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SUSTAINABLE BUSINESS DIGITAL TECHNOLOGY-BASED MODEL: BIKEPOA CASE STUDY AS AN EXAMPLE

Modelo baseado em tecnologia digital para negócios sustentáveis: estudo de caso da BikePoa como um exemplo

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ABSTRACT

Environmental disasters attributed to global warming, strong media pressures towards an ecologically sustainable consumption, give path to alternative forms of green and sustainable consumption, like the sharing economy, a rising pattern in consumption behavior, based on accessing and reusing products to utilize idle capacity. The sharing economy holds the potential to bring effectiveness toward widespread sustainable business practices.

The research objective is to propose a sustainable business technology-based model using technology as mediator among the shared economy agents under the lens of Actor Network Theory (ANT). We have chosen, as a sample, BikePoa bicycle sharing system has 40 stations and more than 2,000 bikes, throughout the city of Porto Alegre, in Brazil. The research methodology followed Kozinets's (2006) participant-observational netnography. It was done 23 personal interviews with users and 7 with employees' provider, and later through Google Docs 251 questionaries' were selected. Findings point for two different factors consumers' inductors and providers 'connection factors.

Keywords: Environmental Sustainability, Sharing Economy, Technology Based, Bicycles

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RESUMO

Desastres ambientais atribuídos ao aquecimento global, fortes pressões midiáticas em direção a um consumo ecologicamente sustentável, dão lugar a formas alternativas de consumo verde e sustentável, como a economia compartilhada. Padrão crescente no comportamento de consumo, é baseado no acesso e reutilização de produtos para utilizar capacidade ociosa. A economia compartilhada possui o potencial de trazer eficácia para práticas empresariais sustentáveis.

O objetivo da pesquisa é propor um modelo baseado em tecnologia para negócios sustentáveis usando a tecnologia como mediador entre os agentes econômicos compartilhados sob a lente da Teoria Ator-Rede (ANT). Escolhemos, como amostra, o sistema de compartilhamento de bicicletas BikePoa, que possui 40 estações e mais de 2.000 bicicletas, em toda a cidade de Porto Alegre, no Brasil. A metodologia de pesquisa seguiu a netnografia participante-observacional de Kozinets (2006). Foram realizadas 23 entrevistas pessoais com usuários e 7 com o fornecedor dos funcionários, e depois, através do Google Docs, 251 questionários foram selecionados. Os resultados no estudo de caso, apontam para dois fatores diferentes: indutores e fornecedores dos consumidores, fatores de conexão.

Palavras Chave: *Sustentabilidade Ambiental, Economia Compartilhada, Tecnologia Digital, Bicicletas*

1 INTRODUCTION

Organizations based on digital sharing platforms such as Airbnb, Uber, Cabify, SmartBike, Freecycle and BikePoa are currently receiving considerable attention from consumers, market sectors, government and academia. The sharing economy is a rising pattern in consumption behavior based on accessing and reusing products to utilize idle capacity. PricewaterhouseCoopers Consulting predict that the main sharing economy sectors will generate revenues of approximately $335 billion by 2025 (PricewaterhouseCoopers, n.d.), and that the innovated consumption model will become greatly accessible, for incumbents and start-ups alike (Chesbrough, 2010).

In the past, individuals may not have considered ridesharing or renting rooms in a home as vacation accommodation, but now there is an important growing trend of individuals preferring such sharing models to the traditional mainstream alternatives (Matzler, Veider & Kathan, 2015).

The sharing economy holds the potential to bring a new level of economic effectiveness to widespread sustainable business practices (Cohen & Kietzmann, 2014). In fact, growing environmental consciousness combined with internet information and communication technologies make sharing possible on a global scale. In the words of Prothero *et al*. (2011): "...by shifting the paradigm away from individual ownership to collectivity and sharing, less demand for consumer goods may give way to a new economy that could help take on problems such as pollution and excessive energy usage.'' (Prothero *et al*., 2011, p. 36).

Hamari *et al*. (2016) propose that technological platforms could be considered as a mediating agent for the combination of relations and activities in the shared economy. In this context, technological mediation stands out by assuming an intermediary and integrating position between human agents and technological artifacts. Following on from these authors, the objective of this study is to propose a sustainable business technology-based model using technology as an action mediator among shared economy agents under the lens of Actor-Network Theory (ANT). As a sample of sustainable business practices, we have chosen the segment of bicycle sharing, which we illustrate by way of a BikePoa case study.

2 LITERATURE REVIEW

We conducted an extensive literature review in the main research bases such as EBSCO, Web of Science, JSTOR, APA, Wiley, Science, searching for previous studies where Actor-Network Theory (ANT) was applied in Sharing Economy business (Fig1). Then, the search was refined looking for ANT application with Digital Technology as mediator of Sharing Economy (Fig.2).

Finally, we went ever deeper in our research looking for past studies that used digital technology mediators in sharing economies and focused on environmental sustainable businesses (Fig. 3).

Sharing / ANT				
Name	Year	Author	Journal	Subject-matter
Actor Network Theory and After	1999	Law, J.; Hassard, J. (1999)	The Sociological Review	contextualization
Actor-network theory—the market test	1999	Callon, M. (1999)	The Sociological Review	contextualization
Building trust in economic space	2006	Murphy, J. (2006)	Progress in Human Geography	economy and individuals
Reassembling the social: an introduction to Actor-Network-Theory	2005	Latour, B.	Oxford University Press	contextualization
The Dark Side of the Sharing Economy … and How to Lighten It*	2014	Malhotra, A., Van Alstyne, M. (2014)	Communications of the ACM	Contextualization
Gift-giving, sharing and commodity exchange at Bookcrossing.com: new insights from a qualitative analysis*	2014	Corciolani, M., Dalli, D. (2014)	Management Decision	Relationships and Dynamics
Exploring consumer attitudes to alternative models of consumption: motivations and barriers*	2016	Edbring, E. G., Lehner, M., Mont, O. (2016)	Journal of Cleaner Production	Individuals and behaviors

Figure 1 - Actors Net Work Theory in Sharing Business
Source: The authors (2018)

Sharing / ANT / Digital				
Name	Year	Author	Journal	Subject-matter
Digital platform more than taxi service: Is Uber an app economy paradigm?	2016	Mckenna, B. (2016)	Computer Weekly	Platforms
La teoría del actor-red y la tesis de la tecnociencia	2009	Echeverría, J., González, M.	ARBOR Ciencia, Pensamiento y Cultura	Contextualization
Una revisión crítica a la teoría del Actor-red para el estudio de losArtefactos	2017	Monterroza, á. (2017)	Trilogía ciencia tecnología sociedad	Contextualization
The politics of punctualization and depunctualization in The Digital Advertising Alliance	2016	Gehl, R. (2016)	The communication review	Contextualization
Understanding the Development and Diffusion of Mobile Commerce Technologies in China: A Biographical Study with an Actor-Network Theory Perspective	2015	Wang, Y.; Yuan, Y.; Turel, O.; and Tu, Z. (2015)	International Journal of Electronic Commerce	Technology and Commerce
Using actor-network theory to analyse Strategy formulation	2005	Gao, P. (2005)	Information Systems Journal	Contextualization
Towards collective protections for crowdworkers: Italy, Spain and France in the EU context*	2017	Donini, A., Forlivesi, M., Rota, A., Tullini, P. (2017)	European Review of Labour and Research	Individuals and behaviors
Inside the sharing economy Understanding consumer motivations behind the adoption of mobile applications*	2017	Zhu, G., So, K. K. F., Hudson, S. (2017)	International Journal of Contemporary Hospitality Management	Individuals and behaviors
The illusion of the digital commons: 'False consciousness' in online alternative economies*	2017	Ossewaarde, M., ; Reijers, W. (2017)	Organization	Relationships and Dynamics

Figure 2 - Digital mediators' studies in Sharing Economy with the application on ANT
Source: The authors (2018)

The theoretical basis using the ANT was quite widespread in several studies among different areas contemplated by sharing economy studies. In the next figure we showed the literature review compiling research with the use of ANT plus digital technology mediator in sharing business focused in the used of environmental sustainable enterprises (Fig 3):

ANT / Digital / Environmental				
Name	Year	Author	Journal	Subject-matter
Ought a green citizen to bicycle or take public transport to work?	2013	Batabyal, A., Nijkamp, P. (2013)	Ecological Economics	Individuals and Environment
Contextualist Inquiry into Organizational Citizenship: Promoting Recycling Across Heterogeneous Organizational Actors	2014	Weaver, S.; Ellen P.; Mathiassen, L. (2014)	Journal of Business Ethics	Organizational citizenship And Sustainable behavior
Sustainable business models, venture typologies, and entrepreneurial Ecosystems: A social network perspective	2018	Neumeyer, X.; Santos, S. (2018)	Journal of Cleaner Production	Sustainable Business
Urban green assemblages: An ant view on sustainable city building Projects	2013	Blok, a. (2013)	Science & technology studies	Sustainable behavior
Explotación minera en la cuenca del río dagua. Una mirada desde la teoría del actor-red	2014	Parra romero, a. (2014)	Centro de estudios interdisciplinarios jurídicos, sociales y humanistas (CIES)	State and Environmntal
The sharing economy helps fight climate change (but not as much as you think)	2017	Yeo, S. (2017)	The Washington Post	Individuals And Behaviors

Figure 3 - Actor Network Theory, Digital Technology in Sharing Economy used in environmental sustainable enterprises
Source: The authors (2018)

2.1 Theoretical Background: Assemblage Thinking (AT) and Actor-Network Theory (ANT)

Assemblage thinking (AT) and actor-network theory (ANT) have been at the forefront of this revalorization of socio-material: the co-constitution between humans and non-humans. Both concepts are deeply related to the spatial dimensions of power and social- relations, seeking out why they emerge particularly in a global society, how they sustain their validation and later they failure. Recently, there is a movement for these concepts to be used into a broader concept: the concept of socio-materiality. (Müller 2015b).

Assemblage is a mode of ordering heterogeneous entities so that they work together for a certain time. In other words, consists of multiple, heterogeneous parts linked together to form a relational whole (Deleuze & Guattari, 1987). According with this authors there are no pre-determined hierarchies, or single organizing principle behind assemblages as all entities, such as humans, enterprises, things have the same ontological

status to start with. Also, Deleuze and Guattari (1987) concept of the assemblage is a provisional analytical tool rather than a system of ideas geared towards an explanation that would make it a theory. Assemblages have at least five different constituent features: i) relational (arrangements of different entities linked together to form a new whole), which could have implied in components autonomy (people, objects, etc.), and components properties can never explain the relations which constitute a whole; ii) productive assemblages produce new organizations, new behaviors, new actors and new realities which could not be considered as a representation of the world; iii) heterogeneous, that make implicit that there are no assumptions as to what can be related (humans or things) nor what is the dominant entity in an assemblage iv) Reterritorialization, that means that assemblages establish territories as they emerge and hold

together but also constantly mutate; v) desired. That means constantly couples continuous flows that are by nature fragmented). The parallels between the concepts of the actor-network and the assemblage are significant (Muller, 2015a).

ANT also conceives of relations of human and non-human entities as producing new actors and new ways of acting, equal in ontological concepts to begin with (Latour, 2012), and with its increasing adoption in the social sciences, ANT has provoked a series of critical assessments, some of which in the same way also apply to assemblage thinking (Whittle & Spicer 2008). Digital technology appears to be an advantaged prompt to engage digital transformations of economy that might enact the promise of doing economy differently.

2.2 Ontological Elements of the Shared Economy

Several authors (Latour, 2012; Muller 2015a; Canniford & Shankar,2016) have proposed various concepts to explain and delimit the shared economy as a field, and the reasons why it has become a booming global phenomenon. In this study we understand the relational process as one of mediation (Adomavicius & Tuzhilin, 2005; Hamari *et al*., 2016), on the basis of the interactions, connections, inductions and practices involving the artifacts and the individuals, which add value to at least to one of the actors: individuals (consumers and providers) involved in this context of the shared economy. The term "relations" refers only to the interactions and processes carried out by the actors in the context of these virtual and physical actions.

The phenomenon of the shared economy, is considered a socioeconomic system developed and supported through new business models, organizations, and technological platforms that focus on transactions, interactions, and peer-to-peer connections in which intermediaries are eliminated from the process and the sharing of physical and human resources is integral. Thus, providing a new configuration that differs from business models in the traditional economy (Schor, 2014; Bradley & Pargman, 2017). In particular, Belk (2013), Schor (2014), and Martin (2016) seek to delineate the field and explain the concepts of shared economies by attributing ontological elements and definers to the phenomenon. For Belk (2013), sharing can represent an alternative to excess private property stocks, financial transactions, distribution of public goods with a purpose grounded in actions of exchange, gifting, and division in which one or more person can enjoy the benefits and/or costs of ownership of a product or service. Over the last decade consumers embraced alternative modes of consumption that increasingly challenged sole ownership as the dominant means of obtaining the benefits of a product (Lamberton & Rose, 2012); this would have been inconceivable in the 1980s and 1990s, which have been characterized as the era of materialism and consumption.

Ostrom and Hess (2007) study the transferable property effect: a socially constructed concept that is dependent on the recognition and acquiescence of other individuals. These authors consider that there are seven hierarchies associated with property, a key point of debate in the shared economy; "access" is the basic level, defined as the right to enter a physical area and enjoy its benefits or not. In addition, the authors mention "contribution" and "property management," which involves the right of "exclusion" of property and especially the right of "alienation," which is widely discussed within an economic system and involves exchanges within a sociological tradition focused on transferable property right.

Belk (2013) defines sharing as "ours," rather than distinguishing it as something that is "mine or yours." However, shared economics can also be considered and represented as a form of connected consumption that aims to link products and services to a dynamic whereby individuals use platforms for actions that accommodate needs and desires in a more sustainable way through reusing and sharing (Leite *et al,* 2015; Breidbach, & Brodie, 2017).

Another form of sharing comes through the concept of gifting. A gift always involves a transfer or exchange of ownership and rights. Although sharing is not about a change of ownership in the same way as gift-giving, it does always involve dual access to a property over a given period, and this can affect how appropriate a given feature of the sharing is considered to be. Contemporary anthropological research considers "gifting" as a means of economic distribution within a model of society that creates ties of social relations. The scholars within this approach tend to focus on the daily perspective in which gifting is combined with immediate reciprocity (Sherry, 1983). The gift is viewed as a continuous act of reciprocity where the act of giving concerns a dialectical chain between dyads. Consumer research in this area emphasizes the importance of "giving" and "receiving" as a means of promoting and maintaining interpersonal connections with family and friends (Wooten & Wood, 2004; Belk, 2010).

The extension of the theme to "community gifting" assumes non-reciprocal and asymmetric relationships that are perhaps more aligned to the concept of sharing. Previous research (Weiberger & Wallendorf, 2011) suggest that "gifting" could be the central goal of interpersonal relationships in which the recipient may be another individual or the community.

Several concepts and terms are used in the literature to characterize the practice of sharing. Collaborative consumption (Botsman & Rogers, 2011; Botsman, 2015), access-based consumption (Bardhi & Eckhardt, 2012), the shared economy and technology (Hamari *et al*., 2016), hybrid consumption (Scaraboto, 2015), political and sustainable development (Martin et al., 2017), commercial sharing systems (Lamberton & Rose, 2012), co-production, co-creation and prosumption (Humphreys & Grayson, 2008, Lanier & Schau, 2007, Ritzer & Jurgenson, 2010), product-service systems (Mont, 2002), access-based consumption, (Bardhi & Eckhardt, 2012), consumer participation (Fitzsimmons, 1985), and shared economy of engagement by platforms and individuals (Breidbach, *et al*., 2017). In this sense, the concept and practice of the shared economy leads to reflection on the way that individuals communicate and transact their relationships, associated with the integration of digital technology platforms into their everyday life. Individuals become consumers and suppliers within a more virtual-oriented universe, in which they may be exposed to utilitarian and altruistic identities, lifestyles, and motives, both economic and social (Hartl *et al*., 2016; Pera *et al*., 2016; Hellwig *et al*., 2015).

These motivations also allow for the sharing not only of goods, but also of intangible knowledge from and for communities through different tools, platforms and applications that moderate, shape and measure this behavior in order to achieve greater differentiation and identification in this new experience (Breidbach & Brodie, 2017).

Belk (2013) suggests that when dealing with consumption and exchange, individuals' behavior can be grouped into three different categories: commodity exchange, gifting, and sharing. He also cites difficulties in that, the delimitations between each category are often blurred and difficult to separate. Lamberton and Rose, (2012) and (Bardhi and Eckhardt, (2012) not surprisingly, argue against Belk (2013) categories, due to the absence of gifting key elements like personalization, ritual process and narrative, that induce emotional engagement, and in terms of car sharing, participants treat both the cars and other participants with the commodities indifference.

In the case of digital gifting mediation, such as in a non-monetary act of exchange, the frontier concepts are not immediately obvious. Digital artifact technology works as a facilitator to offline gifting or sharing.

Dobscha & Arsel (2011) argue that hybrid exchange systems involving "gifting" or "sharing" can give rise to potential tensions in the outcome of the systems being marketed. For example, a system can encourage people to solicit and offer products for free, but can also "force"

people to provide personal information (against counter-sharing) or expect for some kind of reciprocity (against the concept of gifting) (Dobscha & Arsel, 2011).

In Eisenharydt's (1989) definition "[…] the primary focus of actor theory research is the relationships that mirror the basic agency structure of a principal and an agent who are engaged in cooperative behavior, but have differing goals and differing attitudes toward risk" (Eisenhardt, 1989, p. 59). Latour (2012) and Canniford & Shankar (2016) among others explain the basis of ontological ANT, which proposes that all human and non-human participants in an analysis should be treated as equal, active participant. In other words, the material object emerges as an effect of the actors' relations. The theory seeks to understand how these assemblages achieve stability and perpetuity (Latour, 2012; Bettany, Kerrane & Hogg, 2017). Several disciplines such as economics, finance, marketing, political science, and organizational entrepreneurship are frequently applied to ANT, addressing conflicting goals between the principal and the actor (Eisenhardt, 1989).

2.3 Mobility Market Place in Shared Economy

The chaos in the urban mobility of large cities is the real proof that governments and private initiatives have failed to establish mobility models. The lack of access to high-quality transit alternatives as well as the lack of clean and affordable vehicles for consumers leaves a need to address the gap and an opportunity to introduce a different approach featuring business models from the shared mobility market place, such as the bike sharing, car sharing, and ride sharing segments. This poses several challenges to academic ANT. First, the following question arises: who are the agents? On the one hand, individuals looking for better mobility options in large cities. On the other hand, the shared mobility providers (such as Uber, Cabify, and BikePoa) themselves can also be seen as agents (of the natural environment). One of the objectives of shared mobility projects is to reduce the environmental footprint of local transportation (Martin, Shaheen & Lidicker, 2010) and support the transition toward the sustainable mobility paradigm (Banister, 2008). Using the example of car sharing, in 2008, according to Martin, Shaheen and Lidicker (2010) each vehicle in a car-sharing club replaced between nine and 13 privately owned vehicles. Besides, car-sharing members have been shown to use cars 31% less compared to when they owned their own vehicles, which in the United States represented a theoretical possibility of reducing carbon emissions by 482,170 tons per year, in addition to the utilitarian advantages to users (Stead, & Stead, 2013).

Harvey *et al*. (2017) study how technology could mediate the behavior of shared consumers in three online system samples within sharing businesses (Freecycle, Couchsurfing, and Landshare).

2.4 Technology-mediator based model for sustainable mobility

The innovations provided by these digital sharing platforms are prompting behavioral changes in society and business, providing a more balanced and sustainable economy (Martin, 2016). In this sense, "the role and function of platforms is to make connections that can generate business in different locations with different and different partners and / or customers" (Evans & Schmalensee, 2016, p.2).

Technological platforms can provide an ongoing process that integrates actions, connections, inductions, and mediations with the social or behavioral structures of individuals (consumers and providers) who are part of this economic and commercial structure (Scaraboto, 2016; Breidbach & Bardie, 2017). This behavior could be considered a hybrid or engaged action, where shared "objects and individuals" give rise to new situations, actions, and facts within a social, market, economic or political phenomenon (Bardhi *et al.*, 2012; Breidbach & Bardie, 2017).

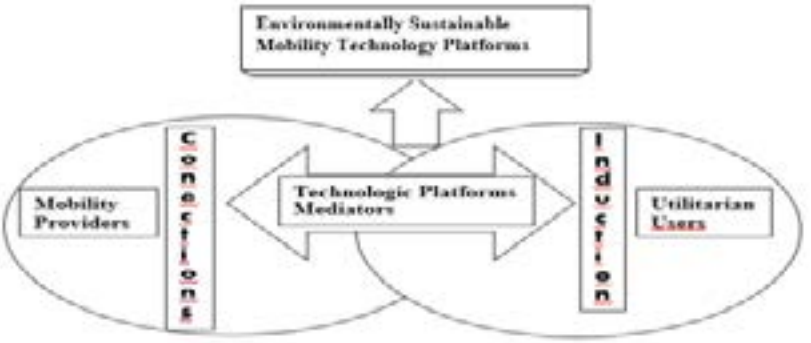

Figure 4 - The proposed Model
Source: The authors (2018)

In the model shown above (Fig.4), technological design characteristics, functionalities, and system information generate a mediational role from a relational dynamic in a transparent and particular manner that provides value to the individuals and providers. According to Ostro (2000), interactions and value creation occur when multiple processes can alter the way individuals see the world.

2.5 BikePoa Case Study

The BikePoa bicycle sharing system began in 2012 as a sustainability project in the Brazilian city of Porto Alegre, operated by Serttel in private partnership with the Itaú Bank. The system aims to increase the use of this mode of transport, as well as to encourage healthy habits and practices, humanize the urban environment, and reduce traffic congestion and environmental pollution.

The BikePoa system has more than 40 stations and more than 2,000 bikes distributed throughout Porto Alegre, wirelessly connected to a solar-powered station that provides access to an online platform. The system allows consumers\users to procure services in two ways: through monthly or daily rates. Monthly procurement requires consumers to register with the system and make a credit card payment in advance through the website, and is valid for unlimited usage over 30 days provided that the terms of service are followed. In turn, for daily procurement, customers do not need to register in advance; they only need to make an online request to use the service and a credit card payment for usage for 24 hours, having been informed of the terms of service and the applicable rates. Bicycles can then be collected through a mobile application or by telephone contact with the operating company. The BikePoa system has more than 170,000 registered users, and since 2012 more than 775,000 transactions have been carried out through the system (BikePoa, 2017). The public company tasked with overseeing Porto Alegre's transportation system, Empresa Pública de Transporte e Circulação (EPTC), announced a fall in cycling-related accidents in recent years, citing the rules and responsibility fostered by bicycle sharing in the city as a major reason for this.

We conducted qualitative research through 23 interviews with BikePoa customers. This enactment can bring more affective, emotional responses where objects can anticipate and assist humans in their actions and reactions, interconnecting, connecting, and inducing participation involving these dynamics—and the network role within and between customer networks—in an economic phenomenon (Latour, 2012).

3 RESEARCH METHODOLOGY

The purpose and orientation of pro-social exchange systems with a focus on environmental sustainability can involve different configurations. In their study, Parsons & Maclaran (2009) mention that environmental research has tended to focus on how consumers acquire goods. BikePoa provides a riding-share service, and consumers find one another online through extensive word of mouth (WOM), search results on the company homepage, and, in particular, through the eye-catching orange color-scheme of the thousands of bikes scattered across the city's parks and avenues and the more than 40 sharing stations. Our research, following Kozinets (2006), is a form of participant-observational netnography with two different phases. In addition, and again in line with Kozinets (2006), we revealed our identity to the community from the beginning in order to promote openness and cooperation.

Our first phase, was to analyze the structural form of the bike-sharing system, which we did by studying the system for two months to understand how customers captured, broadcast, and disseminated data using the internet; in this way, we were able to meet community insiders and learn about the system. It was useful to see in practice how the supporting technology platforms were implemented and how they work in reality. Taking note of examples of computer-mediated communication, this provided us with an initial corpus for data analysis. We also recorded the occupations of the different customers and their uses for the bicycles. The wide distribution of the 40 stations throughout the city allowed for a variety of different uses, such as using the bicycles to go to work on a continuous basis or one a one-off basis, either for mobility or recreational purposes. According to Langer and Beckman (2005), wherever access to websites is not restricted, systems such as Bikepoa can be defined as forms of public communication.

Later, we carried out a personal qualitative engagement involving 23 in-depth interviews with active users (13 men and 10 women) ranging in age from 20 to 62. Moreover, to study the provider side, we conducted 7 in-deep interviews with BikePoa employees who occupied different roles in the company. In a second phase, using Google Docs, we received 280 questionnaires, of which we selected 251 completed. We used the same research script for both questionnaires and for the personal interviews, following the three-stage model developed by Sherry (1983), based on decision-making, exchange, consumption and post-consumption, adapting the themes and questions to our bike sharing case. The formal interviews began on July 10th 2017, and were completed on August 30th, 2017. We carried out the interviews at several Bike Poa stations, and in average the interviews´ duration was between 30 and 40 minutes. Using online records, we captured specific interactions and obtained rich information for content analysis.

In line with Harvey *et al*. (2017), we asked users specifically to refer to how the technology they used influenced the following dimensions: experience, partners selection, motivations, business structure features, property/sharing opinions, negotiation and ritual process. We used technology as a lens to examine sharing motivations, as digital mediated systems require consumers to articulate and communicate their needs and final negotiations. Later, we transcribed and analyzed the computer-mediated completed questionnaires, interviews, and field notes using the NVivo Content analysis software package, which the facilitated thematic coding process.

4 RESULTS

We used the NVivo software package to develop all the association structures and links (Content Analysis) within the main objective (Maclaran & Catterall, 2000). Content analysis is a research method to examine patterns in communication. (Bryman, 2011).

In our analysis, we followed a qualitative and hermeneutic process in which we refined the existing codes (such as word frequencies) in a systematic manner.

The content analysis results (Table I) identify how each human and non-human entity brings its characteristics to the relationship in line with the proposed model and defined by the imbrication of a relational network. We divide the analysis in terms of the main model factors from the point of view of users and providers. (Table I).

Table I.

Content Analysis Results

USERS	
Induction Factors	**Economic advantages**
	Environmental sustainability
	Health
	Mobility Transfers
	Demographic asymmetries
	Negotiation
	Partner selection
PROVIDERS	
Connection factors	**Ritual normalization**
	Technology

Source: The authors (2018)

4.1 USERS

Users explain that besides the economic effect and the quality of the service, the possibility of paying in various ways and avoiding the chaos and the difficulty of the transit of the cities in their mobility is becoming increasingly important. In our model we label as Induction factors the major points selected by users in the content analysis.

4.1.1 Induction factors

a) Economic, environmental sustainability, and healthy mobility transfers

> *"Because it's easier. I live in Alvorada, 15km from downtown, so for me bringing my bike is a lot of work and a car is needed, so shared bikes are easier because they already have their location points, so it's easier for me." (Interviewee 4, user, 25 years old).*

> *"Because it's cheap, it's environmentally friendly, it's easy to use and it's practical, faster than a car, faster than a bus, and I can afford it* [...]*" (Interviewee 10, user, 28 years old).*

> *"I think a lot about how my kids' planet will be in the future, I think we need less cars and the traffic is so heavy, less CO^2 in the atmosphere, so it helps." (Interviewee 11, user, 35 years old).*

> *"*[...] *the traffic in the city is a mess, parking is difficult or too expensive. Now with the availability of bike stations it is much easier. I can go anywhere in the city, and I can do everything through my cell-phone." (Interviewee 8, user, 30 years old)*

> *"It's easy. I can operate everything by cell-phone, the technology is great. I'm tired of paying parking tickets" (Interviewee 2, user, 34 years old)*

These statements are in keeping with Hartl *et al*. (2016), who argues that individuals become virtually oriented consumers due to the technological facilities that are available, and for different reasons such as economic, altruistic, environmental, and social concerns.

b) Demographically asymmetries

> *"The government doesn't care about decent public transportation for old people, and there are few options for taking the bus. I would need two or three for my destinations, it's too expensive and takes too much time. (Interviewee 14, user, 60 years old)*

> *"There are few buses and they are always crowded, the city is very poorly planned and it has grown a lot. It is much better to share bicycles, I do my daily tasks, pay bills, everything is easier and cheaper and I don't need to face this madness of the city." (Interviewee 11, user, 33 years old)*

It is evident that there are significant, demographically driven asymmetries regarding inefficiency in public services and the efficacy of local land-use management and adjustment policies. In general, regions facing adverse demographic trends are increasingly vulnerable over the long-term. Within the fields of urban economics and regional science, there have been few studies that aim to track the analytical links between infrastructure, population-ageing and the long-run financial viability of the city (Carbonaro et al., 2016).

c) Partner selection

> *"I prefer to use BikePoa bikes. They are always well-maintained; I can go to several places with the available stations. I love to ride in the parks at the weekend." (Interviewee 13, user, 22 years old)*

> *"BikePoa is the best option, they have the most modern technology. Everything is by internet, it's easy to operate and there are several forms of payment." (Interviewee 16, user, 36 years old)*

The systems have been developed to reinforce social solidarity in much the same way as intracommunity gifting (Weinberger & Wallendorf, 2011; Corciolani & Dalli, 2014), despite the technology mediation. No participants expressed any sense of post-transaction obligation or of owing partners, but allegiance was frequently expressed in relation to the brand or the cause of pro-social exchange systems.

d) Negotiation

> *"If I decide to take a bicycle ride I only have to access the website and quickly negotiate with my credit card, the time I wish to stay riding" (Interviewee 2, user, 27 years old)*

> *"It is very easy to hire, the system and negotiation are great, any credit cards are available" (Interviewee 3, user, 25 years old)*

4.2 PROVIDERS

From the providers' point of view, the possibility of obtaining complementary income by maximizing the use of their goods, relatively easily with the use of technological resources and organized form (norms and rules) has become a new business development. In our model, we label as Connection factors the major points selected by providers in the content analysis.

4.2.1 Connection factors

a) Ritual normalization.

> *The users, after completing the sharing process, become like absolute owners of the bicycles—that is, they usually look after them. There are few accidents or destruction of bicycles reported (Interviewee 23, BikePoa, manager, 25 years old).*
>
> *The negotiation process and normal ritual is very friendly and reliable for the company (Interviewee 21, finance manager, 47 years old)*

In the literature review, we saw how some kind of ambiguity often plays a part in the sharing process defined as "liminal" (Turner, 1969), which are the moments necessary for mediating economic transfers in which the ownership of property is in a state of transition (liminality). Turner's conception of liminality was inspired by Arnold van Gennep (1960), but the notion of a "liminoid" state as an adaptation of the ritual moment could be seen to be evermore optional in societies (Abrahams, 1969).

b)Technology

> *"Our system is very reliable, offline time is less than five minutes per month and our goal by the end of the year is three minutes" (Interviewee 20, BikePoa maintenance manager, 36 years old).*
>
> *"It takes one minute to conclude the sharing process as long as the user has a valid credit card. It can be done by cell-phone, everything is very convenient." (Interviewee 21, BikePoa, finance manager, 47 years old)*

Martin *et al*. (2016) explain that innovations in digital platform are generating behavioral changes in society and business, providing a more balanced and sustainable economy. This argument is in accord with Scaraboto (2016) and Breidbach & Bardie, (2017), who argue the role of technological platforms as process integrators that give rise to actions, connections, inductions, and mediations within society.

5 DISCUSSION

In countries with a wide history, ancient cities with narrow streets and the understanding of a society regarding the importance of environmental preservation and protection of historical origins, the utilization of bicycles for mobility is not a new fact. However, in emerging and populous cities that have grown up without any urban planning, the environmental chaos caused by air pollution and traffic congestion is a huge problem. In view of this, a success story of a new venture such as BikePoa, which contemplates the sharing economy's benefits within an environmentally sustainable enterprise that also encourages exercise and health is something extremely new and promising.

In our research, we identify certain factors that we refer to as *inductor factors* to consumers: economic advantage, environmental sustainability, healthy mobility transfers, partner selection, and the growing importance of demographic asymmetries due to changes in individual profiles. From the provider side, we identify two *connection factors* that enable the venture: technology, and the ritual of the normalization process. These factors became strategic pillars of our model for environmentally sustainable enterprise (Figure 1) and possible ventures such as BikePoa.

The contribution made by this research can be divided into five points: i) it considers the theoretical (literature review), methodological and conceptual aspects of the shared economy as it is applied to environmentally sustainable businesses, while ii) also still studying the strengths and weaknesses in relation the practical side of business. Moreover, iii) we use the perspectives of the Actor Network Theory to broaden the study of shared economies by way of a novel case like BikePoa. In addition, iv) a methodological contribution approached the area of environmental sustainability following Kozinets's (2006) form of participant-observational netnography, complemented by qualitative research involving personal interviews with BikePoa users and employees. Subsequently, to ratify the findings, we sent questionnaires to the users by Google Docs. Our research also contributed for v) the reinforcement of seminal concepts of shared economy, focusing on technology as the system mediator and on building an environmentally sustainable business model, using a real case of environmental protection within an original business.

6 CONCLUSIONS

The different tensions that the shared economy can generate in individuals have been well studied in consumer research and other disciplines, either from the capitalist perspective of emphatic property ownership, or, on the other hand, in consideration of the advantages of efficient resource that the shared economy proposes. Technology has a decisive role in the mediation of these individuals, enabling the viability of these new ventures.

New startups appear with different innovative proposals arise every day and across all fields, proving that the phenomenon of the collaborative economy model has the potential to change many traditional models.

Within this range of new enterprises, certain niches have been particularly prominent; one such example is urban mobility, which is becoming increasingly complex due to the unplanned growth of cities, the changing profile of their inhabitants, and the adoption of healthier habits. Technology has enabled the confluence of the central considerations—health, affordability, convenience, and recreation—as is the case of BikePoa, which today has more than 170,000 users of more than 2,000 bicycles spread throughout 40 stations in the city of Porto Alegre.

Theorizing the online systems that have facilitated these new hybridized forms of pro-social exchange, such as bike-sharing, is complex and challenging. However, as our research makes clear, the major motivating points are technology-mediated, such as the uniting factor or facilitator between individuals and BikePoa.

6.1 Management Implications and future studies

Our research shows consumers' view of technology-driven business strengths and weaknesses, and attests to the potential of environmentally friendly businesses. Thus, it can be useful as a reference to managers in future ventures.

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