Measuring residual perceived value for the consumer: the case of damaged fruits and vegetables

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Abstract:

Residual perceived value is an interesting concept from a circular economy perspective, since it enables us to capture the sources of value that remain in a product at the end of its use or at the end of its life. However, the literature lacks tools for measuring this concept reserved for post-use, in contrast to purchase and consumption value, which have received a lot of attention from scholars. Our research aims to provide an understanding of the concept of residual perceived value by studying its dimensions and measuring it in the case of food products. An exploratory qualitative study along with two quantitative data collections have enabled us to construct a four-dimension measurement instrument applied to damaged fruits and vegetables. These four dimensions (symbolic, hedonic, individual utilitarian, biospheric utilitarian) could help public authorities better orientate their anti-waste communication.

Keywords : *perceived value, residual perceived value, measurement scale*

Track : *Public Sector & Non-profit Marketing*

Introduction

Over the past three decades, perceived consumer value has received a strong interest from scholars, whether at the conceptualization, operationalization or measurement level (Zeithaml and al., 2020). However, the latter is sometimes criticized for its "*partial vision*" focusing more on purchase and use values and neglecting other types such as residual perceived value (RPV), which refers to the value perceived by consumers at the end of a product's life or use (Kreziak and al., 2015). Although it has been present in the literature for more than twenty years (Parasuraman and Grewal, 2000), RPV remained discreet until the last decade, when it was addressed to products such as clothing, furniture or technological objects, in a circular economy perspective (Kreziak and al., 2015; Lebossé and al., 2022; Türe, 2014). Three dimensions of RPV have been identified: utilitarian, affective and symbolic (Kréziak and al.2015; Lebossé and al. 2022) and have been pointed out as a lever against waste, since it significantly influences the decision to keep or not a product (Kréziak and al., 2020a). But what about more ordinary products with shorter lifespans, such as food? Do we find the same dimensions for these products? Would confrontation with a new sector enrich or challenge this three-dimensional conceptualization of RPV? The implications are significant, because appreciating the residual value of a food product could also be a lever against food waste, as (Evans, 2012) considers that : "*food waste is the act of disposing of food before its sources of residual value have been exhausted*". Hence, shedding light on the RPV of food products and its dimensions is a necessity to understand what value remains in these products once close to its ends of lives. Therefore, this could help public authorities better orientate their anti-waste communication. Likewise, as Parasuraman and Grewal (2000) noted, the marketing literature lacks measurement tools of RPV, which has only been developed in the context of technological objects (Kréziak and al., 2015). We will therefore attempt, through this research, to propose a measurement scale RPV, in the case of food products, specifically for fruits and vegetables.

1. The concept of RPV

1.1 Nature of the concept and definitions. RPV finds its origins in the theory of consumer perceived value. In a research conceptualizing this concept, Parasuraman and Grewal (2000) present four types of perceived value according to the different stages of a product's life cycle: transaction value, acquisition value, use value and residual value. This distinction is based on the assumption that perceived value is dynamic, i.e. it evolves and takes different forms over time and according to the different possible situations of person-object interaction. However, these 4 types of perceived value do not receive the same level of attention from researchers (Mencarelli and Riviere, 2020). While acquisition, transaction and use values have been studied

and measured for a long time, residual value has received little attention (Kréziak and al., 2020b). In those few works that do refer to residual value, there is no consensus on its definition. While some authors, such as (Woodall, 2003), define it as a cost associated with the disposal of objects, others present it as a residual benefit expected when the object is taken back at the end of its life, and thus consider it as a "*trade-in value*" (Okada, 2001). A recent line of work has marked a new shift, placing PRV within a circular economy perspective, where it means much more to consumers (Kreziak and al., 2015; Lebossé and al., 2022; Türe, 2014). The work of (Kréziak and al., 2020a) results in a holistic definition of the RPV: "*It is a post-use value that refers to the value an individual gives to an object when it is no longer being used in its original function*". It is important to note that RPV is empirically different from use value, and can persist even when the object is no longer in use (Kréziak and al., 2020b). RPV is therefore focused on the object and not on its use (Lebossé and al., 2022).

1.2 Concept dimensions and fields of application. Although there are many definitions of RPV, empirical studies are rare. Exceptions to this are the work of Kréziak (2015) and Lebossé and al. (2022). In an effort to understand the disposal behavior of technological objects, Kréziak and al. (2015) proposed a three-dimensional measure of the RPV of a cell phone. The latter is measured through (1) a utilitarian dimension (when the cell phone is perceived as still being able to be used), (2) a financial dimension (when the cell phone has a re-sale value for the owner) and (3) an affective dimension (when the cell phone evokes a memory). Building on this work, Lebossé and al (2022) confirmed these three major dimensions for the case of other objects such as clothing or furniture, via a qualitative study. However, these two studies only examined possessions likely to be donated or re-sold (clothing, cell phones, furniture, etc.), and did not focus on products with a shorter lifespan, such as food products, which are not systematically donated or re-sold but can be used for other purposes in the household.

Based on the principle that "*perceived residual value refers to an object whose status has changed in the post-use phase*" (Kréziak and al.2020b), we can retain, for the purpose of this research, that the PRV of a food product refers to a product whose status has changed because of certain changes in its appearance (stains, deformation, dryness, etc.). The food thus becomes "*damaged*" and may refer to end-of-life. However, the change in a food's state is not always equal to "zero value" for the consumer (Evans, 2012; Kreziak and Cova, 2013). Even if the use value of a product tends towards zero when it changes state, there is still some value left in the product, which refers to the residual value (Kreziak and al., 2015). In the case of food products (fruits and vegetables), we will attempt to identify and measure the dimensions of this residual value. We chose the specific case of fruit and vegetables (F&V) since these are the two most

wasted food types according to Ademe (2016). Moreover, the research has been done in the context of a research project aiming to understand fruit and vegetables waste upon consumers.

2.Methodology

Following Churchill (1979) we generated items by conducting an exploratory qualitative study, which was carried out with 15 volunteer households, during two phases. During the 1st phase (winter), 15 semi-structured interviews (lasting 1 hour in average) were conducted with household representatives in their houses. In the 2nd phase (spring), 15 additional and complementary semi-structured interviews (lasting 1 hour in average) were conducted with the same sample in their houses. We analyzed data using NVIVO 14 until theoretical saturation was reached. The list of generated items was then submitted to 5 marketing experts to evaluate its face and content validity, resulting in 16 items to be tested. Afterwards, we aimed to refine and validate our scale. Data collection occurred online on June 2023 using a sample of 1,048 people, drawn from consumer panels representative of the French population (in terms of age, gender, PSC, location and education level) thanks to the quotas method. The 16 items were evaluated by respondents on a 5-point Likert scale, according to the degree of agreement ("Strongly disagree" to "Strongly agree"). After collecting data, we split the sample randomly into two sub-samples (N1=450 and N2=598) (Appendix 1) to ensure an exploratory phase with the first sub-sample and a confirmatory phase with the second one. In the exploratory phase (study 1), the data collected were subjected to principal component analysis (PCA) using XLStat software with the Promax rotation method. For the confirmatory phase (study 2), the aim was to confirm the structure of the measurement scale and to ensure its reliability and its convergent and discriminant validity via confirmatory factor analysis (CFA). We chose the PLS estimation method, based on analysis of variance and partial least squares, using XLStat software. This approach was chosen due to the data distribution not meeting multivariate normality conditions (Hair and al., 2012).

3.Main results

Based on the statistics of Studies 1 and 2 (Appendix 2 & 3), the 16-item list was reduced in a set of 13 items. After checking the KMO value (exceed .50) and a significant Bartlett's test, four PCA were performed and bad items with bad loadings or communalities were deleted. Analysis revealed a four-factor solution with a last factor eigenvalue equal to 0.942 but we chose to keep it because dimensions were theoretically very significant. Cronbach's alpha was equal to 0.895 which is satisfactory. The findings of Study 2 also demonstrated reliability and structure of each dimension of RPV. Average variance extracted exceeded .50 and each dimension met desired criterion Cronbach's alpha level and D. G's rho of .70, except for

utilitarian biospheric PRV (0.69). Discriminant validity is also verified: AVEs are greater than square correlations (Fornell and Larcker, 1981). Finally, the average of the communalities, an indicator of the quality of the overall measurement model, is 0.759.

This research work is a response to Parasuraman and Grewal (2000)'s call to develop instruments for measuring PRV. Its' aims were to identify the dimensionality of RPV in the context of food products such as fruit and vegetables, to suggest a scale for measuring this concept, and to determine whether the nature and dimensionality of existing scales could be enriched or challenged in this case. After a literature review, an exploratory qualitative study and two quantitative data collections, we built a reliable and valid measurement scale proposing 13 items allocated into 4 dimensions (Appendix 4) : (1) symbolic RPV, which evokes for the consumer a residual value linked to labor, savoir-faire and temporal, economic and physical resources mobilized to create this food product, (2) hedonic RPV that illustrates the sensory aspects that persist in a damaged fruit or vegetable, as well as the residual pleasure derived from this food at the end of its life, (3) individual utilitarian RPV, a component illustrating individual residual benefits linked to health, nutrition or product remaining usefulness for a future recipe or dish and (4) biospheric utilitarian RPV, a new dimension that evokes the residual utility of fruit or vegetables not for ourselves but for natural species, such as animals or the land, which means that there is still a residual value in a fruit or vegetable but would rather go back to the biosphere via composting or nourishing animals.

In general, at the dimensional level, we note that contrary to theoretical expectations and previous work (Kreziak and al., 2015; Lebossé and al., 2022), items relating to the financial aspect of residual value disappear from the measure (loading and communality < 0.5). This result could be explained by the fact that the monetary residual value of damaged fruits and vegetables cycle would not exist or be enough, and that this component would fade in front of symbolic or hedonic dimensions that are probably more important to consumers. We might also note that the RPV structure in the case of food products and the nature of its dimensions are slightly different from the RVP of a technological product. This means that residual value is a concept specific to the product studied. In fact, the biospheric utilitarian RPV is a new dimension specific to food products and did not appear in the work of Kréziak and al. (2015).

4.Implications and future avenues

From a theoretical point of view, this research could enrich two areas of marketing research: products' end-of-life and perceived value. Firstly, it provides a better understanding of what the end-of-life of a food product means to consumers, and demonstrates that this phase is not value-free as Evans (2012) stated. It also underlines that this phase is not the last point of a linear

chain, but rather a continuation of a circular chain of rediscovering the product's remaining value, which was only discovered in the context of household objects (Türe, 2014). Moreover, while the theory of perceived value has long been mobilized, a measuring instrument of product's value at the end of its life cycle was lacking. We have therefore proposed a measurement scale suitable for food products (F&V). From a managerial point of view, this work could provide both public and agri-food actors with a clearer basis for guiding their communications to reduce food waste. One recommendation would be to focus on the symbolic and biospheric aspects of F&V, rather than to exclusively focus on the utilitarian benefits of a damaged fruit or vegetable. This research also has some limitations, which open up new avenues for further research. Firstly, during data collection, we presented a fruit or vegetable at the end of its life as a damaged product. However, this denomination can be subjective and even interpreted differently by consumers. It would be interesting to refine analysis by testing this scale according to the different levels of F&V damage or spoilage. Secondly, nomological validity should be achieved by integrating RPV into a model with other variables (e.g. anti-waste behaviors). Finally, to reinforce the validity of this scale, it would be useful to adapt and test it on other food categories (meat, for example).

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Appendix

Appendix 1: Socio-demographic breakdown of Samples

Indicators		**Frequency (%)**	
		Study 1	**Study 2**
Sex	Other	0,2	0.2
	Woman	52,5	53.5
	Man	47,3	46.3
Age	18-24 years old	6,7	6.5
	25-34 years old	17,1	14
	35-44 years old	16,4	21.1
	45-55 years old	20,7	18.2
	55-64 years old	16,7	16.9
	65 years old and over	22,4	23.2
Education level	Baccalaureate	24,9	20.2
	2 or 3 years after baccalaureate	37,6	40.5
	Master degree or over	14,4	15
	Professional diploma (CAP, BEP)	17,1	18.1
	No diploma, BEPC, « Brevet des collèges », DNB	6	6.2
Socio-professional category	Farmers	0,5	0.2
	Craftsmen, tradesmen or entrepreneurs	5	4.9
	Executive, higher intellectual or liberal professions	21,6	24.1
	Employees or manual workers	47,4	43.6
	Technicians, supervisors and other intermediate professions	25,9	27.2
Location	Northeast	20,7	19.8
	Northwest	19,3	20.4
	Paris region	21,8	20.6
	Southeast	21,8	22.6
	Southwest	16,4	16.7

Appendix 2: Statistics after PCA (Promax rotation)

	Symbolic RPV	Hedonic RPV	Individual utilitarian RPV	Biospheric utilitarian RPV
Symb_resid1	0,927			
Symb_resid2	0,941			
Symb_resid3	0,962			
Symb_resid4	0,827			
Hedo_resid1		0,816		
Hedo_resid3		0,845		
Hedo_resid4		0,956		
hedo_resid5		0,910		
Util_resid1			0,878	
Util_resid7			0.912	
Util_resid3			0.845	
Utill_resid4				0,865
Util_resid5				0,868
Eingenvalue	6.1	1.9	1.4	0.9
Variance (%)	47.6%	62.2%	73.7%	81%
KMO	0.887			
Cronbach's alpha	0.895			

Appendix 3: Statistics after CFA (PLS-PM)

	Symbolic RPV	Hedonic RPV	Individual utilitarian RPV	Biospheric utilitarian RPV
Symb_resid1	0.865			
Symb_resid2	0.872			
Symb_resid3	0.886			
Symb_resid4	0.830			
Hedo_resid1		0.896		
Hedo_resid3		0.919		
Hedo_resid4		0.874		
Hedo_resid5		0.863		
Util_resid1			0.867	
Util_resid7			0.903	
Util_resid3			0.792	
Utill_resid4				0.883
Util_resid5				0.868
Cronbach's alpha	0.89	0.91	0.82	0.69
D.G's rho	0.92	0.94	0.89	0.87
AVE	0.745	0.789	0.731	0.767
Discriminant validity	Checked	Checked	Checked	Checked

Appendix 4: Final list of items

Dimension	Item	Content
Symbolic RPV	Symb_resid1	A fruit or vegetable, even damaged, reflects the work of farmers
	Symb_resid2	A fruit or vegetable, even damaged, tells a story of the land where it grew.
	Symb_resid3	A fruit or vegetable, even damaged, reflects the numerous resources used upstream (water, fertilizers, soil, time, etc.).
	Symb_resid4	A fruit or vegetable, even damaged, is food deserving of respect and appreciation.
Hedonic RPV	Hedo_resid1	A fruit or vegetable, even damaged, can still bring you pleasure
	Hedo_resid3	A fruit or vegetable, even damaged, still tastes good to you.
	Hedo_resid4	A fruit or vegetable, even damaged, still maintains a texture that you enjoy (soft, crunchy, juicy).
	Hedo_resid5	A fruit or vegetable, even damaged, still emits a pleasant scent for you.
Individual utilitarian RPV	Util_resid1	A fruit or vegetable, even damaged, still provides nutritional benefits.
	Util_resid7	A fruit or vegetable, even damaged, is still beneficial for your health.
	Util_resid3	A fruit or vegetable, even damaged, is still useful for preparing a recipe (smoothie, pastry, soup, compote, dish).
Biospheric utilitarian RPV	Utill_resid4	A fruit or vegetable, even damaged, serves as food for animals.
	Util_resid5	A fruit or vegetable, even damaged, can be used to nourish your compost or enrich your soil.