

# **CIRCULAR ECONOMY IN SERVICES: INTENTION TO ADOPT SUSTAINABLE PACKAGING IN FOOD DELIVERY**

## **1 INTRODUÇÃO**

With the expansion of food delivery services, the demand for packaging has increased, intensifying the environmental impact due to the depletion of non-renewable resources, pollutant emissions, and excessive waste accumulation (European Commission, 2018). The production of packaging for food services requires significant amounts of natural resources, such as fossil fuels, contributing to climate change and biodiversity loss (Han et al., 2022).

The global market size for food packaging was estimated at USD 362.9 billion in 2022, reaching USD 380.8 billion in 2023. The global food packaging market is expected to grow at an annual rate of 5.7% from 2023 to 2030, reaching USD 562.3 billion by 2030 (Grand View Research, 2023). More than 42% of globally produced plastics are used in food packaging, representing approximately 141 million tons per year. In most cases, petroleum-based polymeric materials are used in the development of plastic packaging, making this industry intensive in greenhouse gas emissions and significantly contributing to the climate crisis (Jagoda et al., 2023).

It is known that only 2% of discarded plastic packaging is effectively recycled and reintroduced into the manufacturing process of new packaging (Phelan et al., 2022). Some plastic packaging is processed into secondary plastic, also known as open-loop recycling (Antonopoulos et al., 2021; Hsu et al., 2021), while the rest is sent to landfills, incinerated, or ends up in the natural environment (MacArthur et al., 2017).

The academic literature on how companies adopt sustainable packaging practices from a circular economy perspective is limited. Research has focused on very specific cases, restricted in terms of materials analyzed and types of packaging investigated. Additionally, the life cycle assessment perspective is the most used methodology to study the implications of packaging (Cozzolino and De Giovanni, 2023).

Despite the importance of this topic, there is still little research on the internal and external factors perceived as relevant by merchants for a transition from plastic packaging. Recent literature has mainly focused on designing or describing innovative business models that integrate the principles of the circular economy through informal evidence. Thus, the objective of this research is to measure the factors that influence the intention to adopt sustainable packaging to align with the principles of the circular economy in the food delivery service.

This research presents two contributions: the first is academic, offering a structural model that measures the intention to use sustainable packaging in food delivery, extending the application field of the Theory of Planned Behavior (TPB) by using it as a basis to measure the behavioral intention of managers. In addition to the traditional constructs of the TPB (Behavioral Intention, Attitude, Subjective Norms, and Perceived Behavioral Control), this study added relevant constructs to the sustainability area, such as Perceived Benefit, Awareness of Consequences, Environmental Knowledge, and Environmental Concern. This expansion of the theory allows for a more comprehensive and precise analysis of managers' behavioral intentions related to sustainability. The second contribution, managerial and environmental, offers guidelines for entrepreneurs and policymakers, providing information to assist them in developing plans to encourage pro-environmental behavior in companies.

## **2 LITERATURE REVIEW AND RESEARCH HYPOTHESES**

In this study, behavioral intentions are understood as a perceived probability or subjective probability of food trade owners or managers with delivery services adopting sustainable packaging to implement a circular economy model in the services offered. It is

assumed that owners or managers with positive behavioral intentions are more likely to adopt sustainable packaging, contributing to the principles of the circular economy in their trade. In other words, it can be stated that owners or managers with positive intentions are more likely to contribute to the adoption of sustainable packaging and consequently adopt some of the principles of the circular economy. Thus, the following hypothesis is proposed:

**H1. There is a positive relationship between subjective norm and intention to adopt sustainable packaging in food delivery.**

The convenience of use, the degree of safety, and the capital and time costs of using recyclable packaging are within the scope of perceived behavioral control evaluation. Thus, there is a significant influence of perceived behavioral control on the intention to use recyclable packaging (Khan et al., 2019).

In this study, perceived behavioral control is established as the perceived power and knowledge of owners or managers to adopt sustainable packaging in food delivery to implement circular economy principles. It is assumed that owners or managers with strong perceived behavioral control are more likely to adopt sustainable packaging and circular economy practices in their trade. Thus, the following hypothesis is proposed:

**H2. There is a positive relationship between perceived behavioral control and intention to adopt sustainable packaging in food delivery.**

Previous studies support the relationship between attitude and behavioral intention (Khan et al., 2019; Tonglet et al., 2004). Khan et al. (2020) show that environmentally conscious owners or managers successfully implemented circular economy principles in their organizations. The results of Wang et al. (2021) study show that the intention to use recyclable express packaging is strongly influenced by attitude. Thus, regarding pro-environmental behavior, if there is a positive attitude towards sustainability, there is a positive influence on the intention to change behavior towards nature and environmental protection (Gansser and Reich, 2023).

In this study, it is assumed that owners or managers with positive attitudes towards adopting sustainable packaging are more likely to intend to adopt sustainable packaging in food delivery, contributing to the principles of the circular economy. Thus, the following hypothesis is proposed:

**H3. There is a positive relationship between attitude and intention to adopt sustainable packaging in food delivery.**

Awareness of consequences is positively associated with the intention of waste separation (Wang et al., 2019). Similarly, when individuals understand the positive consequences of using reusable packaging, they feel morally obligated to use reusable packaging (Song et al., 2023). Awareness of consequences is an important determinant of recycling intention (Tonglet et al., 2004). The use of sustainable packaging affects the state of the environment (Duan et al., 2019), and thus obliges individuals to consider the consequences of their actions, which positively reflects on the intention of pro-environmental behavior (Wang et al., 2021). Thus, the following hypothesis is proposed:

**H4. There is a positive relationship between awareness of consequences and intention to adopt sustainable packaging in food delivery.**

Understanding the interaction between awareness of consequences and perceived benefit is essential for understanding how people make decisions and make choices. These factors can influence a variety of behaviors, from simple day-to-day decisions to complex choices involving significant risks and rewards. Understanding the relationship between awareness of consequences and perceived benefit is crucial for understanding pro-

environmental behavior concerning the adoption of sustainable packaging in food delivery. Thus, the following hypothesis is proposed:

**H5. There is a positive relationship between awareness of consequences and perceived benefit of adopting sustainable packaging in food delivery.**

This study assumes that attitude is a determining factor in adopting sustainable packaging as it influences individual behavior. When individuals have a favorable attitude towards sustainable packaging, they are more likely to make conscious choices in selecting and opting for sustainable packaging instead of conventional options. Thus, the following hypothesis is proposed:

**H6. There is a positive relationship between perceived benefit and attitude towards adopting sustainable packaging in food delivery.**

Knowledge allows for a deeper understanding of environmental problems and the connections between individual actions and environmental impacts. Thus, individuals with greater knowledge are better able to identify the environmental benefits derived from pro-environmental behaviors, positively influencing perceived benefit. Thus, the following hypothesis is proposed:

**H7. There is a positive relationship between environmental knowledge and perceived benefit of adopting sustainable packaging in food delivery.**

Environmental concern can be conceptualized as individuals' concern about the degradation of natural resources and pollution (Trivedi et al., 2018). It occupies a prominent place in the theoretical frameworks used to predict pro-environmental behavior.

Environmental concern indicates a sense of urgency and triggers the activation of several consequent and iterative steps, such as attention, motivation, evaluation, and defense, through which an individual seeks corroboration to activate a specific behavior, such as adopting sustainable packaging (Trivedi et al., 2018; Yarimoglu and Binboga, 2019). Thus, the following hypothesis is proposed:

**H8. There is a positive relationship between environmental concern and attitude towards adopting sustainable packaging in food delivery.**

With the hypotheses established, it was possible to develop the conceptual model that served as a guide to compose the structural model. Thus, this study proposes integrating variables found in studies on the adoption of circular economy principles in businesses, analyzing various types of constructs.

### **3 METHOD**

The theoretical research model aims to measure the factors influencing the intention to adopt sustainable packaging to align with the principles of the circular economy in food delivery services.

This research is causal in nature, as it tests the relationships between constructs linked by unidirectional arrows through structural equation modeling. Structural Equation Modeling is the most recommended method, given its capability to analyze causal relationships within the model and to verify whether the independent variables explain the dependent variable (Hair et al., 2016).

#### **3.1 RESEARCH INSTRUMENT**

The questionnaire of this research was divided into two sections: the first consists of the main body of the questionnaire, including the scales for each variable; the second section

concerns the respondents' personal information. The measurement items for each variable in the model were referred to validated scales widely used in the relevant literature and were modified to fit the specific context.

Awareness of consequences primarily referenced the measurement items of Apaolaza et al. (2022). Attitude referred to the research of Chen, Yang, and Smith (2016), Wang and colleagues (2018), Tonglet and colleagues (2004), and Khan et al. (2019). Subjective norm and perceived behavioral control primarily referenced the scales of Wang and colleagues (2018). Environmental Knowledge referred to the research of Mostafa (2007), Yadav and Pathak (2016), Zhidebekkyzy et al. (2022). Environmental Concern primarily referenced the scales of Trivedi, Patel, and Acharya (2018). Intention referenced the measurement items of Khan and colleagues (2020) and Nadlifatin and colleagues (2016). Perceived benefit referred to the research of Bozorgparvar et al. (2018), Ma et al. (2020), Park and Ohm (2014). According to Finstad (2010), the 7-point Likert scale demonstrated greater accuracy in the authentic evaluation of participants; thus, this type of scale was chosen for this research.

### **3.2 DATA COLLECTION**

Data collection occurred between May 28 and June 29, 2023. In total, there were 803 (eight hundred and three) questionnaire views; of these accesses, 496 (four hundred and ninety-six) started the response, but not all completed the questionnaire until the end. Thus, 315 (three hundred and fifteen) respondents who completed the questionnaire were considered for analysis. Data were collected through a survey (Calais, 2007), in which observed variables of the constructs were transformed into a questionnaire with 37 (thirty-seven) statements. Additionally, 7 (seven) questions related to the respondent's social profile were included: main area of activity in food trade via delivery, company size, geographical location, age, gender, education level, and marital status. The average response time was 8 minutes and 55 seconds.

### **4. RESULTS**

This research used Structural Equation Modeling to measure the model. The SmartPLS 4 software was used. The first aspect to be observed in measurement models is the convergent validity obtained by observing the Average Variance Extracted (AVEs) (Ringle et al., 2014).

Since all AVEs showed convergent validity and the factor loading of these indicators was  $>0.60$ , it was decided to keep them in the measurement model. Subsequently, the Composite Reliability (CR) ( $\rho$  - Dillon-Goldstein rho) (Ringle et al., 2014) was observed, in which all indices showed adequate values.

The next step of the analysis involved evaluating the Discriminant Validity (DV) of the SEM (Ringle et al., 2014). The DV test was conducted using two methods recommended by Hair et al. (2014). The first is observing cross-loadings of the indicators, the criterion of Chin (1998). It can be observed that all factor loadings had higher indicators in their respective constructs; thus, the DV was confirmed by the cross-loadings method.

The second method uses the Fornell and Larcker (1981) criterion, which advises comparing the square roots of the AVE values of each construct with the Pearson correlations between the constructs (or latent variables). The square roots of the AVEs should be greater than the correlations between the constructs.

With the DV guaranteed, the measurement adjustments are concluded, and the structural model analysis begins. The first aspect observed in the structural model evaluation phase was the bootstrapping histograms. This analysis was conducted to evaluate the presence of outliers. A histogram for each structural coefficient is presented in the bootstrapping output, showing unimodal histograms.

Checking for collinearity in the structural model is fundamental, as the estimation of path coefficients in structural models is based on ordinary linear regressions of each of the endogenous latent variables on their corresponding constructs.

As in multiple regression, path coefficients could be biased if estimation involves significant levels of collinearity among predictor constructs. The absence of multicollinearity is an important step to verify for the reliability of regression models. When there is a strong correlation between two or more predictors in a regression model, multicollinearity may exist. The greatest difficulty occurs when there is perfect collinearity between predictors, making it impossible to obtain singular estimates of the regression coefficients. Thus, the VIF value was checked. By VIF, there is an indication of a strong relationship between one predictor and another. Literature points to the acceptance of  $VIF < 5$  (Field, 2009; Hair et al., 2016).

It is observed that all relationships had a VIF value  $< 5$ , and thus other aspects are observed, such as the Pearson coefficients ( $R^2$ ), which indicate the portion of variance of the endogenous variables explained by the structural model (Ringle et al., 2014). According to Cohen (1988),  $R^2 = 2\%$  is considered a small effect,  $R^2 = 13\%$  a medium effect, and  $R^2 = 26\%$  a large effect. All  $R^2$  values present a large effect. The structural model consists of a series of linear regressions, thus the significance of these relationships should be evaluated sequentially (Ringle et al., 2014). For this reason, the bootstrapping module employing the re-sampling technique was used to obtain Student's t-tests.

For the evaluation, a minimum sample number of 5000 should be considered, while the number of cases should be exactly the same as observed in the original sample (Hair et al., 2011). The critical values of the two-tailed t-test are 1.65 (significance level = 10%), 1.96 (significance level = 5%), and 2.58 (significance level = 1%). It is noted that the structural model results in the Bootstrapping module are greater than 1.96; thus, all hypotheses were confirmed.

## 5. DISCUSSIONS

According to the TPB (Ajzen, 1991), subjective norms are one of the main determinants of behavioral intention. This theory postulates that people are influenced by how their actions are perceived by others and what behaviors are socially acceptable. In the specific context of food delivery services, subjective norms play a crucial role. When food trade owners or managers perceive social pressure to adopt sustainable packaging, they tend to be more likely to consider and implement these practices. The perception that other relevant actors, such as customers, competitors, or even the community, value and support the adoption of sustainable packaging can exert a powerful influence on their decision-making (Harjadi and Gunardi, 2022), as was proven by observing H1 in this research.

Empirical studies have proven the existence of a relevant interaction between perceived behavioral control and intention (Khan and Rundle-Thiele, 2019; Khan et al., 2020; Singh et al., 2018). Moreover, it was found that perceived behavioral control is a significant predictor of the intention to adopt sustainable packaging in food delivery services. Owners and managers who feel more confident in their ability to adopt sustainable packaging in this context are more likely to express a positive intention in this direction, as H2 predicted.

The attitude of owners or managers towards sustainable packaging also plays a crucial role in their intention to adopt. Those with a favorable attitude towards sustainable packaging are more likely to express an intention to adopt sustainable packaging in food delivery, confirming the third hypothesis H3, which stated there is a positive relationship between attitude and intention to adopt sustainable packaging in food delivery.

Investing in sustainable packaging represents an advantageous strategy not only from an environmental standpoint but also economically, as it promotes ecologically responsible and potentially profitable business practices (Abuabara et al., 2019; Ma et al., 2020). By opting for

sustainable packaging, companies can demonstrate their commitment to sustainability, earn consumer trust, and stand out in the market (Abuabara et al., 2019; Ma et al., 2020).

Awareness of consequences, especially concerning global warming, plays a crucial role in the intention to adopt sustainable packaging by food trade owners or managers with delivery services, confirming H4. The study conducted by Ayalon et al. (2016) explored business attitudes and behaviors towards sustainability. The results indicated that awareness of the consequences of global warming and understanding the associated risks were key factors that drove companies to adopt sustainable practices, including environmentally friendly packaging.

Moreover, it was discovered that awareness of consequences is positively related to perceived benefit. This means that food trade owners or managers with delivery services who have a greater awareness of environmental consequences perceive greater benefits in adopting sustainable packaging, thus validating the fifth hypothesis H5.

Perceived benefit is a key factor in the decision-making process related to adopting sustainable practices (Bozorgparvar et al., 2018; Kim et al., 2014; Park and Ohm, 2014). When food trade owners or managers perceive significant advantages in adopting sustainable packaging, such as reducing environmental impact, well-being, and improving the trade's image (Abuabara et al., 2019; Ma et al., 2020), they tend to develop a more favorable attitude towards these packages, confirming H6.

Environmental knowledge refers to the understanding and awareness of environmental impacts and sustainable practices and solutions. When food trade owners or managers possess more in-depth knowledge of environmental issues, they can better understand the benefits associated with adopting sustainable packaging, confirming H7.

In the food trade with delivery services, the environmental concern of owners or managers plays a crucial role in a favorable attitude towards adopting sustainable packaging. Those with greater environmental concern recognize the importance of reducing the environmental impact of food delivery services and are more willing to adopt sustainable packaging as part of their commercial practices, thus confirming H8.

## 6. CONCLUSION

This research used the Theory of Planned Behavior (TPB) to investigate the factors influencing the adoption of sustainable packaging in food delivery services, aiming to align with the principles of the circular economy. The results highlighted the importance of elements such as subjective norm, perceived behavioral control, attitude, awareness of consequences, perceived benefit, environmental knowledge, and environmental concern in the decision to adopt sustainable packaging. The research emphasizes that these factors play crucial roles in business decision-making regarding sustainability in food delivery services.

## REFERÊNCIAS

- Ajzen, I., 1991. The theory of planned behavior. *Organ. Behav. Hum. Decis. Process.* 50, 179–211.
- Cesarina, M., Pauluzzo, R., Muhammad Umar, R., 2022. Recycling habits and environmental responses to fast-fashion consumption: Enhancing the theory of planned behavior to predict Generation Y consumers' purchase decisions. *Waste Manag.* 139, 146–157.
- Cozzolino, A., De Giovanni, P., 2023. Portfolios of sustainable practices for packaging in the circular economy: an analysis of Italian firms. *Int. J. Logist. Manag.* 34, 24–49.
- Delistavrou, A., Tilikidou, I., Papaioannou, E., 2023. Climate change risk perception and intentions to buy consumer packaged goods with chemicals containing recycled CO<sub>2</sub>. *J. Clean. Prod.* 382, 135215.
- Song, J., Cai, L., Yuen, K.F., Wang, X., 2023. Exploring consumers' usage intention of reusable express packaging: An extended norm activation model. *J. Retail. Consum. Serv.* 72, 103265.