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RESEARCH ARTICLE

Understanding Factors of Households' Circular Economy Adoption to Facilitate Sustainable Development in an Emerging Country

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Abstract: A shift from a linear economy to a circular economy can help participants (i.e., enterprises and households) to cut expenses, stabilize supply chains for the long term, and lower manufacturing and operating costs. Although the circular economy can benefit both the economy and the environment, this topic has still been under-studied in developing countries. More specifically, there has been little known about conditions and/or barriers for stakeholders in adopting a circular economy. In this regard, the authors conducted a study among Vietnamese households to improve the understanding of the factors (both drivers and impediments) of a circular economy adoption. Specifically, the authors employed a questionnaire-based survey approach to collect data from 473 households operating in the agricultural sector in the Red River Delta, Vietnam. The PLS-SEM method was performed to unravel the complicated relationship between circular economy adoption, organizational innovation, and income of agricultural households. The results showed that the adoption of circular economy is widely influenced by many factors in Vietnam. For example, technology has a negative impact on the level of circular economy adoption while policy and regulation, management, customer, and society have the opposite effect. Furthermore, organizational innovation played a fully mediating role between circular economy adoption and households' income. The results of the study offer many policy implications for supporting and increasing the households' circular economy adoption for further sustainable development in Vietnam and beyond.

Keywords: Circular economy; Agricultural households; Households' income; Vietnam; Red River Delta; PLS-SEM

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1. Introduction

Circular economy (CE) has received significant attention from government, business, and society during recent years due to its environmental, social, and financial benefits [1]. The circular economy model is more efficient in utilizing and recycling resources, lowering emissions and wastes, than the traditional linear economy model, which collects raw materials and transforms them into goods that are utilized until they are eventually thrown as trash. It therefore helps to decrease the negative environmental consequences and to improve the economy, environment, and society's balance [2,3]. Moreover, according to a study conducted by Barros et al. [4], it was found that CE plays a crucial role in enhancing the sustainability of businesses through its positive impact on various aspects such as strategic planning, cost management, supply chain management, quality management, environmental management, process management, logistics and reverse logistics, service management, and research and development.

At the household level, moving toward the circular economy business model gives great potential for households to achieve higher market share, opening doors to new markets, lowering costs and risks, driving innovation, recruiting talent, and aligning company performance with public expectations. However, the transition from a linear economy to a circular economy business model is not an easy task. The move to a circular economy often requires a comprehensive adaptation of companies' business models or even the creation of new business models [5]. Companies shifting to the CE model must also create entirely new product conceptions, service offerings, reconsideration of suppliers and partners, and value chains that prioritize long-term efficiency over short-term efficiency [2].

The obstacles that businesses experience in applying circular economy principles as well as the elements that encourage the move to circular models are well-defined in the literature. According to the comprehensive review of Sarja et al. [6], most related studies are dominated by a few countries, mainly China and the United Kingdom. However, the determinants of CE adoption are very different across countries due to dissimilarities in culture, legislation, market, etc. [6]. Therefore, there should be particular studies for a specific country context.

Vietnam is an emerging economy with rapid and solid economic growth and governance. However, Vietnam is now confronted with numerous major issues, including resource depletion, pollution, and climate change [7]. Due to the concentration of a significant portion of the population and economic resources in coastal lowlands and deltas, coupled with the prevalent poverty and deprivation in rural areas, Vietnam has been identified as one of the top five countries most susceptible to the consequences of climate change. Specifically, the agricultural sector bears the burden of these impacts. The Red River Delta is a region with the highest Gross Regional Domestic Product among seven socio-economic regions in Vietnam. With its fertile alluvial soil and lush vegetation, it offers an ideal condition for cultivating rice, vegetables, and fruits as well as aquaculture with shrimp and fish. With existing strengths, the local government is trying to promote agricultural production in a circular direction for sustainable agricultural development. One of the most important forces in this goal is agricultural households (households engaged in agricultural production activities, including the production and distribution of agricultural equipment and supplies, as well as the processing, storage, and distribution of agricultural commodities).

Despite the undeniable long-term benefits of a circular economy, there are still numerous barriers to its widespread implementation at present [8]. In this case study, we focus on the determinants of CE adoption in agricultural households in the Red River Delta, Vietnam. Besides, we examine the impact of the CE adoption on households' income with the mediating effects of organizational innovations. There are many studies that assert the relationship between CE adoption, organizational innovations, and households' income separately [9-11]. However, no study before tried to figure out the joint interaction of these three factors. This research gap is the one addressed in this article. The research objectives of this study are (1) to provide insights into the key obstacles that need to be addressed and the incentives that can promote circular economy adoption in the context of Vietnam; (2) To find the indirect impact between circular economy adoption on households' income through the intermediary factor of organizational innovations; and (3) To propose solutions to help promote the adoption of circular economy in households and promote positive impacts of circular economy adoption on households' income.

Analyzing 473 collected questionnaires with Partial Least Squares Structural Equation Modeling (PLS-SEM), our results show that technology is the barrier to the CE adoption of agricultural households, while policy and regulation, management, customer, and society have a positive impact on the CE implementation. Besides, there is strong evidence that organizational innovation played a full mediating role in the positive effects of circular economy adoption on households' income.

The contributions of this study to existing literature are threefold. First, to the best of our knowledge, this is the first research that studies the mediating roles of organiza-

tional innovation on the relation between circular economy adoption and households' income. Second, We do not use binary variables for implementing CE as in other studies. Instead, we categorize it into four levels, which include applying at least one CE-related practice, incorporating at least one CE-related norm into the process, planning to implement any type of CE-related practice, and having no plans to undertake any CE-related activities. It helps to clearly define the specific level of CE adoption. Lastly, our empirical results could draw several managerial implications for local government and businesses.

The rest of this article runs as follows. Section 2 presents the literature review related to factors that influenced the CE implementation. Section 3 describes the data and methodology. Section 4 shows the results and discussions. Section 5 gives concluding remarks.

2. Materials and Methods

2.1 Factors Affecting the CE Adoption

In encouraging the shift from a linear economy to a circular economy at the household level, it is crucial to understand the motivations and barriers for the CE implementation of households. Only by recognizing the factors that impede or ease the transition can business policy and guidelines suggestions be established to efficiently and successfully support the transformation [14].

Urbinati et al. [12] conducted a comprehensive analysis of multiple case studies within the European manufacturing industry to explore the impact of environmental regulations on the establishment of a circular business model and the adoption of circular management practices. Their findings indicate that environmental legislation plays a crucial role in the development of a circular business model and the implementation of specific managerial practices. However, it is worth noting that although governments strive to create favorable conditions for transitioning to circular models through legislation, there can be a mismatch between regulatory measures and the evolving needs of businesses and emerging technologies [13].

Houston et al. [14] conducted a survey among European companies' stakeholders to identify key enablers and barriers to CE implementation. The authors underline that, if overcome, constraints might be transformed as facilitators of the move to circular economy business models. However, the classification of Houston et al. [14] only considers factors inside the company and the value chain. For a more comprehensive view, Xia and Ruan [15] study a sustainable circular economy in agriculture in China and build up a set of factors influencing CE implementation based on stakeholder theory [16]. This study divides barriers to CE in agriculture in China into three sources including government, farmers, and enterprises.

There are many studies that synthesize the factors affecting CE adoption through the literature review method. Werning and Spinler [17] list 29 potential barriers (including 27 factors from the literature and 2 more obstacles from their findings) that prevent organizations from transforming their business models to be more circular. The authors conclude that since the managerial and financial resources of each company are limited, a priority ranking for barriers of CE in order of their impact on the value chain and the difficulty with which business can be overcome is necessary. Galvão et al. [8] study 195 related articles from the Web of Science Core Selection and Scopus database and find out the main barriers identified in the literature are (i) technological, (ii)policy and regulatory, (iii) financial and economic, (iv) managerial, (v) performance indicators, (vi) customer and (vii) Social. Govindan and Hasanagic [18] extracted 5 drivers and 4 barriers to CE adoption from reviewing 155 articles, books, research reports, etc.

However, in the above studies, there are many factors that are both enablers and barriers to CE adoption. As explained in Sarja et al. [6], which provides a systematic literature review on obstacles, catalysts, and ambivalences of the transition to the circular economy in business organizations, some factors are not clearly motivations or barriers but ambivalences of CE transformation. Therefore, instead of developing any specific hypotheses, we comprehensively involve all impact factors mentioned by recent studies that may influence the CE adoption in agricultural households in Red River Delta, Vietnam into our model and figure out which one is the driver or barrier of the CE adoption in our study context.

Based on the summary of Galvão et al. [8] and Sarja et al. [6], there are five main factors that influence CE adoption including technology, policy and regulations, financial issues, management, customers, and society. We summarize the major factors and related papers in Table 1 below.

2.2 The CE Adoption, Organizational Innovations, and Households' Income

In an era where governments, industries, and academia are increasingly concerned about the circular economy and sustainability, innovating business models for circularity and sustainability is becoming increasingly important to maintain a competitive advantage for businesses [26]. Material circularity necessitates a set of organizational innovations that can help to greater resource utilization [27]. A new organizational strategy in the household's business procedures is projected to result in increased efficiency

Table 1. Summarize of factors that influence CE adoption.

Factors	Definitions	References
Technology	Technologies that support the adoption and development of circular economy	Su et al. [19], Pan et al. [20], Geng and Doberstein [21]
Policy and regulation	Policy and regulation of all level governments that support the adoption and development of circular economy	Su et al. [19], Pan et al. [20], Lieder and Rashid [22], Geng and Doberstein [21]
Financial issues	Household's current financial situation/issues	Su et al. [19], Pan et al. [20], Geng and Doberstein [21]
Management	Management direction towards circular economy	Bey et al. [23], Su et al. [19]
Customer	Customers' requirements and pressure on the CE adoption	Bey et al. [23], Ilić and Nikolić [24], Geng and Doberstein [21]
Society	Society's requirements and pressure on the CE adoption	Yuan et al. [25], Ilić and Nikolić [24]

Source: Galvão et al. [8]; Sarja et al. [6].

and cheaper expenses. New organizational approaches in the household's business processes can also result in increased work quality and better customer service. Besides, a new strategy for organizing the household's workplace is projected to boost employee productivity and happiness. According to the OECD [28], organizational innovation can enhance worker satisfaction/productivity and/or lower administrative/transaction costs, resulting in greater corporate performance. Zaied and Affes [29] find that organizational innovation improves corporate performance by enhancing work quality, information interchange, learning capacity, and the utilization of new knowledge and technology. According to Phan [10], two dimensions of organizational innovation, "innovation in business processes" and "innovation in workplace organization", are considerably positively related to company performance.

There are many studies examining the relations between CE adoption and organizational innovation, and between organizational innovations and households' income. However, none of the existing papers study the joint interaction between these three factors. We suspected that there is a mediating role of organizational innovations in the relationship between CE adoption and households' income. More specifically, the CE adoption will lead to organizational innovation, which in turn will increase households' income.

From the above literature review, we build a research framework for our study as in Figure 1 below.

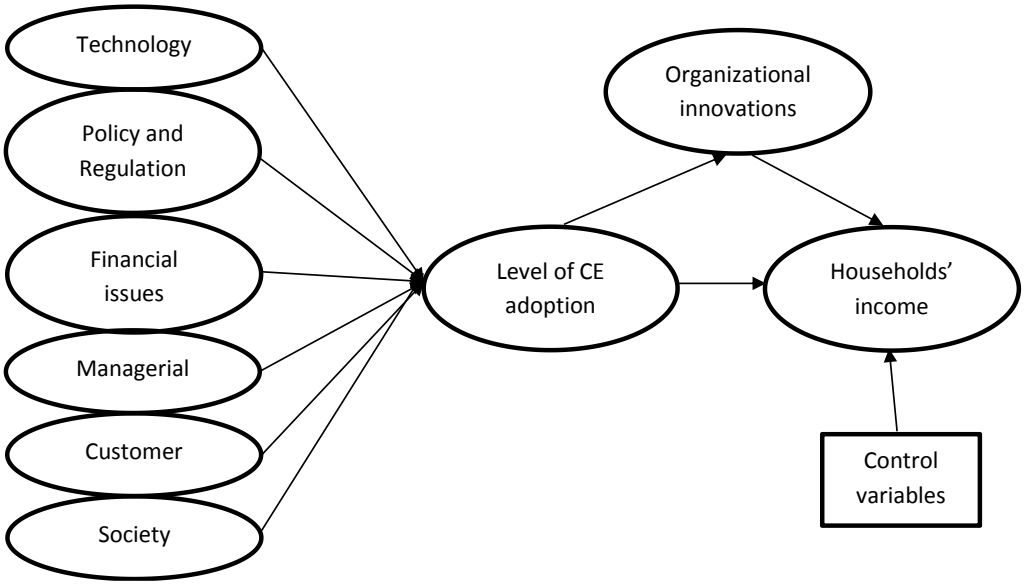

Figure 1. Framework for CE adoption.

3. Data Description and Methods

To understand the factors influencing households' adoption of circular economic practices in their business and the impacts of circular economy on households' income, we employ a questionnaire-based survey method to collect data on households operating in the agricultural sector in the Red River Delta, Vietnam. This survey targets assessing their awareness of circular economy concepts, motivations for adoption, and potential barriers they encounter. Specifically, we asked economic household representatives if they had ever heard of the concept of the circular economy. We will then explain to them the definition of the circular economy as provided by the Ellen MacArthur Foundation and determine if they have engaged in any activities that can be considered part of the circular economy.

Face-to-face, drop-off, and phone-calling methods were employed to distribute the questionnaire. Among 500 distributed questionnaires to agricultural households in the Red River Delta, Vietnam, there are 473 valid questionnaires returned. Instead of clearly defining which factors are drivers or barriers to CE adoption in our survey, we use a Likert 5-point scale ranging from 'strongly disagree' to 'strongly agree' to let respondents evaluate the degree of each factor. Specifically, in our questionnaire, for each potential determinant of circular economy practices adoption, we use at least three Likert questions (see Appendix). We also collect information about households' income as net profit per employee. The level of CE adoption is divided into 4 levels including "having no plan to adopt CE", "having a plan but not sure when will adopt the CE", "in the process of adopting CE", and "already adopted the CE". We also use the number of working labors, household age, and total assets as control variables for households' income. Table 3 illustrates the details of these variables. These factors are analyzed using partial least squares structural equation modeling (PLS-SEM) to figure out which ones are enablers or obstacles. PLS-SEM represents a technique in structural equation modeling that enables the assessment of intricate cause-and-effect associations within path models featuring latent variables. PLS-SEM adheres to SEM notations and symbols, incorporating a path diagram to illustrate connections among latent variables and between each measurement variable and its corresponding latent variables. However, in contrast to the traditional covariance-based structural equation modeling (CB-SEM), PLS-SEM is recognized as a flexible modeling approach that does not necessitate stringent assumptions regarding distributions, sample size, and measurement scale.

Table 2. Data description and summary statistics.

Variable	Definition	Mean	Std	Min	Max
Households' income	Logarithm of net profit per working member.	0.549	0.457	0.006	1.984
CE adoption level	The level of CE adoption of households. If a corporation embraced at least one sort of CE-related practice, the CE adoption level is 4. It has a value of 3 if a company is in the process of implementing at least one of the CE-related practices. If a company hasn't adopted any of the CE-related practices yet, but plans to do so, it gets a value of 2. Furthermore, it has a value of 1 if a business has not implemented and does not intend to adopt any of the CE-related practices.	0.137	0.345	1	4
Labor	Number of employees (Unit: person)	6.288	2.192	3	12
Household age	The number of years of agricultural producing of the household (Unit: year)	7.867	4.283	1	15
Total assets	the total amount of assets owned by the household (Unit: Billion VND)	11.037	6.719	0.207	270.620

4. Results and Discussion

Common Method Variance (CMV) gives rise to a form of bias known as common method bias, which can artificially inflate the perceived relationship between two constructs. In simpler terms, CMV leads to a systematic overestimation of the association among the scale items. To address this potential bias in our data analysis, we employed Harman's single-factor test [30] to examine the presence of CMV. The results of the principal component factor analysis revealed that the largest factor accounted for only 25.99% of the total variance, which falls below the 50% threshold [31]. Consequently, our data does not exhibit CMV bias, and thus, we can proceed with our data analysis without concerns regarding this issue.

Before delving into the analysis of causal relationships between variables, we prioritized ensuring the validity and reliability of our study model. To achieve this, we assessed various indicators including factor loadings, Cronbach's alpha (CA), factor loadings from exploratory factor analysis (EFA), composite reliability (CR), and average variance extracted (AVE). The reliability and validity of the constructs are presented in Table 3. The Cronbach's alpha values ranged from 0.910 to 0.982, surpassing the recommended threshold of 0.70, indicating satisfactory internal consistency [32]. Similarly, the composite reliability values, ranging from 0.950 to 0.983, exceeded the minimum criterion of 0.70 [32]. The average variance extracted values for the four variables fell within the range of 0.856 to 0.882, meeting the recommended threshold of 0.50. Additionally, the factor loadings exceeded the recommended value of 0.4 [32]. Overall, the examination of the measurement properties confirms the unidimensionality and conceptual consistency of the scale.

Table 3. Construct reliability and validity.

Constructs	Questions	Factor loading	Cronbach's alpha	Composite reliabilities	AVE
TECH	TECH1	0.840	0.935	0.958	0.882
	TECH2	0.908			
	TECH3	0.902			
	TECH4	0.828			
PR	PR1	0.790	0.916	0.961	0.860
	PR2	0.899			
	PR3	0.868			
	PR4	0.853			
FI	FI1	0.868	0.909	0.950	0.826
	FI2	0.917			
	FI3	0.793			
	FI4	0.892			
MAN	MAN1	0.895	0.922	0.983	0.859
	MAN2	0.906			
	MAN3	0.794			
	MAN4	0.965			
CUS	CUS1	0.869	0.910	0.960	0.859
	CUS2	0.903			
	CUS3	0.919			
	CUS4	0.791			
SOC	SOC1	0.922	0.929	0.980	0.857
	SOC2	0.861			
	SOC3	0.855			
	SOC4	0.788			
OI	OI1	0.912	0.929	0.978	0.856
	OI2	0.955			
	OI3	0.966			
	OI4	0.868			

Table 4 illustrates the path coefficients from the PLS-SEM analysis. Among 6 factors that are potentially affecting the level of CE adoption in agricultural households in the Red River Delta, Vietnam, we find evidence for the negative influence of technology and the positive influence of policy and regulation, management, customers, and society. Only financial issues have no impact on the CE adoption.

Lacking proven technologies is one of the main obstacles that hinder CE adoption [33]. The estimated coefficient of technology in our model (β = –0.128, p-value = 0.000) provides evidence for the above conclusion. Kandasamy et al. [34] state that from a technological perspective, renovation operations, especially recycling, can be costly and inefficient, leading to material losses and additional expenses. Moreover, the advancement of the agricultural circular economy faces obstacles such as limited agricultural informatization and a lack of flexibility in technology adoption [35]. These factors contribute to the hesitancy of households in less developed countries to embrace the circular economy, as the inefficiency of technology hinders its implementation.

The drivers that promote the level of CE adoption in agricultural households in Red River Delta, Vietnam are policy and regulation (β = 0.245, p-value = 0.000), management (β = 0.210, p-value = 0.000), customers (β = 0.254, p-value = 0.000), and society (β = 0.222, p-value = 0.000). The estimated coefficient of policy and regulation proves that governments in Vietnam are trying to create a favourable environment for the development of the circular economy in agriculture. In the revised Vietnamese Environmental Protection Law that took effect on January 1st, 2022, the government tries to improve extended producer responsibility (EPR), which means companies' re-

Table 4. The estimations of path coefficients.

	Path coefficients	p-value
Direct effects		
Technology -> Level of CE adoption	–0.128***	0.000
Policy and regulations -> Level of CE adoption	0.245***	0.000
Financial issues -> Level of CE adoption	–0.014	0.637
Management -> Level of CE adoption	0.210***	0.000
Customers -> Level of CE adoption	0.254***	0.000
Society -> Level of CE adoption	0.222***	0.000
Level of CE adoption -> Organizational innovations	0.610***	0.000
Level of CE adoption -> Households' income	0.448***	0.000
Organizational innovations -> Households' income	0.107***	0.000
Indirect effects		
Level of CE adoption -> Organizational innovations -> Households' income	0.065	0.000
Adjusted R^2		
Level of CE adoption	0.569	
Organizational innovations	0.671	
Households' income	0.672	

Note: *** indicates significant at 1% significance level.

sponsibility no longer ends at the point of sale but extends to disposal and recycling. Vietnam's new law gives companies two choices: recycle or pay up. Companies must have systems to collect their goods once customers are done with them, extract materials with value and dispose of the rest. If not, they pay into an environmental fund or face a big fine. Besides, in the revised law, the Vietnamese government also supports circular economy transition via policies and standards that enable the three Rs (3Rs): reduce, reuse, and recycle [7]. Besides, the Vietnamese government's circular economy propaganda seems to have worked well as business managers, consumers, and society all have perceptions and requirements for businesses to promote the adoption of the circular economy.

Regarding the impact of CE adoption on households' income and the mediator role of organizational innovation, this study used bootstrapping statistics while performing the SEM, as recommended by Zhao et al. [36], to test for the hypotheses related to the mediating effects among the constructs. We find a significantly positive relationship among these three variables. Specifically, level of CE adoption -> organizational innovations (β = 0.610, p-value = 0.000); level of CE adoption -> households' income (β = 0.448, p-value = 0.000); and organizational innovations -> households' income (β = 0.107, p-value = 0.000). These results suggest that besides directly enhancing households' income, the level of CE adoption also increases organizational innovation, which in turn also boosts the households' income. Therefore, our result suggests that organizational innovation fully mediates the relationships between the level of CE adoption and households' income.

From the above findings, several managerial implications can be drawn. Although technology is the main tool that must be used to achieve circular economy, low technology is a weakness that hinders the ability of agricultural households to adopt the CE. Therefore, the Vietnamese government should pay attention to supporting businesses to access new technologies that help to accelerate the implementation of the circular economy in agricultural households. Besides, the government should continue to improve policy and regulation in supporting the CE adoption, and encourage customers and society in the use of products from the circular business. Lastly, businesses need to focus on improving management and organizational innovation to stimulate the impact of CE on households' income.

5. Conclusions and Policy Implications

Our results shed light on what factors are drivers or barriers to the CE adoption of agricultural households in Red River Delta, Vietnam. Besides, we examine the impact of the level of CE adoption on households' income

with the mediating role of organizational innovations. From a survey of 473 agricultural households in the Red River Delta, Vietnam, the PLS-SEM results show the negative influence of technology and the positive influence of policy and regulation, management, customers, and society on the level of circular economy adoption of agricultural households. Besides, there is significant evidence of the positive impacts of circular economy adoption on households' income in the sample. Furthermore, organizational innovation played a full mediating role between circular economy adoption and households' income.

Although this study has made valuable contributions to the literature on the circular economy (CE), there are some limitations that should be noted. Firstly, the temporal aspect poses a constraint in this study as the adoption of CE, organizational innovation, and households' income require time to develop or acquire, potentially mitigating their positive impacts. Therefore, a longitudinal design would be beneficial for further investigation. Additionally, the research sample size is relatively small. Future research could expand upon this idea by including larger samples and examining other industries and regions to enhance the generalizability of the findings.

To enhance the implementation of a circular economy in agriculture in Vietnam, thereby increasing the income of farmers, it is necessary to address the following issues:

i. Enhance the credit policy system in agriculture by providing preferential interest rates, encouraging the establishment and effective implementation of agricultural insurance funds, and support funds for farmers, and enterprises investing in high-tech and circular agriculture. Conduct research on incentive policies for credit institutions regarding loan capital and interest rate compensation due to the implementation of agricultural interest rate reduction policies;

ii. Research and implement incentive policies for corporate income tax, fees, and charges in sectors such as research activities, pilot projects, and scaling up in circular agriculture. Study and supplement value-added tax incentive policies for pilot agricultural products in high-tech and circular agriculture models, as well as for products that serve as tools, equipment, and techniques for implementing circular agriculture models;

iii. Support research activities and the transfer of technology and innovative solutions in the field of circular economy. There is a need for determination in effectively transferring and timely implementing scientific advancements into practical production activities of farmers and businesses in the field of circular agriculture;

iv. Develop and implement preferential land policies such as policies that support land consolidation, exemption or reduction of land rent, and water surface rent fees imposed by the State. Additionally, provide exemptions or reductions in land use fees to assist households and agricultural businesses in accumulating land, expanding scale, and successfully applying circular economy models in agriculture;

v. Pay attention to attracting and training human resources for the agricultural sector to enhance the awareness and capacity of farmers, enabling them to proactively and confidently apply effective circular economy models in agriculture that are suitable for the rural conditions of Vietnam;

vi. Enhance the role of local government agencies in agricultural management to provide guidance and support to farmers in implementing production activities in accordance with the goals and regulations set by the State, while aligning with market trends and requirements;

vii. Expand the market for circular agriculture products by leveraging the role of industry associations and leading enterprises in connecting, sharing, and linking production along the value chain.

Author Contributions

Study conception and design: Quang Phu Tran, The Kien Nguyen; data collection: Quang Phu Tran, The Kien Nguyen; analysis and interpretation of results: Quang Phu Tran, The Kien Nguyen, Manh Cuong Dong; draft manuscript preparation: Quang Phu Tran, The Kien Nguyen, Manh Cuong Dong; manuscript revision: Quang Phu Tran, The Kien Nguyen, Manh Cuong Dong. All authors reviewed the results and approved the final version of the manuscript.

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Data Availability

All data used in the study are available from the author upon request.

Conflicts of Interest

The authors declare no conflict of interest.

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Appendix A

Constructs		Questions
TECH	TECH1	The company's current technological machines are suitable for circular economy
	TECH2	The company cares about technical development related to the CE adoption
	TECH3	The company is improving technology for the CE adoption
	TECH4	The company is willing to cut-off profit in order to improve technology for the CE adoption
PR	PR1	The current policies and regulations of government encourage households to adopt the CE
	PR2	The current policies and regulations of government force households to adopt the CE
	PR3	The government supports households in adopting the CE
	PR4	The government have subsidies for the CE adoption
FI	FI1	The financial situation of your company is suitable for the CE adoption
	FI2	Your company have no financial difficulties in adopting the CE

Table Appendix continued

Constructs		Questions
	FI3	You have no concern about financial issues when considering the CE adoption
	FI4	Finance is a strength of your company if it adopts the CE
MAN	MAN1	Do you (as a manager) think that the CE adoption is important for your company?
	MAN2	Your company's current management system is suitable for the CE adoption
	MAN3	The manager board of your company is interested in adopting the CE
	MAN4	Your company is willing to revise the management system to adopt the CE
CUS	CUS1	Customers care about the products from circular economy
	CUS2	Customers requires the products from circular economy
	CUS3	Customers are increasingly interested in circular economy products
	CUS4	Customers have certain criteria regarding circular economy when choosing products
SOC	SOC1	Society care about the products from circular economy
	SOC2	Society requires the products from circular economy
	SOC3	Society is increasingly interested in circular economy products
	SOC4	Society has pressure on your company in adopting the CE
OI	OI1	Innovation in technology
	OI2	Innovation in business practices
	OI3	Innovation in workplace organization
	OI4	Innovation in external relations