8 Digital Platforms for Circular Business Model Innovation

A Case-Study to Tackle Food Waste

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Introduction

Current food systems require an unsustainable utilisation of environments and natural resources. Indeed, they are mainly based on an intensive use of rich soils and freshwater, produce large amounts of greenhouse gas emissions, and are contributing to global biodiversity losses (Steffen et al., 2015; Whitmee et al., 2015). These factors have led to a sound increase in humanity's environmental footprint to such an extent that it estimated that nowadays humans need the resources of 1.75 Earths, with EU residents requiring 2.8 Earths (Global Footprint Network, 2019). Unfortunately, the stable growth of the global population will exacerbate this trend over the years. The current population is estimated at 7.7 billion people, and, according to the United Nations, it will reach 9.7 billion people in 2050 (United Nations, 2019). Most of this growth is projected to take place in advanced economies and, in particular, in cities, in which 70% of the world population is expected to establish itself by 2050. Therefore, actual food production and consumption systems will be further challenged by the urbanisation processes, requiring an increase in the food demand (Alexandratos & Bruinsma, 2012; Springmann et al., 2018; Tilman et al., 2011).

Despite those challenges posed to current food systems, according to recent data released by the Ellen MacArthur Foundation, about one-third of all food produced globally is wasted (Ellen MacArthur Foundation, 2019). So, if food waste were a country, it would be the third in the world for what regards greenhouse gas emissions (FAO, 2017; Gustavsson et al., 2011). As a consequence, food waste results in environmental and societal damages, as well as economic losses for all

the actors involved along with the food systems. Interestingly, these three aspects are the three components of the sustainability paradigm (i.e., social, environmental, and economic).

The most significant part of food waste is generated in the late stages of the food supply chain, or it has a domestic origin (Stenmarck et al., 2016). Although, in general, consumers do not cause food waste deliberately and consider food waste as a negative behaviour (Rohm et al., 2017; Van Geffen et al., 2020), changing this behaviour represents a tough mission (Aschemann-Witzel et al., 2015; Farr-Wharton et al., 2014). In this, digital platforms can constitute a proper solution since they can match food provision and demand, enabling transparent transactions between consumers and retailers and giving full information about food whilst guaranteeing its security (De Bernardi, Bertello, et al., 2019). However, the technology per se is not able to vehicle value to consumers (Chesbrough, 2010, p. 355). Companies need to capture that value and deliver it by incorporating it in their business model (Chesbrough & Rosenbloom, 2002; Osterwalder & Pigneur, 2010; Teece, 2010; Zott & Amit, 2010). By leveraging new technologies to shape their business model and contribute addressing the sustainability paradigm, companies give birth to what is called a sustainable business model (Baima et al., 2020; Schaltegger et al., 2012; Stubbs & Cocklin, 2008; Yang et al., 2017). So, a sustainable business model can be defined as a business model able to give companies a great competitive advantage, creating higher value for customers, while enabling companies to achieve the sustainable development of themselves and the whole society (Lüdeke-Freund, 2010). In this sense, a sustainable business model incorporates the three "P"s of the famous triple bottom line approach proposed by Elkington in 1994 (Elkington, 2018): profits, people, planet. In other words, this approach suggests that "the overall performance of a company should be measured based on its combined contribution to economic prosperity, environmental quality and social capital" (European Commission, 2001, p. 26).

In recent years, the presence of enabling technologies and a shift in the attitude of companies and consumers towards addressing sustainability and face wicked problems have led to a gradual shift from the "make-use-dispose" paradigm of current linear economies to circular economy practices (Stahel, 2016). Some studies have started investigating circular business models (Bocken et al., 2014; Geissdoerfer et al., 2018; Linder & Williander, 2017; Pieroni et al., 2019) but the management literature is still scant in this regard, especially for what concerns the food sector (Galati et al., 2018; Pohlmann et al., 2019; Zucchella & Previtali, 2019). So, this chapter aims to investigate how a digital platform can reduce the food waste generated in the late stages of the food supply chain by developing a circular business model which connect retailers and end-users.

To tackle this issue, the case study methodology has been applied for exploring a digital-platform-based food start-up that has been able to build a circular business model for addressing the food waste problem. By doing so, the authors have been able to present a novel framework for investigating the circularity paradigm in innovative business models for sustainability.

Theoretical Background

From Traditional to Circular Business Models

Although the subject of business models has been well established in the literature for some time now, a universally accepted definition of such concept has not yet been provided (Porter, 2001; Zott et al., 2011). The definition of BM, in fact, evolves depending on the perspective used and the changes in the institutional environment (Franceschelli et al., 2018; Zott et al., 2011). Any attempt to define BMs must, therefore, be subjected to a continuous dynamism that is well summarised by the succession of the most famous definitions.

A traditional definition of business model has been developed by Chesbrough and Rosenbloom (2002), who described a business model as the way in which the value proposition is articulated, the target market is identified and the revenue mechanisms—as well as the structure of the whole value chain—are defined, in order to capture value from converting technologies into economic outcomes.

In line with this perspective, Osterwalder and Pigneur (2010) have developed their business model concept around two elements, namely, the cost structure and the revenue flows. The former is generated by the key resources, key partners, and key activities. Conversely, the latter are generated by customer segments, customer relationships, and distribution channels. All these elements depend on the value proposition, which is the core of a company's activities.

More recently, assuming that business models should represent a clear picture of how firms create, deliver, and capture value (Magretta, 2002; Teece, 2010), the concept of value itself has begun to be re-conceptualised. In this regard, economics is not the only lens used to look at the concept of value (Bocken et al., 2013; Evans et al., 2017). In particular, perspectives such as psychology, sociology, and ecology offer a different lens to bring both objective and subjective dimensions (Den Ouden, 2012). More specifically, from a sustainability perspective, the value creation logic should integrate economic goals with social and environmental goals into a more comprehensive meaning of value (Schaltegger & Wagner, 2011). As suggested by Yang et al. (2017), to innovate their business models, companies should integrate into their business models the perspectives of value uncaptured as "the potential value that could be captured but has not yet been captured" (p. 1796).

The perspective adopted by Yang et al. (2017) allows a more comprehensive understanding of value to promote sustainability, focussing not just on "how", "what", and "with whom" the value is shared but also "how much" and "to what extent" the value is shared.

This growing orientation to sustainability issues has been driven by the greater attention companies pay to the environment in which they operate and by the increasing openness towards the various stakeholders, who are even more often seen as co-creators of value (Bresciani, 2017; Freudenreich et al., 2019; Resciniti et al., 2019). The food sector is assuming a key role in the transition to more sustainable business models for a more sustainable society (De Bernardi, Azucar, Forliano, & Bertello, 2020; Nirino et al., 2019). The food industry has a huge impact on the environment and the society (Santoro et al., 2017; Vrontis et al., 2016) since it contributes to and suffers from environmental degradation, especially human-induced climate change and deforestation. Moreover, it can provide farming communities with livelihoods and incomes; it can also fuel land grabs that undermine community rights and wellbeing. Policymakers have recognised the intrinsic importance of the food industry in dealing with these issues. For instance, in 2015, the United Nations have released the 17 Sustainable Development Goals (SDGs) (De Bernardi, Bertello, Venuti, & Foscolo, 2020; Moggi et al., 2018). In the same year, the European Commission has released the research and innovation policy (De Bernardi, Azucar, Forliano, & Franco, 2020). In this way, policymakers have identified the following priorities: nutrition for sustainable and healthy diets, climate-smart and environmentally sustainable food systems, the circularity of food systems, and innovation and empowerment of communities.

The circularity of food systems has become one of the most prominent challenges currently. Circular business models have the main aims to create sustainable value and to employ a proactive multi-stakeholder management (Geissdoerfer et al., 2016; Pieroni et al., 2019), through the adoption of a long-term perspective majorly oriented to (i) close, (ii) slow, (iii) intensify, (iv) dematerialise, and (v) narrow resource loops (Tunn et al., 2019). With this regard, closing a loop means that "the goods of today are the resources of tomorrow at yesterday's prices" (Stahel, 2012, p. 55) since produced waste can be reintegrated into companies' supply chains through reuse or recycling. Closed loops are typically reflected in minimising emissions, resource use, pollution, and waste, and in maximising the resource efficiency of material assets (Lüdeke-Freund et al., 2019; Rosa et al., 2019).

Digitalisation as Enabling Tool for Circularity

The previous section—after a brief examination of the evolution over time of the BM concept—has pointed to the focal role of food companies in

promoting an economy based on sustainability and circularity. This transition is called upon to dialogue with the current socio-economics changes, increasing competition, and the establishment of new disruptive technologies such as big data and Internet of Things (IoT) (Bresciani et al., 2016; Maloni & Brown, 2006; Santoro et al., 2017). For example, customers can access information about products more easily and require at the same time greater product variety with specific dietary and customised facets (Costa et al., 2007) as, for example, healthier food that does not affect the natural environment and human health (Franceschelli et al., 2018). Digital platforms, moreover, have been proved to stimulate collaboration across stakeholders, reducing the distance between producers and customers and facilitating the knowledge exchange among the various actors involved in the supply chain (Attia & Essam Eldin, 2018; Fait et al., 2019). Ciulli et al. (2020), in their analysis of digital platform organisations as waste recovery enabler in the food supply chain, highlighted as the extant literature has so far overlooked the role that digital technology can play in transferring and recovering discarded resources between supply chain actors. According to Ciulli et al. (2020), food waste recovery is often hampered by the "circularity holes" (i.e., missing linkages between waste generators and potential receivers). With this regard, digital platforms may assume a brokerage function to bridge circularity holes which affect supply chains in the food sector and reduce the barriers causing food waste both from the consumer and the supplier side. Even though the increasing importance of circularity in the food sector and the potential role which digital tools may have in the development of circular BMs, only a few studies have analysed real and virtuous case studies of food companies (Bianchini et al., 2018). This study aims to tackle these issues by leveraging the circularity paradigm and by positing the following research question:

> RQ. How can digital platforms reduce the food waste generated in the late stages of the food supply chain?

Methodology

Research Design and Context

This work is exploratory in nature and involves a qualitative approach, trough in-depth interviews and document analysis. A single case study of the digital platform Too Good To Go (TGTG) has been conducted because of the lack of knowledge regarding how digital transformation can lead companies to adopt circular business models in the food industry. TGTG developed an app that can be used to buy food for a discounted price that otherwise would be discarded. This can be done at restaurants, hotels, bakeries, cafes, and supermarkets. Via the app, a so-called magic box can be

bought because the buyer does not know in advance which food products are in the "magic box". After purchasing the "magic box", it has to be picked up by the consumer who made the purchase, often within a defined time slot to assure food quality. In this way, the local entrepreneur is supported and generates less food waste and will possibly get new customers (van der Haar & Zeinstra, 2019). Established in Copenhagen in 2015, TGTG has rapidly extended its business to other European Countries overcoming 14 millions of users. TGTG represents the most important reality for reducing the food surplus in the world. As reported in the website of the organisation, 27.081.177 magic boxes have been sold so far, saving approximately 68.000 tons of CO_2.

Data Collection and Analysis

Data collection has consisted in semi-structured interviews and online document analysis. Two semi-structured interviews have been conducted with the business developer of TGTG in Italy, who has shown her availability to provide new detailed information after a discussion with the top management of Copenhagen. The interviews have been recorded, transcribed, and coded, generating open, axial, and selective codes according to Corbin and Strauss's procedure (1990). The other source of information were document analysis and direct conversations with the European education manager of the company. Especially, document analysis consisted in analysing the organisation's websites, including website text, reports, and multimedia sources, and any other online document related to the organisation. These data were collected to corroborate and integrate findings from interviews (De Bernardi, Bertello, & Shams, 2019; Patton, 2002). Online documents have been analysed with the same procedure of the interviews (Corbin & Strauss, 1990). Next section will provide the results of the study, especially focussing on how a BM can move from a linear to a circular perspective by leveraging collaborations through a digital platform.

Findings

The examination of the case study enabled the authors to shed light on the so-called win-win-win logic followed by the company, where the planet, retailers, and consumers take advantage from the digital platform. Indeed, TGTG ambitious objective is to reduce the amount of waste that in traditional supply chains is generated at every step (see Figure 8.1) and capturing part of its value.

Interestingly, the app acts as a digital platform able to intermediate between the late stages of the supply chain and, particularly, between retailers, which play the distributor role, and consumers. In this way, it is able to drastically reduce the production of waste in those steps where the majority of food is generally discarded (see Figure 8.2). Indeed, through

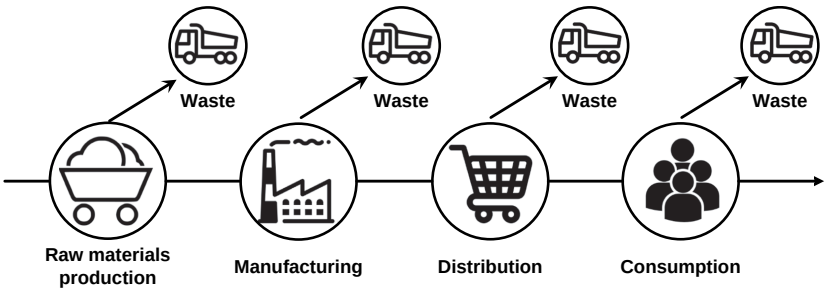

Figure 8.1 A Vision of the Traditional Food Supply Chain.

Figure 8.2 Food Waste Reduction along the Supply Chain after Too Good To Go Intermediation.

TGTG retailers (e.g., bakeries, supermarkets, cafes, shops, restaurants) can offer food that is near to its expiration date or fresh food that remains unsold at the end of the day at a discounted price to consumers. According to Jamie Crummie, one of the founders of TGTG, through his company not only retailers increase their earnings but they are also able to reduce their costs associated to waste management: "We're placing a value on something which businesses have traditionally had to spend a lot of money to get rid of—by that I mean their waste and waste disposal costs—we're shifting an established approach" (Crummie, 2019).

A more in-depth analysis of how TGTG works enabled the authors to develop a novel framework (see Figure 8.3) for describing how a digital-based platform can contribute to addressing the sustainability paradigm

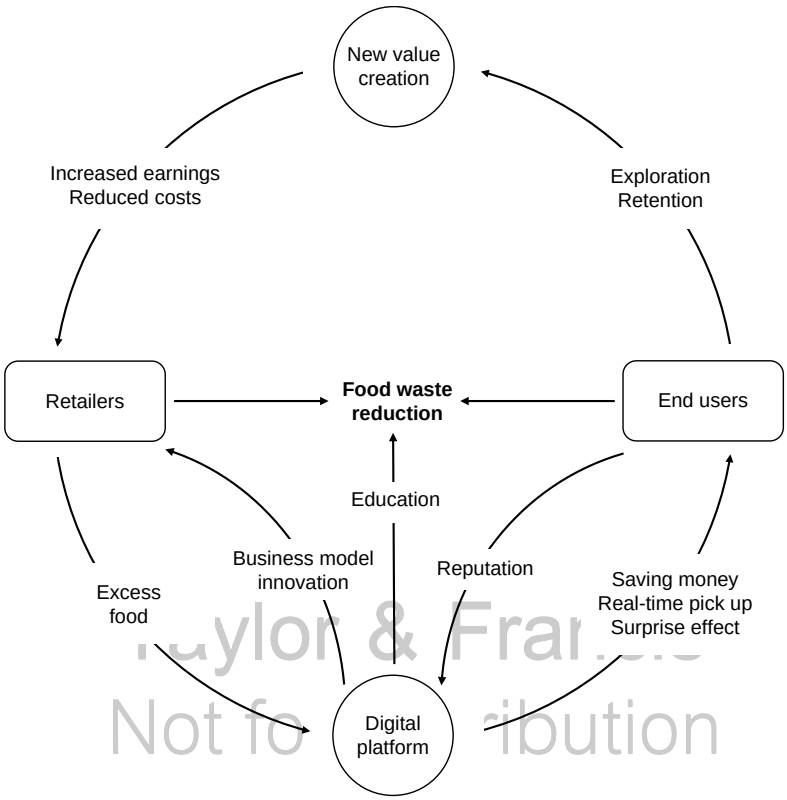

Figure 8.3 The Digital Platform-based Framework for Reducing Food Waste.

whilst empowering food retailers and consumers to create new value. So, besides innovating their business models in a more sustainable way, the digital platform enables food suppliers to improve their brand images and reputation by leveraging their corporate social responsibility. Moreover, since the app acts as a marketing platform, businesses can both retain a loyal customer base or attract a new one sensitive to discover new foods, look for high discounts, or help facing ecological and ethical themes.

Moreover, the end user benefits from the possibility to collect the food at a selected time or even in real time so that every necessity can be satisfied. To further reduce the use of material, the app incentivises consumers to bring with themselves a bag for collecting the food or retiring it in the form of a "magic box", since they cannot know in advance what they are going to buy. This choice has been explained by the business developer of TGTG, who stated:

> Our users prefer to keep the app less customer-centred, not knowing in advance what there is inside magic boxes. In fact, they are more interested in saving food rather than following their taste. Moreover, due to the nature of food waste, retailers know what is unsold just at the end of the day and we cannot ask them to spend time loading this kind of information within the platform.

In addition to that, there is a real surprise effect when a magic box is opened. According to the interviewee, most of the consumers admitted to being really surprised the first time they opened a magic box from both the food quantity and quality. Additionally, since most of the users are very aware of food waste, few users discard the collected food (van der Haar & Zeinstra, 2019). They usually prefer to share it with homeless people or acquaintances such as friends or relatives. In this way, end-users of TGTG contribute to addressing the triple bottom lines of sustainability: economy, environment, and people.

Finally, the company is so committed to the cause of reducing food waste that it has developed a whole section of its website for describing its efforts in this direction. So, it can be observed how it is financing educational programmes in schools, pushing toward political changes in the countries where it is operative, and sensitising and involving other actors of the food supply chain in joining its cause. Moreover, the company is planning to launch a new massive online open course for promoting food circularity and sustainable practices and in which one of the authors has been involved. More exactly, the willingness to engage and sensitise the broader public as possible is so intimately rooted in TGTG's vision that, according to the education manager of the company, there were no alternatives rather than structuring it in the form of an open-access course.

Conclusion

Given the deep changes affecting the food industry and the increasing concerns about sustainability issues (Cozzio et al., 2018; De Bernardi, et al., 2020), business model circularity has been suggested as a key way to enhance both competitiveness and sustainability through new value propositions and business management methods (Ciulli et al., 2020). The article has shown how a food digital-platform-based startup has developed his business model according to a win-win-win logic centred on economic, social, and environmental benefits.

This chapter provides several theoretical contributions. First, it contributes to the literature on the food industry (Giacosa et al., 2017; Vrontis et al., 2016) with a specific regard to food start-ups, analysing the possible development of circular business model innovation. Second, it aids to the literature on sustainable business models which is assigning increasing importance to the issue of circularity (Pieroni et al., 2019).

Third, it contributes to the literature on digitalisation by explaining how digital platforms can be an effective tool for enhancing sustainability according to the triple bottom line approach and establishing partnerships among different stakeholders (Lazazzara et al., 2020; Scuotto et al., 2017; Shams et al., 2019; Vrontis et al., 2017).

From a managerial perspective, the authors suggest a useful framework that can be applied to contribute to the circularity cause. More specifically, the findings suggest several elements that are useful for discovering new value propositions and developing sustainable business models (Zucchella & Previtali, 2019). Accordingly, a very precise business model is needed, and findings show that the success of TGTG can be reconducted due to its positioning not just as an app provider but from the assumption of other functional roles. Notably, in the case under study, an educational role has been assumed and value has been created sensitising people on reducing food waste far beyond reaching only the users of the app. In this sense, entrepreneurs could also consider building valuable networks to supply the required expertise and resources, and eventually consider leveraging other revenue streams, especially when the digital platform is provided for free to its users.

This chapter is not free of limitations. Its main weakness lies in the fact that it presents a single case study. Given the relevance of the topic, future studies should broaden the reflection by conducting comparisons among countries to understand how different cultures can influence the logic of circularity. In this regard, TGTG represents a good case study since it has been expanding in many European countries. Furthermore, further studies should analyse not only the business model of the platform but also how it impacts the various business models of those retailers who adhere to this initiative.

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