# Determining the circular economy implementation barriers in the agriculture supply chain: Evidence from the food supply chain

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The Circular Economy (CE) concept is becoming increasingly appealing as a means of addressing current sustainability challenges and facilitating a shift away from the linear "take-make-use-dispose" model of production and consumption. A sustainable food cycle can include five stages: food production, processing, distribution, food consumption, and food waste management. We can attain total food cycle sustainability if each of these processes is appropriately handled. The goal of sustainable food systems is to create a brighter future. The mission is to create sustainable values by providing food products that meet the needs of consumers while keeping the core values of food safety, quality, and low environmental impact in mind. Over the last decade, the circular economy has emerged as one of the most significant global issues, fostering the development of long-term socio-economic and environmental advantages through the promotion of sustainable and resource-efficient policies.

Growing population and increased food demand, inefficient resource use and distribution, environmental impacts, and especially high rates of food waste at all stages of the food system all call for a shift to more sustainable practices. To address the problem of food waste, researchers, government authorities, non-governmental organizations, and the food industry are constantly proposing, testing, and implementing novel and multifaceted solutions. However, the development of a circular economy has to deal with barriers. In this article, we apply the circular economy concept to the case of a sustainable food system also identify critical barriers through reviewing the seminal literature to develop a circular economy by using the Intuitionistic Fuzzy TOPSIS method for determining and prioritizing the key barriers. Intuitionistic Fuzzy sets have been used in a wide range of applications, including logic programming, medical diagnostics, decision-making, evaluation functions, and preference relationships. Besides, Intuitionistic Fuzzy Sets better depict the acceptance, rejection, and hesitations of the decision-makers

The research questions of this study are listed below;

1) Is the government promotes the development of an agricultural recycling economy?
2) Do enterprises have the ability to develop scientific and technological innovation in circular agriculture?
3) What variables are the most easily changed in order to have a food (anti) waste behaviour?
4) Is there a supportive policy framework in food waste and surplus management?

In addition to these research questions, barriers encountered in the implementation of the circular economy in agriculture and food supply chain were investigated and are listed in Table 1.

Table1. The circular economy implementation barriers in the agriculture supply chain

| Abbreviation of Barriers | Name of the Barriers |
|---|---|
| B1 | Recycling policies in waste management are ineffective to obtain high quality recycling |
| B2 | The administrative mechanism is imperfect |
| B3 | Insufficient organizational culture and management |
| B4 | Agriculture production costs remain high |
| B5 | Weak environmental regulations |
| B6 | Lack of financial resources |
| B7 | Limited professional (Farmers and producers) awareness and skills |
| B8 | Limited capacity for the reuse and recovery activities |
| B9 | Limited availability of reuse products |
| B10 | Enterprise display weak technology innovation |

This study indicates that two key barriers "weak environmental regulations" and "limited availability of reuse products" are the most significant circular economy implementation barriers in the agriculture supply chain.

**Key words**: Circular economy; Agriculture supply chain; Food waste; Intuitionistic Fuzzy TOPSIS