Measuring Product Commoditization: Scale Development

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Commoditization refers to the process by which a product or service becomes standardized and interchangeable with similar products or services on the market, resulting in a reduction of its perceived value and a focus on price competition. The extant literature lacks a validated scale to assess product commoditization from a consumer perspective. The current research conceptualizes the construct of product commoditization and develops a self-assessment scale that evaluates commoditization as expressed by the four dimensions of brand importance, ease of switching, price sensitivity, and product homogeneity. Four studies using multiple methods confirm the reliability and validity of the product-commoditization construct.

1. Introduction

1.1. Commodities and commoditization

Historically (during the 1940s) and from the perspective of suppliers, commodities and raw materials were synonymous, identifying undifferentiated goods, for instance wheat in agricultural economics. By processing such goods, manufacturers add value (by creating attributes) which makes their products (e.g., bread) different from those of their competitors. Then marketing gained attention during the second half of the twentieth century, pointing to the importance of also considering the demand side. For the topic under consideration this implies that consumers may perceive products as (almost) interchangeable even if they possess (objectively) different attributes. Referring to the concept of the product life-cycle, Lurie and Kohli (2002) argue that products might convert into (or achieve the status of) commodities over the course of time. This is why *commoditization* is defined as a process by which a (tangible or intangible) product achieves the status of a commodity (Enke et al. 2022) and is thus perceived as interchangeable with other products by the vast majority of consumers despite the former having objectively different characteristics. This results in a reduction of the product's perceived value and a focus on price competition. Given the increasing speed from launch of a product to its maturity, commoditization has become even more important recently.

Commoditization can occur in any industry; however, it is particularly common in industries with high levels of competition, low barriers to entry, or where technological advances make it easier to replicate or produce simi-

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lar products. Many services (e.g., hairdressing, the fast food business) might be examples of the former, appliances, consumer electronics, bicycles of the latter. More specifically, we will look at TV sets: after the launch of TV sets (in the 1960s), only specially branded stores offered these products, producers dominated retailers in terms of market power, and buyers clearly differentiated between brands. Nowadays, customers visit consumer electronic stores (or their internet platforms) to find a huge variety of different TV sets on the shelves and the majority of buyers follow very simple decision processes based on a few attributes, that is, TV sets are perceived almost as commodities. A more modern product category showing similar patterns of commoditization is smartphones.

Frequently purchased consumer goods also run the risk of being converted into commodities. The flavor of groceries within a certain (sub-)category (e.g., for beer or chocolate) converges when evaluated in terms of blind-taste tests, but marketeers try to differentiate between them in terms of branding activities. We draw attention to the fact that commoditization is a multifaced phenomenon. While price competition is regarded as a characteristic feature, the degree of product homogeneity might vary (e.g., no taste difference for beer but some different attributes for TV sets), ease of switching might be different (e.g., durables vs. frequently purchased consumer goods), and the importance of branding might depend on the share of loyal buyers (e.g., fans of the brand in the case of beer).

D'Aveni (2010) coined the term *commodity trap* and emphasized that as product categories mature, suppliers become more susceptible to the forces of commoditization. By looking at trends in prices, customer benefits, and the intensity of competition he identified three types of commodity traps (deterioration, proliferation, and escalation). Furthermore, he gave advice on how to escape from these traps. In a similar vein, Quelch (2007) appealed to managers to take responsibility for avoiding the commodity trap by being innovative and using their imagination so that their products stay distinguishable. An up-to-date example of how to successfully escape from the commodity trap is the fashion-doll Barbie. Mattel launched Barbie in 1959 and established it as a highly successful toy over five decades; from 2014 onwards, sales of Barbie declined sharply and Barbie lost its unique selling proposition; but in 2023, with the release of the film *Barbie*, the situation changed fundamentally, and sales are increasing rapidly.

Commoditization's negative consequence for companies might imply positive consequences for customers. In fact, neoclassical economic theory (Rothschild 1987) argues that fully informed consumers maximizing their utility might benefit from commoditization since perfect competition usually leads to lower prices. Such a viewpoint, however, falls short when considering the diversity of what economists call utility. Dickson and Ginter

(1987) offer a contrast from the perspective of marketing by arguing that consumers base their decisions only on partial information and that utility is also determined by attributes other than price. This paper adopts such a consumer perspective and considers purchasing decisions for (near) commodities for which perceptual differences of attributes decrease but still exist, reflecting a situation which prevails for many categories of products in industrialized economies.

1.2. Research agenda

D'Aveni (2010) and Quelch (2007) address the commodity trap essentially from a management point of view and recommend managers carefully observe indicators like increasing customer price sensitivity, decreasing interbrand differentiation, intensity of competition and dynamic progression. Reimann et al. (2010) pursue a similar perspective and are the first to propose a scale for assessing an industry's level of commoditization which includes the supply side.

In contrast to Reimann et al. (2010), this paper focuses on the consumers' perspective, confining itself to products (rather than services). Product commoditization is conceptualized as a hierarchical, four-dimensional reflective construct composed of brand importance, ease of switching, price sensitivity, and product homogeneity. Using these, we conceptualize, define, and validate a self-assessment scale for measuring product commoditization. By conducting four different empirical studies and following the prevailing guidelines for scale construction we end up with 13 items suitable for empirical research. To the best of the authors' knowledge, a scale for product commoditization from a consumer perspective does not yet exist.

The remainder of this paper is structured as follows: the next section provides a brief literature review and in particular, conceptualizes product commoditization as a four-dimensional construct. Section 3 reports on the four empirical studies and section 4 concludes.

2. Literature Review and Conceptualization

A detailed bibliometric review from the Web of Science based on appropriate keywords for the time range 1989–2021 identified 530 hits (e.g., Sepúlveda Simon 2022, for details). Papers pertaining to finance were not considered further. Focusing on business, research activities mainly address five areas (the percentage of papers addressing the area are shown in parentheses): strategies (47 %), price (25 %), brand (12 %), market/consumer behavior (10 %), and product (3 %). The dominance of papers about strategies and price highlights the fact that many scholars have investigated the effects of commoditization from a supply-side perspective and how to avoid intense price competition or even price wars. At the same time, the demand side, in particular how customers react

to products losing their differentiation potential, has received limited attention so far.

Articles addressing *strategies* are concerned with drivers of commoditization and how to reduce its negative consequences. Whereas high levels of competitive intensity represent a major driver of commoditization (Homburg et al. 2009), there are many others: external investors and globalization (as identified by Büyükşahin and Robe 2014; Chen and Xiong 2014; Mensi et al. 2013); rapid technological developments (Dumlumpinar 2006) and, consequently, shorter times to market (Olson and Sharma 2008); reduced market regulations, shorter product and industry life cycles, the maturity of the products offered (Homburg et al. 2009; Weil 1996); and, the ease as well as extent of the exchange of information by e-commerce platforms (Huang et al. 2021).

Schallmo et al. (2018) categorize potential strategies against commoditization and whether they are trying to escape from or accept the commodity trap. The former would result in efforts to increase product differentiation through customer branding (McQuiston 2004; Pennington and Ball 2009; Stanton and Herbst 2005), product individualization (Minculescu et al. 2022), offering ancillary services (Reinartz and Ulaga 2008), or increasing performance through innovation. The latter would rely on more traditional measures like cost and price reduction, and mass production (Schallmo et al. 2018). Notably, the prevailing research in this area is predominantly theoretical, and only a very limited amount of empirical work could be identified applying, at most, unidimensional commoditization metrics. We discuss one notable exception (Reimann et al. 2010) in detail at the end of this section.

Given our demand-side perspective, we therefore focus on the other four areas of commoditization identified through the bibliometric review. Building upon the work of Homburg et al. (2009), Luther and Enke (2020), and Reimann et al. (2010), the behavioral consequences of these characteristics constitute the pillars of our conceptual model of *product* commoditization (*Fig. 1*; the "→" indicates these pillars at the beginning of each of the next four paragraphs).

2.1. Brand → brand importance

In the context of this research, the literature has a consistent emphasis on how commoditization causes buyers to perceive all the alternatives evoked in a product class similarly and, therefore, are unable to distinguish between brands. For this reason, brands might be perceived as being homogeneous and interchangeable (Wu et al. 2020). Please note that branding represents a key marketing concept enabling, for example, essential communication activities, the promotion of unique selling propositions, and the creation of crucial benefits (Makadok and Ross 2013) regarding the quality and reliability of a product (Keller and Brexendorf 2019), thus establishing loyalty and the willingness to pay a price premium in return. As noted above, brand names might be important for some buyers even if the product is perceived as being very similar to competitors' products (e.g., the taste of beer might not be distinguishable but the brand name still matters). For this reason, *brand importance* is defined as one dimension of product commoditization and it is expected that increasing product commoditization results in decreasing brand importance (*Fig. 1*).

2.2. Market/consumer behavior → ease of switching

From the supply side, studies concentrate on commodity markets and their degrees of commoditization, companies' options for surviving in commodity markets, the degree of regulation, technological dynamics, and competitive intensity (Homburg et al. 2009). From the demand side, papers address issues such as customers' (lack of) involvement, (rather low) aspiration/quality expectation levels, (high) product category familiarity, (modest) image perceptions, (low) loyalty to the brand, and (high) ease of switching to other brands. Given the low level of differentiation between brands, buyers easily switch between suppliers (Burnham et al. 2003). Because of these patterns and concentrating on the consumer perspective, we define the second dimension of product commoditization as the *ease of switching*, with increased commoditization resulting in increased ease of switching (*Fig. 1*).
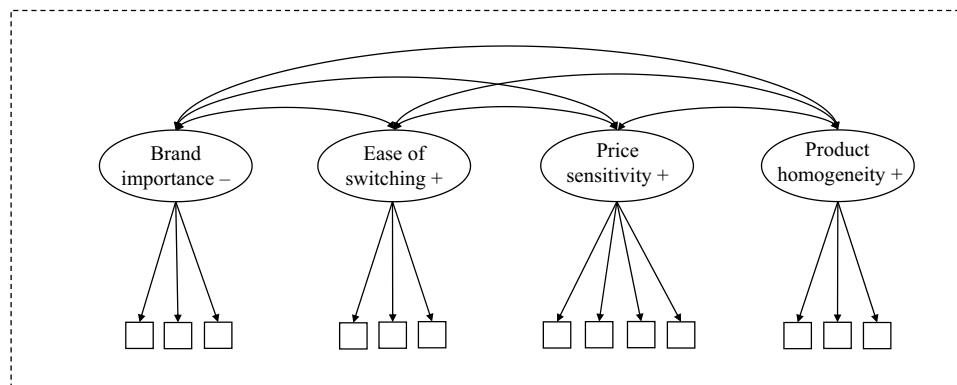

Fig. 1: Conceptual model of product commoditization

2.3. Price → price sensitivity

Studies of price typically analyze the effects on demand for commodities and competitive relationships between homogeneous products. Price sensitivity turns out to be a major driver in this respect (Baye and Morgan 2001). Since customers perceive the quality, performance, and characteristics of commodities as being very similar, they mainly focus on price (Ainslie and Rossi 1998; D'Aveni et al. 2010). This results in price competition which is known to be detrimental to companies. According to this stream of the literature, therefore, *price sensitivity* is defined as another dimension of product commoditization, with increased commoditization manifesting in increased price sensitivity (*Fig. 1*).

2.4. Product → product homogeneity

In terms of product, the literature discusses a product's age (in terms of its life cycle), globalization, product complexity, and product uncertainty as all being features impacting on product homogeneity. These triggers might diminish perceived differences between product attributes, particularly quality, uniqueness, or added value (Narver and Slater 1990). Thus, the degree of product homogeneity and lack of product differentiation increases with commoditization (Homburg et al. 2009; Luther and Enke 2020). Hence, perceived *product homogeneity* is defined as the last dimension of product commoditization, with increased commoditization resulting in increased product homogeneity (*Fig. 1*).

2.5. Demarcation from supply side perspective

During the literature review we identified only one scale which also considers commoditization a multifaced construct: the *industry* commoditization scale proposed by Reimann et al. (2010). This scale was validated by surveying key informants from business units identified through a commercial data base. Reimann et al. (2010) developed this scale with the intention of providing a means to help managers to assess their industry's level of commoditization and its resulting impact on the effectiveness of marketing strategies. The scale includes the dimensions of industry stability, switching cost, price sensitivity, and product homogeneity. Thus, we find correspondence with three of the dimensions (concerning price, product, and switching) but divergence with the fourth dimension (industry stability vs brand importance) which mirrors the different perspectives of the studies, that is, supply vs. demand. At the lower level both scales assume a reflective relationship between the dimensions and the items. Of course, the items are different because the target respondents are different (managers vs customers). Another difference is the fact that Reimann et al. (2010) assume a formative second-order construct. By building a global composite of the four dimensions they thus aggregate commoditization into a single measure. In fact, their paper ends up dichotomizing commoditization by distinguishing only between low and high levels of commoditization. On the contrary, our scale is defined as a hierarchical model aimed at describing product commoditization in its entirety by analyzing the effects of all four dimensions separately.

3. Scale Development

As detailed above we therefore propose to view product commoditization as a four-dimensional, hierarchical, reflective construct. Scale development was carried out by following prevailing guidelines (Churchill 1979; DeVellis and Thorpe 2022; Homburg and Giering 1996; Homburg et al. 2015; Netemeyer et al. 2003; Teeluckdharry et al. 2021 for general guidelines; and Thomson et al. 2005 to help distinguish between different types of hierarchical conceptualizations of latent constructs). Five rounds of data collection feed into the four studies which test the four-dimensional conceptualization of the product-commoditization construct. *Tab. 1* summarizes each step of the process, which entailed two exploratory rounds of data collection for item generation (Study 1), the scale-purification and item-refinement stage (Study 2), scale replication 1 combined with the assessment of discriminant validity and the establishment of metric invariance (Study 3), and scale replication 2 and the assessment of predictive validity (Study 4).

Tab. 2 summarizes the sample characteristics of the studies. When applying statistical rigor, the river sampling procedure used raises concerns because participants might be subject to self-selection bias and increased interest in the content of the questionnaire. As a consequence, river sampling does not generate representative samples (for the German population in our case). Of course, we share these concerns and concede the sampling procedure as a potential limitation of our studies. At the same time, we mitigate these concerns using the following reasoning: (i) Being strictly representative is not required because no immediate decisions will be made based on our findings (BVM, 2020); (ii) no incentives were offered for participation which reduces the risk of respondents taking part because of compensation (i.e., to satisfice); (iii) issues of commoditization do not require special knowledge and interest in retailing might even be beneficial; (iv) in terms of demographics (*Tab. 2*) respondents are somewhat younger, better educated, and show a larger share of students than the German population; this is a consequence of the fact that the questionnaire was distributed through a link using the Questback (2023) Unipark platform; students might be more receptive to pricing but the product categories considered (smartphones and chocolate) appeal to a general target audience; and (v) data collection was conducted during the recent pandemic and, therefore, only online data collection methods were feasible.

3.1. Development of the item pool – Study 1

After the delimitation and definition of the construct and its dimensions, we generated the appropriate items

Scale development stage	Study design	Analysis
(1) Development of initial item pool – Study 1	Exploratory Literature research Face-to-face interviews	Content analysis Face validity Content validity
(2) Scale purification and item refinement – Study 2	Descriptive online survey	Item-to-total correlation Exploratory factor analysis Reliability Confirmatory factor analysis Dimensionality assessment Factor loadings Construct reliability Average variance extracted
(3) Scale replication 1, discriminant validity, metric invariance – Study 3	Descriptive online survey	Confirmatory factor analysis Factor loadings Construct reliability Average variance extracted Structural equation model Multi-group analysis
(4) Scale replication 2, predictive validity – Study 4	Descriptive online survey	Confirmatory factor analysis Factor loadings Construct reliability Average variance extracted Structural equation model

Tab. 1: Scale development procedure

		Study 1	Study 2	Study 3	Study 4
Sample size		$n_1 = 21$ $n_2 = 10$	$n = 86$	$n = 96$	$n = 111$
Sampling procedure Sampling population: Germany		Convenience sampling	River sampling	River sampling	River sampling
Gender	Female		61%	55%	58%
	Male		37%	42%	39%
	Other		2%	3%	3%
Age	Range (years)		[17; 75]	[17; 79]	[15; 64]
	Median (years)		27	27	25
Education	University		51%	46%	55%
	High school		21%	23%	27%
	Apprenticeship		20%	21%	14%
	Compulsory schooling		8%	10%	4%
Occupation	Education		7%	9%	6%
	Student		34%	34%	46%
	Employed		55%	47%	46%
	Unemployed or retired		4%	10%	2%

Tab. 2: Sample characteristics

(Homburg et al. 2015). At the beginning of this process, 21 respondents were exposed to the definitions of the four dimensions of product commoditization. They were asked to develop questions to measure these dimensions, keeping products with different types of involvement in mind. We chose smartphones to represent high-involvement goods on the one hand, and chocolate on the other to represent low-involvement goods. In terms of brand importance, consumers predominantly referred to preferred and familiar brands. In terms of ease of switching,

consumers pointed to the speed and ease of switching to another brand. Price sensitivity manifested in the search for the best price. Four elements reflected product homogeneity: interchangeability, standardization of appearance, performance, and quality of the product. Altogether, this process resulted in an initial set of 51 items, securing sampling validity.

In a second step, 10 consumers with marketing expertise evaluated these 51 items and assessed whether they cor-

Item	Study 2				Study 3			Study 4		
	Mean	*SD*	EFA	CFA	*Mean*	*SD*	CFA	*Mean*	*SD*	CFA
Brand importance										
BI-1	3.74	1.30	0.92	0.87	2.31	1.25	0.76	3.86	1.01	0.80
BI-2	3.01	1.39	0.80	0.93	2.46	1.34	0.74	3.05	1.04	0.78
BI-3	3.19	1.36	0.79	0.89	2.92	1.30	0.77	3.23	1.25	0.83
Ease of switching										
ES-1	3.12	1.27	0.80	0.85	3.96	0.96	0.62	3.61	1.11	0.82
ES-2	2.97	1.34	0.80	0.89	3.80	1.15	0.71	3.28	1.21	0.90
ES-3	3.01	1.23	0.93	0.80	4.06	0.98	0.81	3.29	1.10	0.78
Price sensitivity										
PS-1	2.23	1.07	0.87	0.57	2.16	1.11	0.62	2.81	1.06	0.47
PS-2	2.80	0.99	0.75	0.82	2.42	1.06	0.89	2.91	0.95	0.75
PS-3	3.37	1.15	0.67	0.87	2.73	1.19	0.85	3.64	0.98	0.78
PS-4	2.57	1.06	0.72	0.70	2.36	1.10	0.72	2.65	0.88	0.65
Product homogeneity										
PH-1	1.99	0.96	0.73	0.86	1.65	0.87	0.76	1.89	0.77	0.87
PH-2	1.83	0.75	0.84	0.68	1.63	1.01	0.56	2.05	0.83	0.74
PH-3	2.65	1.01	0.86	0.69	2.17	0.98	0.76	2.58	1.02	0.68
Correlations between factors										
Brand importance ↔ Ease of switching				**0.71**			**0.35**			**0.72**
Brand importance ↔ Price sensitivity				**0.69**			0.23			**0.49**
Brand importance ↔ Product homogeneity				**0.46**			0.18			**0.33**
Ease of switching ↔ Price sensitivity				**0.50**			0.16			**0.42**
Ease of switching ↔ Product homogeneity				0.22			-0.11			**0.29**
Price sensitivity ↔ Product homogeneity				**0.35**			**0.44**			**0.39**

Notes: Five-point Likert-type response categories for all items (increasing values correspond to increasing agreement). SD = standard deviation; EFA = exploratory factor analysis, factor loadings of pattern matrix (oblique rotation) are shown; CFA = confirmatory factor analysis, standardized factor loadings are shown in the upper part of the Table, all factor loadings are significant for a type I error of 0.01 (recommended threshold: loadings > 0.4; Hair et al. 2006); lower part of the Table presents correlations between factors; correlations significantly different from 0 for a type I error of 0.05 are shown in bold.

Tab. 3: Scale items, and factor loadings of factor analyses of the product commoditization scale

respond to the definition of the individual dimensions of product commoditization and whether their verbalization was appropriate, and so safeguarding face validity.

3.2. Scale purification and item refinement – Study 2

3.2.1. Study design

The purification stage of the scale-development procedure worked to reduce the initial pool of items by eliminating items with poor reliability statistics and keeping practicality of data collection at later stages in mind. The data for this study came from a self-administered questionnaire (consisting of 51 items with smartphones as a reference product category and demographic variables; *n* = 86, see *Tab. 2* for sample characteristics). As a protection against satisficing, some items were reversed (later, these items were transformed before the analysis of the data) and the sequence of items was shuffled. Columns 2 and 3 (*Mean*, *SD*) of *Tab. 3* show the descriptive statistics.

3.2.2. Exploratory factor analysis

An exploratory factor analysis (EFA, principal axis factoring, oblique rotation [1]) tested the proposed four-dimensional structure of the product commoditization construct. The Kaiser-Meyer-Olkin (KMO) measure

confirmed the sampling adequacy of the analysis (KMO = 0.85). Bartlett's test of sphericity ($\chi^2_{(df=1275)}$ = 3680.50, $p < 0.01$) indicated that the correlations were sufficiently large for factor analysis. The scree plot justified a four-factor solution, which provided initial statistical evidence for the four-dimensional structure of the construct. A series of EFAs eliminated items with small factor loadings (i.e., for reasons of parsimony, we applied a rather strict criterion during the last step and eliminated items with factor loadings smaller than 0.6). Finally, thirteen items loaded on four factors (see *Tab. 4* for the wording of the items) and accounted for 79 % of the variance in the items (see column 4, EFA, of *Tab. 3* shows the factor loadings of the pattern matrix).

A further check related to the psychometric properties of the four subscales. Item-to-total correlations (totals built upon the average of all of the 51 original items corresponding to the relevant dimensions of the construct) were above 0.86 for brand importance, 0.73 for ease of switching, 0.57 for price sensitivity, and 0.69 for product homogeneity. Cronbach's alpha values (column 2, α, upper panel of *Tab. 6*) exceed the recommended threshold of 0.70.

3.2.3. Confirmatory factor analysis

A confirmatory factor analysis (CFA) tested the 13-item, four-factor model. The factor loadings were all substan-

Dimension (variables are shown below each dimension)
Brand importance (reversed before analysis)
BI-1: I have a preferred xxx brand.
BI-2: When buying xxx, the brand is crucial.
BI-3: There is one xxx brand I identify with particularly strongly.
Ease of switching
ES-1: Switching to another xxx brand is intricate (reversed).
ES-2: Switching to another xxx brand is easy.
ES-3: Switching to another xxx brand is realized quickly.
Price sensitivity
PS-1: I only buy xxx if it is on sale.
PS-2: When buying xxx, I decide based on price.
PS-3: The price of xxx strongly influences my purchasing decision.
PS-4: If the price of my favorite xxx increases, I switch to a cheaper xxx.
Product homogeneity
PH-1: For me, all xxx are the same.
PH-2: For me, xxx differ in their quality (reversed).
PH-3: There are hardly any significant differences between the different xxx.

Study	$\hat{\chi}^2$	*df*	$\hat{\chi}^2$/*df*	*RMSEA*	*SRMS*	$\Delta\chi^2$	Row no.
Study 2 (smartphone)							
CFA	87.66	59	1.49	0.08	0.07	200.80 [1]	1
SEM (word-of-mouth)	186.81	142	1.32	0.08	0.10		2
Study 3 (chocolate)							
CFA	90.10	59	1.53	0.07	0.10	204.63 [1]	3
SEM (word-of-mouth)	185.55	142	1.31	0.08	0.10		4
CFA unconstrained [3]	177.77	118	1.51	0.05	0.07		5
CFA constrained [3]	197.22	131	1.51	0.05	0.08	19.45 [2]	6
Study 4 (smartphone)							
CFA	91.66	59	1.55	0.07	0.07	219.86 [1]	7
SEM (being prone to similarity confusion)	151.90	94	1.62	0.07	0.07		8

(1) $\Delta\chi^2_{(df=6)}$ – chi-square difference test against a model with a single factor of product commoditization only; the critical value of the chi-square distribution for a type I error of 0.05 and *df* =6 is 12.59.

(2) $\Delta\chi^2_{(df=13)}$ – chi-square difference test between $\hat{\chi}^2_{\text{constrained}}$ and $\hat{\chi}^2_{\text{unconstrained}}$; the critical value of the chi-square distribution for a type I error of 0.05 and *df* = 13 is 22.36.

(3) Factor loadings for smartphones, and chocolate are (not) constrained to be identical.

Tab. 5: Overview of model fit statistics for Studies 2–4

tial and significant (upper part of column 5, CFA, *Tab. 3*). The product commoditization measurement model yielded a highly satisfactory fit, in that the fit indices all exceeded their recommended threshold levels (row 1, CFA, *Tab. 5*). The chi-square difference test between the proposed model and a one-factor solution supported the four-dimensional model ($\Delta\chi^2_{(df=6)}$ = 200.80, $p < 0.01$). This result is in accordance with the fact that the estimated correlations between factors (lower part of column 5, CFA, *Tab. 3*) are significant but moderate [2], corroborating the multidimensionality of product commoditization. The construct reliability (*CR*) and average variance extracted (*AVE*) for each dimension (see the upper panel of *Tab. 6*) exceed the recommended thresholds. Fornell and Larcker's (1981) criterion (the *AVE* exceeds the squared correlations for all four dimensions) provided a first indication of discriminant validity.

3.3. Scale replication 1 – Study 3

3.3.1. Study design

The data collection of Study 3 had the overall objective of confirming the psychometric properties and latent structure of the product commoditization scale which was developed. Data collection proceeded as in Study 2 but this time with chocolate as the reference product category. The final sample consisted of 96 respondents (see *Tab. 2* for the sample characteristics).

3.3.2. Confirmatory factor analysis

Again, the factor loadings were all substantial and significant (upper part of column 8, CFA, *Tab. 3*). The product commoditization measurement model yielded a highly satisfactory fit, in that the fit indices (with exception of *SRMS*) exceeded their recommended threshold levels

Latent variable	α	CR	AVE	Max^2
Study 2 (smartphone)				
Brand importance	0.93	0.93	0.81	0.50
Ease of switching	0.89	0.89	0.72	0.50
Price sensitivity	0.83	0.83	0.56	0.48
Product homogeneity	0.79	0.79	0.56	0.21
Word-of-mouth	0.92	0.92	0.67	
Study 3 (chocolate)				
Brand importance	0.80	0.80	0.58	0.12
Ease of switching	0.75	0.76	0.52	0.12
Price sensitivity	0.85	0.86	0.60	0.19
Product homogeneity	0.73	0.74	0.49	0.19
Word-of-mouth	0.92	0.92	0.66	
Study 4 (smartphone)				
Brand importance	0.84	0.84	0.64	0.51
Ease of switching	0.87	0.87	0.70	0.51
Price sensitivity	0.75	0.76	0.45	0.24
Product homogeneity	0.80	0.81	0.59	0.15
Being prone to similarity confusion	0.76	0.77	0.52	

Notes:
α = Cronbach alpha reliability (recommended threshold: $\alpha > 0.7$; Homburg and Giering 1996);
CR = Construct reliability (recommended threshold: *CR* > 0.6; Homburg and Giering 1996);
AVE = average variance explained (recommended threshold: *AVE* > 0.5; Homburg and Giering 1996);
Max^2 = maximum of squared inter-items correlations (according to Fornell and Larcker 1981, Max^2 should be smaller than *AVE* for discriminant validity).

Tab. 6: Psychometric properties of latent variables

(see row 3, CFA, *Tab. 5*). The reliability analysis of the subscales exceeded (with only one exception) the thresholds required for Cronbach's α, *CR*, and *AVE* values (see panel 2 of *Tab. 6*). Fornell and Larcker's (1981) procedure evaluated discriminant validity. In addition, a chi-square difference test examining the one-factor solution against the four-factor solution yielded a significantly worse result ($\Delta\chi^2_{(df=6)}$ = 204.63, *p*<0.01) for the former model. Estimated correlations between factors (see lower part of column 8, CFA, *Tab. 3*) are small, mostly not significantly different from zero. The outcome suggested that the product commoditization scale met the standards for validation.

3.3.3. Discriminant validity

In addition to the Fornell and Larcker (1981) criterion we assessed discriminant validity by showing that product commoditization is not related to the construct of word-of-mouth communication, for which no sound theoretical relationship is expected. In fact, for commodity markets, word-of-mouth is expected to be an antecedent for purchase decisions rather than a consequence, but the influence might be ambiguous: If customers perceive little difference between competing products – as is the case for commodities – they may rely even more on recommendations and reviews from others (i.e., a potential positive influence of word-of-mouth). At the same time, negative word-of-mouth can have a more significant impact in commoditized markets, as consumers may switch products more easily. It is unclear, however, whether spreading word-of-mouth is influenced by purchasing commodities. This direction of causality is investigated but we concede that endogeneity might be an issue here.

To investigate discriminant validity, studies 2 and 3 also collected data on word-of-mouth communication employing the 6-item scale established by Feick and Price (1987). This scale assesses the likelihood of the spread of word-of-mouth by containing items like "I like introducing new brands and products to my friends" or "I like helping people by providing them with information about many kinds of products". *Tab. 6*, bottom row (word-of-mouth) of the upper and middle panel, presents the psychometric properties of the word-of-mouth construct which were satisfactory. A structural equation model investigated the relationship between product commoditization and word-of-mouth communication. Rows 2 and 4 (SEM (word-of-mouth)) of *Tab. 5* offer fit statistics for this model which were acceptable (*SRMS* is slightly above the recommended threshold). The non-significant path coefficients ($\hat{\beta}$) from the four dimensions of product commoditization on word-of mouth (see columns 2–5 of *Tab. 7*) corroborated discriminant validity. We emphasize that the results are similar for both studies investigating product categories with different levels of involvement (smartphone vs chocolate) which might relate to the likelihood of spreading word-of-mouth.

	Study 2[1]		Study 3[1]		Study 4[2]	
Endogenous variable	**Word-of-mouth**		**Word-of-mouth**		**Being prone to similarity confusion**	
Exogenous variables	$\hat{\beta}$	*p*	$\hat{\beta}$	*p*	$\hat{\beta}$	*p*
Brand importance	-0.30	0.31	-0.25	0.41	0.21	0.27
Ease of switching	0.23	0.39	-0.14	0.56	-0.26	0.15
Price sensitivity	0.02	0.91	0.23	0.23	0.34	0.02
Product homogeneity	-0.05	0.77	0.11	0.63	0.31	0.02

Notes: [1] Investigating discriminant validity; [2] Investigating predictive validity.

Tab. 7: Standardized path coefficients for structural equation models

3.3.4. Measurement invariance assessment

The proposed scale aims to be applicable to a general range of product categories, that is, measurement structures are equivalent for different product categories. Therefore, different products were used as stimuli in studies 2 and 3. To test for measurement invariance, our procedure is oriented towards the equivalence test of Hair et al. (2006). For this purpose, we pooled the data from studies 2 and 3 and conducted a multi-group analysis. The procedure first estimated the product-commoditization model for both products simultaneously, without any constraints on the factor loadings. The fit indices of this multi-group analysis indicated that the measurement model reproduced the covariance matrix observed accurately for smartphones and chocolate (see row 5, CFA unconstrained, *Tab. 5*). The second step fixed the factor loadings as equal across the two samples. Again, the model fits the data well (see row 6, CFA constrained, *Tab. 5*). A chi-square difference test between the model without any constraints and the model with fixed factor loadings assessed metric invariance ($\Delta\chi^2_{(df=13)}$ = 19.45, $p > 0.10$). This provides empirical evidence for the equivalence of factor loadings between the two samples and thus for measurement invariance.

3.4. Scale replication 2 – Study 4

3.4.1. Study design

The data collection of Study 4 had the overall objective of once again confirming the psychometric properties and the latent structure of the product-commoditization scale. In addition, this study aims to establish predictive validity. Data collection proceeded similarly as in studies 2 and 3 with smartphones as the reference-product category. The final sample consisted of 111 respondents (see *Tab. 2* for the sample characteristics, columns 9 and 10 (*Mean*, *SD*) of *Tab. 3* for descriptive statistics). Descriptive statistics for studies 2 and 4 should (roughly) coincide because they refer to the same product category (smartphones); in three cases we observed significant mean differences, probably due to sampling errors.

3.4.2. Confirmatory factor analysis

Column 11 (CFA, upper part) of *Tab. 3* presents the factor loadings, which were all substantial and significant. In addition, the product-commoditization-measurement model yielded a highly satisfactory fit, in that the fit indices all exceeded their recommended threshold levels (see row 7, CFA, *Tab. 5*). The reliability analysis for the subscales exceeded (with only one exception) the required thresholds for Cronbach's α, *CR*, and *AVE* values (see the lower panel of *Tab. 6*). Fornell and Larcker's (1981) procedure confirmed discriminant validity. In addition, a chi-square difference test examining the one-factor solution against the four-factor solution yielded a significantly worse result ($\Delta\chi^2_{(df=6)}$ = 219.86, $p < 0.01$) for the former model. Estimated correlations between factors (lower part of column 11, CFA, *Tab. 3*) are significant but

moderate. The results confirmed that the product-commoditization scale met the standards for scale validation.

3.4.3. Predictive validity

Predictive validity requires that scores on a given measure can predict scores of another measure which is theoretically related. In the present case we decided that being prone to similarity confusion was a "theoretically related" construct. Being prone to similarity confusion is one dimension of the more comprehensive construct of consumers being prone to confusion defined as "consumers' general tolerance for processing *similarity*, overload or ambiguity information, which negatively affects consumers' information processing and decision-making abilities" (Walsh et al. 2007, p. 699). In more detail, Walsh et al. (2007, p. 702), define being prone to similarity confusion "as consumers' propensity to think that different products in a product category are visually and functionally similar". These authors argue that consumers who are prone to similarity confusion tend to employ simple purchase heuristics (e.g., buy the lowest priced item on offer). Scholnick and Wing (1988) explain that being prone to similarity confusion occurs in decision-making situations offering many equally acceptable alternatives of which none can be easily verified as best. Commonalities with (near) commodity markets are manifest, in particular with respect to product homogeneity and price sensitivity. Walsh et al. (2007) analyze the consequences of being prone to similarity confusion but – as for discriminant validity – we investigate whether product commoditization might be an antecedent.

Study 4 also collected data on being prone to similarity confusion employing the 3-item scale validated by Walsh et al. (2007). *Tab. 6*, bottom row (Being prone to similarity confusion) of the lower panel, presents the satisfactory psychometric properties. A structural equation model investigated the relationship between product commoditization and being prone to similarity confusion. Row 8 (SEM (being prone to similarity confusion)) of *Tab. 5* offers fit statistics for this model, which were also satisfactory. Finally, the significant path coefficients ($\hat{\beta}$) for the dimensions of price sensitivity and product homogeneity on being prone to similarity confusion (see columns 6 and 7 of *Tab. 7*) established predictive validity.

4. Conclusion

4.1. Synopsis

For many markets in industrialized economies the lengths of product life cycles are decreasing and products are maturing quickly. As a consequence, an increasing number of products are converting to the status of commodities. A comprehensive literature review identified a substantial research stream dealing with commoditization from the supply side, providing advice to managers on how to recognize market signals for products becom-

ing perceived as commodities by buyers. With only one exception (Reimann et al. 2010) these signals are described qualitatively or should become apparent by inspection of simple one-dimensional measures. Moreover, based on these indications the literature suggests potential counter measures to managers.

Interestingly however, there is a substantial lack of theoretical and, especially, empirical research addressing commoditization from the demand side. Of course, the consumer perspective is equally important, complementing the industry perspective of markets in the process of commoditization. Supporting this view, the literature describes how commoditization might affect consumer behavior in multifaced ways. In particular, we identified the areas of brand importance, ease of switching, price sensitivity, and product homogeneity. Based on these, and since a respective scale has been missing so far, this research develops and validates a self-assessment scale that evaluates product commoditization. We conducted four empirical studies in different settings and tested the various types of validity by following the prevailing guidelines for scale construction (Netemeyer et al. 2003).

4.2. Contribution

First, we define product commoditization through a set of product characteristics as perceived by consumers and conceptualize this latent trait as a hierarchical four-dimensional reflective construct composed of brand importance, ease of switching, price sensitivity, and product homogeneity. Thus, we explicitly consider the four dimensions separately and investigate product commoditization in its entirety, that is, whether each of the four dimensions makes an independent contribution.

Second, the proposed scale possesses 13 items, making it easy to administer from a practical point of view. Being safeguarded for measurement invariance the scale should be applicable in different research settings (although we verified this for two product categories only).

Third, regarding managerial implications, we point to how the four-dimensional structure contrasts with prevalent unidimensional views, that is, focusing on product homogeneity (the demand side) or price competition (the supply side) only. Investigating which dimension has the strongest impact should help managers to focus their attention appropriately. In this way, we provide a more general representation and understanding of what constitutes product commoditization, and move away from one-dimensional thinking. We feel that this separation of effects is a central advantage of the proposed scale.

4.3. Limitations and further research

Our literature review showed that there is a shortage of research dealing with product commoditization from a consumer perspective. Although we based our scale on and derived the four dimensions from the extant literature, further theoretical and empirical studies might aug-

ment the breath of the construct. Technological similarity [3] (for instance, baked goods in different forms but made according to the same recipe; lenses made of glass or plastic) might be a prospective candidate for another dimension of product commoditization.

We concede that our sampling procedure is a potential limitation. In exceptional cases some recommended thresholds for scale construction have not been reached by a small margin.

As a final limitation, we note that the scope of the scale was restricted to physical products but is not suited for services. Services (delivered by humans) are inherently more diverse/heterogeneous, but with the rise of automatization and artificial intelligence, the commoditization of services is becoming an increasingly relevant issue for the future. Adapting the proposed scale to services might be an interesting avenue for further research.

Notes

[1] Statistical computations have been carried out using IBM SPSS Statistics 29, and IBM SPSS®AMOS™ 29.
[2] Correlations near ±1 would suggest lower-dimensional solutions.
[3] We gratefully acknowledge this aspect as a contribution from the Editor.

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