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Internal and External Barriers to Circular Economy Adoption among Food SMEs in Johor

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ABSTRACT

The adoption of the circular economy has grown rapidly, and the owners of food SMEs represent a significant market segment with unique characteristics and preferences. This paper aims to examine both the internal and external barriers to circular economy adoption among food SMEs in Johor. A quantitative research approach and convenience sampling method were used to collect data. The data were gathered through an online survey questionnaire targeting food SME owners in Johor Bahru who were aged 21 and above and had experience with the circular economy. A total of 163 responses were collected and analyzed using the Statistical Package for Social Science (SPSS). The findings revealed that the current level of circular economy adoption among food SMEs in Johor Bahru is high. Furthermore, the results indicated that circular economy adoption significantly influences food SMEs both internal and external barriers. Among the barriers, economic factors were identified as the most significant, followed by cultural, technological, and institutional barriers. These findings provide valuable insights for businesses and policymakers, enabling them to better address the needs and preferences of this important consumer segment and enhance their experience with the circular economy.

1. Introduction

The adoption of a circular economy offers substantial benefits to sustainability, particularly within the food sector [1]. A circular economy emphasizes the reduction of waste, the reuse and recycling of materials, and the regeneration of natural systems. By implementing circular economy principles, businesses can significantly decrease their environmental footprint, promote resource efficiency, and foster economic growth [2]. This approach aligns with global sustainability goals by reducing greenhouse gas emissions, conserving biodiversity, and minimizing pollution. In the food industry, a circular economy can lead to more efficient use of resources, reduced food waste, and

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innovative packaging solutions, ultimately contributing to a more sustainable and resilient food system [3].

According to PWC presentation at their recent sustainable Malaysia group conversation, they spoke about the challenges the world faces embracing the circular economy and they still lack in the earlier steps of designing for circularity [4]. While many large multinational corporations (MNCs) and government-linked companies (GLCs) have already adopted circular economy practices, smaller enterprises, especially in the food sector, are lagging behind [4]. Companies such as Unilever and Nestlé have integrated circular economy principles into their operations by implementing strategies such as sustainable sourcing, waste reduction, and recycling programs. For example, Unilever's commitment to making all its plastic packaging fully reusable, recyclable, or compostable by 2025 is a significant step toward a circular economy [5]. Similarly, Nestlé is working towards achieving zero environmental impact in its operations, emphasizing sustainable packaging and reducing food waste [6]. These examples highlight the potential for large companies to lead the way in circular economy adoption, setting a benchmark for others to follow.

However, small and medium-sized enterprises (SMEs) in the food industry face considerable challenges in adopting circular economy practices [7]. Internal and external barriers may significantly affect the implementation of these practices. Circular economy adoption among SMEs, including those in the food sector, is often not systematically tracked or reported in a standardized way. However, some initiatives and studies provide insights into the barriers to circular economy practices in the food sector. Therefore, this study aims to identify and analyze the internal and external barriers hindering the adoption of circular economy practices within food SMEs. By examining these barriers, the research seeks to provide insights that can assist businesses and policymakers in overcoming obstacles to circular economy adoption, thereby promoting sustainability and efficiency within the food industry.

2. Literature Review

In the realm of circular economy barriers within the context of food SMEs, it is noteworthy that existing literature has identified a lack of comprehensive theoretical framework that directly relates to these specific barriers. According to [7], these barriers can be broadly categorized into four main groups: technology barriers, economic barriers, cultural barriers and institutional barriers. Each of these categories encompasses both internal and external barriers that play a significant role in hindering the adoption of circular economic practices by SMEs operating in the food sector.

Technological barriers in the context of circular economy adoption within food SMEs encompass a range of challenges [8]. These challenges can stem from limitations in the availability and development of appropriate technologies necessary for enabling circular practices. For instance, technologies for efficient waste sorting and recycling processes may not be readily accessible or affordable for small and medium-sized enterprises (SMEs). Additionally, the implementation of advanced technologies for resource optimization, such as precision agriculture or smart packaging solutions, may require significant investment in research and development. Moreover, the complexity of integrating various technologies into existing operations can pose implementation challenges, requiring SMEs to navigate issues such as compatibility, training, and infrastructure upgrades [9].

Economic barriers represent financial and market-related challenges that hinder SMEs from adopting circular economy practices. The upfront costs associated with implementing circular practices, such as upgrading equipment or redesigning processes, can be prohibitive for SMEs with limited financial resources. Moreover, the uncertain returns on investment in circular initiatives,

coupled with the financial risks involved, may deter SMEs from making long-term commitments to sustainability [10]. Furthermore, market dynamics, including price competition and consumer preferences, may not always favor sustainable products or practices, making it difficult for SMEs to justify investments in circularity without adequate market incentives or consumer demand.

Cultural barriers within SMEs relate to attitudes, beliefs, and behaviors that influence the adoption of circular economy practices [11]. Resistance to change among employees or management can impede the implementation of new processes or technologies associated with circularity [12]. Moreover, a lack of awareness or understanding of circular economy principles may limit the willingness of SMEs to explore and embrace sustainable practices [13]. Additionally, societal norms and cultural values that prioritize short-term economic gains or conventional business models over long-term sustainability goals can create inertia within SMEs, making it challenging to shift towards circularity.

Institutional barriers are tied to policies, regulations, and institutional frameworks that shape the operating environment for food SMEs [7]. Regulatory constraints, such as licensing requirements or waste management regulations, may impose compliance burdens on SMEs, making it difficult to adopt circular practices. Furthermore, the lack of incentives or supportive policies that reward sustainable behavior or penalize wasteful practices can diminish the motivation for SMEs to invest in circularity [6]. Additionally, inadequate support structures, such as limited access to funding or technical assistance, can further hinder SMEs' ability to transition to circular economy models. Moreover, industry standards and certification schemes that do not prioritize sustainability may create barriers to market access for SMEs engaged in circular practices.

Overall, addressing these technological, economic, cultural, and institutional barriers is essential for facilitating the adoption of circular economy practices within food SMEs. Strategies such as collaborative partnerships, capacity-building initiatives, policy interventions, and market incentives can help overcome these barriers and create an enabling environment for sustainable innovation and growth in the food sector.

2.1 Research Gaps

While technology barriers are acknowledged as significant obstacles to circular economy adoption, there is a notable research gap regarding the readiness of food SMEs, particularly in developing countries like Malaysia, to embrace technological innovations conducive to sustainable practices. Previous studies predominantly focus on developed countries, leaving a dearth of literature on SMEs in the food sector, especially in developing economies, and their willingness to adopt emerging technologies for circular economy initiatives. Furthermore, limited research specifically examines the regulatory constraints faced by food SMEs in developing nations, hindering the implementation of circular economy practices. Additionally, there is insufficient focus on the unique challenges encountered by SMEs in the food sector when integrating circular economy principles into their operations. Addressing these gaps is crucial for informing policymakers, industry stakeholders, and researchers about the specific challenges faced by SMEs in developing countries and aiding in the development of targeted strategies to promote sustainable practices within the food sector.

2.2 Conceptual Framework

The hypothesis model delineates the factors influencing circular economy adoption within Food SMEs, as depicted in Figure 1. The framework comprises internal and external variables affecting

the adoption of circular economy practices. The dependent variable in this study is circular economy adoption, while the independent variables encompass in four categories which are technology barriers, economic barriers, cultural barriers and institutional barriers.

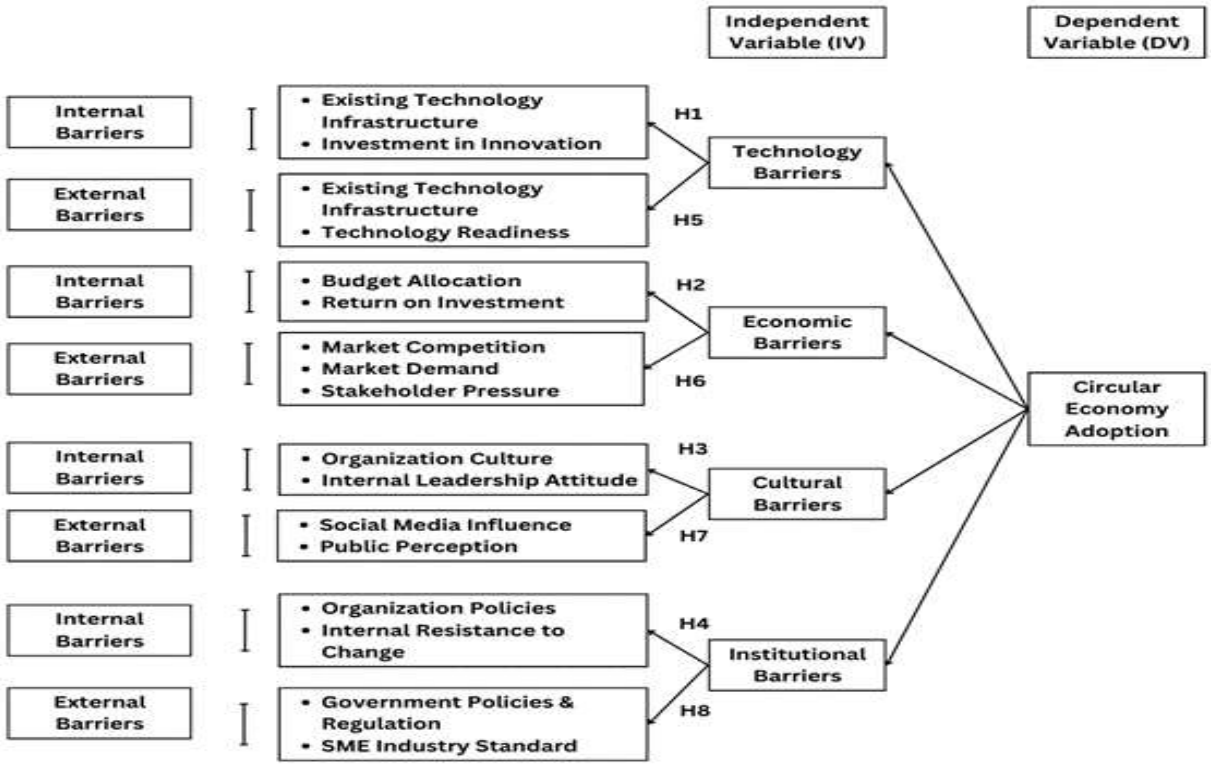

Fig. 1. Conceptual framework

Internal Barriers

H1: Existing technology infrastructure and investment in innovation have significantly influenced the adoption of circular economy practices within Food SMEs internally.
H2: Budget allocation and ROI have significantly influenced the adoption of circular economy practices within Food SMEs internally.
H3: Organizational culture and internal leadership attitude have significantly influenced the adoption of circular economy practices within Food SMEs internally.
H4: Organization policies and internal resistance to change have significantly influenced the adoption of circular economy practices within Food SMEs internally.

External Barriers

H5: Existing technology infrastructure and technology readiness have significantly influenced the adoption of circular economy practices within Food SMEs externally.
H6: Market competition and stakeholder pressure have significantly influenced the adoption of circular economy practices within Food SMEs externally.
H7: Social media influence and public perception have significantly influenced the adoption of circular economy practices within Food SMEs externally.
H8: Government policies and regulation and SME industry standard have significantly influenced the adoption of circular economy practices within Food SMEs externally

3. Research Methodology

The quantitative research method was chosen to use in this study to test the relationship between the dependent variable which is online circular economy adoption and independent variables which are Technology Barriers, Economic Barriers, Cultural Barriers and Institutional Barriers for internal and external respectively. The survey strategy used in this study is to collect data from the respondents because it enables the researcher to collect a large volume of data within a short period. A questionnaire was administered to the sample of the research, which is Food SMEs owners, managers or employee in Johor who aged 21 and above and experienced with circular economy to gather relevant data. Food SMEs owners, managers or employees in Johor were considered as the population of the research. The population of this study was 280 people, and the sample size was 163 samples which were determined using the Krejcie and Morgan table. Besides, the convenience sampling method was chosen to choose the sample based on the comfort and convenience of the researcher.

In this research, the questionnaire was distributed to respondents via an online survey conducted through Google Forms and shared by using links via WhatsApp, WeChat, and Telegram. The questionnaire categorized into four sections as Section A, B, C and D. Section A discussed the demographic profile of the respondents which were gender, age, race, job role, the time period of its operation, the size of food SMEs as well as the experience with circular economy adoption of the respondents by using multiple choice and nominal scale. Section B represents the question for the dependent variable which is circular economy adoption while sections C and D represent the question for independent variables. Sections C questions focus on internal barriers while section D focusing on external barriers which are technology barriers, economic barriers, cultural barriers and institutional barriers representative. Each section conducted 16 questions by providing a choice level of 1 to 5 points, which was a Likert scale five-point agreement.

The data gathered for this research underwent analysis using the Statistical Package for Social Science (SPSS). Various data analysis techniques were employed in this study. The questionnaire was the measuring instrument used in this study. Descriptive analysis was used to explain the basic characteristics of the data being studied [14]. The data collected via the survey questionnaire was transformed into mean, standard deviation, maximum, and minimum. Skewness and kurtosis were used in this study to identify the normality of the data distribution. The data had to have skewness and kurtosis values between -2 and +2 for them to be regarded as normally distributed [15]. Cronbach's Alpha was used as a reliability measure in this study. Cronbach's Alpha value ranged between 0 and 1, and a value exceeding 0.7 was considered reliable. Besides, the multicollinearity could be detected if the tolerance value is more than 0.2 or if a VIF value is less than 10. Multiple regression analysis was employed to investigate the association between the dependent and independent variables. The value of the person correlation must be smaller than 0.05 to examine whether the test was significant. If the value is above 0.05, it indicates that the sample data possess sufficient strength to reject the null hypothesis and accept the alternative hypothesis.

4. Findings/Main Results

Table 1 shows the demographic profile of the respondents based on the questionnaires. The majority of the totals of 244 out of 384 respondents are female which accounts 61.1%, while the rest of 38.9% are male. The majority of the respondents are between 30 to 34 years old (36.4%), Chinese (40.7%), operated in Johor Bahru (40.7%), managers (48.8%), mostly had been operation for 1-5 years (44.4%) and majority of SMEs were classified as small enterprises (10-49 employees,

51.9%). Apart from that, only 29.6% of respondents had experience with circular economy adoption, while the majority (70.4%) did not.

Table 1
Demographic profile

Demographic Respondents		Frequency	Percentage (%)
Gender	Male	63	38.9
	Female	99	61.1
Age	20-24	15	9.3
	25-29	53	32.7
	30-34	59	36.4
	35 and above	35	21.6
Ethnic	Malay	53	32.7
	Chinese	66	40.7
	Indian	43	26.5
Business Location	Batu Pahat	6	3.7
	Johor Bahru	66	40.7
	Kluang	4	2.5
	Kota Tinggi	11	6.8
	Kulai	18	11.1
	Tangkak	15	9.3
	Mersing	7	4.3
	Muar	16	9.9
	Pontian	14	8.6
	Segamat	5	3.1
What is your role in the food SME?	Owner	57	35.2
	Manager	79	48.8
	Employee	26	16
How many years has the food SME	Less than 1 year	24	14.8
been in operation	1-5 years	72	44.4
	6-10 years	60	37
	More than 10 years	6	3.7
What is the size of your food SME?	Micro (1-9 employees)	52	32.1
	Small (10-49 employees)	84	51.9
	Medium (50-249 employees)	26	16
Do you have any experience with	Yes	48	29.6
circular economy adoption	No	114	70.4

Table 2 shows the total descriptive statistics of the mean for each variable (internal barriers). The overall mean score for all variables was between 2.7316 to 3.4509. Economic barriers have the highest mean score (3.4509), indicating they are the most significant external challenge to Circular Economy (CE) adoption while technology barriers adoption has the lowest mean score (3.3701), reflecting a moderate level of implementation among respondents.

Table 2
Total descriptive statistics (mean) for each variable (internal barriers)

Variables	Minimum	Maximum	Mean	Std. Deviation
Circular Economy	1.00	5.00	2.732	1.143
Technology Barriers	1.00	5.00	3.37	1.065
Economy Barriers	1.00	5.00	3.451	1.007
Cultural Barriers	1.00	5.00	3.385	1.011
Institutional Barriers	1.00	5.00	3.415	1.017

Note: DV: Circular Economy Adoption, IV: Technology Barriers, Economic Barriers, Cultural Barriers, and Institutional Barriers

Table 3 shows the total descriptive statistics of the mean for each variable (external barriers). The overall mean score for all variables was between 2.7316 to 3.4202. Economic barriers have the highest mean score (3.4202), while institutional barriers adoption has the lowest mean score (3.2260).

Table 3
Total descriptive statistics (mean) for each variable (external barriers)

Variables	Minimum	Maximum	Mean	Std. Deviation
Circular Economy	1.00	5.00	2.732	1.144
Technology Barriers	1.00	5.00	3.403	1.001
Economic Barriers	1.00	5.00	3.420	1.055
Cultural Barriers	1.00	5.00	3.388	1.043
Institutional Barriers	1.00	5.00	3.226	0.9115

Note: DV: Circular Economy Adoption, IV: Technology Barriers, Economic Barriers, Cultural Barriers, and Institutional Barriers

Table 4 and 5 shows the Cronbach's Alpha values for all variables (internal barriers) ranging from 0.978 to 0.985 and (external barriers) from 0.972 to 0.988. The result was acceptable, and the study was reliable since all the values exceed 0.7 and higher.

Table 4
Cronbach's Alpha (internal barriers)

Variables	N	Cronbach's Alpha
Circular Economy Adoption	4	0.981
Technology Barriers	4	0.985
Economic Barriers	4	0.982
Cultural Barriers	4	0.978
Institutional Barriers	4	0.979

Table 5
Cronbach's Alpha (external barriers)

Variables	N	Cronbach's Alpha
Circular Economy Adoption	4	0.981
Technology Barriers	4	0.972
Economic Barriers	4	0.973
Cultural Barriers	4	0.974
Institutional Barriers	4	0.988

Table 6 and 7 shows the Pearson correlation analysis for all variables (internal and external barriers). All variables show a negative value for Pearson correlation which is perfectly acceptable and meaningful. The Pearson correlation coefficient measures the strength and direction of the linear relationship between two variables, and it ranges from −1 to 1. For internal barriers, Technology Barriers have Highest impact which is -0.884 means that higher technology barriers are associated with lower adoption of the circular economy while institutional barriers have the lowest which is -0.782 but still significant. While for external barriers, Cultural Barriers has the highest impact which is -0.889 means that higher cultural barriers are associated with lower adoption of the circular economy while economic barriers have the lowest which is -0.832 but still significant. A negative linear relationship refers to as one variable increases, the other tends to decrease.

Table 6
Pearson Correlation (internal barriers)

Model		Circular Economy Adoption
Circular Economy Adoption	Pearson Correlation	1.000
	Sig. (1-tailed)	
	N	163
Technology Barriers	Pearson Correlation	-0.884**
	Sig. (1-tailed)	0.000
	N	163
Economic Barriers	Pearson Correlation	-0.850**
	Sig. (1-tailed)	0.000
	N	163
Cultural Barriers	Pearson Correlation	-0.872**
	Sig. (1-tailed)	0.000
	N	163
Institutional Barriers	Pearson Correlation	-0.782**
	Sig. (1-tailed)	0.000
	N	163

Table 7
Pearson Correlation (external barriers)

Model		Circular Economy Adoption
Circular Economy Adoption	Pearson Correlation	1.000
	Sig. (1-tailed)	
	N	163
Technology Barriers	Pearson Correlation	-0.844**
	Sig. (1-tailed)	0.000
	N	163
Economic Barriers	Pearson Correlation	-0.832**
	Sig. (1-tailed)	0.000
	N	163
Cultural Barriers	Pearson Correlation	-0.889**
	Sig. (1-tailed)	0.000
	N	163
Institutional Barriers	Pearson Correlation	-0.878**
	Sig. (1-tailed)	0.000
	N	163

Table 8 and 9 shows the multicollinearity analysis of each variable (internal and external barriers). There is no multicollinearity issue in the variables of internal and external barriers of this study because the tolerance values for all independent variables are between 0.330 to 0.455 for internal barriers and 0.336 to 0.482 for external barriers which is more than 0.2 and VIF values are between 2.198 to 3.030 for internal barriers and 2.074 to 2.976 for external barriers which is less than 10.

Table 8
Multicollinearity Analysis (internal barriers)

Model		Tolerance	VIF
1	Technology Barriers	0.455	2.198
	Economic Barriers	0.330	3.030
	Cultural Barriers	0.385	2.597
	Institutional Barriers	0.412	2.426

Dependent Variable: Circular Economy Adoption

Table 9
Multicollinearity Analysis (external barriers)

Model		Tolerance	VIF
1	Technology Barriers	0.455	2.198
	Economic Barriers	0.330	3.030
	Cultural Barriers	0.385	2.597
	Institutional Barriers	0.412	2.426

Dependent Variable: Circular Economy Adoption

As shown in Table 10 and 13, the model summary indicates an R square value of 0.800, meaning that 80% of the variance in Circular Economy (CE) adoption is significantly explained by the internal barriers while 0.788, indicating that 78.8% of the variation in CE adoption is explained by the external barriers. The ANOVA results in Table 11 and 14 show a p-value of <0.001, confirming that at least one of the independent variables significantly affects CE adoption.

As seen in Table 12 and 15, the multiple regression analysis examines the impact of internal barriers—Technology Barriers, Economic Barriers, Cultural Barriers, and Institutional Barriers—on Circular Economy (CE) Adoption. Among the internal barriers, three variables demonstrate significant positive contributions to CE adoption. Cultural Barriers (β = 0.460, p < 0.001) emerge as the strongest predictor, indicating that overcoming organizational cultural challenges, such as high resistance to change or improvement of sustainability values, greatly enhances CE adoption.

Table 10
Model summary of multiple regression analysis (internal barriers)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.894[a]	0.800	0.795	1.898

Table 11
ANOVA (internal barriers)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	169.552	4	42.388	157.984	<.001[b]
	Residual	42.392	158	0.268		
	Total	211.945	162			

Dependent Variable: Circular Economy Adoption, Predictors: (Constant), Technology Barriers, Economic Barriers, Cultural Barriers, Institutional Barriers

Table 12
Results of multiple regression analysis (internal barriers)

Model	Unstandardised Coefficients		Standard Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	5.312	0.215		24.710	<0.001
Technology Barriers	0.410	0.087	0.375	4.713	<0.015
Economic Barriers	0.340	0.095	0.372	3.579	<0.001
Cultural Barriers	0.520	0.091	0.460	5.714	<0.001
Institutional Barriers	0.125	0.108	0.112	1.157	0.249

Dependent Variable: Circular Economy Adoption

Table 13
Model summary of multiple regression analysis (external barriers)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.888[a]	0.788	0.783	0.53335

Table 14
ANOVA (external barriers)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	167.000	4	41.750	146.767	<0.001[b]
	Residual	44.945	158	0.284		
	Total	211.945	162			

Dependent Variable: Circular Economy Adoption, Predictors: (Constant), Technology Barriers, Economic Barriers, Cultural Barriers, Institutional Barriers

Table 15
Results of multiple regression analysis (external barriers)

Model	Unstandardised Coefficients		Standard Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	5.650	0.205		27.561	<0.001
Technology Barriers	0.350	0.110	0.307	3.182	<0.002
Economic Barriers	0.290	0.120	0.260	2.417	<0.017
Cultural Barriers	0.530	0.140	0.485	3.786	<0.001
Institutional Barriers	0.080	0.110	0.072	0.727	0.469

Dependent Variable: Circular Economy Adoption

Technology Barriers (β = 0.375, p = 0.015) also show a significant positive relationship, suggesting that internal technological limitations, such as access to tools, systems, or expertise significantly influencing CE adoption. Economic Barriers (β = 0.372, p < 0.001) highlight the importance of adequate financial resources and cost management in promoting CE adoption.

In contrast, Institutional Barriers (β = 0.112, p = 0.249) exhibit an insignificant relationship with CE adoption. This suggests that lack of governance structures, internal policies, and regulatory frameworks is not play a significant role in influencing CE practices in this context.

Whereas, among external barriers there are three variables show significant positive relationships with CE adoption. Cultural Barriers (β = 0.485, p < 0.001) emerge as the strongest predictor, suggesting that external cultural factors, such as societal attitudes or community support for sustainability, play a critical role in enabling CE adoption. However, Technology Barriers (β = 0.307, p = 0.002) also significantly contribute to CE adoption, highlighting the importance of access to advanced technologies, infrastructure, and external technical expertise in supporting CE practices. Economic Barriers (β = 0.260, p = 0.017) demonstrate a significant positive relationship, suggesting that external financial resources, such as funding opportunities or cost considerations, are crucial for promoting CE adoption.

In contrast, Institutional Barriers (β = 0.072, p = 0.469) show an insignificant relationship with CE adoption. This indicates that external governance structures, policies, or regulatory frameworks may not substantially influence CE adoption in this context.

Table 16 shows the summary of all hypotheses in this study. H4 and H8 were not supported which means that institutional barriers for both internal and external are not significantly influence on circular economy adoption while H1, H2, H3, H5, H6 and H7 were supported which means that technology, economic and cultural barriers for both internal and external are significantly influence on circular economy adoption.

Table 16
Hypothesis Analysis

Research Hypothesis	Results
Internal Barriers	
H1: Technology Barriers	Supported
H2: Economic Barriers	Supported
H3: Cultural Barriers	Supported
H4: Institutional Barriers	Not Supported
External Barriers	
H5: Technology Barriers	Supported
H6: Economic Barriers	Supported
H7: Cultural Barriers	Supported
H8: Institutional Barriers	Not Supported

4.1 Discussions

The first objective of this study was to examine the internal barriers to Circular Economy (CE) adoption among Food SMEs in Johor. This objective has been successfully addressed. The results revealed that Economic Barriers were the most significant internal obstacle, with the highest mean score of 3.4509, highlighting financial challenges such as cost concerns and resource allocation as critical factors impeding CE adoption. Cultural Barriers followed closely, with a mean score of 3.385, reflecting resistance to change and a lack of alignment with sustainability values. Institutional Barriers and Technology Barriers were also noted as challenges, with mean scores of 3.415 and 3.3701, respectively, although their impacts were comparatively moderate.

The second objective was to explore the external barriers to CE adoption among Food SMEs in Johor. This was also successfully addressed. Among the external barriers, Economic Barriers had the highest mean score of 3.4202, emphasizing the role of external financial constraints, such as limited funding and high costs. Cultural Barriers also emerged as significant (mean = 3.388), underscoring the importance of societal norms and consumer attitudes in influencing CE adoption. Technology Barriers (mean = 3.403) highlighted challenges related to access to advanced infrastructure and external expertise, while Institutional Barriers (mean = 3.226) were the least impactful among the external barriers.

The findings suggest that addressing economic challenges is crucial for fostering CE adoption, both internally and externally. Cultural barriers also require attention, particularly in promoting awareness and aligning organizational practices with sustainability values. Technology-related challenges, while less significant, remain critical to ensuring the successful implementation of CE practices. Institutional barriers, although less prominent, should not be overlooked as they influence the overall adoption process. These insights can guide policymakers and business leaders in formulating strategies to overcome these barriers and promote CE adoption among Food SMEs.

5. Conclusion

The purpose of this study was to identify the internal barriers to Circular Economy (CE) adoption and explore the external barriers affecting Food Small Medium Enterprises (SMEs) in Johor. The multiple regression analysis examined four independents variable technology barriers, economic barriers, cultural barriers, and institutional barriers—both internally and externally. This study successfully examined the internal and external barriers to circular economy (CE) adoption among Food SMEs in Johor. Economic Barriers emerged as the most significant obstacle, followed by Cultural Barriers, while Technology Barriers had moderate influence, and Institutional Barriers had

minimal impact. Addressing financial constraints, fostering sustainability awareness, and improving technological infrastructure are essential to promote CE adoption. Future research should explore these barriers further with diverse samples and broader geographical coverage for deeper insights.

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