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Barriers to Transitioning to a Circular Food Economy in Mississippi, USA.

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Abstract
Background to the Study: The adoption of circular economy ideas to reduce waste and pollution has gained popularity in many industries, including the food business. Although there are multiple benefits to be gained from minimizing food waste through a circular economy approach, there are several barriers preventing economies from successfully transitioning. This research will explore the potential barriers to transitioning to a circular food economy in Mississippi, USA.
Purpose: The purpose of this paper is to investigate the associated risks of transitioning to a circular food economy in Mississippi, USA.
Design/methodology/approach: Over 120 questionnaire surveys were conducted professionally to assess the associated risks of transitioning to a circular food economy in Mississippi, USA. The questionnaire comprised two main sections each exploring different parts of the research question.
Findings: The key findings of the statistical analysis indicated that there is a lack of industry-specific policies, regulations, and strong legislative frameworks. This paper will be very beneficial to industry practitioners and economic researchers with an interest in the circular economy.
Research limitations/implications: There is a limitation of this article because it does not cover all the professional bodies in the food industry and data used in this publication were outsourced from qualified researchers.
Practical and Social implications: The lack of a generic framework and methodology, key performance indicators, benchmark index, and economic performance measures has practical and social implications for society.
Originality/value: This paper contributes with new outlooks aimed at evaluating the associated risks of a circular food economy for decision-makers.
Keywords: Barriers, Circular, Economy, Food, Mississippi, Risk.
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1. Introduction

A circular Economy (CE) is the model of an industrial economy that satisfies several economic characteristics that dissociate growth from the consumption of all kinds of resources in waste management and wealth creation. The concept of circular economy is not a certain resolve for all environmental, social, and economic sustainability problems because circularity is complicated to actualize. There is a great lack of awareness from businesses and individuals. People must understand the concepts and theoretical frameworks of these models before applications can trickle in. It also involves a great deal of understanding, patience, and communication between all parties as there is a lot of technical learning and education involved particularly in recycling and reuse (Dora, 2019; Charter, 2018).

A circular economy model means structural changes in businesses and government policy decision making and several Small and Medium Scale Enterprises are not ready for this sustainable change and are oblivious to the numerous benefits that a circular economy brings (Ghosh, 2019). With its unprecedented usage and application comes an apparent confusion and stalemate about what it means and encompasses several groups concerning the relationship across various supply chains and different types of frameworks related to it. Still, they all fail to link the end and final state of what it means to be ‘’circular’’ (Moktadir et al., 2018).

The typical linear supply chain for food waste conventionally utilizes a ‘take, make, use dispose of’ system, in which food is produced, used/consumed, and discarded as waste thus reducing the intrinsic and extrinsic worth of the food products. This continuous waste leads to scarcity of products, unpredictable prices, hoarding of produce, inflation, and an unsteady source of raw materials (Banks et al., 2018; Stahl and MacArthur, 2019).

This also creates massive levels of waste pollution, air pollution from greenhouse emissions, and land pollution from dump sites all eventually leading to climate change. There has been a steady increase globally, in the number of studies on circular economies across various fields and from different perspectives.

In the same vein, research done in Romania examined the impact on the Romanians' assimilation and compliance with the principles of the circular economy. The study investigated how these factors influence the implementation of a circular economy as a new concept in the country and from the perspective of Romania as part of the EU (Horatiu V. et al, 2020). Prieto et al (2018) found that despite the increase in interest in the concept, there is yet a significant need to change the paradigm, approach, and attitude toward the circular economy in Romania especially since it is predominantly a linear economy. A study by Kris H., et al., (2020) recommended that the EU should develop and disseminate guidance on how circular food can be standardized and incorporated all over the world and the involvement of stakeholders. Several strategic decisions must be made to make this possible, and the EU and every other nation are expected to fashion out the strategic and finite sequence of activities (Bamidele-Sadiq, et al., 2022) to enforce the standardization of the circular food economy. The reusable, recycle, and eco-efficiency are for a procurement standard in the thresholds. Findings from the research show that the lack of industry-specific policies, regulations and education posed a threat to circular solid waste management (Ezeudu & Ezeudu, 2019). Although a substantial amount of research presently exists in circular economics, majorly on policies addressing the institute variables within the organization, environment, and production systems and functionality but none explicitly focuses on food product waste and examines the potential challenges of transforming into a circular food economy in Mississippi, USA.

1.1 Associated Risks with the Circular Food Waste Economies

The circular economy requires key modifications in all aspects of the economy. Abudu O. et al (2022) explain that the projected incremental growth in the global population will "affect the way food is grown, packaged, distributed, and manufactured as the global "take, make, and dispose of" everyday life puts immense pressure on raw materials and energy resources" (p. 11). Hence, businesses and consumers must completely accept the suggestions of lowering purchases, reusing goods, and, when those are not possible, recycling. Currently, there is a lack of societal thinking about how people design techniques to control resources and the ways they develop systems and relationships (Börger et al., 2019). The food system is a major contributor to ozone layer depletion and climate change that produces considerable amounts of solid waste and releases greenhouse gases in the process. Food wastage by suppliers, retailers, and consumers occurs at different times but is hard to observe due to the unavailability of data from virtually all countries, but it is projected that about 2.4 billion tons of food are squandered and wasted every year worldwide (Wijk man et al., 2015).

Political support and leadership are very necessary to drive the transition to circular food waste systems, however, support from governments may not always be forthcoming. Most governments are yet to officially implement and employ these circular economy policies in the food system (Banks et al., 2018). Generally, there is an absence of strong legislative frameworks and financing to begin the shift. The shift to a circular economy will need governments to finance and encourage efficient strong waste management strategies and, finally, businesses and individuals to eliminate flawed linear consumption patterns (Kirchner et al., 2018). Furthermore, another risk is that access to cheap food in developed nations presents the illusion that everything is going well and there is no need to consider the benefits of circular economies. There is a need for more enlightenment and education from the government and businesses in creating a stimulating environment for these conversations. Incentives and rewards systems can also be introduced to deserving people.

Another risk is the lack of key performance indicators, benchmark indices, and economic performance measures to determine the level of progress of these models. There is a need for a generic framework and methodology that will be equitable, transparent, and resilient to resolve this (Dora, 2019). Otherwise, there will continue to be a proliferation of several indexes which will not gain worldwide acceptability.

In addition to all the benefits the circular food economy can provide, some underlying risks come with implementing this strategy. Since a circular food economy relies largely on recycling food waste-specifically through animal feed, it is highly susceptible to health hazards. According to Anita D., et al., (2021), about sixty literature articles have described various risks such as virus, bacterial, and microbial health risks associated with animal consumption of food waste. Additionally, some conventional agriculture practices use Glyphosate-based herbicide (GBH) and a study on circular food economy by Anne M., et al., (2021) shows that crop plant growth and reproduction decrease if GBH is used as fertilizer. Other food risks that can become hazardous include non-infectious pathogens and physical and chemical hazards. While some of these health risks can be tackled with adequate heat treatments and fully functioning facilities, others will require more insight into food recycling and stringent food regulations in Mississippi, USA.

A successful transition to a circular food economy requires the collaboration of various entities, such as the government, relevant NGOs, and partners who are devoted to the cause. Without the collaboration of these entities who already have experience with what a circular food economy should look like, the transition will be

challenging for the government to realize alone.

1.2 Factors that Can Influence Successful Transitioning to a Circular Food Economy

A successful transition into a circular food economy can be encouraged by several factors. The first is favorable political and policy support. Government policies and regulations that promote circular food systems can provide the necessary framework for the transition (Galli et al., 2020). Galli et al., (2020) further suggest that existing policies regarding food waste should be reviewed, new policy goals should be set, and new policy frames should be developed and evaluated constantly to ensure success.

Another important factor is the level of awareness and education provided to the public. The lack of awareness at the individual and organizational levels can make it difficult to transition. Therefore, raising awareness and educating the public about circular food systems can encourage adoption and increase support (Kumar, et al., 2021). Mississippi needs to pay attention to this area and begin educating and training individuals on the adverse impact of food waste and how they can start turning food waste into valuable materials.

For sustainability transition, both infrastructures and technologies need to change (Jurgilevich, A. et al., 2016). If the governments and all relevant stakeholders can develop, and implement new technologies, and processes to support circular food systems because these systems can be complex and require careful planning and management to ensure that they are effective and efficient. New technologies and processes can help to improve the efficiency and effectiveness of circular food systems and make them more financially viable in the long term. Similarly, investing in research and development of new technologies and processes can help to drive innovation and progress in the field of circular food systems (Jurgilevich et al., 2016; Khan et al., 2021).

Overall, transitioning to circular food systems can be very complicated and may necessitate making changes as they are put into place and expanded. As the systems develop, the willingness of all relevant stakeholders (governments, organizations, and individuals) to be flexible and willing to adapt can help ensure success.

1.3 Research Methodology

The study adopts a literature review to highlight the opportunities and associated risks of transitioning to a circular food economy in Mississippi, USA. Furthermore, the study adopts a quantitative research approach using a structured questionnaire amongst professionals to investigate their perceptions regarding the circular food economy in Mississippi, USA. The sample employed in the survey was obtained from a databank of professionals in the food industry. A total of one hundred and twenty questionnaires were distributed electronically by email with 69 responses, a response rate of 57.5% which is satisfactory.

Random sampling was utilized in the survey; this is where each member of a population has a known and non-zero probability of being involved in the sample. It was utilized because of the low cost involved, faster data collection and since the data set is lesser, it is probable to guarantee similarity and to increase the correctness and quality of data. Closed-ended questionnaires were employed because they can be answered finitely by either “yes” or “no, in a few words or a specific short factual answer. The questionnaire comprised two main sections each exploring different parts of the research question.

The first section sought information on the respondents’ profiles as shown in Tables 1 and 2. The second section ranked the associated risks of transitioning to a circular food economy in Mississippi, USA (see tables 3 to 7). The questionnaire responses were assigned numerical codes and the data was analyzed using descriptive statistics and spearman’s rank correlation coefficient.

1.4 Analysis and Discussion of Results

Table 1: Educational qualifications of respondents

Educational Qualification	Frequency	Percentage
Bachelor’s	58	84.06
Masters	10	14.49
PhD	1	1.45
Total	69	100

Table 1 shows that 84.06% of the survey participants have completed at least undergraduate programs, and 15.94% have additional postgraduate qualifications. This means that the outcomes obtained from the survey represent the opinions of a group of professionals with good educational backgrounds to provide a significant contribution. The relevance of academic institutions cannot be overemphasized, as they promote the development of constructive initiatives in the food industry.

With regards to the years of experience, the results indicate that most respondents (57.97%) have at least 10 years of experience working in the food industry, 21.74% have industry experience ranging between 11 and 20 years, and 20.29% have at least 21 years or more (Table 2). As the experience of the respondents is quite respectable, the opinions and views obtained through the survey can be regarded as important and reliable. The majority of respondents had reasonable experience in the food industry, which further shows that respondents are

sufficiently experienced to provide credible data.

Table 2: Years of work experience

Years of Experience	Frequency	Percentage
1-10 years	40	57.97
11-20 years	15	21.74
21 years and above	14	20.29
Total	69	100

1.5 Associated Risks of Circular Food Waste Economies

The main objective of this research is to rank the associated risks of circular food waste economies. This was achieved using spearman's rank correlation coefficient. This is a non-parametric test used to measure the strength of association between two variables and accesses how well the relationship can be described using a monotonic function.

From the correlation in Table 3, it is conspicuous that the lack of industry-specific policies, regulations, and strong legislative frameworks; access to cheap food in developed nations presents the illusion that everything is going well, and lack of data from virtually all countries; lack of societal thinking of the manner that people design techniques to control resource and the ways they develop systems and relationships are positively correlated in the circular food waste economies, while lack of security for farmers is negatively correlated. It was deduced that lack of awareness and enlightenment from businesses and individuals; lack of incentives and a financial rewards system can also be introduced to deserving people., Lack of collaboration among various entities such as the government, relevant NGOs, and partners devoted to the cause, as well as a lack of technical learning and education involved specifically in recycling and reuse, are negatively correlated, whereas the lack of a generic framework and methodology, key performance indicators, benchmark indexes, and economic performance measures to determine the level of progress of these models, are positively correlated.

Table 3: Associated risks with the circular food waste economies

Correlations					
			(1)	(2)	(3)
Spearman's rho	There is a low level of awareness of transitioning to a circular food economy in Mississippi, USA (1)	Correlation Coefficient	1.000	-.088	-.056
		Sig. (2-tailed)	.	.470	.648
		N	69	69	69
	Lack of security for farmers (2)	Correlation Coefficient	-.088	1.000	.259*
		Sig. (2-tailed)	.470	.	.032
		N	69	69	69
	Lack of awareness and enlightenment from businesses and individuals (3)	Correlation Coefficient	-.056	.259*	1.000
		Sig. (2-tailed)	.648	.032	.
		N	69	69	69
*. Correlation is significant at the 0.05 level (2-tailed).					

Table 4: Associated risks with the circular food waste economies

Correlations					
			(1)	(2)	(3)
Spearman's rho	There is a low level of awareness of transitioning to a circular food economy in Mississippi, USA (1)	Correlation Coefficient	1.000	.117	-.142
		Sig. (2-tailed)	.	.338	.244
		N	69	69	69
	Lack of industry-specific policies, regulations, and strong legislative frameworks (2)	Correlation Coefficient	.117	1.000	-.029
		Sig. (2-tailed)	.338	.	.814
		N	69	69	69
	A lack of incentives and a financial rewards system can also be introduced to deserving people (3)	Correlation Coefficient	-.142	-.029	1.000
		Sig. (2-tailed)	.244	.814	.
		N	69	69	69

Table 5: Associated risks with the circular food waste economies

Correlations					
			(1)	(2)	(3)
Spearman's rho	There is a low level of awareness of transitioning to a circular food economy in Mississippi, USA (1)	Correlation Coefficient	1.000	-.009	.077
		Sig. (2-tailed)	.	.940	.528
		N	69	69	69
	Lack of collaboration of various entities such as the government, relevant NGOs, and international partners who are devoted to the cause (2)	Correlation Coefficient	-.009	1.000	-.434**
		Sig. (2-tailed)	.940	.	.000
		N	69	69	69
	Lack of societal thinking of the manner that people design techniques to control resources and the ways they develop systems and relationships (3)	Correlation Coefficient	.077	-.434**	1.000
		Sig. (2-tailed)	.528	.000	.
		N	69	69	69
**. Correlation is significant at the 0.01 level (2-tailed).					

Table 6: Associated risks with the circular food waste economies

Correlations					
			(1)	(2)	(3)
Spearman's rho	There is a low level of awareness of transitioning to a circular food economy in Mississippi, USA (1)	Correlation Coefficient	1.000	.118	-.126
		Sig. (2-tailed)	.	.336	.301
		N	69	69	69
	Access to cheap food in developed nations presents the illusion that everything is going well (2)	Correlation Coefficient	.118	1.000	.249*
		Sig. (2-tailed)	.336	.	.039
		N	69	69	69
	Lack of technical learning and education involved particularly in recycling and reuse (3)	Correlation Coefficient	-.126	.249*	1.000
		Sig. (2-tailed)	.301	.039	.
		N	69	69	69
*. Correlation is significant at the 0.05 level (2-tailed).					

Table 7: Associated risks with the circular food waste economies

Correlations					
			(1)	(2)	(3)
Spearman's rho	There is a low level of awareness of transitioning to a circular food economy in Mississippi, USA (1)	Correlation Coefficient	1.000	.023	.111
		Sig. (2-tailed)	.	.851	.364
		N	69	69	69
	Lack of a generic framework and methodology, key performance indicators, benchmark index, and economic performance measures to determine the level of progress of these models (2)	Correlation Coefficient	.023	1.000	-.351**
		Sig. (2-tailed)	.851	.	.003
		N	69	69	69
	Lack of data from virtually all countries (3)	Correlation Coefficient	.111	-.351**	1.000
	Sig. (2-tailed)		.364	.003	.
		N	69	69	69
**. Correlation is significant at the 0.01 level (2-tailed).					

Recommendations and Conclusion

As discussed above, there are many associated risks of transitioning to a circular food economy in Mississippi, USA. The key findings of the statistical analysis indicated that there is a lack of industry-specific policies, regulations, and strong legislative frameworks. This presents an interesting challenge in exploring a new approach that would seek to spread the benefits of circular food economics and overcome some of the above-associated risks to circular food economy adoption.

This would effectively allow researchers to be more aware of the obstacles hindering the transitioning process. It is hoped that consequently, the industry will make constructive strides toward the application of circular food economics and as a mechanism for many nations to deplore proactive measures to eliminate food waste. Future research can investigate the key drivers of the implementation of a food circular economy in the United States and the entire world.

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