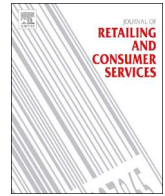




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Consumer responses to planned obsolescence

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ABSTRACT

Companies use *planned obsolescence* as a central marketing strategy to motivate their customers to (re)buy new and upcoming products. These companies try to increase their revenue and profit by reducing the value of a product's older version. While previous literature focuses on companies' perspectives of strategic choice, economic or ecological impact, and innovation management, this paper highlights the customer's perception of planned obsolescence. In presenting three studies, the paper finds that a planned obsolescence strategy harms customers' value perception and ultimately their willingness to pay. By adding customer-related evidence to the discussion, the paper questions companies' planned obsolescence strategies and opens up a potentially rewarding avenue for further research.

1. Introduction

In 1954, industrial designer Brooks Stevens referred to *planned obsolescence* as “instilling in the buyer the desire to own something a little newer, a little better, a little sooner than is necessary” (Adamson and Gordon, 2003). As a central marketing strategy, the objective of planned obsolescence is to stimulate replacement buying among consumers (Guiltinan, 2009). More specifically, planned obsolescence should prompt consumers to buy the newest products by making them incompatible or partially compatible with the old version, and therefore reducing previous versions' value for the consumer (Miao, 2011). By designing products with short lifespans, companies seek higher revenues and profits in saturated and highly competitive markets (e.g., Gershoff et al., 2012; Levinthal and Purohit, 1989; Stewart, 1959). During the Great Depression, for example, companies put artificial expiry dates on products in order to encourage consumers to buy more or renew their products. Nowadays, in technology-driven markets, one often comes across the strategy of reducing products' lifecycles by degrading the older and promoting new versions of the same products, such as software programs, computers, and mobile phones. Following rumors about the new attributes of the product, manufacturers launch new versions of their existing products at regular intervals. For example, Samsung and Apple launch the new versions of their mobile phones every year in the spring and late summer, respectively.

Although there is some literature on planned obsolescence in different fields, such as economics (e.g., Bulow, 1986; Strausz, 2009;

Swan, 1972), strategy (e.g., Utaka, 2000), innovation management (e.g., Bayus, 1988; Fishman et al., 1993; Pantano et al., 2013), and ecological development (e.g., Guiltinan, 2009; Rivera and Lallmahomed, 2016), research on the impact of planned obsolescence on customer behavior is sparse. A summary of planned obsolescence definitions is given in Table 1. It is particularly important to understand consumers' responses to having to substitute working products after a short period of time, as despite the potential benefits of offering them new product alternatives, prior research shows that factors not directly associated with a product's features or benefits can affect evaluations of fairness, consumer preferences, and product choice (e.g., Ha et al., 2009; Ho and Wu, 2011; Lee et al., 2013). To our best knowledge, there are no studies exploring consumers' direct reactions to planned obsolescence practices. To fill this void, our study investigated consumers' assessment of planned obsolescence; in particular, we emphasize the impact of replacement cycles on customer behavior. Our multi-stage quantitative study examined cognitive processing of planned obsolescence from the consumers' perspective. An additional experiment explored short replacement cycles, finding that this harms the new offer's value, which in turn reduces customers' willingness to pay.

This paper contributes to the literature in two ways. First, we provide examinations of planned obsolescence from a customer perspective, thereby extending the planned obsolescence literature (e.g., Boone et al., 2001; Grewal et al., 2004; Stewart, 1959; Stock and Zacharias, 2013). Building on extant research in other fields (e.g., Bayus, 1988; Bulow, 1986; Howell, 1962; Strausz, 2009; Utaka, 2000; Waldman,

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Table 1
Representative planned obsolescence definitions.

Source	Definition
Fishman et al. (1993)	“Built-in or planned obsolescence” refers to products that are “designed to have uneconomically short lives, with the intention of forcing consumers to repurchase too frequently.”
Rivera and Lallmahomed (2016)	“The strategy of shortening a product's lifespan is called planned obsolescence.”
White (1969)	“Planned obsolescence” is the creation in people's minds of the belief that the economic usefulness of a product has declined well before any actual physical decline.
Swan (1972)	“Planned obsolescence” is the production of goods which are less durable than would arise out of production by perfectly competitive industries.
Bulow (1986)	“Planned obsolescence” is the production of goods with uneconomically short useful lives so that customers will have to make repeat purchases.
Adamson and Gordon (2003)	“Planned obsolescence” is defined as instilling in the buyer the desire to own something a little newer, a little better, a little sooner than is necessary.”
Strausz (2009)	“Planned obsolescence” is an incentive device for unobservable quality.
Utaka (2000)	“Planned obsolescence” is seen as the monopolist's choice for an inefficiently short life for first-period products.
Guiltinan (2009)	“Planned obsolescence” depicts the continuous product development which promotes shorter durables replacement and disposal cycles with troublesome environmental consequences.
Amankwah-Amoah (2017)	“Perceived obsolescence” occurs when the users or customers of a product are persuaded to replace a functional product and/or its component, because it is seen to be no longer fashionable or suitable.”
Stewart (1959)	“Planned obsolescence” indicates the practice of holding back product improvements from the market until sales of existing models decline, then employing just enough improvements in new models to induce consumers to turn in their old models. It also suggests a heavy reliance on superficial product changes, styling, or prestige selling appeals to induce consumers to buy a new model before the old model is worn out. It is the execution of a policy of producing products with an unnecessarily short functional life so as to require premature replacement.
Waldman (1996)	“Planned obsolescence” refers to the behavior of a firm that underinvests in durability from a social-welfare standpoint.
Packard (1960)	“Planned obsolescence” is addressed through the modes of function, quality, and desirability. Obsolescence of function, is a situation in which an existing product becomes outmoded when a product is introduced that performs the function better; obsolescence of quality is found when through deliberate intent, a product breaks down or wears out at a given, usually not too distant, time; and obsolescence of desirability is evident when a product is still sound in terms of quality or performance, but becomes “worn out” in our minds because styling or other change makes it seem less desirable.
Cooper (2004)	“Obsolescence” occurs when products go “out of use” or “out of date.”

1996), we demonstrate that consumers' perception of planned obsolescence should be considered within the context of the product replacement strategy. Our study thus extends research on planned obsolescence by giving an empirical perspective on how customers perceive a company's strategy. This is one of the first studies that quantifies the impact an applied planned obsolescence strategy has on customer behavior. In so doing, we emphasize Bulow's (1986) notion of inefficiently short replacement periods. Specifically, we show that companies' marketing strategies should better attend to the time cycles within which products are replaced. Our study confirms theoretical assumptions from economics research (e.g., Levhari and Peles, 1973), which indicate customers' reluctance to buy new products after short replacement cycles.

Second, this paper extends research on planned obsolescence models by answering the call to examine the effects of replacement timing (Bayus, 1988). Our results indicate that planned obsolescence specifically influences the customer-brand relationship and is therefore valuable for practitioners and researchers alike. By following this strategy, companies' main goal is to influence and reactivate a consumer's need to purchase the new offer as a replacement solution. In other words, exploiting customers' sense of their products becoming outdated or unusable, the planned obsolescence strategy is integrated into the companies' marketing plan. Our finding that the substitution period's length can change the product's perceived value, has important implications because manufacturers rely on consumers' understanding of added value when they launch new products.

In the next section, we present the theoretical framework and review the literature on planned obsolescence, which underpins our theoretical framework.

2. Theoretical framework

Researchers from different scientific fields offer a different scope, as well as different definitions and objectives of planned obsolescence. Thus, they have distinguished between several variations of planned obsolescence (e.g., Bayus, 1988; Box, 1983; Guiltinan, 2009). Economics researchers, for example, discuss planned obsolescence in two

contexts: first, they associate planned obsolescence with the capitalist system and examine a monopolist (e.g., Choi, 1994; Miao, 2010, 2011; Waldman, 1993) or an oligopolist market structure (Bulow, 1986). They found that a monopolist structure has a strong incentive to introduce new products that make old products obsolete and thus reduce the old products' profitability. Therefore, economists submit that the monopolist could be better off not offering new products (Miao, 2010). In this understanding, planned obsolescence refers to designing products with uneconomically short lifespans (e.g., Fisher et al., 1962) and the intention to pressurize consumers to repurchase more frequently than is necessary (e.g., Ellison and Fudenberg, 2000). Second, economists discuss planned obsolescence in the context of durable goods and customers' substitution behavior (e.g., Choi, 1994; Miao, 2010; Strausz, 2009; Waldman, 1993).

Ethics researchers (e.g., Cooper, 2004; Guiltinan, 2009) criticize frequent application of planned obsolescence for multiple reasons. First, following Schumpeter (1942) approach of creative destruction (Tischleder and Wasserman, 2015), the desire to own something new often implies disposing of things still in working order.

Second, in order to overcome the time consistency problem, a product's short durability and its wastefulness impose costs brought on by the durable goods monopolists (Bulow, 1986; Coase, 1972; Gul et al., 1986; Olsen, 1992). Waldman (1996) demonstrated that incentives to introduce a new model of a product, improve social welfare. He argued that even after introducing a new model consumers continue to receive the same utility from the older models as before. Conversely, Fishman et al. (1993) and Ellison and Fudenberg (2000) showed that in competitive markets planned obsolescence could be a necessary condition for continued technological progress. They proposed that a pattern of rapidly deteriorating products and fast innovation could be superior to one with durable products and slow innovation. Utaka (2006) noted that “this fails to take into account how the introduction of a new model decreases the benefit” consumers derived from using older models that have lost their appeal.

Strategy researchers share the latter view. They posit that managers' perception of, awareness of, and approach to planned obsolescence vary considerably, depending on the situation and market context. For

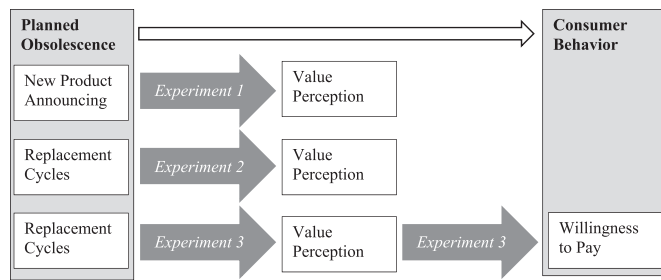


Fig. 1. Theoretical framework.

example, Stewart (1959) uncovered executives’ opinions about the phenomenon, its practice, and their reaction to the growing criticism of planned obsolescence principles. He states that the question is not one of technological obsolescence as such, but rather of minor changes which are “designed to persuade the consumer to scrap his existing, functional model” (Stewart, 1959).

Table 1 summarizes the literature introduced in this section and offers an overview of different definitions. Based upon this summary we adopt a definition of planned obsolescence as a deliberate attempt to shorten the lifespan of a product (Cooper, 2004; Packard, 1960).

3. Planned obsolescence from the customer's perspective

Besides some exceptions with an interest in a marketing context (e.g., Bayus, 1988; Howell, 1962; Utaka, 2000), planned obsolescence research overwhelmingly focusses on the company's perspective. Although some scholars interpret planned obsolescence as nothing more than planned innovation (e.g., Howell, 1962), the rise in planned obsolescence entails many questions, criticisms, and a call for caution (e.g., Box, 1983; Pauwels and D’Aveni, 2016; Tischleder and Wasserman, 2015).

With consumerism and consumer empowerment on the rise, companies’ initiatives are increasingly analyzed and shared, to the extent that they influence consumers’ purchase decisions. While some companies continue to develop different versions of new products, many consumers complain about such strategies. New products are sometimes developed for aesthetic rather than functional reasons, in order to generate more sales to existing customers (Bodur et al., 2013; Nguyen and Klaus, 2013; Stock and Zacharias, 2013). In fact, some consumers indicated feeling manipulated into accepting offers that oblige them to buy upgrades for which they had not asked, or that left them facing incompatibility issues (e.g., Strausz, 2009). For example, in examining customers’ responses to product innovation programs, Stock and Zacharias (2013) conducted a triadic survey on a multi-industry sample with 180 cases from business-to-business companies. They found that product program newness decreases customer loyalty, while product

program meaningfulness increases customer loyalty. In addition, if a brand was closely associated with innovativeness, the negative effect of product newness was reduced. Also, customers involved in the value-creating process, induced the loyalty effect of product meaningfulness.

In a consumers’ repurchasing behavior study, Grewal et al. (2004) compared unforced replacement decisions driven by technological obsolescence to forced replacement decisions driven by poor product performance. They found that durable products’ replacement intervals were shorter for unforced decisions and explained this finding by pointing to how involved customers were and what motivated them to buy. Regarding planned obsolescence, this study has limited applicability due to the fact that Grewal et al. (2004) considered only self-motivated consumers who voluntarily substituted their product. In a planned obsolescence strategy, however, the company launches a new version of a product intending to make the old one obsolete. The aim then is to motivate consumers to replace their existing products through the means of new product announcements. Boone et al. (2001) suggest that frequent product launches can be interpreted as reminder of the company’s ongoing product improvement, which simultaneously signals to customers that their existing product is outdated. Thus, a short product substitution time could motivate faster replacement among customers, regardless of the actual improvement that the product offers. “Planned obsolescence is much more than a matter of durability; it is also and perhaps primarily about how often a firm will introduce a new product and how compatible the new product will be with older versions” (Bulow, 1986). This implies that the speed at which new products are developed, can be a more appropriate proxy for obsolescence than durability. Following this line of reasoning, we contend that planned obsolescence changes customer behavior. This proposition has not been examined up to now. We hypothesized that short replacement cycles indicate superior value to the old version and affect customers’ perception of value as well as their subsequent willingness to buy (Sweeney et al., 1997). Fig. 1 presents our subsequent theoretical framework, exploring the relationships between different practices of planned obsolescence and their impact on value perceptions and consumers’ willingness to pay.

To test our assumptions, we engaged in a series of experiments. First, we examined the influence of simply an announcement of a new product version on value of the offer. Second, another experiment stressed the impact of the replacement period on the customer's perception of value. Finally, a third experiment connected the replacement cycles not only to value of the offer, but also to its impact on willingness to pay. Fig. 2 details the research process and the studies given in this paper.

4. Experiment 1 – announcement effects

In Experiment 1 we want to determine whether the replacement time influences customers’ value perceptions of the anticipated new

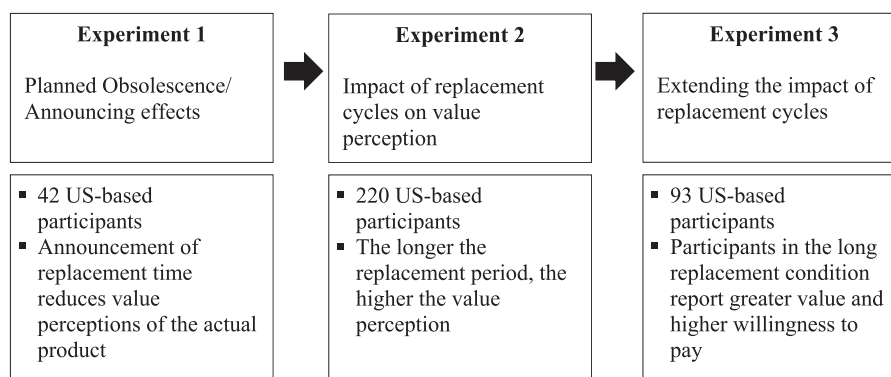


Fig. 2. Overview of studies.

model. Experiment 1 explores the relationship between an announcement of a smartphone replacement with the customer's value perception. We hypothesized that the mere announcement of a replacement time would decrease the current product's value and, in turn, increase the upcoming model's value, regardless of the innovativeness of the product.

4.1. Method

Experiment 1 compares the value of the new smartphone on offer when the company announced a new product to the value of the current smartphone. We use a questionnaire to present a scenario in which the respondents had recently bought a new and up-to-date smartphone of their preferred brand. While one version of this questionnaire gave the *status quo* and did not provide any other information, the second version added the announcement of a new product shortly after the recent purchase, which would make the latter obsolete. We expected the announcement to manipulate time perception and to moderate the smartphone's perceived value, such that participants would show reduced value perceptions. The other version of the questionnaire represented the present *status quo*, and we expected participants to show increased value perceptions. Table 2 details the treatments for both groups.

Measurement of our focal construct, the *value of the offer*, relied on Darke and Chung's (2005) five-item scale. This scale comprised the scales of Inman et al. (1997) and Lichtenstein and Bearden (1989) and consisted of five semantic differential items, which were measured on a 7-point scale. Table 3 provides an overview of the items.

The questionnaire also contained a question relating to the replacement period, as a manipulation check. Specifically, participants were asked how they felt about the replacement time of their specific brand, indicated on a seven-point scale ranging from "very short" to "very long."

4.2. Sample

Forty-two customers (23 female, 19 male) from a US panel participated in this study. Participants were randomly assigned to one of two groups ($n_1 = 20$, $n_2 = 22$, (Student, 1908a, 1908b), see also Appendix A). All participants answered the same questionnaire, although the groups were differently informed as to the announcement of a new product. The second group, which had been given the announcement of the imminent obsolescence of the latest phones. Participants working with this announcement were informed of a launch time for the new smartphone in the very near future, while participants in the first version had no such information.¹

4.3. Results

In order to test the effect of replacement time on the value of the offer, a between-groups analysis of variance (ANOVA) was performed.

¹ In the questionnaire, we selected the smartphone brand to be mentioned, on the basis of a pre-test. Prior to distributing the questionnaire, we presented 12 different mobile phone brands randomly to 342 representative US panel respondents. The pre-test participants had to rank the brands from most to least innovative. Samsung, which is significantly different to Apple, led the top-down list from the customers' perspective ($\Delta = 0.160$, $p < .1$). Together, Apple and Samsung led the top innovative brand group. The brands that came next on the list, were ranked significantly lower ($p < .1$) and showed a remarkable difference to the leading couple ($\Delta \geq 1.799$).

Huawei, for example, appeared to the bottom of the list, ranking lower than the ninth place on average. An early quota in the questionnaire assured us that participants shared this perception. Thus, having chosen Samsung and Apple as representative brands, we permitted participation only if respondents ranked either Apple or Samsung among the Top 2 innovative brands.

Prior to conducting the ANOVA, the assumption of homogeneity was tested and not satisfied based on Levene's F test: $F(1, 40) = 8.346$, $p = .006$. The replacement period was significant as a manipulation check at $p < .10$, which indicates that the manipulation of the replacement time was successful.

For the focal variable, the value of the offer, participants in the status-quo condition reported greater higher value perceptions ($M = 5.470$) than those in the short replacement time condition ($M = 4.591$).² The independent between-groups ANOVA yielded a statistically significant effect: Welch's $F(1, 34.877) = 4.726$, $p = .037$, $\eta^2 = .101$. Thus, replacement time accounted for 10.1% of the variance in value perceptions.

4.4. Discussion

The results substantiate the effect of planned obsolescence on the value of the offer. The analysis indicated that the mere announcement of the replacement time reduces customers' value perceptions of the actual product. This means that providing customers with a timeframe that predicts obsolescence, will change the perceptions of their recent purchase. Simply announcing a replacement date has an impact on customers' value perceptions. This change in value perception, triggered by the announcement of a forthcoming new product launch, is dissociated from, for example, innovation perceptions. This indicates that if consumers were to decide between two different products, one with and one without the information about an upcoming launch, their choices would be driven by the devaluation of the product soon to be substituted. Their choices neither correspond to the products' attributes, nor to market availability. This could result in customers making suboptimal choices.

One question that arose was whether the results of Experiment 1 were attributable to the imagined setting, fictive ownership of a recent smartphone. We addressed this question by focusing on the smartphone respondents really owned, and examining customer responses to planned obsolescence in greater detail.

5. Experiment 2 – the main effect

Experiment 2 demonstrates the main effect on which this paper reports, namely the impact of companies' planned obsolescence on customers' value perceptions. This study identified the customer's perspective on the product categories' replacement cycle. Experiment 2 connected a smartphone's replacement cycle with the customer's value perceptions. Thus, it compared the value of the smartphone on offer when the company announced a new product with the value of the current smartphone.

5.1. Method

This study focused on customers' different perceptions of value, specifically, the value of the smartphone on offer and compared the perceived value when companies have a short substitution period to when the companies have a longer substitution period. The questionnaire used in this experiment presented a new, hypothetical smartphone with attributes³ similar to those of the smartphone the respondent currently owns. The description participants received attached to the questionnaire, included a manipulation of the substitution

² Note that the M-values represent the mean of the scale and were calculated as a summarized score divided by the number of items.

³ The description of the smartphone we presented stems from a conjoint analysis. A total of 132 respondents identified the most preferred attributes in a new smartphone. The attributes we included were based on the available attributes on the market at the time the study was conducted. Detailed information can be obtained from the authors.

Table 2
Experimental treatment (Experiment 1).

Experiment 1 replacement time stimuli text	
Opening instructions	“What would you do?” On the next page, you will find a hypothetical scenario about buying decisions of a smartphone user. We want you to read the scenario carefully and imagine yourself in the situation explained in the scenario.
Scenario description ^a	Imagine that you own a recent smartphone. It is the most current model of your preferred brand, [brand], which you have bought some weeks ago. You are comfortable using the smartphone's functions.
Manipulation short replacement time ^a	As you read some articles in a popular magazine, you discover some news that [brand] is about to launch a new smartphone. The smartphone you recently bought will not be sold after this launch because the new smartphone will replace it. You check the internet for more information and find that [brand] will start selling the new model in a short period of time. Please try to imagine vividly that you find yourself in this situation and answer the following questions accordingly.

^a [brand] represents the respondent's preferred brand.

Table 3
Item wording.

Items ^a
<i>Value of the offer</i> (Darke and Chung, 2005)
unattractive / attractive
bad buy / excellent buy
extremely unfair / extremely fair
no savings at all / extremely large savings
extremely worthless / extremely valuable
<i>Willingness to pay</i> (Allen et al., 2008)
I like this smartphone.
I will buy this smartphone in the future.
I prefer this smartphone over the other brands.
It is likely that I will buy this smartphone the next time I am at the store.
I intend to buy this smartphone

^a all items were measured on a 7-point Likert scale.

period, which we expected would moderate the offer's value such that in the shorter period participants would show a reduced value perception, and in the longer substitution period, participants would show an increased value perception of the smartphone on offer.

Our focal construct, the *value of the offer*, relies on Darke and Chung's (2005) five-item scale (Table 3). Table 4 details the treatments

Table 4
Experimental treatments (Experiment 2).

Experiment 2 smartphone description stimuli text	
Opening/Headline ^a	[brand]'s upcoming smartphone
Manipulation long replacement time	On the market: autumn 2016
Manipulation short replacement time	On the market: August 1, 2015
Common text ^b	HD Display 5" Display Size 128 GB Memory Size Android Operating System Wi-Fi, Bluetooth, USB, 3 G/4 G, LTE, GPS Available in Custom Colors 20.7 Megapixel Camera 20 days Standby Time 24 h Talk Time Conditions of your actual contract apply, 24 months renewal. Price to receive the new smartphone: \$499, payable when you receive the phone.

^a [brand] represents the respondent's current brand, either Samsung or Apple. An early quota in the questionnaire ensured that participants owned a smartphone from one of these two brands.

^b Technical details represent smartphones' attributes at the time the data was collected.

for both groups.

5.2. Sample

Two-hundred and twenty US citizens (115 female, 105 male) participated in this experiment. Appendix A details the sample's composition. Participants were recruited from a US panel and randomly assigned to one of two conditions. Participants in two groups all answered the same questionnaire, excepting that for one group the new smartphone's release time was different to that given to the other. For participants given the short substitution period, the new smartphone was said to be launched within the following week, while for participants given the longer substitution period, a launch time of approximately one year after the questionnaire was proposed. Both time periods were pre-tested and found appropriate. Considering our research question, an early quota in the questionnaire ensured that participants own a recent smartphone, i.e. one not older than 4 years.

5.3. Results

The assumption of homogeneity was tested and satisfied based on Levene's F test: $F(1, 218) = 1.255, p = .264$. Participants with the long replacement condition reported greater value perception ($M = 5.285$) than those with the short replacement condition ($M = 4.978$), as reflected in the ANOVA, $F(1, 218) = 3.522, p = .062$.

These results conceptually replicate the finding of Experiment 1, that the replacement time influences value perception of the product. Experiment 2 additionally demonstrated that the longer the replacement period, the higher the value of the offer.

5.4. Discussion

The findings highlighted again that the offer's value is highly influenced by providing consumers with the launch date of the replacement. Our results show that the value perception differs completely, depending on the imminence of the replacement. Consumers perceive a longer replacement cycle as increasing value, even if the features and specifications of both offers are equal. For researchers and managers alike, this gives rise to the question whether it is beneficial to announce the replacement of an existing product. It is important to know whether it will change customers' long-term value perception of a particular product. Managers, importantly, need information on how sharing the information of new product launches will change the target consumers' mind over time. To be more precise, the question is whether it will change their willingness to buy future products. Our subsequent experiment tested whether longer or shorter replacement time affected customers' value perceptions and how this influences their willingness to buy.

Table 5
Literature overview of the relationship between replacement cycles and customers' behavioral intentions.

Sources	Citation
<i>Literature overview</i>	
Okada (2001)	Past usage experience and duration of possession of incumbent products has a significant influence on the decision to purchase a replacement product.
Roster and Richins (2009)	Durable goods' replacement decisions involve two interconnected, but distinct sub-decisions: whether to replace the product, and what to do with the incumbent possession.
Grewal et al. (2004)	Durable products' replacement intervals are shorter for unforced replacement decisions driven by technological obsolescence than for forced replacement decisions driven by poor product performance.
Cripps and Meyer (1994)	Consumers tend to replace at a slower rate than would be predicted by normative theory, and tend to assign more weight to opportunity costs arising from obsolescence than to those arising from product deterioration.
<i>Related theories</i>	
Priester et al. (2007)	<i>Ambivalent feelings</i> which arise in replacement decisions represent a state of psychological conflict concerning an attitude object. If the old cell phone is still in working order, it may feel wasteful to replace it despite the owner's desire for something new.
Ajzen (1991)	<i>The theory of planned behavior</i> shows that attitude toward the behavior, subjective norms, and perceived behavioral control, determine intentions, and these intentions are translated into behavior to the extent the behavior is under the consumer's control. In the same vein, consumer's intention to acquire a replacement product, would be a function of the consumer's attitude toward acquiring a replacement, subjective norms, and ability to acquire a replacement.
Eagly and Chaiken (1993), Grewal et al. (2004), Herek (1986), Kardes and Cronley (2000)	<i>Functional theories of attitudes</i> suggest that people hold attitudes because they enable them to meet specific needs, thus facilitating the planning, implementation, and attainment of goals. These attitudes serve different functions, such as facilitating decision-making (the knowledge function); communicating (the value-expressive function); socially interacting (the social-adjustive function); and the fulfillment of hedonistic goals (the utilitarian function).

Table 6
Literature overview of the relationship between value of the offer and willingness to buy.

Representative sources	Citation
<i>Literature overview</i>	
Fu and Elliott (2013)	Consumers need to invest cognitive effort and to process more information (e.g. product value information) to reach the point of price decision-making.
Pauwels and D'Aveni (2016) Parry and Kawakami (2015)	Market's willingness-to-pay occurs through hedonic regressions of quality and value components. Both perceived utilitarian and hedonic value of an innovative product is positively and significantly related to willingness to pay.
Levinthal and Purohit (1989)	Consumers' expectations of a forthcoming product decrease the price that they are willing to pay for the current product, because of its loss in value due to obsolescence. Thus, the new improved version is characterized by consumers' increased willingness to pay and by its competitive interaction with the old product.
Hamilton et al. (2011), McFadden (1986), Monroe (1990), Sheth et al. (1991) Sun et al. (2016)	Studies in both marketing and economics literature hypothesize that the greater the perceived value of a product, the greater the consumer's willingness to pay, constrained by budgetary and competitive forces. Four dimensions of value perceptions, namely social value, emotional value, unique value, and quality value, drive consumers' purchase intentions and thus their willingness to pay.
Li et al. (2012), Netemeyer et al. (2004)	Previous research clearly supports perceived value as an antecedent of willingness to pay.
<i>Related theories</i>	
Rosen (1974)	<i>Hedonic pricing theory</i> depicts a stable, positive price–quality relationship based on the assumption that product market mechanisms lead to efficient and equilibrium pricing, where customers “pay for what they get” and “get what they pay for.”
Jedidi and Zhang (2002)	The economic theory of consumer utility maximization implies that the consumer's willingness to pay for an innovative product reflects the utility or perceived value of the benefits provided by an innovation.

6. Experiment 3 – willingness to buy

In early planned obsolescence literature, Stewart (1959) noted that “it is perfectly clear that there is general concern and interest in looking for and considering alternative means for maintaining consumer expenditures.” Thus, companies are generally concerned about customers' willingness to pay. As a marketing strategy, planned obsolescence stresses the innovativeness of the new, in comparison to the obsolete model. Table 5 provides an overview of the literature dealing with the relationship between replacement cycles and customers' behavioral intentions. Table 6 details this relationship by providing a literature overview of the link between value of the offer and willingness to buy.

Experiment 3 thus sheds light on the relationship between replacement periods and willingness to buy.

6.1. Method

Similar to Experiment 2, this study compares customers' value perception and willingness to pay for a new smartphone when

companies announce a short substitution period, as opposed to announcing a longer substitution period. The questionnaire presented a new, hypothetical smartphone with attributes² similar to those of the smartphone the respondent currently owns. The description given to participants included a manipulation of the time period, which we expected would moderate the offer's value such that in the short substitution period participants would show a reduced value perception and willingness to pay, while a longer substitution period, would show an increased value perception and willingness to pay.

Our focal construct, the *value of the offer*, relies on Darke and Chung's (2005) five-item scale. Its outcome construct, *willingness to pay*, was measured with the six-item self-report measure from Allen et al. (2008) (Table 3).

6.2. Sample

Ninety-three US citizens (46 female, 47 male), who owned a recent Apple smartphone, participated in this experiment. Participants were recruited from a US panel and randomly assigned to one of two

conditions. Appendix A details the sample's composition. All participants answered the same questionnaire, excepting that the new smartphone's release time was different for each of the two groups. For participants in the short time period group a launch time within of the week the questionnaire was announced, while participants in the long-time period group were given a launch time of approximately one year after the questionnaire. As with Experiment 2, an early quota in the questionnaire ensured that participants owned a recent smartphone, i.e. not older than 4 years.

6.3. Results

To test the effect of replacement time on the value of the offer and customers' willingness to pay, we performed two between-groups ANOVAs. For the value of the offer, the independent between-groups ANOVA yielded a statistically significant effect: $F(1, 91) = 4.127$, $p = .045$. Participants in the long replacement condition reported greater value perceptions ($M = 5.278$) than those in the short replacement condition ($M = 4.732$). Likewise, the results of the independent between-groups ANOVA for the willingness to pay showed that participants in the long replacement condition ($M = 4.739$) reported a significantly ($F(1, 91) = 3.962$, $p = .05$) higher willingness to pay than those in the short replacement condition ($M = 4.067$).

6.4. Discussion

The analysis highlights that the influence of replacement cycles on willingness to buy is equal to customers' value perceptions. Customers perceive longer replacement cycles not only as value-adding, but it also increases their willingness to buy. Does this imply that managers should extend their product replacement cycles for as long as possible to stimulate their potential customers' willingness to buy? Managers still have to keep in mind that longer replacement periods could lead either to a revenue decrease, or to customers switching to new products introduced by their competitors.

7. General discussion

Discussions on planned obsolescence, despite being scarce, are rather diverse. We found the theoretical construct of planned obsolescence used in a variety of research fields, ranging from innovation needs (Ellison and Fudenberg, 2000; Fishman et al., 1993) to company profits (e.g., Guiltinan, 2009; Miao, 2011). The customer's perspective on companies' planned obsolescence strategies has been largely unexplored. Building on previous researchers findings (e.g., Bulow, 1986; Howell, 1962; Strausz, 2009; Utaka, 2000; Waldman, 1996), we proposed that planned obsolescence impacts customers' product perception and, ultimately, their purchasing behavior. Our set of studies provides support for this notion and shows that, although customers are unable to identify planned obsolescence as such, the strategy has an impact on their value perception of the new model. Customers rely on different antecedents, which include the replacement period, in deciding about substituting their existing products.

We predicted that participants confronted with a short substitution period would exhibit a reduced value perception, and vice versa. The study's findings confirm this hypothesis. Although we presented an up-to-date smartphone with optimal configuration that is not on the market, we did not change any of its attributes in the treatments. The substitution period we described, influenced both consumers' value perceptions and their willingness to buy.

Experiments 1 and 2 demonstrate that customers' perception of replacement cycles influences their value perceptions. Experiment 3 further examines this finding, and provides evidence of replacement cycles' influence on customer behavioral intentions. It contrasts short with long replacement periods with respect to a hypothetical, but up-to-date product. The short replacement time, reduces both, customers

value perceptions and their willingness to buy.

This research enhances the theoretical understanding of planned obsolescence by including the much-needed customer's perspective in the discussion. The studies provide further insight into the causes and consequences of a company-induced planned obsolescence strategy. It adds to Grewal et al. (2004) notion of *consumers' product* by investigating a company's application of a planned obsolescence strategy. Grewal et al. (2004) submit poor product performance as the key driver of a company's planned obsolescence strategy. Our research offers and substantiates a contrasting definition of planned obsolescence. We propose planned obsolescence as the company's strategic decision to reduce the value of an old model by offering a new version of a particular product. This approach alternates consumers' replacement decision by introducing a new substitute product.

The studies' findings extend our understanding of planned obsolescence beyond characterizing it as a simple marketing strategy (e.g., Howell, 1962), also giving support to our hypothesis that, increasingly, shortening replacement cycles harm customers' willingness to buy. As demonstrated, replacement periods positively influence both customers' new model assessments, and their willingness to buy. In our experiments, the relationship between the value of the offer and the willingness to pay, is stable. These results support the idea that a planned obsolescence strategy will, depending on the replacement period, only reach a limited rather than the entire target group.

This research also adds to the innovation literature (e.g., Bayus, 1988) by adding the notion of customers' reduced replacement cycles perceptions. Our findings support the view that *planned obsolescence* differs from *planned innovation*. Howell (1962) argues that planned innovation fits in somewhere on a spectrum between a completely new product and a product with imperceptible modifications. Our results demonstrate that the sheer idea of a product becoming obsolete, already changes customer behavior. We posit that, contrary to the notion of planned innovation (Bogoviz and Mezhev, 2015), the notion of an almost obsolete product alone alters consumers' behavioral intentions.

7.1. Managerial Implications

This study enriches our understanding of planned obsolescence, taking it beyond the narrow innovation and profitability focus, for managers and researchers alike. While earlier planned obsolescence research is inconclusive about the customer's perception of such a strategy and the coinciding definition (see Guiltinan, 2009 for an overview), our results provide empirical evidence of effects planned obsolescence has on consumers' perceptions and their behavioral intentions. Our studies reveal that planned obsolescence as a strategy might not be able to reach all customers. Based on our findings, customers who need a new phone are more likely to substitute the old product with a new version of the same kind, than are customers who own a recently purchased smartphone. However, those seeking a new product, are the ones who care about the possible obsolescence of their product. Those customers will buy a new phone in a short period of time anyway. Conversely, a company's planned obsolescence strategy might not reach the customer for whom it was intended. Customers who do not urgently need to buy a smartphone, are also likely to consider obsolescence in their buying decision. For them, the motivation could lie in their need to cope with their peer group socially in not appearing to be 'out-of-date' anytime soon.

The study should help managers to better position their new models. Companies' strategies for marketing their new models depend on the customer group in focus, while they consider the frequency of model changes (Ellison and Fudenberg, 2000; Fishman et al., 1993) and the role of irrelevant product attributes in product differentiation (e.g., Broniarczyk and Gershoff, 2003; Brown and Carpenter, 2000; Carpenter et al., 1994). Marketing new models can thus either follow the classical idea of offering better performance (Grewal et al., 2004), or focus on the consumer's value perceptions. Our results which show customers

perceive products with longer replacement periods, as valuable, support extending product lifetimes, and thus also planning replacement cycles with longer intervals. Managers should thus avoid rapid product replacements, and invest in incremental changes to the existing product.

7.2. Limitations and directions for research

This research leaves many fruitful avenues to be explored in future studies. First, additional work should consider how customers perceive planned obsolescence in product categories other than durable goods. Besides Ellison and Fudenberg's (2000) work on planned obsolescence in the software industry, research on customers' perception of planned obsolescence strategies in non-durable product categories is sparse. Similar analyses of the replacement period for other products are needed to allow for comparison across products (Bayus, 1988). A broader understanding of customers' reactions would give us a more general understanding of planned obsolescence's antecedents and outcomes.

Thus, a deeper understanding of planned obsolescence is necessary. While our research focuses on customer behavior from a general perspective, more research is needed regarding obsolete products in the context of customer decision-making processes. Given the stages of customers' product decision making, developing detailed knowledge of how new model announcements influence each stage, will be useful. While previous research has highlighted the need for additional or advanced product attributes to win over customers, identifying a tipping point at which the customer is persuaded to buy the new version of

the product, would be interesting. For example, extending Bayus's (1988) findings by using our model should make it possible to find further determinants of replacement purchases from the marketing perspective.

Further, our research only covers one aspect of planned obsolescence, namely the replacement period. Other dimensions of planned obsolescence should also receive attention in further research. Additionally, a theoretical distinction between planned obsolescence and other marketing strategies (e.g., Howell, 1962), or innovation and innovativeness (e.g., Choi, 1994; Ellison and Fudenberg, 2000; Stock and Zacharias, 2013) offers a broad avenue for further research. Moreover, future planned obsolescence research shall explore appropriate boundary conditions and related mediators of the construct.

Finally, from the managerial point of view, further research is needed on how to address the different customer groups proposed in this study. Scholars should examine whether and how firms effectively and efficiently support customers' decision making in planned obsolescence strategies. Clearly, samples representing other cultures, countries, and product categories should be investigated to understand the generalizability of our findings. In addition, longitudinal data focusing on actual customers' behavior will increase the validity of this study's findings.

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Appendix A

See Table A.1.

Table A.1
Descriptive statistics.

	Experiment 1 ^a	Experiment 2 ^b	Experiment 3 ^c
<i>Gender</i>			
Female	54.8%	47.7%	49.5%
Male	45.2%	52.3%	50.5%
<i>Age</i>			
≤ 24	14.3%	11.8%	11.8%
25–34	7.1%	21.4%	23.7%
35–44	28.6%	19.1%	18.3%
45–54	11.9%	18.2%	20.4%
55–64	14.3%	14.5%	12.9%
65–74	21.4%	12.3%	10.8%
≥ 75	2.4%	2.8%	2.2%
<i>Educational Degree</i>			
Less than High School	0%	0.5%	1.1%
High School / GED	9.5%	15.5%	10.8%
College Degree	78.6%	72.2%	73.1%
Master's Degree	7.2%	7.3%	9.7%
Professional Degree (JD, MD)	4.8%	3.6%	6.5%
<i>Annual Salary in US\$</i>			
0–25,000	21.4%	18.2%	11.8%
25,001–50,000	26.2%	24.1%	12.9%
50,001–75,000	23.8%	21.4%	22.6%
75,001–100,000	21.4%	14.5%	17.2%
100,001–125,000	0%	7.7%	12.9%
125,001–150,000	2.4%	6.8%	10.8%
150,001–175,000	2.4%	1.8%	2.2%
175,001–200,000	0%	3.2%	5.4%
200,001 +	2.4%	0%	4.3%

^a n = 42.

^b n = 220.

^c n = 93.

References

- Adamson, G., Gordon, D., 2003. *Industrial Strength Design: how Brooks Stevens Shaped Your World*. MIT press, Cambridge.
- Ajzen, I., 1991. The theory of planned behavior. *Organ. Behav. Human. Decis. Process.* 50 (2), 179–211.
- Allen, M.W., Gupta, R., Monnier, A., 2008. The interactive effect of cultural symbols and human values on taste evaluation. *J. Consum. Res.* 35 (2), 294–308.
- Amankwah-Amoah, J., 2017. Integrated vs. add-on: a multidimensional conceptualisation of technology obsolescence. *Technol. Forecast. Soc. Change* 116 (3), 299–307.
- Bayus, B.L., 1988. Accelerating the durable replacement cycle with marketing mix variables. *J. Product. Innov. Manag.* 5 (3), 216–226.
- Bodur, H.O., Gao, T., Grohmann, B., 2013. The ethical attribute stigma: understanding when ethical attributes improve consumer responses to product evaluations. *J. Bus. Ethics* 122 (1), 167–177.
- Bogoviz, A., Mezhev, S., 2015. Models and tools for research of innovation processes. *Mod. Appl. Sci.* 9 (3), 159–172.
- Boone, D.S., Lemon, K.N., Staelin, R., 2001. The impact of firm introductory strategies on consumers' perceptions of future product introductions and purchase decisions. *J. Product. Innov. Manag.* 18 (2), 96–109.
- Box, J.M.F., 1983. Extending product lifetime: prospects and opportunities. *Eur. J. Mark.* 17 (4), 34–49.
- Broniarczyk, S.M., Gershoff, A.D., 2003. The reciprocal effects of brand equity and trivial attributes. *J. Mark. Res.* 40 (2), 161–175.
- Brown, C.L., Carpenter, G.S., 2000. Why is the trivial important? A reasons-based account for the effects of trivial attributes on choice. *J. Consum. Res.* 26 (4), 372–385.
- Bulow, J., 1986. An economic theory of planned obsolescence. *Q. J. Econ.* 101 (4), 729–750.
- Carpenter, G.S., Glazer, R., Nakamoto, K., 1994. Meaningful brands from meaningless differentiation: the dependence on irrelevant attributes. *J. Mark. Res.* 31 (3), 339–350.
- Choi, J.P., 1994. Network externality, compatibility choice, and planned obsolescence. *J. Ind. Econ.* 42 (2), 167–182.
- Coase, R., 1972. Durability and monopoly. *J. Law Econ.* 15 (1), 143–149.
- Cooper, T., 2004. Inadequate life? Evidence of consumer attitudes to product obsolescence. *J. Consum. Policy* 27 (4), 421–449.
- Cripps, J.D., Meyer, R.J., 1994. Heuristics and biases in timing the replacement of durable products. *J. Consum. Res.* 21 (2), 304–318.
- Darke, P.R., Chung, C.M.Y., 2005. Effects of pricing and promotion on consumer perceptions: it depends on how you frame it. *J. Retail.* 81 (1), 35–47.
- Eagly, A.H., Chaiken, S., 1993. *The Psychology of Attitudes*. Harcourt Brace Jovanovich, Fort Worth, TX.
- Ellison, G., Fudenberg, D., 2000. The Neo-Luddite's Lament: excessive upgrades in the software industry. *RAND J. Econ.* 31 (2), 253–272.
- Fisher, F.M., Griliches, Z., Kaysen, C., 1962. The costs of automobile model changes Since 1949. *Am. Econ. Rev.* 52 (2), 259–261.
- Fishman, A., Gandal, N., Shy, O., 1993. Planned obsolescence as an engine of technological progress. *J. Ind. Econ.* 41 (4), 361–370.
- Fu, F.Q., Elliott, M.T., 2013. The moderating effect of perceived product innovativeness and product knowledge on new product adoption: an integrated model. *J. Mark. Theory Pract.* 21 (3), 257–272.
- Gershoff, A.D., Kivetz, R., Keinan, A., 2012. Consumer response to versioning: how brands' production methods affect perceptions of unfairness. *J. Consum. Res.* 39 (2), 382–398.
- Grewal, R., Mehta, R., Kardes, F.R., 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.
- Guiltinan, J., 2009. Creative destruction and destructive creations: environmental ethics and planned obsolescence. *J. Bus. Ethics* 89 (1), 19–28.
- Gul, F., Sonnenschein, H., Wilson, R., 1986. Foundations of dynamic monopoly and the coase conjecture. *J. Econ. Theory* 39 (1), 155–190.
- Ha, Y.W., Park, S., Ahn, H.K., 2009. The influence of categorical attributes on choice context effects. *J. Consum. Res.* 36 (3), 463–477.
- Hamilton, R.W., Ratner, R.K., Thompson, D.V., 2011. Outpacing others: when consumers value products based on relative usage frequency. *J. Consum. Res.* 37 (6), 1079–1094.
- Herek, G.M., 1986. The instrumentality of attitudes: toward a neofunctional theory. *J. Social. Issues* 42 (2), 99–114.
- Ho, C.-H., Wu, W., 2011. Role of innovativeness of consumer in Relationship between perceived attributes of new products and intention to adopt. *Int. J. Electron. Bus. Manag.* 9 (3), 258–266.
- Howell, L.L., 1962. Planned innovation as a marketing tool. *Calif. Manag. Rev.* 4 (4), 66–71.
- Inman, J.J., Peter, A.C., Raghurir, P., 1997. Framing the deal: the role of restrictions in accentuating deal value. *J. Consum. Res.* 24 (1), 68–79.
- Jedidi, K., Zhang, Z.J., 2002. Augmenting conjoint analysis to estimate consumer reservation price. *Manag. Sci.* 48 (10), 1350–1368.
- Kardes, F.R., Cronley, M.L., 2000. The role of approach/avoidance asymmetries in motivated belief formation and change. In: Ratneshwar, S., Mick, D.G., Huffman, C. (Eds.), *The Why of Consumption: Contemporary Perspectives on Consumer Motives, Goals, and Desires*. Routledge, London, pp. 81–97.
- Lee, K., Khan, S., Mirchandani, D., 2013. Hierarchical effects of product attributes on actualized innovativeness in the context of high-tech products. *J. Bus. Res.* 66 (12), 2634–2641.
- Levhari, D., Peles, Y., 1973. Market structure, quality and durability. *Bell J. Econ. Manag. Sci.* 4 (1), 235–248.
- Levinthal, D.A., Purohit, D., 1989. Durable goods and product obsolescence. *Mark. Sci.* 8 (1), 35–56.
- Li, G., Li, G., Kambele, Z., 2012. Luxury fashion brand consumers in China: perceived value, fashion lifestyle, and willingness to pay. *J. Bus. Res.* 65 (10), 1516–1522.
- Lichtenstein, D.R., Bearden, W.O., 1989. Contextual influences on perceptions of merchant-supplied reference prices. *J. Consum. Res.* 16 (1), 55–66.
- McFadden, D., 1986. The choice theory approach to market research. *Mark. Sci.* 5 (4), 275–297.
- Miao, C.-H., 2010. Tying, compatibility and planned obsolescence. *J. Ind. Econ.* 58 (3), 579–606.
- Miao, C.-H., 2011. Planned obsolescence and monopoly undersupply. *Inf. Econ. Policy* 23 (1), 51–58.
- Monroe, K.B., 1990. *Pricing: Making Profitable Decisions*. McGraw Hill, New York.
- Netemeyer, R.G., Krishnan, B., Pullig, C., Wang, G., Yagci, M., Dean, D., Ricks, J., Wirth, F., 2004. Developing and validating measures of facets of customer-based brand equity. *J. Bus. Res.* 57 (2), 209–224.
- Nguyen, B., Klaus, P.P., 2013. Retail fairness: exploring consumer perceptions of fairness towards retailers' marketing tactics. *J. Retail. Consum. Serv.* 20 (3), 311–324.
- Okada, E.M., 2001. Trade-ins, mental accounting, and product replacement decisions. *J. Consum. Res.* 27 (4), 433–446.
- Olsen, T.E., 1992. Durable goods monopoly, learning by doing and the Coase conjecture. *Eur. Econ. Rev.* 36 (1), 157–177.
- Packard, V., 1960. *The Waste Makers*. Pelican, Harmondsworth.
- Pantano, E., Iazzolino, G., Migliano, G., 2013. Obsolescence risk in advanced technologies for retailing: a management perspective. *J. Retail. Consum. Serv.* 20 (2), 225–233.
- Parry, M.E., Kawakami, T., 2015. Virtual word of mouth and willingness to pay for consumer electronic innovations. *J. Product. Innov. Manag.* 32 (2), 192–200.
- Pauwels, K., D'Aveni, R., 2016. The formation, evolution and replacement of price–quality relationships. *J. Acad. Mark. Sci.* 44 (1), 46–65.
- Priester, J.R., Petty, R.E., Park, K., 2007. Whence univalent ambivalence? From the anticipation of conflicting reactions. *J. Consum. Res.* 34 (1), 11–21.
- Rivera, J.L., Lallmahomed, A., 2016. Environmental implications of planned obsolescence and product lifetime: a literature review. *Int. J. Sustain. Eng.* 9 (2), 119–129.
- Rosen, S., 1974. Hedonic prices and implicit markets: product differentiation in pure competition. *J. Political Econ.* 82 (1), 34–55.
- Roster, C.A., Richins, M.L., 2009. Ambivalence and attitudes in consumer replacement decisions. *J. Consum. Psychol.* 19 (1), 48–61.
- Schumpeter, J., 1942. *Capitalism, Socialism and Democracy*. Harper, New York.
- Sheth, J.N., Newman, B.I., Gross, B.L., 1991. Why we buy what we buy: a theory of consumption values. *J. Bus. Res.* 22 (2), 159–170.
- Stewart, J.B., 1959. Planned obsolescence. *Harv. Bus. Rev.* 37 (5), 14–174.
- Stock, R.M., Zacharias, N.A., 2013. Two sides of the same coin: how do different dimensions of product program innovativeness affect customer loyalty? *J. Product. Innov. Manag.* 30 (3), 516–532.
- Strausz, R., 2009. Planned obsolescence as an incentive device for unobservable quality. *Econ. J.* 119 (540), 1405–1421.
- Student, 1908a. The probable error of a correlation coefficient. *Biometrika* 6, 302–310.
- Student, 1908b. The probable error of a mean. *Biometrika* 5, 351–360.
- Sun, G., D'Alessandro, S., Johnson, L.W., 2016. Exploring luxury value perceptions in China direct and indirect effects. *Int. J. Mark. Res.* 58 (5), 711–731.
- Swan, P.L., 1972. Optimum durability, second-hand markets, and planned obsolescence. *J. Political Econ.* 80 (3), 575–585.
- Sweeney, J.C., Soutar, G.N., Johnson, L.W., 1997. Retail service quality and perceived value: a comparison of two models. *J. Retail. Consum. Serv.* 4 (1), 39–48.
- Tischleder, B.B., Wasserman, S., 2015. Thinking out of sync: a theory of obsolescence. In: Tischleder, B.B., Wasserman, S. (Eds.), *Cultures of Obsolescence: History, Materiality, and the Digital Age*. Palgrave Macmillan, New York, pp. 1–17.
- Utaka, A., 2000. Planned obsolescence and marketing strategy. *Manag. Decis. Econ.* 21 (8), 339–344.
- Utaka, A., 2006. Planned obsolescence and social welfare. *J. Bus.* 79 (1), 137–148.
- Waldman, M., 1993. A new perspective on planned obsolescence. *Q. J. Econ.* 108 (1), 273–283.
- Waldman, M., 1996. Planned obsolescence and the R&D decision. *RAND J. Econ.* 27 (3), 583–595.
- White, L.J., 1969. *The American Automobile Industry in the Post War Period*. Harvard Business Press, Harvard University.