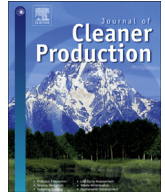




Contents lists available at ScienceDirect

## Journal of Cleaner Production

journal homepage: [www.elsevier.com/locate/jclepro](http://www.elsevier.com/locate/jclepro)

## Consumers' reactions to product obsolescence in emerging markets: the case of Brazil

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## ARTICLE INFO

*Article history:*

Received 30 October 2014  
 Received in revised form  
 29 August 2015  
 Accepted 31 August 2015  
 Available online xxx

*Keywords:*

Product lifetime  
 Planned obsolescence  
 Psychological obsolescence  
 Sustainable consumption  
 e-waste  
 Brazil

## ABSTRACT

Product obsolescence represents a major challenge for sustainability. Deliberate curtailment of product lifespan and the symbolic devaluation of devices appear especially acute in the electronics segment, thus pushing up e-waste volumes. However, consumer reactions to these processes as well as their own enactment of psychological obsolescence remain understudied. Based on a representative urban sample survey of 806 Brazilians, this paper discusses the dissonance between consumers' product longevity experience, orientations to replace devices before terminal technical failure, and perceptions of industry responsibility and performance. Results indicate an experience of shortened product lifespan over time, which trails expectations of product longevity, although this fails to fuel consumer dissatisfaction. Technical failure is far surpassed by subjective obsolescence as a motive for rapid product replacement. While individuals acknowledge corporations' role in contrived product replacement, they do not seem to condemn this behavior. We conclude that Brazilians naturalize obsolescence by adjusting downwardly their product lifespan management behaviors.

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### 1. Introduction

Waste reduction has become a central challenge in achieving a more sustainable society (OECD, 2011). Electronic waste (e-waste) accounts for a large part of the problem: as a result of an ever-expanding electronics market and the rising obsolescence rate of electronics, e-waste is growing faster than any other waste stream. Indeed, e-waste volume currently increases three times faster than regular waste (InfoDev/World Bank, 2012).

Emerging economies, like Brazil, that host a burgeoning middle class with long-delayed consumer aspirations (Ferreira et al., 2012; Tabion, 2010) bear increasing responsibility for the rise in e-waste. Market estimates suggest Brazil's e-waste is in excess of 1 m ton annually (ABDI, 2013) and anticipate it will hit 1.2 m tons in 2016—a prognosis that may prove conservative, once the electronic household devices, mobile handsets, and computer equipment segments achieve double-digit growth rates per year (ABINEE, 2013). Among developing nations, Brazil—where e-waste growth doubles population growth—stands out with the highest projected per capita e-waste rate (7.1 kg) for 2015 (InfoDev/World Bank, 2012;

UN/Step E-Waste World Map Initiative, 2015). Given that less than 60% of total waste is adequately disposed of in authorized landfills and only 4% of total waste is actually recycled (InfoDev/World Bank, 2012) the implications of waste generation in Brazil are enormous.

Waste management policy and regulation (falling under the umbrella of the National Plan for Solid Waste, set in motion in late 2010), as well as trade initiatives, have recently focused on attaining extended producer responsibility for the entire lifecycle of products. However, criticism abounds regarding a) the irregular enforcement of the law; b) the lack of formal and continuous feedback instruments to provide all stakeholders with information about their respective roles and possible sanctions; and c) the ineffective implementation of collection, recycling, and reverse logistics mechanisms, particularly with regards to electronic appliances (Oliveira et al., 2012). Additionally, little attention has been directed to stimulating a more responsible approach to products' lifespan or to the availability of cost-effective replacement parts or product-repair facilities. Public policy and grassroots mobilization from pressure movements (like consumer associations) often highlight waste-management issues like reverse logistics, recycling, adequate disposal infrastructure, and take-back schemes embedded in extended producer responsibility (i.e., once waste is already generated). Initiatives concerning waste prevention and throughput reduction have been grossly ignored. Further,

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producers' deliberate curtailment of product lifetime and their marketing campaigns to hasten symbolic devaluation of products and induce their premature replacement have been overlooked, as has consumer awareness and responsibility for e-waste generation resulting from psychological obsolescence. Psychological obsolescence (also known as symbolic or subjective obsolescence) results from consumer realization of the declining use value of goods based upon negative judgments of product desirability; ultimately, psychological obsolescence can be defined as the subjective devaluation of product perception based on learned experience, emotional attachments or benefits, status achievement, fashion, or esthetic quality. In the case of a developing nation like Brazil, where product acquisition defines not merely consumer identity but also the extent to which citizenship is effectively achieved (García Canclini, 2001; O'Dougherty, 2002), rapid substitution of products clearly signals social inclusion (Barbosa and Veloso, 2014) and confers status (Üstüner and Holt, 2010).

Mass-media discussion of producer responsibility has emphasized the end of the product lifecycle (through recycling or eco-friendly waste disposal) and, thus, largely failed to consider the impact of longer-lasting and repairable appliances. Academic scholarship has also overlooked the analysis of symbolic obsolescence and consumers' premature replacement practices. Consumers' pivotal role in promoting sustainable consumption solutions (Jackson, 2005; Mont and Power, 2009) has, thus, been neglected with regards to waste generation and reduction. The bulk of the literature considers consumers' role as it relates to their responsibilities for waste disposal and recycling (that is, waste management), not their influence over waste generation. As a result, the study of consumers' ability to leverage product durability remains underdeveloped (Evans and Cooper, 2010). The less we understand the public's views regarding product obsolescence, the less likely we are to achieve a sizable decline in waste volumes, paving the way towards a sustainable future.

Although greater product longevity has been pointed out as an obvious strategy for reducing waste and increasing material productivity (Von Weizsacker et al., 1997), the discussion around reversing the trend toward shorter lifecycles has focused on alternatives like remanufacturing (King et al., 2006). Shorter lifespans have usually been defended on grounds of promoting technological innovation, business growth, and healthy economics (Fishman et al., 1993); yet these occurrences have also been linked to negative environmental consequences like resource depletion, pollution, and greenhouse-gas emissions (Cooper, 2005; Guiltinan, 2009). Moreover, rapid product replacement has negative economic side-effects. For example, governments are forced to divert ever-increasing resources for waste management in order to finance expanding garbage-collection systems and landfill acquisition and development. Further, society is exposed to a rapidly growing number of toxic materials from non-recycled products, putting pressure on health spending and labor productivity. In addition to this, continued demand for increasingly scarce natural resources needed to manufacture replacement products pushes commodity prices up, thus contributing to inflation and economic instability.

Interestingly, both positive and negative assessments of product obsolescence attribute this outcome to manufacturers' decisions and interpret the issue from an instrumental and consequentialist perspective—in other words, planned obsolescence is seen as an impetus for both technological progress and environmental setbacks (Cooper, 2005; Fishman et al., 1993; Guiltinan, 2009). Ultimately, consumers have been exonerated from any responsibility in rapid product churn; instead, subjective obsolescence has mostly been interpreted as the expression of engineered product decay induced by manufacturers' institutionalized practices (Peattie,

2010; Spinney et al., 2012). Guiltinan (2009:20) nicely synthesizes this idea: “The most direct way to speed replacement demand is to shorten the usable life of a product... (in that sense) the objective of planned obsolescence is to stimulate replacement buying by consumers.”

In sum, product obsolescence may take the form of either products' functional inoperability (i.e., technological or functional obsolescence), unfavorable cost-benefit propositions for extending product lifetime (i.e., economic obsolescence), or products' declining value as social and symbolic currencies (i.e., symbolic or psychological obsolescence); further, the latter form of obsolescence may be spurred by either (or both) manufacturer-led destabilization of factors and features that qualify products as both appealing and functional or end-users' drive to self-actualize their identity through the purchase of up-to-date devices (Cooper, 2004; Peattie, 2010; Spinney et al., 2012). The prevailing view is that consumers are either manipulated to perceive currently owned products as outmoded or are locked into situations they neither control nor endorse; as a result, consumer perceptions and behaviors have mainly been considered immaterial to a proper understanding of the underlying dynamics conducive to shortening products' lifespan. We understand that, by overlooking consumers' dispositions and denying their agency in the product lifecycle, the opportunities for identifying policy and behavioral touch-points with which to promote change and offset obsolescence-driven e-waste problems have been seriously impaired.

## 2. Research on product longevity and obsolescence

The scant empirical scholarship on the subject presupposes a generic consumer support for product longevity yet finds that consumers are divided on whether appliances lifespans are adequate. This ambiguity applies even to devices strongly impacted by technological advancements (like mobile phones and personal-care appliances); in Cooper's (2004) study respondents envisioned product lifespans that substantially exceeded the actual experienced lifespan (in some cases, by as much as 33%). Interestingly, Cooper reports that while a majority of consumers express a strong perception of declining durability, only a minority blames manufacturers for this outcome. This minority, in turn, mostly focuses on producers' intentional reduction of product lifespan via either decreased reliability or continual product updates (Cooper, 2004: 431; 433–435). Apparently, consumers adapt to this imbalance between high durability expectations and low performance by lowering their product-lifespan expectations (Evans and Cooper, 2010), thus reducing the resulting cognitive dissonance. This finding is consistent with evidence that product durability is not perceived as a problem (Evans and Cooper, 2010) and with the weak role product longevity plays in influencing consumer choice (Cooper, 2004; Cox et al., 2013).

The environmental implications of product lifespan (including waste reduction and recycling considerations) are often overlooked by consumers, who understand it mainly as a quality issue (Cooper, 2004, 2005; Cox et al., 2013). Consumers' failure to see the connection between product longevity and environmental concerns represents a warning signal for policy efforts aiming to achieve sustainable consumption goals. Such perceptions seem to reflect the existing gap between green beliefs and green behaviors (Auger and Devinney, 2007; Jackson, 2005; Kollmuss and Agyeman, 2002), wherein knowledge deficits hinder awareness of the environmental implications of consumer choices.

Research suggests that consumers often replace products in response to fashion and new technology rather than as a result of declining performance or irreparable technical failure (Cooper, 2004; Cox et al., 2013; Evans and Cooper, 2010), thus signaling

the strong influence of psychological or symbolic obsolescence. In the UK, for example, 1/3 of appliances were discarded while still functional and another 1/5 required only some repair to function properly (Cooper, 2004). Concomitantly, research has proven that the interval for replacement is shorter when driven by psychological obsolescence than by physical obsolescence (Grewal et al., 2004).

Longevity (which consumers prize in theory as they expect longer lifespans) seems detached from appliances' perceived quality; this indicates that—for many consumers—functional features related to durability have marginal impact on how individuals use and when they dispose of devices (Cooper, 2004). Equally important, longer lifespan is related to a few disadvantages, as durable products can become outdated, energy inefficient, or embody a negative cost-benefit balance as affordability of new versions increases (Cooper, 2004). To understand a rationale for purchases that extends beyond functionality, scholars recognize the influence of socio-emotional or psychological forces such as consumerism, time famine, and consumer's attempts to self-actualize through frequent product replacement (Evans and Cooper, 2010; Cox et al., 2013). Resorting to these arguments as ad hoc or residual explanations for shortened lifespan of electronics is congruent with the lack of empirical research on consumers' assimilation of symbolic obsolescence and awareness of manufacturers' deliberate curtailment of product lifetime.

The notion of psychological obsolescence can be related to consumer engagement with goods as a means for establishing identity and engaging socially (Douglas and Isherwood, 1996). Material objects like electronics constitute signs and scripts for personal identity, enabling consumers to meet core needs (such as belonging, transcendence, self-actualization, and distinction). This notion of psychological obsolescence assumes a declining subjective utility (social desirability) of products over time as a symbolic representation of status and character. Several authors perceive that an “organized creation of dissatisfaction” (Steele and Larson, 1993: 73) is behind the rapid devaluation of products' subjective worth; this devaluation is spurred by technological innovations and rebranding efforts, with the continual introduction of new product styles and models contributing to products' declining appeal and desirability.

Some scholars exonerate consumers and relate this process almost exclusively to manufacturers' destabilization of product qualities (Spinney et al., 2012). Such an approach interprets consumers as being locked into situations beyond their control and, thus, undermines the possibility of instilling them with a sense of personal awareness, responsibility, and efficacy in regards to their influence over product lifespan (Holt, 2012; Jackson, 2005; Sanne, 2002).

In reality, consumers may not be victims but rather willing accessories to this process. They eagerly validate technology innovation as a reason for product replacement and exhibit no nostalgia for discarded appliances—a substantial number of which become e-waste even though still operational (Cooper, 2004; Cox et al., 2013). In other words, the potential benefits of longer-lasting products (for society, the environment, and individuals' own pocketbooks) may fail to appeal to consumers if the barriers that impede individuals' acknowledgment of the negative impact of e-waste (especially, the issue of psychological obsolescence) are not mapped out in order to inform public debate and policy.

### 3. Research questions

These issues clearly indicate the pivotal role lifespan data and socio-psychological measurement of the public's views about product obsolescence play in achieving sustainability goals through

reduced throughput (Cooper, 2010). This paper aims to understand perceptions regarding product lifespan and value of product longevity, as well as attitudes and behaviors towards product obsolescence, in the context of a developing society (Brazil) characterized by a burgeoning middle class with an avid desire for consumer electronics (Radar Acrefi-Datopopular, 2012). Since the success, and consequences, of planned obsolescence ultimately depend on consumer behavior in the marketplace, it is essential to understand consumer perceptions and reactions towards fast-paced durable-goods replacement and disposal cycles; such an understanding facilitates informed policy decisions and effective grassroots mobilization in regards to these issues. Given the economic and environmental weight of e-waste in this country, we direct our analysis to a selection of electronic appliances.

First, this study seeks to understand the consumer experience with product lifetime by surveying past and current product lifetime usage backgrounds, degree of satisfaction with product longevity, gap between perceived reasonable lifespan and actual usage lifespan for these appliances (referred to in this paper as the *longevity gap*), and variation of expected longer lifespans across appliances. Moreover, we seek to describe actual behavior in relation to appliance disposal and reasons for replacement. Equally important, given the paucity of comparative data on these topics, we will discuss findings in comparison with Cooper's (2004; 2005) results for the UK (valid for the late 1990s). These data provide a context for subsequent research questions on attitudes and behaviors towards obsolescence.

Second, this paper spotlights the perceived value attributed to product durability, the acknowledgment of planned obsolescence, and its effects upon personal life. To our knowledge, this data furnishes the first portrait of consumers' perceptions of product obsolescence in developing societies from Latin America. Discussion of findings provides a descriptive picture of the degree to which e-waste generation behaviors are “locked-in” or autonomously driven. Equally important, it enables the quantification of consumers' acknowledgment of both manufacturer-driven planned obsolescence and individual symbolic obsolescence of products (the two forms of obsolescence most widely acknowledged by the literature). Furthermore, the analysis aims to examine the ways in which these perceptions interact with consumer attitudes towards product longevity and motivations for disposal behavior, as well as with claims used in favor of and against incentivized product substitution. Lastly, we also consider the extent to which consumers' reactions connect to environmental concerns.

This research aims to fill a gap in the understanding of what drives consumer disposal behavior of electronic products in emerging markets; this contribution should both elucidate the extent to which current policy and regulation initiatives align with consumers' social practices and identify, for the purposes of educational and informational campaigns, the issues that may resonate most strongly with the population. In light of the lack of publicly available data on both product lifespans and consumers' relationships with product lifespan and product obsolescence, this paper will primarily offer a descriptive, explorative account.

### 4. Methodology

The current discussion relies on survey data conducted by market research agency Market Analysis, in a pro-bono partnership with IDEC, the oldest and most influential consumer-advocacy network in Brazil. The study aimed to gather information that could inform policy decisions and guide communication campaigns by IDEC. For that purpose, an urban representative sample of 806 adult Brazilians (aged 18–69 years old and residing in the largest

**Table 1**  
Frequency of technical problems with current device (in %).<sup>a</sup>

Electronic device	2 or + Times	Once	Never	DK/NA
Computer	16.6	15.4	67.8	0.2
Mobile	13.1	9.2	77.7	0.0
Washing machine	9.0	12.0	78.9	0.1
Printer	6.9	10.1	82.6	0.4
TV	3.4	9.9	86.3	0.3
DVD/Blu-Ray	3.0	7.5	88.8	0.6
Oven	2.6	4.6	92.0	0.7
Fridge/Freezer	2.4	7.8	89.4	0.3
Camera	1.8	6.4	91.3	0.4
Microwave	1.8	7.1	90.5	0.5

<sup>a</sup> Samples vary from  $n = 367$  to  $n = 806$ , depending on device, as ownership of appliances is not universal.

nine state capital cities across all major regions<sup>1</sup>) was drawn based on a random probability selection of landlines. Quotas of gender, class, and age groups were applied at the respondent level to ensure the sample reflected population parameters. Cases across cities were distributed in proportion to population size, with a greater share of total interviews concentrated in larger cities like São Paulo and Rio de Janeiro. Data collection, via telephone interviews, took place from August 30 to October 7, 2013. Sample estimates can be interpreted within a margin of error of  $\pm 3.5\%$ .

The questionnaire is structured in two sections (see Appendix for wording of questions and response options). The first section seeks to understand individuals' usage and disposal experiences with appliances and their approach to product lifetime. We posed questions for ten different electronic appliances<sup>2</sup> and collected responses only from respondents who had owned at least one previous device. Qualifying subsamples vary from 91% (for mobile phones) to 44% (for printers and microwaves) of the originally contacted sample. Questions pertain to the length of time that respondents used their previous devices and the useful lifespan that they deem reasonable for each category. The net difference of these average estimates provides a picture of the longevity gap as experienced by consumers. This first section also probes disposal routines, including attempts to repair products before replacing them. We discuss findings based on frequency distributions and descriptive comparisons with similar data for the UK.

The second section explores attitudes and behaviors towards product longevity and obsolescence. We describe consumers' inclinations towards early disposal and replacement of products, as well as their orientations towards product longevity, their assessment of producers' performance with regards to product longevity, and their perception of lifespan curtailment as a deliberate strategy of manufacturers. We also aim to verify the extent to which consumers acknowledge product replacement as a non-voluntary, constrained decision and to establish how conscious they are of the consequences of shortened product lifespan. Frequency distributions and composite indexes are used to provide a basic segmentation analysis. Additionally, cross-tabulations with highlighted significant differences are used to inform whether acceptance or rejection of product obsolescence reflects environmental concerns, perceived sustainable performance by manufacturers, and understanding of product-longevity effects and responsibility.

<sup>1</sup> Cities include São Paulo, Rio de Janeiro, Belo Horizonte, Curitiba, Porto Alegre, Brasília, Goiânia, Salvador, and Recife.

<sup>2</sup> Devices probed include mobile phones (cellular or smartphone), personal computers, printers, cameras, televisions, DVD or Blu-Ray players, microwaves, ovens, washing machines, and fridges or freezers. Appliances were selected for reasons of relevance to IDEC and of comparability with available research, such as Cooper (2004).

**Table 2**  
Levels of satisfaction with product performance measured by incidence of technical problems (in %).

	None	Once	2–3 times	4 or + Times
Very satisfied	73.7	44.8	38.3	9.1
Somewhat satisfied	22.9	38.8	38.3	45.5
Neither satisfied nor unsatisfied	1.5	3.0	10.6	9.1
Somewhat unsatisfied	1.5	9.0	8.5	24.2
Very unsatisfied	0.3	4.5	4.3	12.1

## 5. Discussion

Brazilians' experience with their current appliances is relatively new and short-lived. On average, mobile devices have been in use for about 2.6 years, while current fridges/freezers have the highest usage longevity, at roughly 6 years. As many as a quarter of computer owners and one-in-five mobile phone and washing-machine owners have experienced problems with the functioning of their current device (Table 1); thus, technical failure serves as a proxy for product obsolescence and constitutes a tangible reality for a fairly significant number of individuals.

Predictably, performance satisfaction is connected with performance experience (Table 2). However, given high levels of contentment with product experience, consumers' concerns about product longevity do little to moderate their perceived product usability, a result that suggests that durability is weakly problematized as an issue. Similar to findings from other studies, product lifetime is far from a primary purchasing consideration and, therefore, has only marginal influence over consumers' relationships with brands and future choices (Cooper, 2004; Cox et al., 2013). This suggests that pro-sustainability policy and grassroots actions would be wise to spotlight the issue of product longevity and illustrate its connection with overall performance experience.

When comparing expected with experienced product lifespan, Brazilians experience a gap larger than that reported in other societies. On average, 66% of Brazilians feel product lifespan falls short of what they deem to be a reasonable lifetime (Table 3)—a higher percentage than that reported for Britons (45%) by Cooper (2004: 429). Similar to the British case, consumers in Brazil hold different longevity expectations across categories. One noteworthy pattern stands out: the more portable the electronic device, the lower the expected ideal lifespan,<sup>3</sup> yet the larger the gap between expectations and experience<sup>4</sup>—a result which advises that longevity awareness campaigning may be successfully focused on this type of product.

Environmental concerns moderately increase perceptions of inadequate product longevity. The perceived gap in product lifespan becomes more salient as pessimism grows regarding the environment in general ( $p < .03$ ,  $\chi^2 = 17,244$ ,  $df = 8$ ), and the level of pollution in particular ( $p < .01$ ,  $\chi^2 = 20,064$ ,  $df = 8$ ) (see Q25 and Q26 in Appendix). This finding stands in contrast with that of Cooper (2004: 429), who found no effects of environmental views on the deemed-reasonable lifetime of appliances.

Survey respondents also provided information about the age of the subset of appliances previously discarded in disrepair. Although the age of devices discarded due to functional obsolescence closely

<sup>3</sup> For example, perceived reasonable lifespans for mobile, computers, camera, and DVD/Blu-Ray (also referred as video-players) stand at about 5–7 years; for TVs, washing machines, and fridge/freezers this figure rises to between 10 and 13 years.

<sup>4</sup> The averaged longevity gap for mobiles, printers, and video players falls 45% short of what is deemed a reasonable lifespan, versus an overall average difference of 31% (which incorporates categories with even lower gaps—such as ovens, at 11%).

**Table 3**

Longevity gap: Device longevity expectations (reasonable lifetime) and actual longevity experience with previously owned device (prior lifetime before substitution) (mean of years).<sup>a</sup>

Electronic device	Prior lifetime	Reasonable lifetime	Lifetime shortfall (Difference)
Fridge/Freezer	9.5	12.3	2.8
Oven	8.3	11.1	2.8
Washing machine	7.4	10.0	2.6
TV	7.6	10.0	2.4
Microwave	5.2	8.3	3.2
DVD/Blu-Ray	4.1	7.0	3.0
Printer	4.0	6.8	2.8
Computer	4.0	6.7	2.7
Camera	3.8	6.4	2.6
Mobile	3.0	5.3	2.3

<sup>a</sup> Samples vary from n = 363 to n = 803, depending on device, as ownership of appliances is not universal. No responses were removed as missing cases.

approximates the mean age of all discarded appliances, it is important to note that these products account for only a minority of all discarded appliances. Further, in two categories, the age of products discarded in disrepair exceeded the mean disposal age; this, tellingly, indicates that products discarded for functional reasons took longer to replace than those discarded for psychological reasons.<sup>5</sup> In other words, product flaws in usability do not always explain disposal behavior—a fact that suggests that psychological obsolescence, in addition to functional or performance issues, may influence consumer disposal and replacement of products.<sup>6</sup>

Compared to Cooper's results for the UK, Brazilians' expectation of reasonable product lifespan is shorter, as is the amount of time they use their electronic devices before replacement,<sup>7</sup>—two factors that predict higher e-waste volumes and less sustainable behaviors. Comparing seven electronic appliances with available data for both countries shows that, in the UK, an average of 18.3% adults across these categories expect devices to last at least 15 years, whereas in Brazil only 14.7% of respondents do so.<sup>8</sup>

More tellingly, an examination of Brazilian data beyond mean values reveals that the recorded usage time for previously discarded devices exceeded consumers' lifespan expectancy only in a minority of cases: printers and microwaves (16%), mobiles (17%), video players and cameras (18%), computers (19%), TVs and ovens (24%), and fridges/freezers and washing machines (25%). In other words, while a considerable proportion of individuals have past experiences with products falling short of reasonable lifetime expectations, these experiences failed to inform consumers' expectations of future durability; this is an indirect indication that other considerations beyond technical underperformance influence prospective views about longevity of electronics.

<sup>5</sup> In-disrepair washing machines and fridges/freezers were the exceptions; they took about 10% longer to be replaced, compared to the average mean of product disposal.

<sup>6</sup> The weight of psychological obsolescence is expected to vary according to product type. Household appliances like ovens or fridges can be expected to be less subject to manufacturers' deliberate devaluation of their qualities and less likely to influence personal identity or acquire the social relevance of portable electronics. I thank reviewers for pointing this out.

<sup>7</sup> For example, personal computers and video players in Brazil are expected to work for 5 and 7 years, respectively, vs. 9 and 10 years in the UK. In a similar vein, these devices are disposed of, on average, after 4 years in Brazil, vs. 6 and 7 years, respectively, in the UK.

<sup>8</sup> The categories include mobile phones, computers, video players, microwaves, TVs, washing machines, and fridges/freezers. Whereas a similar proportion of Britons and Brazilians expected that mobiles and fridges/freezers should last 15 years (34% and 33%, respectively), in other segments (like TVs, computers, or video players) Britons were nearly twice as likely to hold that expectation.

**Table 4**

Expectations for product replacement within next 12 months.<sup>a</sup>

	Mobiles	Digitals	Audio–Video devices	Household appliances
Highly likely	18.7	14.2	8.2	7.8
Somewhat likely	19.0	10.0	9.5	10.5
Somewhat unlikely	36.8	37.5	45.6	40.2
Highly unlikely	25.5	38.3	36.7	41.6

<sup>a</sup> Samples vary from n = 120 to n = 321, depending on device, as ownership of appliances is not universal. No responses were removed as missing cases.

Another equally important indication of consumers' relative detachment from longevity issues is revealed by probing individual intentions to replace devices within the next 12 months. As shown in Table 4, inclinations to replace current devices are somewhat or highly likely for 38% for mobiles, 24% for digitals (including computers, printers, and cameras), 19% for household appliances (including microwaves, washers, ovens, and fridges/freezers), and 18% for audio–video electronics (including TVs and video-players).<sup>9</sup>

This propensity for short-term product churn appears to align with suspicions that, over time, users experience decreasing product durability—a phenomenon also noticed in other societies (Cooper, 2004; Cox et al., 2013). Consumers' desire for new products in the near future suggests individuals' susceptibility to revise their own interpretations of adequate life for devices; it is evidence of the role subjective factors play in moderating the relationship between experience and expectations. However, devising a suitable test for these hypotheses requires considering the current useful lifetime of devices, weighted by consumers' propensity for early device replacement even in the absence of foreseeable technical malfunctions. Table 5 synthesizes this information by providing estimates of the useful life of prior devices (prior lifetime), projected lifetime of current devices (usage time weighted by propensity for replacement in the near future), useful lifetime evolution (i.e., the difference between prior and projected lifetimes), reasonable lifespan expected, and prematurity rate (i.e., net difference between projected product longevity and desirable durability). To calculate the projected lifetime of current devices, we sum each product's current lifetime and the additional lifetime anticipated by the owner according to his/her stated propensity to replace device within the next 12 months. Since short-term substitution propensity is captured following an ordinal scale (in degrees of likelihood), we consider that a “highly likely” response implies a de facto replacement of a current device in less than one year. Accordingly, those responses are valued at 0.5 (in other words, reference devices were thought to be replaced within half a year from date of survey). Other response options are assigned higher values as they symbolize more added lifetime to a currently owned device: a “somewhat likely” response = 1 (i.e., device to be replaced in one year); a “somewhat unlikely” response = 1.5; and “highly unlikely” = 2 (i.e., device to be replaced in no less than two years).<sup>10</sup>

Admittedly, weighting procedures are artificial instruments, yet they provide reasonably comparable estimates for behaviors concerning the objects under discussion. These procedures aid in differentiating, in relative terms, devices' projected lifetime from the previous lifetime experience undergone by users. In other

<sup>9</sup> Given limited questionnaire space, respondents were requested to choose a primary electronics device as a reference and answer the question about likelihood of its replacement in the near future. Accordingly, these propensities for appliance replacement are based on different sub-sample sizes.

<sup>10</sup> Interestingly, assigning a higher value (5, rather than 2) to the “highly unlikely” category did not materially affect the results.

**Table 5**  
Mean estimates of projected lifetime, lifetime evolution, and prematurity rate (in years).<sup>a</sup>

Electronic device	Prior lifetime	Projected current lifetime	Lifetime evolution	Reasonable lifetime	Prematurity rate
Mobile	3.0	3.1	0.1	5.3	−2.2
Computer	4.0	3.3	−0.7	6.7	−3.4
DVD/Blu-ray	4.1	4.0	−0.1	7.0	−3.0
Camera	3.8	3.2	−0.6	6.4	−3.2
TV	7.4	4.2	−3.2	10.0	−5.8
Printer	4.0	3.7	−0.3	6.8	−3.1
Microwave	5.2	3.8	−1.4	8.3	−4.5
Fridge/Freezer	9.5	6.2	−3.3	12.3	−6.2
Washing Machine	7.6	3.7	−3.9	10.0	−6.3
Oven	8.3	4.3	−4.0	11.1	−6.8

<sup>a</sup> Samples vary from n = 27 to n = 308, depending on device chosen as reference device (as ownership of appliances is not universal). No responses were removed as missing cases.

words, despite the embedded arbitrariness of any weighting procedure, the enabling, inferential advantages of following this procedure largely offsets its potential weakness.<sup>11</sup>

Findings indicate that once propensity to change is factored in, the projected lifetime for currently owned devices is consistently smaller than past useful lifespan experiences enjoyed by consumers—the only exception being mobiles, where durability improvement is negligible. For about half of the devices studied (household and audio–video appliances) we estimate major deteriorations in projected longevity. Consumers' projected product lifetime for currently used items is less than actual reported lifetime of previously owned products. In other words, product obsolescence in the form of decreasing product dependability over time becomes a substantial feature of Brazilian consumer reality. It remains to be seen whether consumers perceive this as a problem and whether they perceive this outcome as being fully independent—or not—of their own expectations and actions.

Rather curiously, projected lifetime for current devices lags behind conceptions of adequate life. This gap reveals the prematurity rate for consumers discarding devices, which affects all appliances, as indicated by the negative values in the last column of Table 5. This finding suggests that consumer decision-making about product disposal timing remains fairly independent of perceived-reasonable product lifetime; this leaves room to consider subjective reasons related to psychological obsolescence as drivers of disposal behavior.

A shortened user experience leads to fewer opportunities for product repair and maintenance, given that device substitution is often anticipated before technical failure. In turn, rapid product churn creates disincentives for the development of a product-repair market, which is further discouraged by manufacturers' higher returns in promoting new sales than in repairing old devices (Thierry et al., 1995).

Only 24% of Brazilians attempted to have malfunctioning devices repaired—a figure less than half of that reported in the UK.<sup>12</sup> Attempts to have mobile handsets repaired are less than half as common as for audio–video electronics (19% vs. 44%), and they significantly trail attempts to repair digitals (27%) and household

<sup>11</sup> Admittedly, the projected lifetimes of products with typically longer life-cycles (e.g., washing machines or ovens) may have been underestimated as a result of assigning a maximum of a further two years of product life to those goods respondents were “highly unlikely” to replace within 12 months. On the other hand, assigning a far greater value to those responses (e.g., a value of 5 or 10) would have grossly overrepresented the typical lifecycle of mobile phones, computers, and digital products.

<sup>12</sup> Cooper (2004: 437) reports 26% and 38% of respondents who usually or sometimes had their appliances repaired, respectively. We used a yes/no response set pre-screening for those who have had performance issues with their currently owned devices.

**Table 6**  
Disposal mode for discarded products (in %).<sup>a</sup>

	Household appliances	Digitals	Audio–Video	Mobile
Sold or donated	74.0	62.5	44.8	30.0
Kept at home	5.2	20.8	31.3	40.7
Thrown away	14.9	15.4	21.0	12.6
Lost or stolen	0.0	0.0	0.0	14.0
DK/NA	5.9	1.4	3.0	2.8

<sup>a</sup> Samples vary from n = 67 to n = 214, depending on device chosen as reference device (as ownership of appliances is not universal).

appliances (23%).<sup>13</sup> Like Britons, the main reason Brazilians avoid repair work has been cost (about 2/3 of respondents in both countries).

The chosen mode for device disposal depends on the type of electronics. While the most frequent situation with older mobiles is to keep them at home (41%), audio–video and digitals are largely sold or passed along among relatives, friends, or charity groups (74% and 63%, respectively). Table 6 summarizes occurrences by class of electronics.

Data suggest a major opportunity to support and enable reuse habits and/or develop a second-hand market—once a substantial portion of electronics remains in circulation among other users.<sup>14</sup> Similar results were found in the UK (Lyndhurst, 2011). Findings also indicate a latent market for product repair once retaining replaced devices becomes a fairly ingrained practice among Brazilians—a habit that might also feed a second-hand market. Sustaining the needed infrastructure to maximize advantages provided by these routines will critically stave off the increasing levels of e-waste reported in Brazil over the past decade.

Comparison of Britons' and Brazilians' reactions to product longevity reveal some peculiarities among the latter group; these may well apply to other countries undergoing similar processes of social inclusion through consumerism and the emergence of a consumption-thirsty new middle class. Data indicate that, in Brazil, expected device lifespan (i.e., reasonable lifetime) far surpasses actual usage time (i.e., prior lifetime in Table 3); the resulting gap exceeds that recorded in the UK, in relative terms, and actual usage experience of Brazilians is shorter than that of Britons. In theory, these two elements should fuel dissatisfaction, yet over 90% of Brazilians are somewhat or totally happy with their devices' durability.

<sup>13</sup> Significantly, younger cohorts and consumers from the more affluent south-east region markets are least likely to search for repair assistance when their devices malfunction.

<sup>14</sup> Giving devices to acquaintances is a popular option. Over 3/4 of respondents who selected the “sold or donated” option disposed of their devices in this manner.

**Table 7**

Status of products before replacement (in %).

	UK	Brazil	Digitals	Audio–Video devices	Mobiles	Household appliances
Beyond repair	46	30	25	33	33	28
In need of repair	21	23	22	15	21	30
Still functioning	33	47	53	52	46	42

The gap in longevity is effectively acknowledged, but desire for longer lasting products does not spur dissatisfaction with devices. Instead, Brazilians balance dissonance by self-adjusting usage habits for a shorter experience. In other words, local consumers use their appliances over shorter lifespans—not just shorter than in other mass consumer societies but also shorter than the appliances are expected to last. Accordingly, the expectation for extended longevity does not necessarily reflect a personal commitment to product usage for longer periods or an adversarial stance against market practices of planned obsolescence. To some extent, such an expectation proves itself materially inconsequential; rather, it reflects a psychological benefit or guarantee that is rarely acted upon yet affords a sense of consumer control over the useful life to be attributed to the product. When psychological obsolescence is at work, consumers retain control over the moment and occasion when they dispose of their products. This type of control is qualitatively different from control over the conditions that determine how long they may depend on these devices. Despite these differences, a substantive number of consumers behave as if these differing types of control, ultimately, were interchangeable, with equivalent weight and implications.

### 5.1. Acknowledging product obsolescence

Product replacement resulting from technical failure is acknowledged only occasionally in both Brazil and the UK; this result suggests the greater influence of deliberate lifespan curtailment by producers or consumers. Consequently, planned obsolescence, in general, which consumers experience as a technology-driven push (through the release of upgraded devices or through unfavorable cost-benefit propositions for extending product lifetime), and symbolic obsolescence, in particular, seem at play. The latter exerts substantially more influence in Brazil than in the UK. Table 7 compares this information, even if not based on perfectly analogous measures.<sup>15</sup> Data for Brazil is further disaggregated by type of devices.

In nearly half of the occurrences of discarded products, it was not a physical inability to keep using the devices that shaped consumers behaviors but, rather, the product's perceived inability to meet an individual's identity aspirations, to confer social status on the consumer, and to communicate this to others. Consumer product churn reflects the inability of devices to uphold the social meaning and identity quality expected from them; thus, consumers assess them as being outmoded and less functional or versatile expression instruments. One in two Brazilians is steered by psychological obsolescence when it comes to replacing electronic devices, compared to only one in three Britons. This influence is particularly strong in the digital and audio–video segments.

<sup>15</sup> In the Brazilian survey, the question that probed the reasons for substitution of older devices offered three response options: the older device was no longer working (beyond repair); it was still working but with problems (in need of repair); or a new device with more up-to-date, modern features was desired (old device still functioning). We believe this wording more validly captures the sense of psychological or symbolic obsolescence.

**Table 8**

Perceived effects of planned obsolescence (in %).

	No mention of personal effect	Mention of personal effect
More benefited	17.1	16.3
More harmed	48.0	53.3
No difference/DK/NA	34.9	30.5

The weight of psychological obsolescence does not mean that product durability is irrelevant—that is, that consumers easily accept poor durability, or that manufacturers are exonerated of any responsibility for it. An examination of attitudes that contextualizes consumers' disposal behavior reveals a general picture of disorientation and anxiety—an atmosphere in which policy and grassroots movements have a clear role to play.

Two thirds (66.7%) of Brazilians acknowledge they feel compelled to substitute devices,<sup>16</sup> regardless of whether product replacement decisions are based upon psychological obsolescence or technical failure. This group is evenly split in terms of their motivations for replacing devices (namely, 33.8% replace products only when they are beyond repair or in need of repair, while 31.6% anticipate product replacement based on issues of modernity and higher social value).

One third of consumers acknowledge replacing products before necessary because they felt these products provided diminishing subjective returns, yet also feeling uneasy about doing so—a combination that portrays them as apparently locked into situations beyond their control that feed psychological obsolescence. Often, some expression of economic obsolescence lies behind these scenarios. Economic obsolescence refers to situations in which consumers are led to replace products as a result of a cost-benefit calculus, such as is the case when a current device becomes more expensive to run (due to poor energy efficiency). In other words, this is planned obsolescence in the form of the perceived economic handicap of keeping the current device; it accelerates the subjective devaluation of appliances and feeds consumer-initiated early substitution of products. Yet, we understand that perceived economic obsolescence here does not trigger replacement; rather, it serves to strengthen the influence of symbolic obsolescence over the ultimate premature disposal of usable electronic goods. This conclusion is reinforced by findings to be discussed in the next section, which reveals that consumers criticize manufacturer-driven obsolescence but not industry performance on lifespan issues—and that they feel consumer excitement (rather than corporate strategy) propels rapid product churn. In fact, when assessing whether specific subgroups attribute blame for product obsolescence to the industry or whether they acknowledge personal responsibility for premature product retirement, only about one in seven individuals (15.4%) willingly admit motivations pertaining to symbolic obsolescence, uninfluenced by corporate tactics or policy with regards to product lifespan.

Notably, people are capable of reflecting on some of the implications of shorter lifespan, provided that the issue is visible and explicitly connected to personal repercussions. Evidence in support of this assertion was collected by running a controlled experiment that probes for the personal effects of frequent product launches by manufacturers. Using a split-sample ballot approach, the experiment offered a description of consequences of frequent product

<sup>16</sup> Response to survey question: "I feel I end up substituting electronic devices more frequently than I would like to." Percentage includes all response options that indicated a level of agreement.

**Table 9**  
Perceptions of producer-driven product obsolescence (in %).<sup>a</sup>

	Agree	Disagree	Neither
Nowadays, electronic devices have far shorter lifespans than in the past.	92.9	5.1	1.9
Some companies in the electronics industry refrain from offering all technical innovations in their products, foreseeing future product launches.	89.6	8.0	2.3
Some electronic appliances are designed to last shorter amounts of time to induce the purchase of new products sooner.	84.1	14.0	1.9
Manufacturers of electronic products are doing a good job of informing the public about product lifetime and durability.	76.6	20.4	3.0
Manufacturers of electronic products are doing a good job of increasing product lifetime and durability	74.3	22.7	3.1

<sup>a</sup> All questions were measured using a 5-point Likert scale, however, for the sake of space, data presented has been collapsed into favorable and unfavorable response options. The “agree” category comprises both “totally agree” and “somewhat agree” responses; similarly, the “disagree” category comprises both “totally disagree” and “somewhat disagree” responses.

launch policy by producers only to half the sample (see Q28a, in [Appendix](#)). Results are reported in [Table 8](#).

Making consequences explicit stimulates consumers with neutral orientations towards planned obsolescence to connect this issue to a personal agenda of interests; as a result, negative assessments increase as indifference decreases. The effect, while not major, clearly suggests that if policy and grassroots mobilization are able to connect the waning-product-longevity issue with the larger context, including personal consequences, the balance of mixed feelings and somewhat shallow reactions to this matter may change.

Product durability is praised rather than perceived as a hindrance to satisfactory user experience. Concurrently, however, numerous consumers tend to perceive durability as having marginal value unless longevity is expressed in cost-benefit terms or is tied to an identity-building project of environment-friendly citizenship (as would be the case, for example, if individuals avoided contributing to e-waste to fulfill a conception of ecological responsibility). The value of product durability requires that we take into account the context in which devices are acquired and used and also bear in mind their instrumental role in communicating an individual's position in society. So, when Brazilians are asked about their orientations towards attaining longer-lasting devices for themselves, 98.3% agree they would do whatever they could to extend their appliances' lifetimes (see Q23.1 in [Appendix](#)). Similarly, 85.9% express willingness to fix technical failures in devices to last longer (see Q19.3). Yet, a far smaller share (60.5%) voices a preference for reusable, non-disposable devices over disposable ones (see the inversely recoded Q19.1), and a mere 41.9% disagrees with the idea that it is of personal importance to update the version of devices used each year (see Q19.12).

The net reduction from aspiring to longer-lasting appliances to accepting their frequent replacement reflects the effective destabilization of subjective value allocated to currently owned equipment. Notably, Brazilians do not attempt to reconcile these views. Factorial analysis of these attitudes yields two distinctive sets of orientations—an attitude cluster around the questions that tap the value of durability and another cluster around questions that probe the use of devices as means for establishing identity and social currency.<sup>17</sup> These differing orientations illustrate the independency of intentions and the difficulties inherent in making longevity a factor of personal and social value.

## 5.2. Assessing producers' responsibility

Mixed reactions to product obsolescence, including the denial that it is a problem, may also reflect consumers' sense of personal

<sup>17</sup> An Oblimin principal component analysis yielded a structure matrix with two components (eigenvalues of 1247 and 1121 accounting for 31.18% and 28.03% of variance, respectively).

responsibility for rapid product-substitution cycles. The presumption of autonomy in decision-making has its counterpart in blame-taking. A trade-off assessment of forces that propel obsolescence, in which people's consumerism is considered as an alternative driver to producer-led strategy, indicates that blame—at least to some degree—also falls within society (see Q29 in [Appendix](#)). Although the majority did blame corporate strategy (58.7%), 35.2% of Brazilians agreed with the former interpretation that consumers' socio-emotional states are a driver of premature product disposal; this means that over one third of consumers consider themselves to be complicit in propelling product obsolescence.

The acceptance of ambiguity in relation to the objective and subjective performance of products—and the partial acknowledgment of consumers' influence in the process that shortens product lifespan—does not prevent individuals from viewing critically producers' role and responsibility in product obsolescence. While it is true that about 2/3 of Brazilians favorably judge producers' performance in increasing useful product life (see Q19.6 in [Appendix](#)) and informing the public of this (see Q19.4), it is also true that an overwhelming majority of Brazilians are aware of, and blame producers' strategies for, reduced product lifespan (see Q21.5 and Q21.4, respectively). Sympathetic views regarding manufacturers' efforts in relation to durability features of devices coexist with awareness that product-makers embed obsolescence in product design.

Consumers perceive that manufacturers' business approaches seek to perpetuate future sales through piecemeal delivery of innovations and deliberate curtailment of product lifespan, thus externalizing costs to consumers and society. As a result, an intentional stimulation of product substitution is attributed to manufacturers ([Table 9](#)). These findings echo the way consumers elsewhere interpret industry product-optimization processes ([Cox et al., 2013](#)).

However, such recognition is not indicative of disapproval for either product-makers or their practice of embedding functional and symbolic obsolescence into product offers. The apparent contradiction between an overall positive assessment of performance in terms of durability and the public's ability to identify manufacturers' product destabilization behaviors lends itself well to an auxiliary interpretation: It suggests that the public does not connect product replacement with product obsolescence or longevity. In other words, the effects of psychological and functional obsolescence are parallel, although they are attributed to somewhat different dynamics. The public's implicit understanding of obsolescence is one of severe technical failure—that is, functional obsolescence—which evidence shows prompts only a minority of product replacements.

Companies may be perceived to induce fast-paced product replacement as part of their business strategy, but this remains largely unrelated to a situation in which products are purposely engineered to become outmoded or in disrepair. By the same token, awareness of anticipated product churn spurred by manufacturers



coexists with individuals' seemingly self-oriented decisions about device replacement. Criticism of this business approach is, therefore, quite relative, as consumers partially acquiesce to industry's rationalization that the benefits of the innovation and modernization inspires creative destruction processes through shorter product lifetimes. Research indicates that planned obsolescence takes place in a context in which producers destabilize products' qualities and valuation by communicating the technological innovations and improved cost-benefit proposition of newer versions (Spinney et al., 2012). Through marketing and advertising, the industry seeks to mobilize consumers to assimilate these propositions, which ultimately instill responses typical of a "throwaway society" with rationality and legitimacy (Cooper, 2005; Schor, 2010).

Given electronic appliances' role as social goods with symbolic meaning—and given that both technological and psychological benefits offered by devices require from individuals some minimal level of engagement with product and usage competence, which further reinforces the instrumental nature of products for identity-building (Warde, 2005)—consumers are as likely to condemn obsolescence as they are to condone it, provided it fulfills the associated promise of personal and social modernization. Consumers, thus, strive for an uneasy balance between fulfilling self-actualization needs (through better technology and fashionable design adoption) and attending to self-preservation considerations (through environmentally and economically conservative decisions that will ultimately prevent rapid product churn). These trade-offs should not be overlooked when ascertaining consumers' opinions on product-longevity issues and exploring the underlying dynamics behind these opinions.

Further evidence highlighting this uneasy balance between self-actualization and self-preservation needs was collected during the survey. Repeating the split-ballot sample experiment, we asked separate subsamples to select a response option for a specific trade-off scenario (order of options were randomly rotated for each respondent). One half of the sample was asked Question 27a (see Appendix). Nearly seven out of ten Brazilians (69.1%) selected the first option, agreeing that technological innovation and its macro-economic gains are benefits that outweigh the drawbacks of curtailed lifespan. In contrast, less than a quarter (23.6%) put a premium on environmental and social habits over product modernization. These findings suggest that when the consequences of planned obsolescence are made explicit to consumers, they tend to overweigh positive effects embedded in economic-oriented arguments and downplay adverse social and environmental implications.

The other subsample answered a different question (Q27b in Appendix). Over eight out of ten Brazilians (81.3%) selected the first option, indicating a preference for durable devices over fashionable design or technological innovation. Viewed together, these responses indicate apparently irreconcilable preference patterns. However, a society with a booming middle class coming out of a long-repressed level of consumption, like Brazil, may find no contradiction in favoring tangible collective benefits (like economic progress) over attempts to curtail consumerism yet still approve a normative call for producers to behave more responsibly with their supply of devices; after all, the cost for acquiring a new device due to obsolescence is borne by the consumer alone.

Public goods like a healthier environment or society may appear to be distant, less appealing benefits when compared to a stronger economy and sustained innovation; on the other hand, the financial implications of shortened product lifetime may appear daunting to a majority of individuals still acclimating to their newly acquired status as consumers and struggling financially to fulfill the diversity of consumption expectations. In sum, individuals may be looking for the immediate benefits of product modernization while

expecting manufacturers to absorb the cost of it, thus reconciling both outcomes in their product offer.

The balance between interpretations that product obsolescence is an outcome of manufacturers' strategies or a byproduct of autonomous consumers' choice driven by psychological forces can better be grasped by examining the interplay of attitudes towards product durability and industry's perceived responsibility for reduced lifecycles. Two additive indices were produced to that end, enabling the identification of the size and characteristics of segments with opposing views on manufacturers' role in shortened product longevity.<sup>18</sup> Each index was dichotomized for the sake of interpretation, which yielded four major segments (Table 10).

When pro-durability and acknowledgment values are low (slightly over 11% of sample) product disposal is fully internalized and naturalized, and consumers do not assign blame to any party for devices' shortened useful lifetime. These consumers behave uncritically as happy discarders of goods. This group includes the largest proportion of consumers who replaced older devices due to psychological obsolescence (62.5%, vs. average of 47%, based on Q5, response option 3). Predictably, this group displays little concern for issues of pollution, waste, and environmental degradation. It is also disproportionately younger than any other segment.

However, opinions are not solely based upon environmental indifference or generational factors; this group's product experience is one of devices lasting as long as, or even longer than, what is expected as reasonable (57.1% of such opinions vs. average of 40.6%) and its members are the least likely to acknowledge being harmed by producers' continual launch of new models (44.7%, vs. average of 53.1%). Thus, their experience suggests little reason to identify obsolescence as an issue. Moreover, they tend to agree more strongly than any other segment that the economic and technological gains of shorter device lifetime should be prioritized over environmental and moral effects (75.5% vs. average of 69.1%), conveying a closer value alignment with a materialistic perspective of priorities for society.

At the opposite end of the spectrum, individuals who exhibit a strong interest in durability issues and a heightened sense of manufacturers' responsibility for shortened product lifespan account for the largest segment of consumers (43.3%). Their outlook is that of critical consumers who demand from manufacturers longer-lasting and repairable products (88%, vs. average of 81.4%), resent more strongly producers' accelerated pace for new model launches (61.7%, vs. average of 53.1%), and are somewhat less willing to blame consumer excitement for obsolescence (31.7%, vs. average of 35.2%). They are also more likely to negatively assess companies' performance regarding product durability (29.7%, vs. average of 22.7%) and the quality of information they provide to the public (25.7%, vs. average of 20.4%). This group has a higher concentration of female and older respondents than the sample as a whole. Their criticism also reflects a stronger concern with environmental issues. Noticeably, their contentious views coexist with feelings of impotence, as a sizable number of critical consumers admit being driven by market forces to adopt throwaway practices. Their numerous concerns regarding technology-driven obsolescence of

<sup>18</sup> One additive index is composed of the four variables described earlier as surveying opinions about product durability (related to prioritizing practices favorable to longer lifecycles, including repair of technical failures, and preferences for disposable and yearly updated products). After recoding all variables in a consistently interpretable direction, we labeled this index "pro-durability" (composed by Q23.1 and Q23.2) Respondents with high pro-durability values account for nearly 57% of the total sample. The second index, labeled "acknowledgement of planned obsolescence," is composed of the first three items in Table 9 (Q19.2, Q21.4, and Q21.5), which specifically tackle obsolescence. Respondents with high acknowledgment values accounted for 75% of total sample.

**Table 10**  
Attitudes towards product durability and producer-driven planned obsolescence (in %).

		Pro-durability		
		Low	High	Total
Acknowledgment of planned obsolescence	Low	11.3	13.6	24.9
	High	31.8	43.3	75.1
	Total	43.1	56.9	100.0

products makes them the most receptive audience for policy regulation and grassroots-mobilization efforts.

The other two segments are composed of what we call “willing deniers” (13.7%)—those who embrace product longevity but overlook producer destabilization of durability—and “comfortable complainers” (31.8%)—those who blame manufacturers for shorter lifespan but fail to defend longevity. Both comfortable complainers and willing deniers tend to see producers’ performance on product durability in a more favorable light, with deniers being more likely to blame consumers, rather than corporate strategy, for premature product replacement.

Deniers also champion a reading of psychological obsolescence as an autonomously produced effect, unrelated to companies’ policies, thus nurturing a depoliticized appraisal of product lifecycle. Accordingly, they tend not to feel locked into situations that force product replacement. In contrast, comfortable complainers harbor a greater sense of being pressured by market forces to accelerate product turnover than do other segments (83.2%, vs. average of 66.7%). However, this appraisal is insufficiently strong to compel a negative judgment about industry performance in relation to product lifetime.

## 6. Conclusions

Acceleration of e-waste growth represents a major challenge for developing societies seeking to travel the path of sustainable consumption and production. Trapped between consumption-thirsty emerging middle classes and increasing environmental problems induced by behaviors typical of throwaway societies, developing nations like Brazil rely on citizens’ educated choices, responsible corporate behavior, and public policy to reconcile sustainability targets with the public’s aspirations for access to, and self-actualization through, material goods. In this context, the negative environmental, economic, and social implications of obsolescence-driven increases in e-waste require evidence-based policy interventions and organized consumer mobilization to curb deliberate curtailment of product lifetime and constrain overconsumption.

Earlier opinion surveys rank Brazil among the societies more inclined to prefer disposable (rather than reusable) products (Globescan and National Geographic, 2012). Brazilians also pay marginal attention to product durability and the means by which to maximize product lifespan (Akatu, 2013). Moreover, despite verbal expressions of high environmental concerns and willingness to embrace greener habits (Globescan and National Geographic, 2012), Brazilians seldom connect issues of product durability to other sustainability aspirations (Akatu, 2013). These findings may encourage students of sustainability, activists, and policy-makers to bypass consumers and ignore their views and actions. However, our research suggests that knowing how product longevity relates to consumer values may play a pivotal role in the success of public policy and grassroots initiatives that promote product longevity.

This study makes a contribution by providing fact-based input about product longevity and the nuances behind consumer

engagement with premature product replacement in electronic appliances—considerations that ultimately enable better calibration of policy decisions. This research also uncovers the need to acknowledge consumer agency in making sense of product obsolescence; this is key to both reorienting marketing and advertising to present longevity as a valuable feature of products and to successfully advocating for producer responsibility that extends beyond reverse logistics to include longer-lasting product design. Therefore, we agree with Cox et al. (2013:27), who argue that “increasing product durability on its own is unlikely to overcome the very significant psychological, emotional and social factors which underpin the rapid churn of products in the modern ‘throwaway society.’”

Product longevity is at the center of the dilemma between fulfilling new middle classes’ aspirations of social inclusion through mass consumption and sustainably managing society and the environment, yet findings show this issue remains relatively peripheral to consumers’ preoccupations. Consumers exhibit a lack of awareness of both the importance of this issue and the negative effects of replacing products before they become inoperable. Consumers may recognize that product durability has decreased (which is a true reflection of their own experience, if comparing past lifetime and projected lifespan of devices owned) and may wish products to last longer, but these orientations do not reflect their own management of product lifetime.

Consumer-initiated shortened lifespan signals the successful socialization of individuals into the naturalization of product symbolic obsolescence. This naturalization reflects the extent to which consumer identity-building is based on continual access to updated products and, consequently, willing replacement of devices. Brazilians’ tendency to expect lower durability and replace products earlier for symbolic reasons (compared to developed societies like the UK) suggests that consumers from developing societies may embrace product obsolescence as proof of their successful market inclusion.

Research in the UK has argued that reduced expectations of product functional reliability and durability spring from actual experiences of shortened dependability of devices (Cox et al., 2013: 24). Findings from Brazil echo this reality, revealing a decreasing evolution in product durability. Evidence of consumer concern with being locked into premature product substitution and consumer awareness of the corporate advantage of stimulating fast-paced substitution processes suggests that consumers should be exonerated from any responsibility in relation to e-waste generation through obsolescence. However, given that consumers’ realizations of these facts seldom translate into a critical view of business practices, it is unlikely that public opinion will spur politicization of the obsolescence issue through boycotts, direct protests or support for new regulations.

Product longevity is depoliticized in the sense that it is only obliquely related to manufacturers’ initiatives and remains a neutral or problem-free issue, as it is perceived by consumers to have no clear-cut consequences for society. Even critical consumers who praise appliance durability and identify producers’ responsibility for shortened product lifetimes are susceptible to adopting psychological-obsolescence-driven behaviors; these behaviors lead to premature product replacement and indicate a mostly benevolent view of industry’s longevity performance. This disconnection seems to ultimately reflect an awareness of only those questionable corporate practices that are related to motivating faster product replacement, a process which is itself perceived as heavily molded by consumers’ will. Admittedly, the critical issue of corporate responsibility for the deliberate design of products and campaigns to kindle product obsolescence and substitution is often met by consumer apathy. Consumers who are

consistently aware of being locked into situations beyond their own control remain a minority.

For a public policy and grassroots mobilization effort against product obsolescence to be successful, it must understand that only a fraction of consumers is both capable of connecting throwaway practices to adverse socio-environmental outcomes and willing to play an assertive role in influencing manufacturers. Therefore, a focus on making those connections more visible and personally relevant within a broader audience should be given priority. Another implication of this study is that through leveraging the value of longer-lasting devices and improving the ease with which products can be repaired, updated, and upgraded public policy could offer an answer, albeit limited, to the problem of increasing e-waste. Concomitantly, we find some potentially rewarding opportunities for efforts favoring an improved infrastructure for repair and reuse of devices (i.e., efforts that tackle poor accessibility and cost-benefit imbalances of repair options).

Further, despite of the perception that product repairs are expensive and the financial discomfort generated by shortened disposal cycles, the success of policy and grassroots mobilization cannot be solely based upon monetary arguments. As research elsewhere has found, consumers value purchases made in the short-term more than the savings obtained from delayed buying decisions (Winer, 1997). In other words, psychological obsolescence will be poorly addressed if contested merely on grounds of the financial strain it may provoke—although this argument may resonate more strongly among an emerging middle class aspiring to simultaneously fulfill as many consumption dreams as possible within a limited budget. A reframing of longer-lasting durables as appealing signs for personal identity may prove a more effective action against psychological obsolescence. In this sense, better cues for what goods represent and what social function they play, rather than advantageous cost-benefit calculations, may ultimately persuade consumers to behave sustainably in their relationships with products.

Finally, research suggests that younger cohorts display shorter lifespan expectations and fewer concerns for product longevity, and that they tend to exonerate firms from responsibility for ongoing premature-replacement dynamics. Even if, as they grow older, income and education moderates these orientations, an intensification of psychological obsolescence may be expected. These implications call for a targeted approach in information campaigns regarding the individual and collective consequences of shortened durables replacement and disposal cycles.

## Acknowledgments

Thanks to Michele Hartmann Feyh and two anonymous reviewers for their valuable help and suggestions.

## Appendix

### Interview questions

- Q1a. Which of the following devices do you currently own for your personal use or family use? 1. Yes; 2. No
1. Mobile or smartphone
  2. Computer, notebook, laptop, netbook, or tablet
  3. DVD or Blu-ray
  4. Digital camera (different from mobile)
  5. TV
  6. Printer
  7. Microwave
  8. Fridge or freezer
  9. Washer
  10. Oven

- Q1b. Approximately how long have you owned your current (DEVICE)...?
- Number of years:    Number of months:
- Q2a. Was (DEVICE) your first one or did you have another before? 1. First one; 2. Others before
- Q2b. For how long did you have your previous (DEVICE)?
- Number of years:    Number of months:
- Q5. Let's talk about your previous (DEVICE). Did you replace your previous (DEVICE) with the current one because...?
1. Previous (DEVICE) was no longer working
  2. Previous (DEVICE) was working but with flaws or problems in some of its functions
  3. Previous (DEVICE) was working but newer was more up-to-date, modern, better, or with more functions.
- Q6. I'd like to talk a bit about performance problems you had with (PREVIOUS DEVICE). Thinking of the last time you had a performance issue with that product, which of the following options comes closer to what you did?
1. Replaced (DEVICE) with problems without seeking technical support
  2. Replaced (DEVICE) with problems but before that sought out technical support
- Q7. When you looked for technical support, which of the following options comes closer to what actually happened?
1. Looked for technical support but did not find it
  2. Found technical support, took (DEVICE) for repair but repair did not work
  3. Found technical support, but did not leave (DEVICE) for repair
  4. Found technical support, repaired (DEVICE) successfully, and still replaced (DEVICE) soon after
- Q8. Which of the following options comes closer to why you avoided repairing (DEVICE)?
1. Repair was too expensive, would not pay off.
  2. Technical support did not find product parts needed for the repair.
  3. Repair would have taken too long.
  4. Repair outcome was unwarranted or would not be satisfactory.
  9. DK/Can't recall
- Q10. Now, let's talk about (CURRENT DEVICE). Overall, how would you rate your level of satisfaction with this (CURRENT DEVICE)? Totally satisfied; somewhat satisfied; neither satisfied nor dissatisfied; somewhat dissatisfied; totally dissatisfied; DK/NA
- Q12. And how would you rate your level of satisfaction with (CURRENT DEVICE)'s lifespan and durability? Totally satisfied; somewhat satisfied; neither satisfied nor dissatisfied; somewhat dissatisfied; totally dissatisfied; DK/NA
- Q13. Over the next 12 months, how likely is it that you will replace your (CURRENT DEVICE) for a newer one? Very likely; somewhat likely; somewhat unlikely; not likely at all; DK/NA
- Q14. Since the day you started using (CURRENT DEVICE) how many times did you experience performance or functioning problem with it? Never; once; two-three times; four or more times; DK/Can't recall
- Q15. Thinking about the way you use these devices, what do you consider as the minimum reasonable time they should last? How much time should (DEVICE) last?
- Number of years:    Number of months:
- Q16. All things considered, when selecting an electronic device how would you rate the importance of the product

durability in hours or useful lifetime? Very important; somewhat important; neither too important or unimportant; somewhat unimportant; not important at all; DK/NA

Q19. Now I will read few statements. Please, for each one I'd like to know how much you agree or disagree with it. Please state whether you totally agree, somewhat agree, neither agree nor disagree, somewhat disagree, or totally disagree.

1. I prefer disposable devices rather than those that can be repaired or reused.
2. Nowadays, electronic devices have far shorter lifespans than in the past.
3. I would rather fix a device not working properly than replace it with a new one.
4. Manufacturers of electronic products are doing a good job at informing the public about product lifetime and durability.
6. Manufacturers of electronic products are doing a good job of increasing product lifetime and durability.
7. Our government should create laws forcing manufacturers to extend product durability and lifespan even if that causes higher prices.
8. Over the past few years, the volume of electronic product waste has seriously increased around my neighborhood.
12. To me, it's important to update my electronics every year.
13. I feel I end up replacing electronic devices more frequently than I would like to.

Q20. How acquainted do you think you are with the following issues? Never heard of; only heard a little about; know something about; know a fairly good amount; or know really well.

2. Effects of electronic waste upon people and the environment
6. The lifespan and durability of the electronic products I own

Q21. I will read a few statements. Please, for each one I'd like to know how much you agree or disagree with it. Please state whether you totally agree, somewhat agree, neither agree nor disagree, somewhat disagree, or totally disagree.

- 4 Some companies in the electronics industry refrain from offering all technical innovations in their products, foreseeing future product launches.
- 5 Some electronic appliances are designed to last shorter amounts of time to induce the purchase of new products sooner.

Q23. People think differently about electronic products. For each statement, please state whether you totally agree, somewhat agree, neither agree nor disagree, somewhat disagree, or totally disagree?

1. I'll do anything I can do to have my electronics last longer.
2. I'm willing to fix electronics with problems so I can use them longer.

Q25. All things considered, how would you rate the current situation in Brazil with regards to (ISSUES)? Would you say it is excellent, good, fair, poor, or terrible?

Q26. And compared to 10 years ago, would you say (ISSUES) have improved a lot, improved a little, stayed the same, worsened a little, or worsened a lot?

- 1 The environment

2 Air and water pollution

3 Amount of waste on the streets

4 Depletion of natural resources like forests, animals, etc.

5 Climate change

Q27a. Some people think it is good that electronic devices do not last too long because it enables the incorporation of new technologies and features, which keeps products up-to-date and keeps the economy moving. Some other people think that short-lived electronic devices are bad because they generate a large amount of waste with negative environmental effects and also fuel consumerism. Which opinion is closer to yours?

Q27b. Some people think manufacturers of electronic devices should produce longer-lasting and easy-to-repair appliances even if these products don't incorporate the latest technology or a fashionable design. Other people think that manufacturers should produce new devices that continuously incorporate the latest technology and more modern designs, even if these products do not last for too long. Which opinion comes closer to yours?

Q28a. Thinking about the launch of new models of electronic appliances every year (which render current models outdated and induce people to discard them) would you say that you personally feel more benefited than harmed, more harmed than benefited, or you feel it makes no difference?\*

*\*This question was run in a split-ballot experiment; half the sample was read the full statement and the other half was read the statement without the parenthetical comment.*

Q29. Some people think consumers' excitement for new things motivates manufacturers of electronic devices to withdraw product models that were launched not too long ago. Other people think that manufacturers of electronic devices, by launching new models too soon, force people to dispose of models launched not too long ago. Which opinion is closer to yours?

## References

- ABDI – Associação Brasileira de Desenvolvimento Industrial, 2013. Logística Reversa de Equipamentos Eletroeletrônicos - Análise de Viabilidade Técnica e Econômica. Brasília, Distrito Federal, Brasil. [http://www.abdi.com.br/Estudo/Logistica%20reversa%20de%20residuos\\_.pdf](http://www.abdi.com.br/Estudo/Logistica%20reversa%20de%20residuos_.pdf).
- ABINEE – Brazilian Electrical and Electronics Industry Association, 2013. Economic Overview and Performance of the Sector 2013. São Paulo, São Paulo, Brasil. <http://www.abinee.org.br/ing/informac/arquivos/pan2013i.pdf>.
- Akatu – Instituto Akatu, 2013. Pesquisa Akatu 2012: Rumo à Sociedade do Bem-estar. São Paulo, São Paulo, Brasil. <http://www.akatu.org.br/pesquisa/2012/PESQUISA AKATU.pdf>.
- Auger, P., Devinney, T., 2007. Do what consumers say matter? The misalignment of preferences with unconstrained ethical intentions. *J. Bus. Ethics* 76 (4), 361–383.
- Barbosa, L., Veloso, L., 2014. Consumption, domestic life and sustainability in Brazil. *J. Clean. Prod.* 63, 166–172.
- Cooper, T., 2004. Inadequate life? evidence of consumer attitudes to product obsolescence. *J. Consum. Policy* 27 (4), 421–449.
- Cooper, T., 2005. Slower consumption reflections on product life spans and the throwaway society. *J. Ind. Ecol.* 9 (1–2), 51–67.
- Cooper, T., 2010. *Longer Lasting Products: Alternatives to the Throwaway Society*. Gower Publishing.
- Cox, J., Griffith, S., Giorgi, S., King, G., 2013. Consumer understanding of product lifetimes. *Resour. Conserv. Recycl.* 79, 21–29.
- Douglas, M., Isherwood, B., 1996. *The World of Goods*. Routledge.
- Evans, S., Cooper, T., 2010. Consumer influences on product lifespans. In: Cooper, T. (Ed.), *Longer Lasting Products: Alternatives to the Throwaway Society*. Gower Publishing, Farnham, pp. 319–350.
- Ferreira, F.H.G., Messina, J., Rigolini, J., López-Calva, L., Lugo, M.A., Vakis, R., 2012. Economic Mobility and the Rise of the Latin American Middle Class. World Bank.
- Fishman, A., Neil, G., Oz, S., 1993. Planned obsolescence as an engine of technological progress. *J. Ind. Econ.* 41 (4), 361–370.

- García Canclini, N., 2001. *Consumers and Citizens. Globalization and Multicultural Conflicts*. University of Minnesota Press.
- Globescan and National Geographic, 2012. *Greendex 2012: Consumer Choice and the Environment – a Worldwide Tracking Survey*. [http://images.nationalgeographic.com/wpf/mediacontent/file/NGS\\_2012\\_Final\\_Global\\_report\\_jul20-cb1343059672.pdf](http://images.nationalgeographic.com/wpf/mediacontent/file/NGS_2012_Final_Global_report_jul20-cb1343059672.pdf).
- Grewal, R., Metha, R., Kardes, F., 2004. The timing of repeat purchases of consumer durable goods: the role of functional bases of consumer attitudes. *J. Mark. Res.* 41 (1), 101–115.
- Guiltingan, J., 2009. Creative destruction and destructive creations: environmental ethics and planned obsolescence. *J. Bus. Ethics* 89 (1), 19–28.
- Holt, D., 2012. Constructing sustainable consumption from ethical values to the cultural transformation of unsustainable markets. *Ann. Am. Acad. Polit. Soc. Sci.* 644 (1), 236–255.
- InfoDev/The World Bank, 2012. *Wasting No Opportunity: the Case for Managing Brazil's Electronic Waste*. Washington. [https://www.infodev.org/infodev-files/resource/InfodevDocuments\\_1169.pdf](https://www.infodev.org/infodev-files/resource/InfodevDocuments_1169.pdf).
- Jackson, T., 2005. *Motivating Sustainable Consumption: a Review of Evidence on Consumer Behaviour and Behavioural Change*. Centre for Environmental Strategy, University of Surrey. [http://hiveideas.com/attachments/044\\_motivatingcsfinal\\_000.pdf](http://hiveideas.com/attachments/044_motivatingcsfinal_000.pdf).
- King, A., Burguess, S., Ijomah, W., McMahon, C., 2006. Reducing waste: repair, recondition, remanufacture or recycle? *Sustain. Dev.* 14 (4), 257–267.
- Kollmuss, A., Agyeman, J., 2002. Mind the gap: why do people act environmentally and what are the barriers to pro-environmental behavior? *Environ. Educ. Res.* 8 (3), 239–260.
- Lyndhurst, Brook, 2011. *Public Understanding of Product Lifetimes and Durability (2). Reuse of Bulky Items*. Department for Environment, Food and Rural Affairs by Brook Lyndhurst, London. [http://randd.defra.gov.uk/Document.aspx?Document=ProductLifetimes2\\_Reuse\\_Finalpublishedreport.pdf](http://randd.defra.gov.uk/Document.aspx?Document=ProductLifetimes2_Reuse_Finalpublishedreport.pdf).
- Mont, O., Power, K., 2009. *Understanding Factors that Shape Consumption*. ETC/SCP Working Paper. [http://www.scp-knowledge.eu/sites/default/files/knowledge/attachments/wp2013\\_1.pdf](http://www.scp-knowledge.eu/sites/default/files/knowledge/attachments/wp2013_1.pdf).
- O'Dougherty, M., 2002. *Consumption Intensified: the Politics of Middle-class Daily Life in Brazil*. Duke University Press.
- OECD - Organisation for Economic Co-operation and Development, 2011. *Greening Household Behaviour: the Role of Public Policy*. OECD Studies on Environmental Policy and Household Behaviour. OECD Publishing.
- Oliveira, C.R., Bernardes, A., Gerbase, A., 2012. Collection and recycling of electronic scrap: a worldwide overview and comparison with the Brazilian situation. *Waste Manag.* 32 (8), 1592–1610.
- Peattie, K., 2010. Rethinking marketing. In: Cooper, T. (Ed.), *Longer Lasting Products: Alternatives to the Throwaway Society*. Gower Publishing, Farnham, pp. 243–274.
- Radar Acrefi-Datapopular, 2012. *Os Desejos de Consumo dos Brasileiros*. Research Report. [https://www.google.com.br/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&cad=rja&uact=8&ved=0CB0QFjAAahUKewj3jeaAqpLGAhWct4AKHT8WABg&url=http%3A%2F%2Fwww.job360.com.br%2Fnos%2Fradar\\_acrefi\\_data\\_popular.pptx&ei=URL\\_VbehNYLvggS\\_rlDAAQ&usq=AFQjCNETF6ldO7pUzflpU5h8eJySI9YcJQ&sig2=\\_UZFrZPocLKasTqEasF3A](https://www.google.com.br/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&cad=rja&uact=8&ved=0CB0QFjAAahUKewj3jeaAqpLGAhWct4AKHT8WABg&url=http%3A%2F%2Fwww.job360.com.br%2Fnos%2Fradar_acrefi_data_popular.pptx&ei=URL_VbehNYLvggS_rlDAAQ&usq=AFQjCNETF6ldO7pUzflpU5h8eJySI9YcJQ&sig2=_UZFrZPocLKasTqEasF3A).
- Sanne, C., 2002. Willing consumers—or locked-in? Policies for a sustainable consumption. *Ecol. Econ.* 42 (1–2), 273–287.
- Schor, J., 2010. *Born to Buy: the Commercialized Child and the New Consumer Culture*. Paperback.
- Spinney, J., Burningham, K., Cooper, G., Green, N., Uzzell, D., 2012. What I've found is that your related experiences tend to make you dissatisfied': psychological obsolescence, consumer demand and the dynamics and environmental implications of de-stabilization in the laptop sector. *J. Consum. Cult.* 12 (3), 347–370.
- Steele, M., Larson, E., 1993. Attention shoppers: don't look now but you are being tailed. *Smithson. Mag.* 23 (10), 70–79.
- Tabion, M., 2010. Emerging market consumers. A comparative study of latin America and Asia Pacific. In: *Esomar Latin American Conference*, Cartagena, May, 23–25.
- Thierry, M., Salomon, M., Van Nunen, J., Van Wassenhove, L., 1995. Strategic issues in product recovery management. *Calif. Manag. Rev.* 37 (2), 114–135.
- UN/Step – Solving The E-waste Problem, 2015. *E-Waste World Map Initiative 2015*. [http://www.step-initiative.org/Overview\\_Brazil.html](http://www.step-initiative.org/Overview_Brazil.html).
- Üstüner, T., Holt, D., 2010. Toward a theory of status consumption in less industrialized countries. *J. Consum. Res.* 37 (1), 37–56.
- Von Weizsacker, E., Lovins, A., Lovins, H., 1997. *Factor Four: Doubling Wealth, Halving Resource Use*. Earthscan.
- Warde, A., 2005. Consumption and theories of practice. *J. Consum. Cult.* 5 (2), 131–154.
- Winer, R.S., 1997. Discounting and its impact on durables buying decisions. *Mark. Lett.* 8 (1), 109–118.