



## **Embedding transparency on digital services: A case study of the food sector**

Marcella Lomba, Aguinaldo dos Santos

marcellaln@gmail.com; asantos@ufpr.br

Design & Sustainability Resesarch Center, Federal University of Paraná. Rua General Carneiro, 460, Ed. Dom Pedro I, sala 717, Centro – Curitiba – Brazil, CEP 80060150

### **Abstract**

Transparency is one of the principles to promote sustainable provision of services, being the ability of a service to communicate social, environmental and economic practices and performance. Digital technologies are continuously expanding the possibilities to increase the level of transparency across all stakeholders associated with service profession. However, while transparency has been pointed to as a key priority in innovation agendas in various sectors, there is still lack of knowledge on its practical implications for service design. The food sector is one of the most critical in terms of addressing transparency, due to the global need for transformations in food production and consumption systems, in order to become more inclusive, sustainable and healthy. This research conducted ex-post-facto case studies, followed by an Action Design Research carried out within a small company of organic food delivery. The paper presents the outline of a framework to diagnose the state of transparency on a service that can also be used on the creative phase of the Service Design process.

Keywords: transparency, digital services, food sector, sustainability

## Introduction

The term transparency may have a different meaning depending on the context, being applied in many areas such as business management, marketing, production management, law and government, among others (Schiefer & Deiters, 2013). In general, for organizations to be more transparent, it implies greater communication and information openness, requiring accountability. As organizations become more transparent, they will also become more reliable and accountable (Rawlins, 2008).

According to the World Economic Forum (2018), fostering transparency and trust is key to creating responsible models of consumption for the benefit of business and society. It is an emerging theme with opportunities to address more significant contributions from research on the integration of transparency in digital services for business facing increasing demand from consumers for greater control, understanding and participation in decision making and the evaluation of practices associated with the service delivery (Wognum et al., 2011; Schiefer et al., 2014; Ostrom et al., 2015; World Economic Forum, 2018).

The food sector is at the forefront of the global efforts to enhance transparency (Tapio et al., 2016). In part, these efforts have been pushed by scandals related to animal maltreatment, toxin contamination, pesticides, fraud, among others. Such events have contributed to enhance concerns among consumers regarding food quality and safety and, consequently, rising awareness about the impact of production practices on communities and on the environment (Wognum et al., 2011).

The design community has already formed a field of study called Food Design, which proposes to apply knowledge, methods and strategies to improve our relationship with food (Latin American Food Design Network, 2017). Yet, despite such efforts, the available knowledge regarding the heuristics, tools and methods associated with the use of transparency on the Design of Services directed towards the food sector, is still rather absent. There is clearly a great amount of tacit knowledge among practitioners but the emerging digital technologies are providing affordances for transparency that are yet to be explored.

Reflections on the theme points to the research opportunity of exploring more user-centered approaches for enhancing transparency on digital food services, which does require the development of heuristics and tools that support the role of Designers. In this paper the authors report and investigation on the theme carried out via ex-post-facto case studies

followed by and Action Design Research applied on a local organic food delivery company. The objective was to contribute to the practice of Service Design with a framework to diagnose the state of transparency on a service that can also be used on the creative phase of the Service Design process.

## Digital services

The everyday activities and routines such as food shopping, urban mobility, entertainment, education and medical treatment, are all being strongly influenced by new technologies, especially the digital ones (Celaschi, 2017; Penin, 2017). Indeed, in the food sector, for instance, there is already an intense use of Food Sensors, Internet of Things (IoT), Mobile Applications and Internet Connectivity Platforms, Big Data, Advanced Analytics, Artificial Intelligence and Blockchain as well as other emerging digital technologies (World Economic Forum, 2018).

Digital innovations can help transform global food systems, shaping consumer diets, consumption behaviors and promoting value-chain linkages and stimulate further collaboration among stakeholders (Celaschi, 2017; World Economic Forum, 2018). In such context, Service Design can play a fundamental role because, despite technological evolution, the relational social aspects and the integration of so many different touchpoints into a coherent experience, requires the competencies of Designers to develop meaningful innovations (Verganti, 2008; Penin, 2017).

The term *digital enabled services* has been used to refer to all services based on information and communication technologies, where the degree of digital dependency may vary according to technology, market and business adoption (Penin, 2017). There is an array of possibilities for those involved in designing services in this emerging context. In this respect Hartwig & Billert (2018) have proposed a service typology, where services are categorized according to the interaction between service provider and the customer and, also, the use of information technology and communication (ICT). Conventional services are characterized by a physical interaction between the service provider and customer (person-to-person), e.g., financial advice provided on the branch of a Bank. In contrast, a digital service can be characterized by a direct customer interaction with the service through digital touchpoints. In this case, the

digital touchpoint (typically a website or mobile app) acts as a mediator for the service delivery, e.g., online banking and online shopping.

Digital service touchpoints and channels not only influence customer perceptions of a company's value propositions but, in the case of digital services, is the main channel to influence the meanings that consumers depict throughout their journey (Bitner & Wang, 2014; Vorhees et al., 2017; Penin, 2017). Design can strongly influence individual and group behavior in ways that restrict or support customer and employee service experience, which is a direct opportunity to promote more sustainable patterns of consumption and production.

The study reported on this paper focuses on the digital services applied on the food sector. Besides of the lack of research on the theme on the literature, the motivation also came from the fact that digital services in the Brazilian food sector were still scarce at the time of the research. The situation was in contrast with the global landscape in which services are delivered and experienced, where profound changes have derived from digitalization (Ostrom et al., 2015).

## **Transparency in the food sector**

Transparency in the food sector can be defined as the ability of a product, service or process to communicate relevant and accurate information about food safety, quality and integrity, as well as social, environmental and economic practices and performance required to deliver it (Wognum et al., 2011; Schiefer & Deiters, 2013). Besides the aspect of information visibility, from a controlling perspective, food transparency can also have a pro-active role on developing awareness and competences about sustainability, both on the customer as well as on the stakeholders.

The most common approaches to improve transparency for the customers in the food sector, focuses on the communication about product technical attributes in a more business-driven perspective, following the requirements imposed by regulations (Wognum et al., 2011; Schiefer & Deiters, 2013). It can also be observed with the use of certification logos and product labelling. However, although these conventional approaches are replicable in digital contexts, the emerging digital technologies have open new opportunities for more efficient and effective transparency (World Economic Forum, 2018). It allows, for instance, customization of transparency according to the customer needs and, with technologies

such as Blockchain, a service provide highly reliable information in real time to all stakeholders. Indeed, digital information can be captured from different sources and stages, processed, delivered and used from and for different stakeholders. Indeed, digital information can be captured from different sources and stages, processed, delivered and used from and for different stakeholders, with an unprecedented level of interactivity and accuracy.

## **Method**

The study adopted a systematic and non-systematic literature review on the theme, in order to build up a theoretical framework. One of the focus was on previous studies that have investigated service transparency in the food sector. Subsequently, the research involved the investigation of a set of ex-post-facto (or after-the-fact) case studies (Yin, 2001). The selection of the cases considered solutions based on emerging digital technologies, typically from food tech companies. The selection criteria also considered the selection of companies with at least 2 years of existence and, also, services that attempt to influence consumption decisions in the direction of a healthier and/or more sustainable choice.

Finally, in order to conceive and test a proposition of a framework for assessing transparency on digital services, the research included an Action Design Research, conducted in partnership with a local organic food delivery company. This Action Design Research did involve the use of digital ethnography with customers of the partner company, in order to understand their consumption behaviors, perceptions and, very importantly, their expectations regarding food transparency.

Participants were recruited based on socio-demographic characteristics and food consumption styles patterns that, were described using three persona profiles: a) Conventional Consumers, whose food choices are driven by convenience and price; b) Health Consumers who prioritize health care in food consumption and c) Sustainable Conscious Consumers whose food attitudes towards sustainable consumption. The field work involved a total of six participants.

The assessment of the level of transparency of the existing service as well as the development of new propositions, was carried out through co-creation workshops with the company directors. That included a discussion about the strategic implications of enhance transparency on the

digital service of the partner company. The main result of this experience is a framework for assessing / creating service transparency, combining the literature review, the empirical research findings obtained on the ex-post-facto cases and the proposition tested on the Action Design Research phase.

## Key research findings

The literature review pointed to five categories of transparency practices. Despite being predominantly product-oriented, the authors concluded that these categories could be extended to a service perspective: a) environmental; b) social and ethical; c) production process; d) information handling and e) consumer education.

Critical analysis of the ex-post-facto cases allowed the identification of eight categories of solutions, grouped according to four clusters, as shown in Table 1.

Name	Description	Key transparency practices
<b>Farm to table food delivery</b>		
<b>CASE01</b> UK	Online commerce grocery with a focus on ethically sourced food from local producers. - Powered by Data Analytics	<ul style="list-style-type: none"> <li>- Easy to know the people behind the food and trusted suppliers</li> <li>- Customers can visit the producers</li> <li>- Click to harvest and follow the food</li> <li>- Recipes to help on how to cook</li> <li>- Rich content about sustainable practices</li> </ul>
<b>CASE02</b> Brazil	Online commerce platform as a service for community gardening - Powered by Data Analytics	<ul style="list-style-type: none"> <li>- Customers can visit the plantations</li> <li>- Customers can choose what to grow</li> <li>- Customers can share and sell produced food</li> <li>- Online monitoring of the growing food</li> </ul>
<b>Food supply chain traceability</b>		
<b>CASE03</b> USA	General mobile app that provides insights based on food labels from different brands. - Powered by Blockchain, Data Analytics and Big Data	<ul style="list-style-type: none"> <li>- Easy and instantaneous access to food attributes information</li> <li>- Comprehensive view and insights on ingredients, allergens, additives and claims</li> <li>- Information on how products are produced and how ingredients are sourced</li> </ul>
<b>CASE04</b> France	Mobile app owned by a supermarket chain that provides product label-based data, - Powered by Blockchain, Data Analytics and Big Data	<ul style="list-style-type: none"> <li>- Easy and instantaneous access to information</li> <li>- Information on how products are produced and how ingredients are sourced</li> <li>- Information about key dates (eg.: when food was harvested or packed)</li> </ul>

<b>Healthy eating (nutrition and meals)</b>		
<b>CASE05</b> USA	Mobile app that offers personalized nutrition solutions based on user's self-reported data. - Powered by Artificial Intelligence, Data Analytics and Big Data	<ul style="list-style-type: none"> <li>- Personalized health indicators</li> <li>- Personalized food shopping recommendations based on dietary plan</li> <li>- Health coach with insights, goal setting and accountability in a gamified way</li> <li>- Recipes to help on how to cook</li> <li>- Rich content about health practices</li> </ul>
<b>CASE06</b> Brazil	Online subscription meal kit delivery allowing users to cook their own. - Powered by Data Analytics and Big Data	<ul style="list-style-type: none"> <li>- Meal preferences setup and customization</li> <li>- Chef-dietitian-approved meals by third parties</li> <li>- Certified organic handler and all organic ingredients clearly labeled on delivery</li> <li>- Easy to know people behind the food and trusted suppliers</li> <li>- Rich content about sustainable practices</li> <li>- Recipes to help on how to cook</li> </ul>
<b>Farming as a service</b>		
<b>CASE07</b> German	In-store farms, that provide individual modules that grow herbs, lettuce, fruits and all types of vegetables. - Powered by Data Analytics, Big Data and IoT	<ul style="list-style-type: none"> <li>- Placed in restaurants, grocery stores, where customers can directly see the production</li> <li>- Employees visit in-store farms twice a week to harvest mature plants and seed new ones</li> <li>- Customers have access to the plants at their freshest points, still alive with their roots</li> <li>- Introduce more varieties of plants</li> </ul>
<b>CASE08</b> German	Smart compact vertical farming system for home. - Powered by Data Analytics, Big Data and IoT	<ul style="list-style-type: none"> <li>- Online assistance and monitoring of the growing food</li> <li>- Easy and instantaneous access to information about the plantation</li> <li>- Introduce to more varieties of plants</li> <li>- Showroom visits to experience before buy</li> </ul>

Table 1: Example of transparency practices drawn from the multiple case studies

Combining data from the theory and the practical cases, it was possible to identify the most recurring transparency topics, as well as the least noticeable. The main practices identified are related to transparency about production processes, information handling and consumer education. Transparency regarding information about food through the supply chain, as well as customer's personal and usage information, had the greatest replicability between the cases.

From the ethnographic research, it was possible to identify key insights about the different user needs and perceptions about food consumption and transparency, when referring to the experience with a local service. The user's transparency requirements encompasses: a) information

handling; b) credibility; c) guidance on service activities;  
d) personalization; e) relationship with food powered by the service and f)  
food conscious consumption powered by the service.

The Healthy Consumers, expect that a more transparent service is supposed to enable a level of personalization and empowering the relationship with the food and an interface for personal care. The informational behaviour of the Health and Conscious Consumers, are similar, both are more open to access and interact with more detailed information about food, processes and producers. But the Conscious Consumers needs more information-checking for service credibility and trust.

### **Service transparency dimensions**

Based on a critical review of the literature, on the ex-post-facto cases and on the Action Design Research carried out on a food service provider, a framework for assessing digital service transparency is proposed (Lomba, 2020), structured according to three key dimensions (Figure 1). These dimensions guides service transparency diagnose, interventions on an existing service or, alternatively, to conceive new service concepts focused on a more transparent food service in which it is possible to describe how 'Design for Transparency' could intervene on the food service experience.



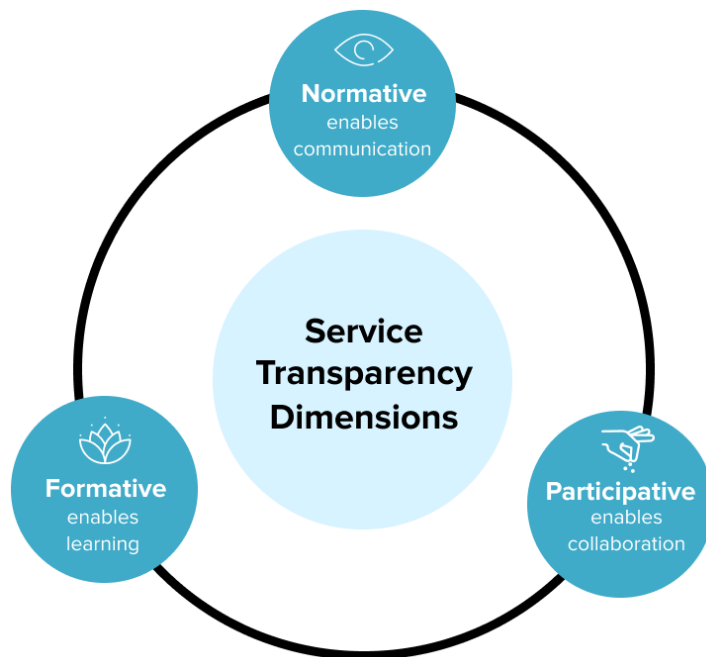


Figure 1: Service Transparency Dimensions

These proposed dimensions of service transparency are described below, according to their impact on transparency as well as the implications for the service provider.

### **Normative transparency**

This dimension allows the visualization of data or information required to comply with sector-specific norms and regulations. It is usually the first transparency strategy adopted by organizations. CASE03 and CASE04 approached normative transparency with the use of mobile applications in retail, such as the use of an augmented digital label based on the traceability enabled by blockchain. They offer a larger volume of data regarding food security, quality and integrity to the consumers, like nutritional composition, ingredients, food allergy alerts, food origin, processing methods, environmental, animal and social impacts, etc. Hence, on this dimension services can expand their transparency beyond mandatory information about food attributes, exploring the communication of other elements of the service delivery, such as the activities and stakeholders involved, highlighting information on the practices that contribute to a more sustainable consumption.

### **Formative transparency**

This dimension deals with the empowerment of the customer so that transparency is more effective. It emphasizes the development of competencies (knowledge, skills and attitudes) that will enable accurate interpretation of information and its conversion on better customer's decision making. CASE01 and CASE06 have approached formative transparency with the use of mobile social applications and web content platforms with supported artificial intelligence. Those technologies contributes to develop customers competencies related to healthy eating (eg.: culinary recipes and indications for consumption) and sustainable consumption (eg.: the people behind the food, the selection criteria for organic producers and how the service minimizes the impact on the environment).

### **Participative transparency**

This dimension deals with solutions on transparency that increase the engagement of the customer (as well as all stakeholders involved in the service), allowing a level of transparency in which customers can personalize (for themselves) and contribute (to the community) the continuous improvement of the service experience and its performance in relation to sustainability. In general, participative transparency is the last dimension presented on the investigated studies, including the company involved on the Action Design Research. It is clearly more likely to occur on user-centered services. CASE05 and CASE08 have approached the participative transparency with the use of mobile applications equipped with artificial intelligence, IoT and contextual interactions. The emphasis is on instrumenting engagement of customers by all relevant stakeholders, in all aspects of a service, thus allowing the customer to choose, exchange or sell, evaluate, among others forms of collaboration.

### **Conclusion**

In this paper we highlighted key implications of applying the principle of transparency on digital food services focused on the consumer perspective. It was identified that depending on the organization objective related to transparency, it may be necessary to intervene in the service channels and touchpoints, or even in the reformulation of the service's value proposition. Also, embedding transparency on digital services can contribute to induce customers to adopt more sustainable behaviors,

reducing the cognitive nearsightedness that often affect customers when making choices about food consumption.

In an age of constant connectivity, companies may enable a more systematic transparency level, across different digital channels and touchpoints, opening space for customer cooperation within the food sector and food infrastructure (Schiefer et al., 2014). However, embracing emergent technologies as building blocks for the future of food requires careful reflection since an overly technology driven approach carries the risk of creating other problems instead of helping customers (Celaschi, 2017). On the other hand, these technologies can enable an expanded perspective on transparency and its role for sustainability, with the possibility of a non-anthropocentric scope of information provided to the customer.

The authors understand that the proposed Service Transparency Dimensions are the building blocks for a framework to enable the implementation on Service Design. The heuristics associated with this framework are already known and will be the subject of future publications.

## References

- Bitner, M. J., & Wang, H. S. (2014). Service encounters in service marketing research. In *Handbook of Service Marketing Research*. Edward Elgar Publishing Ltd.
- Celaschi, F. (2017). Advanced design-driven approaches for an Industry 4.0 framework: The human-centred dimension of the digital industrial revolution. *Strategic Design Research Journal*, 10(2), 97-104.
- Hartwig, K. & Billert, M. S. (2018). Measuring Service Quality: A Systematic Literature Review. In: *European Conference on Information Systems (ECIS)*. Portsmouth, UK.
- Latin American Food Design Network (2017). Organic Charter. Buenos Aires, Argentina. Retrieved from <https://www.lafooddesign.org>.
- Lomba, M. N. (2020). Modelo para Diagnóstico da Transparência em Serviços Digitais para o Consumo mais Sustentável de Alimentos (A Framework for Diagnosing Transparency in Digital Services for Sustainable Food Consumption). Master's Dissertation. Curitiba: Federal University of Paraná.

- Ostrom, A., Parasuraman, A., Bowen, D., Patrício, L. & Voss, C. (2015). Service Research Priorities in a Rapidly Changing Context. *Journal of Service Research*, 18 (2), 127–159.
- Penin, L. (2017). *An Introduction to Service Design: Designing the Invisible*. London: Bloomsbury Publishing.
- Rawlins, B. (2008). Measuring the relationship between organizational transparency and employee trust. *The Public Relations Journal*, 2 (2).
- Schiefer, G. & Deiters, J. (2013). *Strategic Research Agenda on Transparency in the Food Chain Towards 2020*. International Center for Food Chain and Network Research. Bonn: Universität Bonn-ILB Press.
- Schiefer, G., Reiche, R. & Deiters, J. (2014). Transparency in Food Networks - Where to Go. *International Journal on Food System Dynamics*, 4(4), 283–293.
- Tapio, P., Saarimaa, R. & Vinnari, M. (2016). Editorial: Futures for food. *Journal of Futures*, 83, 1–3.
- Verganti, R. (2008). Design, meanings and radical innovation: a meta-model and a research agenda. *Journal of Product Innovation Management*, 25(5), 436-456.
- Voorhees, C., Fombelle, P., Gregoire, Y., Bone, S., Gustafsson, A., Sousa, R. & Walkowia, T. (2017). Service encounters, experiences and the customer journey: defining the field and call to expand our lens. *Journal of Business Research*, 79(1), 269-280.
- Wognum N., Bremmers H., Trienekens J., Van der Vorst, J. & Bloemhof J. (2011). Systems for sustainability and transparency of food supply chains - Current status and challenges. *Journal of Advanced Engineering Informatics*, 25(1), 65–76.
- World Economic Forum (2018). *Innovation with a Purpose: The role of technology innovation in accelerating food systems transformation*. Retrieved from <https://www.weforum.org/reports/innovation-with-a-purpose-improving-traceability-in-food-value-chains-through-technology-innovations>.
- World Economic Forum (2018). *Operating Models for the Future of Consumption: Shaping the Future of Consumption*. Retrieved from

<https://intelligence.weforum.org/topics/a1Gb00000038oKCEAY?tab=publications>.

Yin, R. K. (2001). *Case Study: Planning and Methods*. Porto Alegre: Bookman.