

Automatizing Green Practices? The Analysis of Reverse Vending Machines as a Re-contamination of Theories of Practices

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Submitted: May 7, 2019 – Accepted: December 8, 2019 – Published: December 31, 2019

Abstract

The analysis I bring to the present symposium about contamination of practice theories concentrates on potential reconfiguration of domestic waste management as social practice through the installation of Reverse Vending Machines (RVMs). Being them designed to collect plastic bottles and caps assigning a reward to whom bestows them, this research concentrates on RVMs functioning and the re-composition of everyday practices they are supposed to bring. The analysis re-contaminates theories of practices encompassing consumptions studies, sustainability and Actor-Network Theory's concepts within the broader framework of environmental sociology. These three scholarships already contaminated theories of practices and contributed sensibly to strengthen their application. I will review the essence of these contributions and, moving from that, I will further explore the agency of objects within everyday social practices relying on the case study of RVMs. Through media analysis further informed by fieldnotes about direct observation and informal interviews, I will reconstruct the RVM rationale highlighting the connections with material arrangements of everyday practices.

Keywords: Theories of social practices; Environmental sociology; Recycling; Domestic waste management; Reverse vending machine..

1 Introduction

The Reverse Vending Machine (RVM) is located under a colonnade, close to a bank, in a pedestrian area. The street is an elegant one. It encourages people to take a stroll enjoying the lights of the shop windows and to meet friends in cafés. Since I had to walk through most of the town centre bringing my bag with a dozen of polyethylene terephthalate (PET) bottles, I felt a bit uncomfortable. However here I am. The machine is a huge white parallelepiped made of two blocks with three small doors and a little round hole. Each small

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door hides a hole: two are for bestowing bottles and one for aluminium cans, while the littlest one is for plastic caps. There is also a screen showing messages about: i) how cans and bottles are processed once collected by the RVM; ii) the advantages for me (the user); iii) the benefits for environment and iv) for the local community. It seems that anybody can positively profit from this system. With another message, the screen underlines the small reward that I can get per each bottle I deliver and I can use in the shops in the city centre immediately. This means to get money from waste to be re-infused into local economy. It sounds like being part of a circular economy.

(Extract #1, Ethnographic notes from fieldwork)

The extract above briefly describes the first direct contact I had with an RVM. The machine was dedicated to a reward system for recycling plastic bottles. By approaching it, I could directly explore an interesting attempt to promote recycling of plastic bottles through a shorter path in line with the declared purpose of fostering circular economy. Starting from this, the analysis I bring to the present symposium about contamination of practice theories considers the potential reconfiguration of domestic waste management as social practice through the installation of RVMs. In particular I concentrated on the socio-material relationships shaped through the interaction between a dedicated technology to promoting a specific way to perform domestic waste management of recycling and every day's life arrangements. It means to look at how social relationships, routines and technological objects shape each other. This means to apply a symmetrical perspective, thus not assigning a prominent role to technology (refusing a technological determinism) nor to social factors (refusing social determinism). This ontological posture is coherent with practice theory approach that integrates Science and Technology Studies (STS) legacy, as it will be described later.

Equipped with these lenses I will deal with theories of practices from the perspective of consumption studies about sustainability within the broader framework of environmental sociology. Actually, these scholarships already contaminated the debate about theories of practices. Indeed, they sensibly contributed to the development of the second phase of theories of practice (Postill, 2010). They brought lights on social processes about sustainable consumption, a key environmental issue, from an alternative point of view both empirically and theoretically (Warde, 2014). Theories of practice are currently adopted by scholars in several research areas (Hui, Schatzki & Shove, 2017) but it is recognised that their contamination with sustainable consumptions strengthened their application also echoing beyond this debate (Warde, 2014). I will consider these contributions and, moving from that, I will further explore the agency of objects within everyday social practices for sustainable consumption through the case study of RVMs.

Presently, to split different components of waste in order to bestow each material to the proper recycling path need some domestic arrangements that encompass space, duties and timing (Watson, 2012). A combination of these elements, as it will be described in the coming paragraphs, is necessary to process and consequently re-use waste as new raw materials. Indeed, looking at the representation made by producers of these machines. RVMs are meant to intervene in this process as promoting agents of a more virtuous recycling system by shortening the regular path envisaged by urban waste management system (see further, fig. 2). RVMs are not mere collecting points. Rather they should be there appositely to mediate the interaction between recycling facilities and citizens. In doing this, they are meant to enact a re-use path for plastic as raw-material thus driving towards a more sustainable waste cycle. This should promote two features of circular economy: i) a more efficient way to recycle and ii) value for waste. Indeed, RVMs receive waste giving back a reward for those who bestow it. The reward can be money, vouchers or discount coupons for shopping. The system encouraged through such an economic incentivisation shares some analogies with the *Pfand System* in Germany but, actually, it differs a lot. I will be back on this later while describing the principle of what in Italian is called "*riciclo incentivante*," a reward scheme for recycling.

In this regard, I will also examine the role of incentives that represent a key feature for RVMs. For this reason I will go through a dedicated discussion about behaviour, practice and pro-environmental choices recalling some key criticisms toward the linkages between attitudes, behaviour and choice, called ABC model by Shove (2010), and further developed by scholars into sustainable consumption (among

the many Hargreaves, 2011; Hargreaves, Longhurst & Seyfang, 2013; Shove & Spurling, 2013). More recently it finds itself promoted by Blue, Shove, Carmona and Kelly (2016) even for health policy.

This discussion allows to contextualize the contamination of theories of practice with environmental sociology terms, particularly concentrating on the sustainable practices.

The paper will thus delve into the case of RVMs in northern Italy addressing these elements (a) through the reconstruction of producers and installers' point of view and (b) the perspective of the machine itself or the program of action (Akrich & Latour, 1992; Latour, 1992) that includes the delegation of specific tasks connected with domestic waste management. As it will be shown later, such a delegation goes beyond the simple task of sorting waste implying also other kinds of arrangements, and this highlights the nexus of practices.

For this contribution I connected two sources of data:

- selected newspaper articles as well as on other press and media releases;
- an ethnography of RVMs' use in the specific context of Veneto, North-Eastern part of Italy.

I first looked for newspaper articles interrogating TIPS dataset,¹ a dedicated media monitoring project. This way, I could realize that the issue is not covered by most Italian newspapers, since I collected only four articles. I thus considered other sources such as websites of RVM producers and news-blogs enlarging the corpus up to 72 documents; the documents included local newspapers and press agencies that relaunched local initiatives. Such an heterogeneous set of sources and documents was retrieved querying Google, websites of RVMs' producers and those of local campaigns of rewards for recycling. I analysed the corpus looking for references to RVMs' design (functioning, litter to be bestowed to them, rewards, connection with municipalities) and location. In this way I could reconstruct the general narrative as promoted by producers as reverberated on the media about the rationale of RVMs' installation. Furthermore, in collecting articles as well as other media releases ranging from 2014 to early 2019, I came across several news about recent instalments of RVMs: there are about 450 installed machines all around the country and a considerable share of them is in Veneto.² I took advantage of this to set up fieldwork in two different locations in the Veneto plain. Being the fieldwork in the same region I opted to compare two RVMs considering their setting as a main comparing criterium: one, as described in the opening extract from fieldnotes, is installed in a town centre and a second one is located at the entrance of a shopping mall. This allowed me to compare the same functioning in two settings of consumptions which, may be inscribed into different social practices.

Fieldwork took place in February 2019 and included direct observation and informal interviewing with users and responsables for installing and maintenances of RVMs. I was inspired by the idea of self-ethnography; in Alvesson's perspective it is a research about a setting to which researcher "has natural access, [and] is an active participant, more or less on equal terms with other participants." (2003, p. 174). In particular, as it will be clear from extracts proposed below, I followed the requirements of RVM in order to properly use it. Hence, I could consider within my fieldwork both the delegations and the scripts that shape specifically the bundles of materially mediated arrangements that social practices of domestic waste management consist.

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1. Technoscientific Issue in the Public Sphere (TIPS) is a running project about technoscience in the media: it collects and indexes contents several daily newspapers. For more details see Giardullo and Lorenzet (2016).
 2. According to the web site of Wise society, almost two thirds of RVMs are installed in Northern part of Italy. 20.15% is located in Veneto <https://wisesociety.it/ambiente-e-scienza/riciclo-incentivante-economia-circolare-rifiuti/> (Last accessed 26 April 2019). Although these are not official data, we can have an idea of the geographical distribution across the country. Some other more recent press releases hint that the actual number of RVMs is presently higher in Italy or, at least, it is likely to increase sensibly. https://www.adnkronos.com/sostenibilita/best-practices/2019/01/17/riciclo-bottiglie-pet-coripet-oratutta-filiera_CzKBCTrPkm5kzr4ZOL3DHP.html (Last accessed 27 April 2019).

2 Domestic Waste Management: Between Behaviour and Practice

Sorting waste is a profoundly mundane activity for households and requires a certain effort (Watson, 2012). In a short autobiographic novel, *La poubelle agréée*³ (1993), Italo Calvino described his duty within the broader household domestic routine, the only one is allowed to him by his family: to take out the trash. Such a task makes him feel useful to domestic activities since, as he declares, he is not into other tasks of daily routine contributing to reproductive labour.

Furthermore, Calvino masterfully emphasizes that taking out the trash bin full of waste connects him — and his family as well — to larger processes that contribute to the social order. Knowing how to bestow properly trash to the waste management systems entails to be in harmony with local government requirements — the novel takes place in Paris — using a shared standard for bins (the poubelle agréée, see note 3) to be emptied by garbage collectors. At the same time collecting waste in that bin assures order in the kitchen and, as Calvino admits, within his family. Indeed, to fill the bin is a specific task that falls within his competence. This example from the literature — but not fiction — is useful to further recall us how domestic waste management is inherently a social practice. It finds itself in between public governance and private management since it is not only an activity that frees an household from its own waste rather, if properly performed according to the authority for waste management, further ensure a sanitized and harmonic way of living as well as reducing environmental impact of our activities (Martin, Williams, & Clark, 2006). As more recently confirmed, a tidy and well-lit place where to throw wastes shows the robustness of a well-functioning waste management system (Glad 2018).

Being informed by this we can read this extract from fieldnotes:

I have always sorted my waste in order to obtain at least four different kinds of litter. According to my municipality, and more precisely to the waste management facilities provided in my neighbourhood, I can consider plastic, cans (i.e. aluminium) and glass as the same kind of waste (1); paper, cardboard and food packages produced by Tetra-Pak are another kind (2); the same applies for organic waste (3) and non-recyclable waste (4). Each of them is expected to follow a specific trajectory: (1), (2) and (3) will be routed to dedicated recycling processes. For such reason it is required to me, and to my fellow citizens as well, to organize and shape appositely domestic routines and spaces. Rather than use a single bin I am asked to sort and to split different components of the same package. The four kinds of waste require a specific bin each; they lay in an equipped corner of the kitchen, patiently waiting to be emptied in dedicated garbage containers located down in the street.
(Extract #2, Ethnographic notes from fieldwork)

We can realize that the routine of taking out the trash consists of at least three elements. First, to know criteria to be applied for sorting out waste (competence); second, to understand that sorting waste contributes to keep our dwell clean, to safeguard public decency and finally to limit our environmental footprint (meanings); third the place and the room appositely equipped with proper bins to perform such activity (material arrangement). According to Shove and colleagues (2012), these three elements are enough to define it as a social practice. Nonetheless, as many other activities connected to consumption, typically, domestic waste management is framed through the lens of behavioural theories. Not only scholars investigate the value of social norms, peer pressure and the analysis of attitudes as motivations (Cecere, Mancinelli & Mazzanti, 2014) but even public campaigns often tend to promote virtuous behaviour as a desirable side of human conduct. Shove (2010) provocatively synthesised this frame about social change toward sustainable consumption as *ABC model*. It develops through the stages: since the current patterns of consumption revealed to be a threat for the environment and thus for human beings, then they must be changed. Changes may be obtained intervening on the following scheme: “[...] values and attitudes (the A), which are believed to drive the kinds of behaviour (the B) that individuals choose (the C) to adopt.” (*Ibidem*, p. 1274). This is a well-known and debated topic within the studies of consumption, especially in relation to the issue of sustainable consumption (Warde, 2014; Spaargaren, 2003

3. As translated in the English version of the novel it means “pleasing dustbin, something approved and acceptable (with the implication: approved by the prefectorial regulations [...] thus funding the basis of our social contract and of the expediences of good living).” (pp. 97–98)

& 2013). Indeed, theories of practice addressed directly such a topic by refusing it. Indeed, according to Warde (2014) theories of practices emerged as a reaction towards two major limits of the study of consumption such as the models of individual choice and cultural analysis. This emerged with particular emphasis in understanding the root causes for environmental degradation lying in every day's life activities as well as the strategies to limit household's impact on natural resources through more sustainable consumption. This is what can be considered a proper contamination of theories of practices promoted by a specific debate within environmental sociology.

Indeed, scholars interested in sustainability issues, as in relation to climate change for instance, especially from early 2000s onwards, were disappointed with explanatory social factors of dominant models of consumption that turned to be environmentally unsustainable. Indeed, environmental sociology inscribed consumption within — at least — three broad theoretical traditions (Spaargaren & Mol, 2011). We can first concentrate on the neo-marxist perspective that coherently with the study of capitalist production systems (Schnaiberg, 1980) propose a harsh critique toward dominant logic that promote unsustainable forms of consumption for ensuring economic profit to capital; critical consumption, in order to limit environmental externalities as well as the choice to limit consumption are two strategies to cope with the ambiguities of contemporary affluent society. Unfortunately, the same deepness of analysis applied in the study of socio-economic structural basis of capitalism is not equally applied for the processes of consumption that still contribute to perpetrate unsustainable consumption (Spaargaren & Mol, 2011). A more refined attempt to understand consumption choices is brought by risk society theory (Beck, 1992): it approaches consumption considering individuals as responsible for what they choose; facing growing global risks (ozone depletion, climate change to mention), individuals can be segmented according to their awareness of the risks that their conduct as consumers may bring for them and for the environment (e.g. the use of car as mean of transportation). Finally, the cultural value-change theory (Spaargaren & Mol, 2011) assumes that cultural shifts, towards a non-materialist culture as recorded by Inglehart analysis (1995; 1982), directly influences consumer choices. Looking at these perspectives from another angle, we can easily acknowledge that cultural value change and risk society theories may assist justifications about using an ABC model. Indeed, individualistic and rational perspectives on consumption assume personal beliefs, perceived norms and attitudes as efficient predictors of consumption patterns: once researchers identify and isolate the cognitive components of specific choices of consumption (e.g. level of awareness), behavioural changes can be obtained by intervening exactly on those components (Hargreaves, 2011).⁴

Already in 2003 Gert Spaargaren directly call for empirical focus onto lifestyles and strategies for innovation government administrative bodies implement for sustainability in utility sectors (2003). This was further echoed in 2010, when Hinton and Goodman contributed to the *International Handbook of Environmental Sociology* with a chapter about sustainable consumption as sociological research object. They were very critical about behaviouristic approaches to consumption highlighting the too much rationalistic representations of social actors being considered only as consumers.

Repeated actions (or chains of actions, routines) cannot be labelled only as a choice consistent with a structure of attitudes, nor it is only a matter of awareness of being exposed to a risk. In this regard, Blue, Shove, Carmona and Kelly (2016) argued that even un-healthy practices associated with addiction, as for instance smoking, cannot be disconnected by the entanglements with other activities (eating out, taking a break from work etc.). Hence, the complex of social relationship of which consumption consists cannot be flatted even considering the case of addiction. A specific conduct is largely connected to other arrangements of social life. Moreover, any kind of conduct do not happens in the vacuum, rather within a larger socio-technical regime (Geels, 2011) of established practices and their rules (Hargreaves, Longhurst & Seyfang, 2013). Theories of practices, as previously said, shifts the researcher's gaze from the consumer to the practices as proper and fruitful unit of analysis. In this regard domestic waste management, of course, is not exempted.

In analysing households' attitude in recycling, Thomas and Sharp (2013), for instance, admitted that normativity is not as diriment as it was supposed to be as predictor of virtuous habits. In interviews with

4. One of the most celebrated articles in this scholarship is *The Theory of Planned Behaviour* by Ajzen (1991). According to Scopus' figures, at the beginning of 2019, the paper got 25.948 citations; the 31,4% of them is from contribution into social sciences.

recycling and not-recycling households they recorded the presence of alternative and opposite norms consistent with their habits even though the law (the regime) in the country they considered — United Kingdom — expressly promotes recycling.⁵ Therefore, explanations for pro-environmental practice should be found somewhere else. Martin and colleagues (2006) in reviewing studies about the profiles of non-recyclers pointed out that both lack of time and inconvenience of recycling stations work as main explanatory factors of non-recycling conduct. A more recent comparative research between households in France and the UK, echoed these evidences; time pressure and family dynamics do play a critical role in arranging both spaces and routines for recycling (Boulay, Metcalfe, Barr, & Shaw, 2014).

Although examples in the literature about the theoretical and empirical limits of behavioural approach to understand consumptions shapes a clear depiction, such a perspective is still largely appealing. To drive people towards more virtuous and sustainable paths, as recycling, there is a systematic tendency to apply promotional strategies through incentives. This is the case of RVMs' rationale. They are appositely designed to collect plastic bottles and caps assigning a reward to whom bestows them.

The presence of such a technological artefact calls for the adoption of a dedicated perspective. Indeed, an Actor-Network Theory (ANT) approach have been fruitfully adopted for investigating vending machines (Piccioni, 2008; Mattozzi & Piccioni, 2012) as well as for other levels of waste management (Bortolotti, 2019; Minervini, 2010 & 2013). Typical ANT categories, such as script (Akrich, 1992; Akrich & Latour, 1992) program of action and delegation (Latour, 1992) are useful here to reconstruct the rationale and the assumption laying behind the design and the installation of those machines. Indeed, looking at RVMs with these lenses can contribute to discuss theories of practice highlighting the role of material components of social practices.

In this regard theories of practices, as Reckwitz (2002) signals, practices consists of the interconnection of multiple elements such as objects (“things” as Reckwitz calls them, *Ibidem*, p. 249), competences and meaning. Warde (2014) recognizes that the second generation of theories of practice is partly in debt with STS and more specifically with ANT. Thus, the material side of social practice is recognised as a key element of what can be identified as a practice, and Shove, Pantzar and Watson (2012) elevated it to not less than a specific component of a formalised triadic system for a proper analysis of social practices.

3 An Automatized Incentive to Enact Circular Economy: Recycling PET through RVM

European Environmental Agency certifies that the average rate of municipal solid waste recycled reached the 43.6% in 2014, +13% compared to 2004 (EEA 2016). If we look at the figures for packaging waste in 2013 the share reaches 65.2%, +10.6% compared to 2005 (Id.).⁶ EU considers these data as a successful story and the outcome of well devised EU environmental policy (Id). On this momentum, the EU launched the EU Circular Economy Package presenting it as an “ambitious and long-term path for waste management and recycling.”⁷ The general idea of circular economy is a change of paradigm from a linear trajectory that figures the extraction of resources (natural resource or raw materials) transformed during the production phase as second step and thus phase of consumption. This model, currently the dominant one, has several leaking points that produce waste which is typically directed towards landfilling or energy recovering. According to Eurostat (2018), even though recycling is increasing, landfilling and burning are still relevant solution for waste disposal: in 2016 more than half of waste produced in EU 28 routed towards: landfilling (45.5% of the total), energy recovery through incineration (5.6%), backfilling

5. The Household Waste Recycling Act required to local administration to provide dedicated bins for each item to be recycled already in 2003. See <http://www.legislation.gov.uk/ukpga/2003/29/contents> (Last accessed 19 February 2019).

6. The *Guidance on Municipal Waste Data Collection*, published in May 2017 by Eurostat, defines municipal solid waste as “waste originating from households, commerce and trade, small businesses, office buildings and institutions (schools, hospitals, government buildings). It also includes: waste from selected municipal services i.e. waste from park and garden maintenance, waste from street cleaning services.” (p. ii). Packaging waste is part of municipal solid waste and includes “absorbents, wiping cloths, filter materials and protective clothing not otherwise specified” as well as all the kinds of packaging (food, beverage, etc.).

7. http://ec.europa.eu/environment/circular-economy/index_en.htm (Last accessed 19th February 2019).

(10.1%, that means burying for the purpose of slope reclamation or safety or for engineering purposes in landscaping) or incinerated without any energy recover (1.0%).

Circular economy might play a more virtuous role. Indeed, it brings the idea of closing the loops of production and consumption re-using (alternative use, refurbishment etc) the wastes produced, as well as the goods that reached the end of their lifecycle. In other words, circular economy promotes the re-use of each by-product deriving from production cycles, in practical terms limiting the use of landfill as waste disposal option. It is possible to distinguish between two groups of circular economy activities (Stahel, 2016): a first one promotes reuse, fixing and remanufacture/repurpose of goods; a second group that turns old goods into new resources by recycling their components (*Ibidem*).

Domestic waste recycling, according to EU, falls exactly into this latter group. EU encourages the recycle by affirming “materials from products at the end of their lifecycle should be recovered through dismantling and recycling. Re-injecting these materials into the beginning of the product lifecycle reduces environmental impact and costs of production.”⁸ Hence, a strategy for the promotion of circular economy is to foster new forms of recycle.

In this regard, RVMs offer an original interpretation of circular economy to be performed through the interaction with technologies (Figure 1).



Figure 1. The two RVMs considered for this research: on the left the one settled in the city centre, on the right the one positioned side to the entrance of a shopping mall. Source: Photo by the author.

The two RVMs were equipped for providing some kind of reward: the first one, on the left, has been equipped with technology for giving back credit through an app directly to users' smartphone or to print a coupon as an alternative; the second one, on the right, only releases coupons. In both cases, a user is supposed to choose the reward according to his/her interests; discount or credit can be spent respectively in the shops of the city centres or inside the shopping mall. The general functioning of RVMs is described in the following newspaper article.

8. https://ec.europa.eu/commission/sites/beta-political/files/circular-economy-factsheet-waste-to-resources_en.pdf (last accessed 28th December 2019).

Thanks to eco-compactors [RVMs, N.d.A.], by correctly differentiating waste, citizens will not only perform a good environmental action but will also be rewarded in an easy and direct way. Users just have to throw PET plastic bottles, PE-HDPE plastic caps and aluminium cans in the eco-compactor: the machine is designed to recognize the type of waste, differentiate it automatically, reduce the volume up to 90% initial and transform the material transferred into a bale ready to be sent to the recycling chain. In turn for waste the machine will allow the user to choose, thanks to the touch screen system, which discount or coupon to get as a reward, depending on the type of store chosen (e.g. restaurant, pizzeria, chemist, wellness centre or supermarket), to be spent in the activities under agreement in the historic centre.

(Il Sole-24Ore 24 April 2016)

This article describes exactly how the RVM is part of a larger network of interactions. It refers both to the technical details (the volume reduction for bestowed packages) and to how it can positively influence local activities of the area. Actually the “automatic differentiation” is performed through the presence of the small-doors: each of them is designed to receive different kind of packages according to the material which is made of. Thus, the sorting is made manually by users, but I will be back on this later in the next paragraph. What is relevant at this point is that RVMs need to be part of shared project for business as this other article exemplifies.

*Go Recycling*⁹ is the project based on the creation of business starting from what most people consider scrap. It is something new for us [in Italy N.d.A.] while already established in some other countries where these collectors, once inserted the material give in exchange good or even coins. The collector [i.e. the RVM, N.d.A.], [...], allows the micro-collection of “valuable” materials (PET, ALU, etc.): just insert the “products” into the machine to receive a gift voucher in exchange.

(La Nazione, 6 November 2015)

The ecosystem of economic relationship is further explained in this other newspaper article; it is indeed necessary to have an agreement between shop owners, municipalities, recycling centres and utilities for environmental services and waste management.

[...] An eco-compactor was inaugurated to collect plastic bottles, cans and steel boxes. Installed only in mid-January 2017, to date over 24,000 pieces have been delivered. Coupons received in exchange for waste can be spent at over fifty local businesses and municipal museums: with two coupons you can have a reduced admission ticket instead of a full one.

(AdnKronos 23 March 2017)¹⁰

As we can read in this extract from Italian news, the declared rationale underneath the installation of RVMs is to promote a sustainable pro-environmental behaviour by giving value to waste. For whom recycles specific items, whatever it is PET bottles or aluminium cans etc. Money, or other forms of economic incentives are provided. The specific incentive may vary locally. However, the general approach is recognizable: to give back a small reward (a part of this new value) to whom (re)introduce waste into a “virtuous cycle.” To perform such process collecting points are needed and they should be not the same of recycling stations. Rather, they need to be explicitly dedicated to an alternative shorter and more remunerative path of recycling. The items bestowed there are brought directly to reprocessing (see figure 2).

This shorter path is crucial for ensuring value to the waste: it bypasses the steps that normal waste management facilities envisages, such as selection between different kinds of plastic, transport and cleaning. From the point of users, as previously described, they can get tickets for discount or they can get credit for the purchase of other goods.

9. This is a fictitious name. The same applies to others quoted in the subsequent excerpts.

10. All the excerpts from Italian sources are translated by me.



Figure 2. Regular and shorter chains of recycling: shorter chain should reduce environmental impact and ensures valorization of plastic.

Compared to other schemes that rewards the return of specific material for recycle or re-use, as for instance the *Einwegpfand* better known as *Pfand* in Germany, this kind of initiative is business oriented. Indeed, deposit-refund systems is based on an environmental tax. The scheme charges a small amount of money (in Germany 0.25 € for single use containers is charged) on each bottle. Such amount can be recovered by bestowing the bottle to a shop or even to a RVM contrasting the risk of throwing it with unsorted waste or, even worst, disposed in the environment, a problem also called “midnight dumping” (Walls, 2011). However, in this case it is a refund and not a reward.¹¹

On the contrary, RVM promoting reward is a system based on the assumption that recycle per se is a choice that need to be made convenient in order to be performed by citizens.

This system is a system that we build. Obviously, we operate on people’s emotions. [...] If I give people an incentive, I give a prize, I give a point [to be summed to others for discounts], there will be a queue in front of the machine. We agreed with the recycling consortia to give incentives.

(Excerpt from Italian daily morning show on national television)

This concise explanation of the RVM logic is given by the CEO of RV Inc., an Italian RVM producer firm: he clarified this aspect during a presentation in a morning TV show on Italian national television.

This is in line with rationalistic theories previously recalled. Indeed, it demonstrates the appeal of the approach towards behaviour change. There is a clear assumption about the gratification promoted by an economic reward, perfectly in line with the ABC model. Gratification feeling, considered as universal, should spread and contribute to the success of this alternative chain for recycling (“there will be a queue”). For our discussion this is a first interesting hint that allows to mark out about the agency of technology, the material arrangement, within domestic waste management as social practice: the technology is charged with the expectation to promote a specific and — for the RVM producers — more desirable way of recycling. Coherently, the design of such technology is configured in that way to promote a specific change in, or a re-shaping of, domestic waste management daily habits.

As it is clear from the media representation and the short excerpt just few lines above, the whole argumentation envisages the presence of a dedicated technology. The strategy of RVMs assigns a clear relevance to a material component of interaction. Indeed, it reconfigures the value of waste exactly being an access point or collection point for PET bottles. In this case, a technological artefact is appositely designed for intervening in domestic practice of waste management since waste sorting is an already provided municipal service. Moreover, it is the turnout or, in other words, the access point to the alternative path for recycling that enacts a different and more profitable one. Apparently it is more profitable for anybody: i) for who throws bottles and gets a reward; ii) for who got an already sorted and compact bale of plastic ready to be reprocessed and thus sold as raw material; iii) for local shopkeepers who provide discounts that may increase their earnings.¹²

Producers of RVMs try indeed to make RVMs as passage points, made convenient to users through incentives, in the chain of recycling. Shortening of the recycling loop would not be achieved in the same way without the intermediation of this technology. A single RVM provide several kinds of rewards that a user can easily choose on a touchscreen at the end of PET bottles bestowing, perfectly substituting alternative collecting points that requires a human operator. Finally, the RVM accept any container independently of where it has been purchased; this means that it is open to collect from any source totally substituting retailers as middleman of deposit-refund schemes (Walls, 2011).

11. The *Pfand* system, as well as other deposit-refund schemes, contribute to shape specific practices of urban mining: people at the margins (e.g. unoccupied, homeless) self-organize as informal collectors in order to obtain what they need to survive. In Berlin, for instance, it is common to see people collecting dozens of bottles on shop-carts; there are even further side effects as for instance the creation of dedicated web platforms and apps for facilitating collectors (Barrin, 2018).

12. It should be noted that the general discourse detected through content analysis of the corpus and through the RVM instructions about recycle plastic does not question the issue of the plastic use reduction. Rather it encourages recycling depicting it as economically convenient and even environmentally friendly. There is a general agreement on the need to reduce plastic use, since plastic has a less efficient recycling path, therefore the proper environmental issue is to limit plastic use in our daily life, for instance for food packing. RVMs seems to relieve consumers from this burden. This may resonate with the “rebound effect” already detected for energy use by households equipped with solar panels (Greening, Greene & Difiglio, 2000), since it allows to keep energy consumption or even at higher levels rather than decreasing them.

The centrality of a technological artefact in a larger and heterogeneous network of actors for promoting sustainable practices in the framework of circular economy becomes even more evident in case of failure.

Once finished to empty my bag I push the button... Alas! Not a sound, nor a bill.

The machine just took my PET bottles and caps giving me back any reward! I called the telephone number pasted on the front side of the machine in order to signal the failure and to inquire further about the doom of my waste. The man in charge of maintaining the RVM gently explained me that the agreement between the municipality and the company providing the machines expired. It has not been judged convenient enough to be renewed and what the screen is still describing to me is no longer valid in the town. Thus, the machine is “out of the grid.” RVM properly collected my bottles and caps but they will follow the normal path of recycling being aggregated to the original category of waste I was accustomed to: plastic, cans and glass, all together.

(Extract #3, ethnographic notes from fieldwork, RVM in the city centre)

As we can read from this excerpt from fieldnotes, all the efforts for selecting bringing there the bottles and further separating caps were useless for two reasons: first, no reward was provided, second the shortcut into recycling path was not available. Since the machine was “out of grid” (actually, out of a specific agreement for rewarding) the RVM failed: no value could be generated.

Indeed, a key issue for RVMs, to shape directly the practices of recycling, as we learned is connected to the ability of imposing itself as the *obligatory passage-point* (Callon, 1986) for a shorter path of circular economy through incentives. As Callon marked out about how to track trajectories of technoscientific innovation through an ANT perspective (*Ibidem*), obligatory passage-points consist of issues to be solved that are ineluctable premises for dealing proficiently with another — connected — one. This concept embraces a variety of possible elements such the setting up of a narrative point as common need (Kitchen, 2000), human bodies (Crabu, 2017) but, being plastic enough concept, it may include even material elements as for instances artefacts. This is the case for RVM: through it, the entire network of relationships keeps its function shortening the recycling path and, as a consequence, it allows to produce the required value to be distributed as reward to users.

Conversely, if it does not work properly thus all the activities carried out hitherto becomes of a limited utility: an “out of grid” machine gave back no reward (no value could be generated) and did not contribute to a shorter recycling path.

When technologies do not attain to the task, when the input does not give back the expected output (Volonté, 2017), then we have an additional proof of its agency (*Ibidem*). To say it differently, if RVM as obligatory passage point falls it will thus promote a domino effect making pointless any effort required for adapting to the scripts envisaged by the RVM itself (see next paragraph for details).

Furthermore, as demonstrated by STS literature about infrastructures (Leigh-Star, 1999), failure reveals what is normally invisible to users, for instance the tasks assigned to an apparatus of technologies. In this specific case, the failure in triggering the shorter path for circular economy allows us analytically to deal with two further categories about the agency of technological artefacts such as: the scripts that RVMs promote and the related delegations of tasks from the waste management system directly to the user.

4 Scripts and Delegations

To throw plastic, aluminium cans, glass, paper in dedicated garbage containers requires a specific activity of sorting. For plastic, potentially among the most problematic materials to be reprocessed (Nace, 2017), this is particularly crucial. Indeed, not every single plastic resin is recyclable or is actually recycled (*Ibidem*) also because too costly and thus inefficient (Dars Ellis, 2012). The most convenient category of plastic is Plastic Number 1, PET.

Let's reconstruct the trajectory of the long path (figure 2) for a PET bottle¹³: once collected for instance from kerbside, waste management municipal service move the bottle (together with other litter such as other plastic resins waste) to an eco-centre. Then, the waste needs to be sorted, that means separated by wastes and packages that are made of other plastic resins (Polypropylene — PP or High-density polyethylene — HDPE). Plastic resins need to be processed homogeneously, that means that each bale should contain only the same kind of plastic. After that, bottles are washed to ensure that plastic is as pure as possible. Then, it is crushed by processing industry into small flakes before finally be compacted into pellets ready to be used by industries that will use them to extrude new products (Dars Ellis, 2012).

What is clear from this sketchy description is that the system of recycling has several different tasks to be performed in order to obtain new raw material to be re-used for new products. Such a process necessarily has some costs that normally relapse on the end-user of recycled polymer as well as on the citizen that pays for waste management. The shorter path reduces these costs; it provides to processing industry an already selected and cleaned plastic. From this derives the value that contributes to the reward provided by the RVM.

This time I sorted my waste differently. Indeed, I collected plastic bottles separately in a bag in order to bring them to another destination. A reverse vending machine (RVM) has been settled to receive a specific portion of waste: polyethylene terephthalate (PET) the type of plastic used for disposable beverage bottles. If I bring my PET bottles to the RVM, that otherwise would be only waste to me, it will provide me a small amount of money, actually a coupon, I can use in local shops as discount. I have come across this opportunity very recently and it looks convenient.

(Extract #4, ethnographic notes from fieldwork)

RVMs are designed to accept specific kind of packages that are normally inserted in the recycling path all together; in other words, the RVM has its script through which properly interact. As any other technology or artefact (Akrich, 1992) RVM embodies specific value systems that shape the way through which users are allowed and, conversely, not allowed to use it. In this case, since the shorter path of recycling need to cut the costs of sorting and transport to produce value within the circular economy framework the designers of the machine, the passage point, set up specific features that imposes rules of interaction. In other words, a script. Technically, as previously said, this is obtained with the design of the small doors and the diameter of the holes for bottles. This is not the only strategy: indeed, the second RVM visited in a shopping mall (figure 1, on the right) only few kilometres far from the town centre described before, imposes explicit rules: "Reduce, recycle, reward. Bring here 10 empty [PET] water bottles. 10 bottles = 1 coupon for discount" (emphasis added).

So, in this case the rules for interaction are settled very clearly: the acceptable bottles are explicitly indicated, as well as the minimum amount required to get the reward. One could object that it is not actually influencing how to perform the entire chain of actions that constitute the practice of recycling; indeed, it seems to limit its influence to the imposition of how dealing with a specific basic task, namely how to throw bottles. However, if we examine what is needed to perform the bestowing of PET bottles, we can realize how those scripts actually delegate tasks that are normally part of the longer path of waste management. Indeed, RVMs are oriented at, or presume a, reshuffling of waste management, entirely.

I read carefully the instructions. They are written in green block letters clearly visible. According to them, I should only insert bottles and caps separately and then push a button to get my reward. A last effort consists of putting bottles and caps one by one; it takes just few minutes but longer than emptying my bins in the garbage container. Overall, I think the game is worth the trouble. Recalling to my mind the steps I made up to this point, still, the whole operation seems convenient, although I had to further select my waste, separate a part of it and finally bring it here. Indeed, here the system is designed for rewarding my efforts: the coupon and the reassurance that my PET bottles will follow a shorter, more

13. Minervini (2013) actually did it. In performing a valuable ethnography of a recycling centre, he concretely followed the recycling path of his wine bottle.

convenient and more environmentally friendly path toward recycling.
(Extract #5, ethnographic notes from fieldwork, RVM in the city centre)

To better understand this element another ANT concept may help: it is called as *program of action* (Akrich & Latour, 1992). Taking a step back about how recycling PET bottles works I figure out a detailed path. Indeed, to perform a proper recycling some steps, as described before, are necessary. Each step corresponds to a specific task to be performed. Each task is assigned to a specific actor (see figure 2) and this is the detailed program of action. But in order to produce value — to implement circular economy — these tasks need to be delegated to a less costly actor. Such a program of action of recycling PET bottles is similar to the longer path but, through a series of delegated task included in RVM's scripts, it shortens the path. This means that who defined the scripts expects users to include the act of bestowing selected waste in a defined series of tasks, thus outlining a program of action.

The shaping of the program of actions qualifies agency of artefacts such as RVMs. Indeed, it is a way through which the agency of a material component of a practice influences the shape of the practice it-self.

The woman describes to me how the RVM works. While she is inserting the bottles in the hole separating them from caps, she explains to me:

“It’s a pain in the neck because it requires time in separating bottles and to get here, but at the end of the day you can recover something [she hinted at the touch screen through which select the discount coupon] for the grocery and you produce less waste. Here it is comfortable since I can come by car. So, it is ok. Fortunately, today there is no queue.”

She concludes to bestow the bottles she brought there in her bag, selects the discount on the touchscreen of RVM, she pushes the button to get the coupon. She tears the bill apart and heads towards her car.

(Extract #6, ethnographic notes from fieldwork, RVM at the shopping mall)

As described in the field notes and conversations with a user, it is possible to point out at least three of them:

1. Selection: a further and more refined selection among plastic waste;
2. Transport: selected plastic wastes need to be appositely brought to the RVM;
3. Separation: further separation of components of plastic waste is required at the moment of bestowing it to the RVM.

Selection is the first necessary task to be performed. In the case of the RVMs considered so far, it means to sort out part of a more general waste category (plastic) that normally would be grouped together not considering the resins. Concretely this is translated in storing PET bottles in another place, a bag, a bin or a crate. This might not be a difficult task, but it can reroute normal domestic arrangements even for a recycling household: from merely allocating room for the outcome of the further selecting criteria, to the time to be dedicated to such a task. For the latter, it should be reminded that the RVMs are not as capillary diffused as garbage bins, nor as door-to-door recycling scheme. Thus, using them requires an out-of-sync moment for delivering PET bottles to RVMs compared to regular recycling path as it emerged from the field. This brings us to the second delegation, transport: selected plastic waste needs to be brought to the specific places where the closest RVM is located. According to direct observation and to the review of media releases, RVMs may be settled in town centre, in a shopping mall or even in a parking lot. To carry appositely selected bottles means to include such a destination into one's own route. Independently on the convenience of walking, cycling or driving on regular basis with a bag full of waste, this might be an uncomfortable task since it might be awkward and inappropriate. We should keep in mind that the stability of practices is assured by interconnection with complementary ones (Hargreaves, Longhurst & Seyfang, 2013). Indeed, as Blue, Shove, Carmona and Kelly (2016) remind us, there are some practices that have their right places — and moments as well — to be performed: to be aware of

this is part of the skills and knowledge required for carrying on practice in connection with other ones. The appropriateness of bringing waste in non-conventional places for waste might interfere with other practices thus representing a burden.

The final task delegated to user is separation of bottles from caps. Separating the components of the beverage package is a final necessary task that maximize the previous ones: indeed, such a task further safeguards homogeneity of the resins. The two components are made of different kinds of plastic. Looking at accustomed users of RVMs separating bottles from caps is a mechanical gesture but, as described through fieldnotes (extracts #4, #5), at the same time it makes the whole operation longer compared to simply throwing plastic (even if sorted) in a dedicated trash bin.

Taken all together the three delegated tasks are consistent with the reduction of steps for the path of recycling; and this actually allows to save time and energy. Each task relieves the entire chain of a burden that can be monetized. In doing so, the RVMs to work properly, at least, requires a specific reshuffling of the conventional program of actions for domestic waste management; through its scripts it delegates three crucial tasks that contribute to create value out of waste.

This actually contributes to implement a circular trajectory involving heterogeneous actors (users, technologies, municipality, wastes) enrolling them into a network of interactions that can be called an assemblage or an actor-network (Latour, 2005).

At this point we might ask ourselves: does technology changes behaviours or re-configures practices? The answer to this question needs to recall what discussed in the previous pages.

5 Conclusions

The analysis provided here concentrated on RVMs functioning and the re-composition of everyday practices they are supposed to bring. I recovered some elements from seminal works of STS especially recalling key concepts from ANT to explore in depth an attempt to reshape domestic waste management practices brought by RVMs. This brought me discuss in an empirically informed analysis the performativity of non-human actors within a significant environmental issue such as domestic waste management.

From an analytical point of view this strategy offered at least two advantages: on the one hand, it allowed to analyse both users and waste managers; on the other, as a starting point it gives back a more accurate analyse of waste recycling as mundane activity. I used an eclectic methodology including content analysis of media releases and field-notes from a self-ethnography. Thus, I extrapolated scripts as designed by engineers that created RVMs, as publicly presented and by following them, their values systems and tasks delegated to users.

I took advantage of the path already made by the fruitful contamination of the theories of practice by environmental sociology in the specific research area of sustainable consumption. As already recalled above, it contributed sensibly to show empirical and analytical opportunities deriving from such an approach provided relevant theoretical insights for advancements in social theory (Warde, 2014) furthermore have been tested in dealing with social change (Spaargaren, Lamers & Weenink, 2016) also in a multilevel perspective (Hargreaves, Longhurst & Seyfang, 2013).

More specifically, what has been done here was the re-injection of an STS perspective setting the technology at centre of the focus of the analysis of domestic waste management as social practice. Recently the material component of social practices has been judged as just as “employed, manipulated and constructed by the participants in their doings and sayings” (Spaargaren, Lamers & Weenink, 2016, p. 9) thus refusing the performativity of non-human actors. The case of RVMs for plastic recycling proofed the non-neutral role of technology emphasising the performative ability of the materiality into social practices.

Partially following the idea of RVMs producers: technology can be the promoter of a different set of actions in recycling. Shove, Pantzar and Watson (2012) in their book directly rely on such idea in order to stress the point of the material component of their triadic system for the understanding of social practice.

More specifically posing the material component at the centre of the analysis of social practice enriched the discussion about the two areas of the recycling process:

a) the purpose of reducing the share of disposal and creating profit within the framework of circular economy;

b) the users who are asked to perform recycling, namely sorting, transporting and further separating materials.

The category of delegation allowed to outline how to enact circular economy this way articulates around a diffused chain of mundane arrangements. To produce profits for all the actors involved in the path, some steps need to be performed differently. Scripts imposed by engineers through RVM allow the value creation since they delegated at least three tasks to the end user. It is therefore a delegation from the artefact to the user forcing him to direct and reorganize different aspects of his daily life by investing time, space and energy. Indeed, it influences program of action (Akrich & Latour, 1992; Latour, 1992) for recycling PET bottle as it was meant originally by municipal waste management.

So, we cannot speak only of a delegation to the artefact (or technology in this case). This process goes in an opposite direction either. Technology requires tasks to be delegated to properly function in order to accomplish its duty. Hence, within the debate on the agency of objects in the framework of social practices analysis, it is even more relevant to the present discussion.

This consideration brings us to an answer for the question about the technological push toward changing behaviour. In principle, an approach based on theories of practice should refuse the idea of a pure incentivization through a technological push; several commentaries, review articles and research papers mentioned before already explored critically the issue of behaviouristic approach and its limits. So, literature is quite well aligned. However, for such a case study this answer is not enough; indeed, as shown before, the change of behaviour is exactly within the state of mind of RVM producers. A direct response relies on the reception of the two RVMs visited: it is not by chance that a perfectly working RVM is active in a shopping-mall while the one “out-of-grid” is located in an elegant street of a town centre. Social practices to be performed need to be enrolled in other chains of actions or, better to say, into other bundles of already established practices. Thus RVMs, and more in general technology, is not changing behaviour but it can shape practice of waste recycling provided that it relies on a stable network or relationships, or an actor-network.

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