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THE SHARING ECONOMY IN PRACTICE: AN EXPLORATORY STUDY OF THE ACCEPTANCE AND USE OF DIGITAL PLATFORMS IN FOOD WASTE REDUCTION

Economía compartilhada na prática: Um estudo exploratório sobre aceitação e uso de plataformas digitais para a redução do desperdício de alimentos

La economía compartida en la práctica: Un estudio exploratorio sobre la aceptación y el uso de plataformas digitales para reducir el desperdicio de alimentos

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ABSTRACT

This article addresses the issue of reducing food waste by way of digital sharing economy platforms, which promote sharing by donating, selling and exchanging surplus food among institutions, commercial establishments and end consumers, thus boosting accessibility and improving food security. In order to succeed, these platforms need to be accepted by the market, but little is known about the acceptance and use factors of these platforms. Therefore, the study presented in this article identifies the factors that influence the acceptance and use of such platforms. The Extended Unified Theory of Acceptance and Use of Technology (UTAUT2) was used as a theoretical basis for developing an embedded case study on the Ecofood platform. In addition to secondary data collection, interviews and direct observations were carried out in two cities in Southern Brazil. Effort expectancy was identified as the key factor for use behavior, and two new factors (trust and gratefulness) were identified as factors that influence intention behavior and use of the platform. Three propositions were developed to summarize the findings and guide future research.

KEYWORDS | Sharing economy, digital business platforms, food waste reduction, UTAUT2, embedded case study.

RESUMO

Este artigo aborda a questão da redução do desperdício de alimentos por meio de plataformas digitais de economia compartilhada, as quais promovem o compartilhamento por meio da doação, venda e troca de alimentos excedentes entre instituições, estabelecimentos comerciais e consumidores finais, melhorando a acessibilidade e a segurança alimentar. Para ter sucesso, essas plataformas precisam ser aceitas pelo mercado, mas pouco se sabe sobre os fatores de aceitação e uso dessas plataformas. Portanto, o estudo apresentado neste artigo identifica os fatores que influenciam a aceitação e o uso de tais plataformas. A Teoria Unificada Estendida de Aceitação e Uso de Tecnologia (UTAUT2) foi utilizada como base teórica para o desenvolvimento de um estudo de caso incorporado na plataforma Ecofood. Além da coleta de dados secundários, foram realizadas entrevistas e observações diretas em duas cidades do Sul do Brasil. A expectativa de esforço foi identificada como principal fator para o comportamento de uso, e dois novos fatores (confiança e gratidão) foram identificados como fatores que influenciam o comportamento intencional e uso da plataforma. Três proposições foram desenvolvidas para resumir as descobertas e guiar pesquisas futuras.

PALAVRAS-CHAVE */ Economia compartilhada, plataformas digitais de negócios, redução do desperdício de alimentos, UTAUT2, estudo de caso incorporado.*

RESUMEN

Este artículo aborda el tema de la reducción del desperdicio de alimentos a través de plataformas digitales de economía compartida, que promueven el compartir a través de la donación, venta e intercambio de alimentos excedentes entre instituciones, establecimientos comerciales y consumidores finales, mejorando la accesibilidad y la seguridad alimentaria. Para tener éxito, estas plataformas deben ser aceptadas por el mercado, pero se sabe poco sobre la aceptación y los factores de uso de estas plataformas. Por tanto, el estudio presentado en este artículo identifica los factores que influyen en la aceptación y uso de tales plataformas. Se utilizó la Teoría Unificada Extendida de Aceptación y Uso de Tecnología (UTAUT2) como base teórica para el desarrollo de un estudio de caso incrustado en la plataforma Ecofood. Además de recolectar datos secundarios, se llevaron a cabo entrevistas y observaciones directas en dos ciudades del sur de Brasil. La expectativa de esfuerzo fue identificada como el factor principal para el comportamiento de uso, y dos nuevos factores (confianza y gratitud) fueron identificados como factores que influyen en el comportamiento intencional y el uso de la plataforma. Se desarrollaron tres propuestas para resumir los hallazgos y guiar la investigación futura.

PALABRAS CLAVE */ Economía compartida, plataformas digitales de negocios, reducción del desperdicio de alimentos, UTAUT2, estudio de caso incrustado.*

INTRODUCTION

According to the UN's Food and Agriculture Organization (FAO 2011, 2017), every year about 1.3 billion tons of food are lost or wasted globally, an amount that could feed 2 billion people. Instead, 821 million people go hungry everyday around the world, and food insecurity in Latin America has risen from 7.6% in 2016 to 9.8% in 2017 (World Food Programme, 2019; FAO, 2018). Because of the severity of the problem, food is mentioned in several of the 17 Sustainable Development Goals of the United Nations, such as zero hunger and responsible consumption and production. Goal 12.3 in particular proposes: "by 2030, halve per capita global food waste at the retail and consumer levels and reduce food loss along production and supply chains, including post-harvest losses".

Therefore, identifying ways to reduce food loss and waste is empirically relevant for its contribution towards reducing hunger, food insecurity and the overuse of natural resources. Digital platforms can be a part of the food waste solution, as they can promote consumer awareness and facilitate surplus food transactions between people, which complies with the two priorities suggested by the hierarchy proposed by the US Environmental Protection Agency (EPA) that uses the "reduce, reuse, recycle" approach (NRDC, 2017).

The high waste that occurs at the end of the food supply chain can be understood as excess resources that are available to some consumers, and that must be used and shared, since these resources are perishable and have different expiry dates, depending on the type of food and its storage conditions (Parfitt, Barthel & Macnaughton, 2010). Platforms of the sharing economy can, therefore, optimize the excessive capacity of these goods through information technology (Gan *et al,* 2018), thus increasing access to healthy food, and encouraging resource efficiency (Muñoz & Cohen, 2017).

Even though there is a significant gap in our understanding of the implications of food waste in fast-developing countries, such as the BRICs (Brazil, Russia, India and China) (Parfitt, Barthel & Macnaughton, 2010), there are few academic studies about food waste in Brazil (Henz & Porpino, 2017), and no study has ever analyzed the acceptance and use factors of these platforms. For this reason, the study in this article used the Extended Unified Theory of Acceptance and Use of Technology (UTAUT2), developed by Venkatesh, Thong and Xu (2012) to analyze the factors that influence the acceptance and use of Digital Platforms for Reducing Food Waste (food platforms, for short). The application of the UTAUT2 in different countries and different technologies is also relevant, according to Venkatesh, Thong and Xu (2012), and there are only two Brazilian studies that have used this theory, and food platforms were not addressed.

The project aimed to identify which factors influence the users' acceptance and use of food platforms. As secondary objectives, we sought to identify: (i) different types of food platform, and (ii) key factors related to the acceptance and use of food platforms. Because of this, we undertook an embedded case study of the Ecofood platform.

The results show that all the factors pointed out by the UTAUT2 model were found in the field, but some adaptations were necessary due to the specificity of the case and the context. The analyses uncovered trust and gratefulness as factors that influence intention behavior and use of the food platforms. We also identified a new relationship between effort expectancy and use behavior, which may be a contribution to the UTAUT2 model, summarized in three research propositions.

In the following sections, we present the theoretical background, the methodology used for mapping out the food platforms, and the embedded case study on Ecofood. The results are then shown, followed lastly by the conclusion.

THEORETICAL BACKGROUND

This section presents the food waste problem, food platforms as a possible solution for this problem, and the UTAUT2 used to analyze the acceptance and use of food platforms.

The food waste problem

The FAO (2014) estimates that the total cost of food waste could reach $ 1 trillion a year, but a further $ 700 billion relating to the environmental impact, and $ 900 billion associated with social costs. In short, food waste negatively impacts access to consumption due to increasing food prices, which reduces the economic gains of food chains and increases food insecurity (Lipinski *et al*, 2013; CAISAN, 2018; Dunning, Johnson & Boys, 2019; Gromko & Abdurasalova, 2018; Papargyropoulou *et al*., 2014; Brancoli, Rousta & Bolton, 2017).

It is also estimated that the world's population is expected to grow from 7.7 billion in 2019 to 9.7 billion in 2050 (United Nations, 2019), and in order to feed the entire population food production needs to increase by 70% (FAO, 2009, 2017), with demand for animal food also increasing by approximately 70% by 2050 (Searchinger *et al*., 2018), requiring more resources than plant-based products. Unfortunately, the approach used to feed the growing global population in recent centuries has been based on chemical fertilizers and pesticides in tandem with the growth in arable land (Garcia-Garcia, Woolley & Rahimifard, 2015). These facts are worrying, since the increase in food demand is the main factor of deforestation and land degradation worldwide (Gromko & Abdurasalova, 2018), while food waste is the third largest emitter of greenhouse gases in the world, after China and the United States (Food Loss and Waste Protocol, 2016).

Thus, reducing food loss and waste is the most efficient and sustainable way of feeding the entire population. To this end, it is extremely important to adopt more sustainable approaches to production and consumption, by addressing food waste consciously, and avoiding CO_2 emissions, which will require the involvement of public, private and civil society bodies (Papargyropoulou *et al.,* 2014; Thi, Kumar & Li, 2015).

There is, however, both controversy and disagreement in the literature as to the definition of food loss and waste. The first discrepancy is that some authors separate loss from waste (FAO, 2011; WRAP, 2009), while others use the term waste to represent all lost and wasted food in the chain (FUSIONS, 2014). This study adopts the FAO (2011, p. 2) definition, so "food losses take place at production, postharvest and processing stages in the food supply chain (...) Food waste occurring at the end of the food chain (retail and final consumption) which relates to retailers' and consumers' behavior". Exhibit 1 shows the causes and impacts of food waste, as well the solutions for reducing food waste that are found in the literature.

Despite the FAO (2011) pointing out that developed countries waste more food than developing countries, the study performed by Porpino *et al* (2018) shows that Brazil is one of the countries with the highest levels of food waste in the world, with an average family waste of 128.8 kg per year, which is higher than in some developed countries. Despite the relevance of this fact, there is a lack of studies on food waste in Brazil (Henz & Porpino, 2017), so this study focused on food platforms that redistribute surplus food for human consumption, and promote awareness of the issues.

Exhibit 1. **Summary of causes, impacts and solutions for food waste reduction**

	Descriptions	Authors
Causes	Consumer behavior, as stringent high quality and esthetic standards. Lack of planning and carelessness of consumers regarding the expiry date of food. A large monthly purchase, hampering the management of the food in stock Prioritization of food abundance and freshness, performing the bountiful preparation of food and discarding leftovers. Cultural behaviors. Poor recycling systems Lack of adequate awareness education programs for reducing waste. Lack of private sector participation and funding to improve services aimed at reducing loss and waste. Lack of coordination among supply chain stakeholders. Sales contracts between producers/farmers and buyers can also lead to crop waste	Thi, Kumar and Li (2015), FAO (2011), CAISAN, (2018), Parfitt, Barthel and Macnaughton (2012), Brancoli, Rousta and Bolton (2017), Porpino et al (2018), WRAP (2009).
Impacts	Increased production to compensate for loss and waste (natural overuse) Water waste (agriculture accounts for 70% of the world's annual use of water resources). Inefficient use of natural and financial resources Food insecurity Negative impacts on consumer access due to rising food prices. Reduces the economic gains of food chain actors Increased use of fertilizers. Deforestation, loss of biodiversity and natural ecosystems. Terrestrial acidification and aquatic eutrophication Methane and carbon dioxide emissions that cause climate change The carbon-related impact embedded in the earlier stages of the food life cycle that has been wasted.	Lipinski et al (2013), FAO (2014, 2017), CAISAN (2018), Food Loss and Waste Protocol (2016), Gromko and Abdurasalova (2018), NRDC (2017), Papargyropoulou et al. (2014), Brancoli, Rousta and Bolton, (2017), FUSIONS, (2014), Garcia-Garcia, Woolley and Rahimifard (2015).
Solutions for reducing food waste	Consumer awareness strategies (public campaigns, changing the labeling and packaging system, portion reduction in restaurant dishes, purchase planning and proper storage, among others). Research and development of technological innovations to reduce food waste New business models that connect stakeholders in the chain through information technology. Greater coordination among stakeholders, improving communication, process and operations in the supply chain. Redistribution of edible and healthy food for human consumption The amendment and implementation of laws and regulations that promote and facilitate food donations. Production of animal feed with food being diverted from the food chain Bioenergy generation Composting, creating a nutrient-rich organic fertilizer. Anaerobic digestion Incineration, and disposal on landfill sites or as sewage.	FUSIONS (2014), NRDC (2017), Papargyropoulou et al. (2014), Garcia-Garcia, Woolley and Rahimifard (2015), Lipinski et al. (2013), Gromko and Abdurasalova (2018), FAO (2011), Parfitt, Barthel and Macnaughton (2010), CAISAN (2018), Searchinger et al. (2018), Porpino et al (2018), Henz and Porpino (2017), Thi, Kumar and Li (2015)

Source: The author

Digital platforms for reducing food waste

The concept of sharing has its origin in the old days, when relatives and close friends shared resources (Belk, 2014). The act of sharing food is observed in several species and was first documented anthropologically in primitive hunter-gatherer societies. Surplus food was generally shared to avoid wasting resources (Morone *et al.*, 2018).

Despite sharing being an old concept, it has been improved due to advances in information and communication technology, which allow scale sharing (Cohen & Kietzmann, 2014). Only in the early 2000s, however, did the sharing concept start being used more widely in commercial activities due to the scarcity of natural resources, and driven by the use of the internet, which increased connectivity between the online and offline world (Botsman & Rogers, 2010). The technological advances made possible the proliferation of web and mobile platforms for food sharing (Michelini, Principato & Iasevoli, 2018), mainly because information technology connects people who wish to share food, thus increasing the effectiveness of sharing practices (Morone *et al.*, 2018).

In literature the term 'sharing economy' has synonyms, such as collaborative consumption, peer-to-peer economy, collaborative economy, gig economy and shared economy. Despite the fast expansion of the term in recent years, there is no consensus regarding the definition of the sharing economy (Koopman, Mitchell & Thierer, 2015; Kumar, Lahiri & Dogan, 2018; Muñoz & Cohen, 2017). For this reason, in this article we have adopted the Koopman, Mitchell and Thierer (2015) definition, which considers the sharing economy as the coordination of people to acquire or distribute any kind of underutilized resources in exchange for monetary or non-monetary benefits. Thus, food platforms include the exchange, sale and even the donation of food (D'Ambrosi, 2018). These platforms define food waste as an optimization problem, which is understood as being inefficient consumer coordination (Harvey *et al.*, 2019).

In short, food platforms allow access to surplus food, avoid waste and hyper-consumption, and move the global economy towards sustainability (Cohen & Kietzmann, 2014). In essence, this business model reduces the cost of accessing food, meets customers' needs and allows for greater resource efficiency (Muñoz & Cohen, 2017; Botsman & Rogers, 2010). However, even though food sharing practices have increased due to consumer awareness of socio-environmental and ethical problems caused by food waste, there are still few individuals who know and use food platforms (D'Ambrosi, 2018).

According to Kumar, Lahiri and Dogan (2018) and Piscicelli, Ludden and Cooper (2018) there is a triadic dynamic between service enablers (platforms), service providers (those that host the resources and provide the service, like suppliers) and clients (who consume and pay for the resources and services, the end consumer) in the sharing economy. The benefits for consumers who interact on the platform increase with the number of suppliers, and vice versa. The sustainable economic success of these platforms, however, depends on the acquisition and retention of users (Kumar, Lahiri & Dogan, 2018). Currently, the reasons for sharing food found in the specialized literature are varied and complex (Harvey *et al,* 2019), as shown in Exhibit 2.

Extrinsic factors (economic, social and environmental) constitute the advantages promoted by food platforms that are more or less attractive to users. Intrinsic factors, on the other hand, are inherent to the individual, as ideals or desires that may propel them to use food platforms, or not. Considering that the study by Kumar, Lahiri and Dogan (2018) found there to be a high turnover of customers and suppliers in these business models, we first need to understand the causes of user acceptance and use of food platforms from a theoretical perspective.

Exhibit 2. **Factors that influence the acceptance and use of food platforms.**

EXTRINSIC FACTORS	ECONOMIC	Cost reduction to end consumers Immediate gratification after sale Income from the sale of surplus food Better adjustment to seasonal demand
	ENVIRONMENTAL	Lower environmental pollution Saving natural resources, automotive resources and labor Better use of food, avoiding waste and food shortage. Waste management laws and rules imposed by governments.
	SOCIAL	Increases food availability and access More social and cultural interactions Ease to use (providing minorities inclusion) Social inclusion Waste management laws and rules
INTRINSIC FACTORS	PERSONAL IDEALS	Pleasure to be part of the platform Social and environmental concern Cooperation spirit, empathy and solidarity. Networking and socialization
	PERSONAL DESIRES	Independence Autonomy Convenience of food service

Source: created based on Koopman, Mitchell and Thierer (2015), Kumar, Lahiri and Dogan (2018), Muñoz and Cohen (2017), D'Ambrosi (2018), Gan et al. (2018) and Cohen and Kietzmann (2014).

The Extended Unified Theory of Acceptance and Use of Technology (UTAUT2)

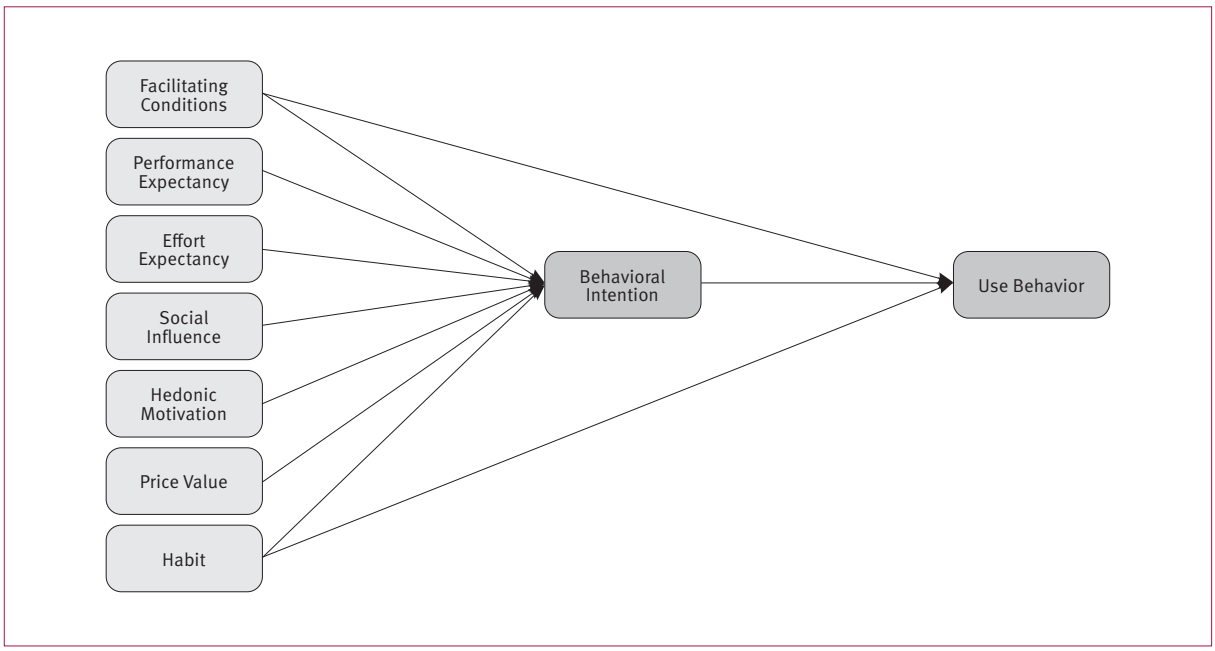
Samaradiwakara and Gunawardena (2014) compared 14 technology acceptance theories and concluded that UTAUT is an "improved theory", since it is the theory with the highest explained variance. The development of the UTAUT was based on eight technology acceptance and use models for understanding employee acceptance and use of technology (Venkatesh *et al,* 2003). UTAUT2, by extension, was developed to examine consumer acceptance and use of technologies. Hence, there is a greater explained variance than in the original UTAUT (Venkatesh, Thong & Xu, 2012).

This study used UTAUT2, since platform users (suppliers and end consumers) are understood to be platform consumers. Venkatesh, Thong and Xu (2012, p. 159) define the four determinants of UTAUT as:

> *performance expectancy* is defined as the degree to which using a technology will provide benefits to consumers in performing certain activities; *effort expectancy* is the degree of ease associated with consumers' use of technology; *social influence* is the extent to which consumers perceive that important others (e.g., family and friends) believe they should use a particular technology; and *facilitating conditions* refer to consumers' perceptions of the resources and support available to perform a behavior.

The new determinants included in the UTAUT2 model are hedonic motivation, price value and habit. *Hedonic motivation* is characterized as the fun or pleasure an individual derives from using technology, and is the intrinsic motivation of the model. *Price Value* is an important factor for consumers with regard to decision making about intention and the use of technology, because consumers bear the price of using technology. *Habit* is characterized by the way individuals perform behaviors automatically, and is a critical factor that drives the use of technology (Venkatesh, Thong & Xu, 2012). Figure 1 illustrates the UTAUT2 model.

Figure 1. **UTAUT2 model**



Source: Venkatesh, Thong & Xu (2012).

Another important change in Venkatesh, Thong & Xu's (2012) model is that *facilitating conditions* are directly related to *use behavior*, because a consumer who has access to favorable conditions is more likely to use the technology. Although the model is constructed quantitatively, other studies have used the UTAUT in a qualitative way (Batane & Ngwako, 2017; Knoblock-Hahn & LeRouge, 2014; Bixter *et al*, 2019; Mejia & Torres, 2017; Lo, Jenkins & Choobineh, 2017; Sovacool, 2017), as does this study. Venkatesh, Thong and Xu (2012) also suggest the application of the model in different countries and technologies, so applying the UTAUT2 in the Brazilian context of food platforms is timely.

METHODOLOGY

Our study was based on qualitative exploratory research (Richardson, 2007). The method was divided into two phases: (i) mapping out food platforms and; (ii) developing an embedded case study (Yin, 2003), both described below.

Phase 1: Mapping out food platforms

In order to select a single relevant and representative case to be studied in depth, so as to respond to the first specific study objective, we mapped out existing food platforms. This process took place during the first three months of 2019, as Table 1 describes. We only selected platforms that fit the concept adopted by the study, which is: food platforms that bring together at least two user groups, and explicitly address solutions for the problem of food waste.

We identified 773 companies, of which 60 are food platforms, and excluded those platforms that are replicated in the different databases.

Table 1. **Number of platforms for food waste reduction found in databases**

Database	Keywords	Total Analyzed	Total of food platforms
CrunchBase	"Sharing Economy", "Food and Beverage"; Food Processing"; "Food Delivery"; "Organic Food"; "Snack Food"; "Food Truck" / "Food sharing"	30	5
AngelList	"Sharing Economy"; "Food sharing"	120	15
FoodTech Movement	"Recycling and Waste"	10	3
App Store	"Food sharing" and "desperdício"	105	20
Google Play	"Food sharing" and "desperdício"	501	25
Liga Ventures	"Reuse of Waste and Discards"	7	5
Total		773	60

Source: The authors.

To understand the different types of food platform better, we analyzed and divided the 60 platforms into groups considering their: purpose (donation, sale, sale and donation, exchange, or awareness); types of user (retailers, farmers/food producers, restaurants, NGOs, neighbors, needy people, final consumers, etc.); and transaction model (B2B, B2C or C2C). This analysis enabled us to identify five different types, as detailed in Exhibit 3.

Exhibit 3. **Types of Food Platforms**

SALES PLATFORMS	
Local Markets	
- Homemade meals to final consumers (C2C)	Mapha Food Share, Dinnrtime.com, Nomnom, Watscooking.com, Alimentto and Foodly
- Local producers to buyers (B2B)	FreshSpoke, Farmily and Ugly
- Local producers to consumers (B2C)	Share.Farme, Earthineer, PULL UP A SEAT, Freshist and Wastee
Conventional Markets	
- Business to business (food close to expiry date)	Saveadd and Food Finder
- Business to consumer (food close to expiry date)	Wesaveeat, Ecomida, YourLocal, Fairmeals, Pratododia, Food Flow, Ecofood, Desperdício Zero and Ndays
- Schedule the meal sale	RefService

Continue

Exhibit 3. Types of Food Platforms

Concludes

DONATION PLATFORMS	
Donation from companies	
- NGOs	Food4All and No Food Waste
- Not necessarily needy people	Share Your Food
-Needy people (sometimes hungry students)	Unsung and Share Meals
Donation from individuals	
- Not necessarily needy people (between neighbors)	Ratatouille, Yo No Desperdicio, pApperplate and Findwhatsleft
- Needy people (sometimes there are volunteers as users)	Share Food Online
Donation from individuals and companies	
- Not necessarily needy people	OLIO, Comida Invisível and Shusha.exactscores.com
- Needy people (sometimes there are food banks and volunteers as users)	Community Fridge, Food2Share, Sharing Food and Happiness, Food4needy and Frigo Solidale
Food donation through monetary donations	
- Needy people	ShareTheMeal
SALES AND DONATION PLATFORMS	
- Food purchase app (a percentage of sales is donated to charitable organizations)	NeighbourFood
- Sale or donation of homemade food (between natural people)	Eathentica
- Donation or sale at a reduced price (always from business to final consumer)	All You Can Share and CropMobster
- Donation or sale of food by natural or legal people	foodonate and Ripelist
EXCHANGE PLATFORMS	
- Between B2B	Gurbi and Grow Share
- Between C2C	SwapEat
AWARENESS PLATFORMS	
- Shopping list and pantry management	BEEP, Spesa Facile App and Groceree.
- Food management (shopping list and pantry) and exchange	Share Food and EatBy App
- Recipes to avoid food waste	Kozinhar

Source: The authors.

From the typology presented in Exhibit 3, we can observe that most were *sales platforms* (26 platforms), while the largest number of sub-types was the *sale of food near the expiry date from business to consumer* (nine platforms). The relatively high number of platforms for this kind of purpose indicated that this was the best-developed type at that moment. We then analyzed these platforms in more detail to identify the ideal business to consumer (B2C) type for the focus of our case study. As can be seen in Table 2, we extracted our case from a stratified sample (Flyvbjerg, 2006).

Table 2. **Sales Platforms for food near the expiry date from business to consumer (B2C)**

Platforms	Origin	Download	Instagram followers	Facebook followers
Wesaveeat	Spain	10.000+	1.058	635
Ecomida	Chile	(not found)	444	3.321
YourLocal	Denmark	10.000+	2.286	3.931
Fairmeals	Portugal	1.000+	890	1.390
Pratodia	Brazil	100+	640	304
Food Flow	Brazil	10+	930	354
Ecofood	Brazil	10.000+	11.300	1.746
Desperdício Zero	Brazil	(not found)	1.437	84
Ndays	Brazil	*	71	9.007

Source: data extracted from Google Play, Facebook and Instagram in 2019 July.

*Web app: it means that this platform operates on the website, and is not an app offered by App Store or Google Play.

Phase 2: Case study development

To select the best developed and most relevant food platform for our research, we analyzed the number of downloads of mobile apps, and the number of followers on two social media platforms, Facebook and Instagram (see Table 2). As a result, the platform we selected was EcoFood, which can be considered a "critical case", i.e.: what applies to this case will possibly also apply to other cases in the same subcategory (Flyvbjerg, 2006).

EcoFood is a platform that connects businesses that often generate surplus food (restaurants, bakeries, candy stores and small and medium-sized grocery stores, etc.) with consumers who might be interested in buying it at reduced prices. Such transactions would, therefore, reduce food waste. Users post and order food on the platform, and must pick it up within the period required by the establishment, since EcoFood does not have a delivery service. The platform used to operate in seven cities in Brazil: Londrina, Campo Mourão, Arapongas, Rolândia, Ibiporã and Maringá in Paraná, and Balneário Camboriú in Santa Catarina. However, due to contractual problems in 2019, it reduced its operations in Paraná to just three cities: Londrina, Maringá and Campo Mourão.

We analyzed the acceptance and use of Ecofood in two different cities where this platform operates, which enabled a comparison between cities, and increased the validity of the study. We collected data from users that

have surplus food (suppliers) and users interested in acquiring this food (consumers). The embedded case study, therefore, had two units of analysis (data from two cities) and two subunits (data from suppliers and end users) in each analysis unit. We also analyzed secondary data, performed direct observation, conducted interviews, and triangulated data to develop more consistent and elaborate propositions (Eisenhardt, 1989). Data were collected in Londrina, where the app received the most acceptance from users, and Balneário Camboriú, where the app was the least well-accepted. These two cities were chosen precisely because they represented the market extremes for the company.

We interviewed both the suppliers with highest and lowest ratings in the app, as well as frequent users and those who had used the app to buy food just once, or never. Again, the collection of data at the extremes allowed us to better assess the reasons for using (or not using) the platform. Exhibit 4 summarizes the data collection.

Exhibit 4. **Summary of data collection**

Data source	Description	Period	Role
Exploratory interviews	Conducted with the owners, by calls and a face-to-face meeting, to understand the field and align expectations.	From July to August 2019.	Helped develop the semi-structured script, which was tested and reformulated once, making the questions open and simple to understand by all education levels
Semi-structured interviews	Interviews with the consumers and suppliers adopted many forms, such as face-to-face, by video conference, e-mail, call and instant messages. In total, 26 individuals were interviewed: 14 suppliers and 12 consumers. All interviews were recorded and transcribed.	From August to November 2019.	Main source of data, enabling an understanding of the main factors of acceptance and use of food platforms.
Secondary data	Analysis of 12 newspaper reports, 3 purchase reports provided by EcoFood, in addition to 114 posts, 1.347 comments and 265 ratings from Facebook, Instagram, Google Play and the App Store.	From January to December 2019.	Understanding the perspective of users and corroborating and validating the data provided by the interviewees.
Direct observations	Observations of food collection from establishments and the experience as a platform consumer in Londrina. Altogether, 13 direct observations were registered.	From August 21st to August 24th and from October 16th to October 23rd, 2019.	Understanding the interactions between users and how the technology works.

Source: The authors.

We analyzed the data using the NVIVO software, according to the techniques and procedures proposed by Strauss & Corbin (2008). The first phase consisted of open coding, allowing new concepts and ideas to emerge from the field, which was a more inductive phase of analysis that focused on the raw data. Axial coding then allowed emerging concepts and ideas to be grouped together. The findings were compared with the UTAUT2 reflexively. The last phase consisted of selective coding, when the categories and subcategories created during the analysis were refined. The software helped with the analysis process, and facilitated resumption of the raw data and the storage of the logical process performed by way of notes made in memos.

Finally, we analyzed the data for each city separately, compared them in order to identify patterns and differences in the same platform, and prepared our propositions (Eisenhardt, 1989). In order to increase the validity and reliability of the study, we made a study validity table (Exhibit 5), as suggested by Yin (2003).

Exhibit 5. **Study validity table**

Tests	Definition	Research strategies
Construct validity	Correct operational measurement for concepts, requiring multiple data input sources for triangulation.	Literature review about Food Loss and Waste, Sharing Economy Business Platforms and UTAUT2. Identification of user acceptance and use factors through the interviews involving the two user groups on the platform, and also by way of secondary data and direct observation. Validate the factors discovered through data analysis with the previous literature.
Internal validity	Establish a non-spurious causal relationship, seeking evidence for the reason behind relationships.	Data triangulation, through interviews, direct observation and secondary data collection. Search for patterns in subgroups of analysis (between the two user groups in each city).
External validity	Establish the domain for generalization (research drawing).	Data from different cities (Londrina in Paraná and Balneário Camboriú in Santa Catarina) were analyzed, and the different users involved in the platform (suppliers and consumers) were interviewed, which validates the findings at each of the different points of the platform. Proposition elaboration from the cross analysis between the cities (based on literature).
Reliability	Reliability of case study operations, to enable the repetition.	Recording and transcription of the interviews, archiving the field notes from the direct observation and secondary data, as well as the analysis file made in NVIVO.

Source: The authors.

RESULTS

Initially the data for each city were analyzed separately and later cross-analyzed, enabling differences to be identified. Exhibit 6 summarizes the analyses for each city.

Exhibit 6. **Cross-analysis of the data from the two cities**

	Londrina		Balneário Camboriú	
	Consumers	**Suppliers**	**Consumers**	**Suppliers**
Performance Expectancy	- Good quality service and good relationship - Lack of product variety and establishments registered - Long service time due to communication failures - Suitable to the user's lifestyle - More product accessibility	- Food waste reduction in the establishment and reduction of financial losses - Promotion of the establishment through the app - Acquisition of new customers	- Mutual benefits for establishments and consumers. - Lack of variety of products and establishments registered. - Good quality service and agility - Lack of internal communication in the establishment - Inappropriate to the user's lifestyle	- Food waste reduction in the establishment and reduction in financial losses - Promotion of the establishment through the app
Effort Expectancy	- Ease of use - Lack of delivery - Restricted pick-up time	- Ease of use - Previous experience with other apps - Easy to implement	- Easy to use - Lack of delivery - Restricted pick-up time	- Easy to use - Previous experience with other apps - Management effort to keep the right product availability on the app
Social Influence	- Influenced by people and establishments - Users become influencers	- Platform's owners contact them - Employee indication or media - Image improvement	- Instagram and social media - Digital influencers - Users become influencers	- Platform's owners contact them - Image improvement
Facilitating Conditions	- Cordial support - Good informal communication channel - Lack of formal communication channels (only by email, not convenient for users who prioritize practicality and response speed) - Good compatibility with smartphone systems - Clause for allergy sufferers in the adhesion term - Payment form (only by credit card)	- Training offered by platform - Cordial support - Good communication (though e-mail, phones, text messages, and even personal contact) - Usability problems (impossibility of correcting information released on the day, and problems with incorrect voucher validation)	- Cordial support - Need more payment options - Failure in the communication channel (most of the consumers interviewed did not know that the app had stopped operating in the region).	- Training offered by platform - Cordial support - Failure in the communication channel (failure in the sales notification and some establishments unaware of app operations discontinued).
Hedonic Motivation	- Environmental awareness	- Environmental awareness - Social awareness	- Environmental awareness - Social awareness	- Environmental awareness - Social awareness
Price Value	- Financial savings promoted by platform - Time savings (no need to cook) - High quality products - Large portions delivered	- Revenue increase	- Financial savings promoted by platform - High quality products	- Revenue increase - Absence of monthly fees
Habit	- Intermediate use frequency - Habit of searching for offers on the app	- High use frequency	- Low use frequency - Users forgot the platform	- Low use frequency

Source: The authors

As can be seen in Exhibit 6, communication between users and the platform is very different in each city, especially with regard to suppliers. In Balneário Camboriú, many suppliers claimed they were demotivated because of low sales and dissatisfaction with failures in sales notification. They were also not notified about the app being discontinued. In Londrina, on the other hand, a relationship of proximity and friendship between the suppliers and the platform has resulted in a more personalized service, which promotes satisfaction and motivates suppliers to continue using the platform. These findings are in line with Morone *et al*. (2018) and D'Ambrosi (2018) who claim that the lack of direct social contact between users and platforms can cause distrust and fear in using it, thus negatively affecting food sharing.

In both cities, consumers complained about the effort needed to collect food at restricted times, and the lack of variety in the establishments and the products registered. This fact has reduced the frequency of use of consumers in Londrina, and made it difficult to acquire and retain users in Balneário Camboriú.

This indicates that: (i) in order to retain suppliers, it is necessary to maintain efficient communication and a personalized service, and; (ii) in order to retain consumers, it is necessary to offer more establishment and product options, in addition to a delivery service.

Through the analyses in the two cities, we adapted the UTAUT2 items to better suit the context and technology we studied. Exhibit 7 describes these adaptations.

Exhibit 7. **Factors and components adapted to food platforms**

Factors	Components	Descriptions
Performance Expectancy	Usefulness perceived	User's perception regarding the usefulness of the platform in their routine (for end consumers and establishments).
	Advantage perceived	Advantages pointed out by users when using the platform, whether financial, due to waste reduction or some other factor.
	Quality of service	User's perception of the service offered by the establishment, and the speed of the service.
	Variety	Perception of variety of registered products and establishments, and the perception of users consumption variety via the platform.
	Lifestyle	The perception that the platform suits the lifestyle of the end consumer or the establishment's routine operations.
Effort Expectancy	Easy to use	How users perceive the platform usability, if the system is easy and intuitive. In this case, previous experience, a simple system and similarity of the platform with other platforms facilitated its use.
	Delivery	How users perceive the effort needed for pick up the food, and the restrictions with regard to collection times. In this case, both users reported dissatisfaction with the lack of delivery.
	Implementation effort	Perception of effort made by the establishments to implement the platform, either due to a change in production or in the employees' operations for the use of the platform.
	Availability management	Efforts made by the establishments to maintain the correct information on the platform system, avoiding the incorrect release of vouchers.

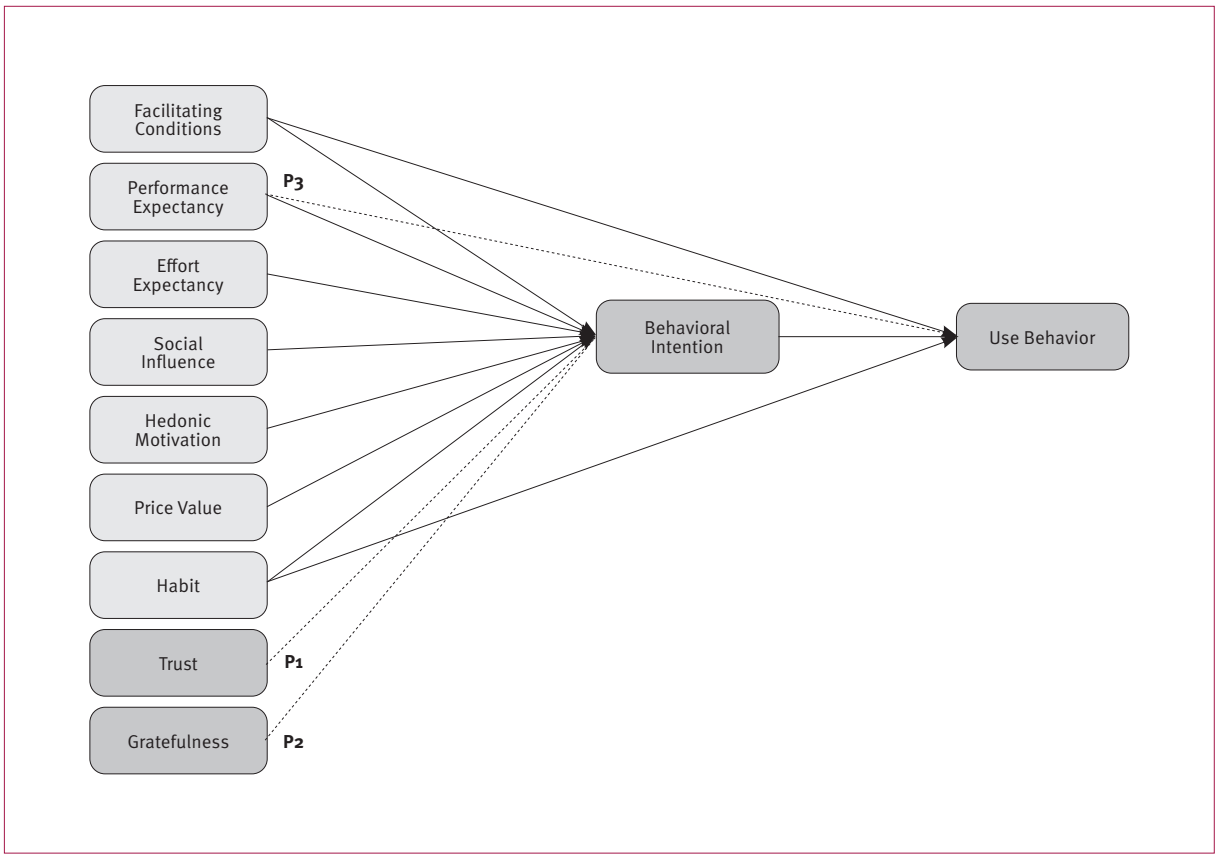
Exhibit 7. Factors and components adapted to food platforms

Factors	Components	Descriptions
Social Influence	Influenced	How users were influenced to use the platform, and how they discovered the platform, via friends, social media, relatives, etc.
	Influencers	How users of the platform influence others to use it.
	Image	Changing others' perceptions of platform users, whether the user's image changed after starting to use the platform or not.
Facilitating Conditions	Cordial support	Quality, readiness and attention given by the platform support.
	Compatibility	Platform compatibility with the different devices and operating systems (IOS and Android).
	Communication channels	Variety of communication channels maintained by the platform, and their good functioning for adequate information flow.
	Payment	Payment options available via the platform, which may facilitate or hinder consumer use.
	Training	Training offered by the platform for establishments, and the quality and clarity of the training.
	Conditions for allergy sufferers	Clauses in the adhesion term to better serve users who have food restrictions due to food allergies.
Hedonic Motivation	Environmental awareness	Concern shown by users regarding environmental causes.
	Social awareness	Concern shown by users regarding social causes.
Price Value	Financial savings	Perception of cost reductions for the final consumer.
	Revenue increase	The establishment's perception of increased revenue from the sale of surplus food.
	Time saving	Perception of reduced time for preparing meals by end consumers.
	Product quality	Quality and value perceived by consumers with regard to the food offered through the platform.
	Monthly payment	The absence of a monthly fee for using the platform, which is seen as positive by the establishments.
Habit	Use frequency	The number of times and the frequency with which the platform is used by the users.
	Open the app	Habit to open the application and search for offers, otherwise, the user may forget the platform.

Source: The authors

Analysis of the data that emerged from the two cities enabled us to identify two new factors that influence behavioral intentions and the use of the technology (trust and gratefulness), and that modify the association of an existing factor that influences the use of the technology (effort expectancy). Figure 2 presents the modified version of the UTAUT2, according to the recognizably limited results of our research. Indeed, the development of the following three propositions serve this exact purpose: they can be used as the starting point for future research.

Figure 2. **Adapted UTAUT2 model**



Source: Venkatesh, Thoung & Xu (2012) adapted by the authors.

P1: Trust influences behavioral intention and use of food platforms

According to Flavián, Guinalíu and Gurrea (2006, p. 2) "trust is defined as a group of beliefs held by a person derived from his or her perceptions of certain attributes", considering the brand, products and services on offer, the point of sale and the cordiality of the sellers, among other factors. The authors emphasize that trust is multidimensional, and depends on the honesty, benevolence and competence perceived by the consumer in relation to the seller's actions and products. Trust is crucial to online shopping, as consumers are required to trust the privacy and data security system of the platform on which they make their purchases and to which they entrust their personal and even credit card details (Hoffman, Novak & Peralta, 1999).

In analyzing the empirical data of the case, we realized that ***consumer trust*** relates to the perception of: data security, the quality of the food delivered (due to the reputation of the establishments registered on the

platform), the food delivered being good and safe to eat, and the platform being honest and correctly transferring the value of the sales to the establishments' bank accounts.

Hence, the first components of trust relate to ***data security***, the feeling of security when registering his or her personal and credit card details, as explained by the quote from consumer E: "the card is registered there and nothing was ever charged, unless I bought it". Users trust that the platform will not charge incorrect amounts to their cards, and will keep their data safe. The second component of trust relates to the ***quality and reputation of the supplier.*** The user believes in the quality of the food delivered because of the reputation of the establishment that is registered on the platform (either because of the user's prior knowledge, or the platform's internal reputation system). The third component is ***confidence in the food delivered.*** Users know and are confident that the food delivered is safe and good for consumption, even if it is not so fresh or attractive appearance-wise. The fourth component of trust is ***confidence in the payment system.*** Suppliers are sure that the platform will transfer the money from the sales payment to them. In the beginning, the platform's owners had to personally contact each business to build confidence that the platform would not steal from them. Later, they began to trust the platform due to the reputation of the restaurants that were already registered.

P2: Gratefulness influences the behavioral intention and use of food platforms

Being grateful is defined as being: "appreciative of benefits received or expressing gratitude" (Merriam-Webster, n.d.). By extension, in the case in question, **gratefulness** can be understood as the user's perception of satisfaction with using the platform, and their feeling of thankfulness and pleasure at being part of the change that the platform proposes. **User satisfaction** is caused by good experiences and expectations being met, as supplier I reported: "On the contrary. In fact, we only have good things (to say about the platform)" and supplier J substantiated this view by saying: "What I see is that it's good in this way (...) Expectations are being met". **Gratitude** is expressed by being thankful for the service provided by the platform, as supplier B stated: "In fact, I have to thank Ecofood for giving me this opportunity". Finally, consumer I said: "I just really thank you for the initiative". The feeling of being part of the change also seems to keep users engaged and active on the platform.

P3: Effort expectancy influences the use behavior of food platforms

According to the analyses, most users stopped using the platform because of the perception that the effort needed to use the app was excessively high (effort expectancy). In practice, restricted times for consumers to collect the food and automatic release failures in the system were seen as being a lot of effort by users at both ends (suppliers and consumers). Thus, effort expectancy seemed to be the main factor for continued use of the platform (in technical jargon, *user retention* by the platform owner). In other words, even if users are hedonically motivated, and have a positive perception of performance expectancy, price value, facilitating conditions, and social influence, these are not sufficient to guarantee that the user will effectively engage with the platform.

Finally, the analysis indicated there was little hedonic motivation, social influence or habit. Perhaps social influence and hedonic motivation are not so relevant for food platforms; we expected that most users of this type of platform would have significant environmental and social concerns. Most of them, however, use the app

because of financial savings (for consumers) and increase in revenue (suppliers). Habit and social influence were seldom mentioned. Some interviewees reported knowing the app via digital influencers, but this did not make them frequent users. Explanations for this fact seem to relate to the perception of value generated by the user (performance expectancy), the effort necessary to use the app (effort expectancy), the communication and support provided by the platform owner (facilitating conditions) and the price value. In summary, the most important constructs seem to be performance expectancy, effort expectancy, facilitating conditions, and price value.

CONCLUSION

In this article we identified which factors influence the acceptance and use of food platforms, first by identifying and classifying the different types of food platform, and then, the key acceptance and use factors via an embedded case study.

Although Michelini, Principato and Iasevoli (2018) classified the food sharing platforms mentioned in academic literature and found on Google Play and App Store, their search focused only on food redistribution platforms, i.e., they did not include other types of food platform, such as consumer awareness platforms and food exchange platforms. Therefore, by identifying different types of food platform, our study contributes to the literature on digital business platforms.

The study also contributes to the academic literature by discussing how digital platforms in the sharing economy can reduce food waste, and the key factors that influence the acceptance and use of such platforms. According to our research, the main constructs are performance expectancy, effort expectancy, facilitating conditions, and price value. Perhaps the combination of these constructs generates habit, which is something to be pursued in future research. Correspondingly, the results of our research also indicated that social influence and hedonic motivation do not appear to be relevant when it comes to accepting and using food platforms. Analysis of the case study also allowed us to identify two new constructs (*trust* and *gratefulness*) and to add a new relationship between *effort expectancy* and *use behavior*. We summarized these findings in three research propositions. Our study also contributes to the evaluation and adaptation of an existing theory (UTAUT2) to a new technology (food platforms) and context (Southern Brazil).

The main limitation of the study refers to the single case study method. Limited external validity does not allow the theoretical model to be generalized and extended to include all other types of digital business platforms. In this regard, we hope that further research investigates this theme, so as to validate or refute the suggested adaptations to the UTAUT2. Both quantitative and qualitative studies, as well as studies to verify the specificities of other platform types listed by the mapping out process should be pursued. Finally, studies aimed at understanding the relationship between users, intermediated by platforms, are also required, either through relational theories or network analysis.

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AUTHORS' CONTRIBUTIONS

Laís Moltene performed the theoretical-methodological construction and the collection and analysis of the data. Laís Moltene and Renato J. Orsato worked together in the final revision of the manuscript.

