with minimal or zero-waste packaging.	2.71	0.85	Moderately Implemented
8. I include labels that guide customers on how to dispose of packaging appropriately.	2.68	0.82	Moderately Implemented
9. I choose suppliers who follow sustainable packaging practices.	2.88	0.74	Moderately Implemented
10. I regularly monitor and evaluate the amount and type of packaging waste we generate.	2.73	0.91	Moderately Implemented
Weighted Mean	2.71		**Moderately Implemented**

Legends: 3.26-4.00: Fully Implemented, 2.51-3.25: Moderately Implemented

1.76-2.50: Partially Implemented1.00-1.75: Not Implemented

Operational Efficiency of Coffee Shops

1. People

Table 3 presents the Operational Efficiency of Coffee Shops in

terms of People. The results in Table 3 suggest that, under operational efficiency, maintaining the correct number of staff to handle daily operations received the highest mean score of 3.49 (SD=0.80), which is interpreted as strongly agree. This implies that the owners prioritize maintaining an adequate workforce to meet daily demands, thereby ensuring a smooth workflow and sustained quality. The low deviation suggests that most of these businesses consider staffing levels as a key factor for operational success.

Meanwhile, providing cross-training that allows staff to take on multiple roles when needed and conducting regular staff meetings that help improve overall performance ranked lowest among the set, with mean scores of 3.32 (SD=0.92) and 3.90 (SD=0.90), respectively; both are interpreted as strongly agree. This indicates that the actual implementation of these practices may not be as consistent as sustaining sufficient staff. The slightly higher deviations imply variation of these practices among coffee shops, which may be due to differences in resources and management styles.

The assessment of operational efficiency in terms of people, as evaluated by coffee shop owners themselves, reveals a high degree of managerial confidence and effectiveness in human resource practices, with an overall weighted mean of 3.38, interpreted as "Strongly Agree." This outcome highlights the pivotal role of personnel management in the seamless functioning of coffee shops, where service quality depends heavily on staff skills, coordination, and responsiveness.

The strong, uniform agreement across all indicators suggests that coffee shop owners perceive their leadership and people-management practices as well aligned with efficiency goals. However, this self-reported confidence should be interpreted with some analytical caution. At the same time, it reflects intent and managerial practices; it may not fully capture employee experiences or customer perspectives, both of which are equally critical to evaluating actual operational efficiency. It necessitates a re-evaluation of existing organizational structures and skill sets, demanding innovative training programs and incentive schemes to align employee behavior with circular objectives (Iacovidou et al., 2020). Nonetheless, the data affirm that coffee shop owners recognize the centrality of their workforce and actively pursue strategies to foster performance, morale, and organizational coherence—core components of sustainable service delivery. Such alignment can foster a workforce that is not only proficient in their daily tasks but also deeply committed to sustainable practices, ultimately

enhancing the coffee shop's competitive advantage and environmental stewardship (Jones & Comfort, 2021).

The finding implies that the coffee shops in the area are people-oriented, as they recognize that achieving high efficiency depends on the competence and motivation they provide to employees. This means having a human capital perspective allows them to view employees not merely as labor but as a critical asset for organizational performance. Hence, regular training, communication, and teamwork lead to higher productivity and customer satisfaction.

Table 3. O*perational Efficiency of Coffee Shops in terms of People*

STATEMENT	WEIGHTED MEAN	SD	VERBAL INTERPRETATION
1. I ensure that employees are well-trained to perform their duties efficiently.	3.42	0.86	Strongly Agree
1. I observe strong teamwork and collaboration among my staff.	3.34	0.90	Strongly Agree
1. I make sure that employees follow standard operating procedures consistently.	3.36	0.91	Strongly Agree
1. I provide clear guidance and supervision to my team.	3.47	0.80	Strongly Agree
1. I ensure that staff respond quickly and effectively to customer needs.	3.34	0.92	Strongly Agree

1. I maintain a sufficient number of staff to handle daily operations.	3.49	0.80	Strongly Agree
1. I motivate my employees to maintain high productivity and quality.	3.36	0.91	Strongly Agree
1. I provide cross-training so staff can take on multiple roles when needed.	3.32	0.92	Strongly Agree
1. I encourage clear and timely communication among employees.	3.42	0.81	Strongly Agree
1. I conduct regular staff meetings to improve overall work performance.	3.32	0.90	Strongly Agree
Weighted Mean	3.38		**Strongly Agree**

Legends: 3.26-4.00: Fully Implemented 2.51-3.25: Moderately Implemented

1.76-2.50: Partially Implemented1.00-1.75: Not Implemented

2. Process

Table 4 highlights the Operational Efficiency of Coffee Shops in terms of Process. The highest-rated indicators in Table 4 include timely restocking of supplies, with a mean of 3.42 (SD=0.91) and a verbal interpretation of strongly agree. This practice is crucial in supporting lean operations and reducing operational disruptions, thus aligning with the principles of process optimization and continuous flow. The relatively moderate standard deviation suggests that most coffee shops place a high value on effective inventory restocking as part

of their operational flow.

In contrast, ensuring that daily operations follow a clear and organized workflow has the lowest mean score of 3.27 (SD=0.94), although it is still interpreted as strongly agree. This suggests that while coffee shops emphasize the importance of an organized workflow, their actual implementation is inconsistent with other practices. The standard deviation also implies that some establishments are more systematic than others, possibly influenced by factors such as management experience and employee skills.

The evaluation of operational efficiency in terms of processes demonstrates a robust commitment to systematic, well-structured, and adaptive operational practices, as reflected by an overall weighted mean of 3.34, interpreted as "Strongly Agree." This signifies a high degree of confidence among owners in their ability to manage workflows, standardize procedures, and continuously optimize daily operations to meet service demands. The smooth orchestration of processes is critical in the food and beverage industry, where customer satisfaction is tightly linked to speed, consistency, hygiene, and reliability.

The findings emphasized that standard workflow practices, inventory management, and continuous process are essential in minimizing waste and maintaining consistency. It will also examine the adoption of innovative waste-processing techniques and sustainable management standards that extend beyond simple food waste to encompass a broader range of operational outputs (Martin-Rios et al., 2022). Similarly, the emphasis on prompt restocking and waste integration highlighted the importance of resource availability and sustainability-oriented operations in enhancing service reliability. This includes exploring closed-loop systems for materials, energy, and water, as well as implementing remanufacturing and recycling programs for packaging and used equipment (Da-wei et al., 2021). The lower emphasis on workflow organization found that small businesses often lack formal systems but rely on adaptive, experience-based practices.

The results imply that while these coffee shops are strong at ensuring consistent operations, they must strengthen their structured processes to achieve higher efficiency. It is also noted that a more formalized process is needed to streamline daily operations. Hence, coffee shops can further enhance operational efficiency and competitiveness by focusing on workflow clarity alongside their existing strengths.

Table 4. *Operational Efficiency of Coffee Shops in Terms of Process*

STATEMENT	WEIGHTED MEAN	SD	VERBAL INTERPRETATION
1. I ensure that our daily operations follow a clear and organized workflow.	3.27	0.94	Strongly Agree
2. I manage inventory efficiently to minimize waste and overstocking.	3.41	0.89	Strongly Agree
3. I implement standard procedures for handling customer orders.	3.29	0.95	Strongly Agree
4. I regularly evaluate and improve our operational processes.	3.34	0.94	Strongly Agree
5. I make sure preparation times are consistent and predictable.	3.32	0.92	Strongly Agree
6. I restock supplies and ingredients promptly to avoid interruptions.	3.42	0.91	Strongly Agree
7. I oversee that cleaning and sanitation routines are performed efficiently.	3.37	0.83	Strongly Agree
8. I integrate waste management into our daily operational	3.34	0.92	Strongly Agree

workflow.			
9. I clearly define roles and responsibilities for all operational tasks.	3.31	0.97	Strongly Agree
10. I ensure that peak-hour operations are handled smoothly and systematically.	3.34	0.98	Strongly Agree
Weighted Mean	3.34		**Strongly Agree**

Legends: 3.26-4.00: Strongly Agree 2.51-3.25: Agree

1.76-2.50: Disagree 1.00-1.75: Strongly Disagree

3. Technology

Table 5 presents the Operational Efficiency of Coffee Shops by the technology utilized. The results shown in Table 5 suggest that the highest-rated factor for operational efficiency related to technology was the use of online platforms to engage with customers and gather feedback (M = 3.66, SD = 0.71). This indicates strong agreement. This finding reveals that coffee shops value their digital presence and customer interaction. They see social media and online platforms as essential for improving service and marketing. The low standard deviation reflects a strong consensus among respondents, suggesting that most shops consistently use digital engagement in their operations.

In contrast, the lowest-rated factor was the use of technology to reduce manual work and improve overall productivity (M = 3.32, SD = 0.92). This factor was still viewed as strongly in agreement. This suggests that while shops generally appreciate adopting technology, some may still rely on traditional methods in certain areas. The higher standard deviation indicates differences in how technology is used. Some businesses fully embrace digital automation, while others remain partly manual, possibly due to limited resources or outdated technology.

The assessment of operational efficiency in terms of

technology, as reported by coffee shop owners, indicates strong support for integrating digital solutions and equipment into daily operations. With an impressive overall weighted mean of 3.48, indicating "Strongly Agree," the findings reflect robust alignment between technological adoption and operational goals. In modern service industries, where speed, precision, and customer engagement are paramount, technology is a critical enabler of both productivity and service quality. Coffee shop owners appear to embrace technology not only as a tool for operational enhancement but also as a strategic asset that contributes to competitiveness and innovation.

Coffee shop owners demonstrate a high level of technological maturity and strategic integration across multiple operational domains. Such technological integration, encompassing everything from innovative inventory systems to AI-driven waste sorting, facilitates a more precise and adaptive operational framework, directly contributing to circularity goals (Cioffi et al., 2020). From transaction management to customer engagement, and from staff coordination to energy efficiency, technology is both pervasive and deliberate. This indicates not just adoption but also adaptive capacity, in which technology serves as both an efficiency tool and a dynamic resource for resilience and growth in a competitive service landscape. The strategic deployment of these technologies can transform conventional linear processes into closed-loop systems, enabling comprehensive data collection that informs sustainable practices and innovative business models (Fogarassy & Finger, 2020).

The findings imply that coffee shops are already moving toward digital transformation. However, they need to focus more on improving automation and tools that boost productivity. This means businesses could invest more in technologies that reduce manual work, integrate operational data, and improve efficiency. By closing automation gaps and building on their strengths in digital engagement, coffee shops can fully leverage technology to achieve long-term operational success.

Table 5. *Operational Efficiency of Coffee Shops in terms of Technology*

STATEMENT	WEIGHTED MEAN	SD	VERBAL INTERPRETATION
1. I use POS (Point of Sale) systems effectively to manage transactions.	3.47	0.86	Strongly Agree
1. I utilize digital tools to monitor inventory levels and sales performance.	3.42	0.81	Strongly Agree
1. I rely on technology to improve the speed and accuracy of our service.	3.51	0.75	Strongly Agree
1. I use online platforms to engage with customers and gather feedback.	3.66	0.71	Strongly Agree
1. I offer digital and contactless payment options for customer convenience.	3.39	0.91	Strongly Agree
1. I use technology to manage staff scheduling and monitor attendance.	3.51	0.77	Strongly Agree
1. I invest in energy-efficient appliances for daily shop operations.	3.39	0.85	Strongly Agree

1. I ensure that all equipment is maintained regularly and without delay.	3.54	0.73	Strongly Agree
1. I make sure our digital tools are user-friendly and accessible to staff.	3.61	0.77	Strongly Agree
1. I apply technology to reduce manual work and boost overall productivity.	3.32	0.92	Strongly Agree
Weighted Mean	3.48		**Strongly Agree**

Legends: 3.26-4.00: Strongly Agree 2.51-3.25: Agree

1.76-2.50: Disagree 1.00-1.75: Strongly Disagree

Correlation between the Circular Economy Initiative and the Operational Efficiency of Coffee Shops in San Jose City

Table 6 shows the Correlation between the circular economy practices and the operational efficiency of coffee shops in San Jose City. Table 6 presents the correlation analysis between circular economy practices (Product and Packaging) and the operational efficiency dimensions (People, Process, and Technology) of coffee shops. The results reveal that, for the Product dimension of circular economy practices, all operational efficiency indicators show strong positive correlations: People (r=0.612, p=0.000), Process (r=0.608, p=0.000), and Technology (r=0.628, p=0.000). These p-values are less than 0.01, indicating that the relationships are highly significant. This suggests that improvements in sustainable product-related practices—such as sourcing eco-friendly materials and reducing waste—are strongly associated with greater efficiency in human resource utilization, process optimization, and technology adoption.

For the Packaging dimension, the correlations are weaker but

remain statistically significant: People (r=0.358, p=0.005) and Process (r=0.335, p=0.010) show weak positive correlations, while Technology (r=0.420, p=0.001) shows a moderate positive correlation. Although weaker than the Product dimension, these p-values still fall below 0.05, indicating that sustainable packaging efforts—such as using recyclable or biodegradable materials—are meaningfully related to operational efficiency, particularly in technology adoption.

Overall, the findings suggest that circular economy practices in Product have a stronger and more consistent impact on operational efficiency than those in Packaging. Nevertheless, both dimensions show statistically significant relationships ($p < 0.05$), confirming that adopting circular economy initiatives positively contributes to operational performance in coffee shops.

Table 6. C*orrelation between CE and OE of Coffee Shops*

OPERATIONAL EFFICIENCY	CIRCULAR ECONOMY PRACTICES – PRODUCT (R)	SIG. (2-TAILED)	INTERPRETATION	CIRCULAR ECONOMY PRACTICES – PACKAGING (R)	SIG. (2-TAILED)	INTERPRETATION
People	0.612	.000	Strong Positive	0.358	.005	Weak Positive
Process	0.608	.000	Strong Positive	0.335	.010	Weak Positive
Technology	0.628	.000	Strong Positive	0.420	.001	Moderate Positive

Note: Correlation is significant at the 0.01 level (2-tailed).

Interpretation scale: 0.00–0.19 = Very Weak Positive; 0.20–0.39 = Weak Positive; 0.40–0.59 = Moderate Positive; 0.60–0.79 = Strong Positive; 0.80–1.00 = Very Strong Positive.

Conclusions

The study revealed that circular economy (CE) initiatives, particularly in product-related practices, are moderately implemented

yet strongly correlated with enhanced operational efficiency in coffee shops in San Jose City. Sustainable product strategies—such as sourcing locally, minimizing waste, and repurposing materials—were associated with significant improvements in the efficiency of people, processes, and technology. These results emphasize that CE initiatives, when strategically applied to product design and sourcing, can meaningfully enhance internal business operations, contributing to better performance, reduced costs, and environmental responsibility.

On the other hand, while packaging-related initiatives were also implemented to a moderate extent, their correlation with operational efficiency was notably weaker. This suggests that while sustainable packaging supports environmental goals, it is not yet deeply embedded in coffee shops' operational core. The findings underscore the need for a more holistic and integrated approach to CE practices—one that goes beyond compliance and surface-level changes, and instead embeds sustainability into every aspect of business decision-making. The study confirms the potential of circular economy strategies to serve as both a sustainability framework and a driver of operational excellence. Thus, accepting the hypothesis that having CE practices for the product also increases the overall OE of the coffee shops.

Recommendations

To enhance the impact of circular economy (CE) initiatives on operational efficiency, coffee shop owners should move beyond limited implementation by strategically integrating sustainability into their core business models. This includes adopting product life-cycle thinking—designing menus and services that minimize waste, sourcing ethically and locally to reduce carbon footprints, and turning by-products (such as used coffee grounds) into value-added offerings, such as compost or beauty products. Investing in data-driven tools that monitor waste, energy use, and product flows can also enhance decision-making and identify specific areas where sustainability efforts can generate cost savings and productivity gains.

Furthermore, collaboration among coffee shops can foster a community-based circular economy ecosystem. Shared supplier networks for eco-friendly packaging, joint marketing of green practices, and collective participation in sustainability training can reduce costs while expanding reach. Government units, academic institutions, and

sustainability advocates should also partner to develop scalable models and provide technical support. Integrating CE strategies into local ordinances, business development programs, and educational curricula can ensure that sustainability is not only a competitive advantage but a standard practice across the coffee industry.

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