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Article — Published Version

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Journal of Marketing Analytics

Provided in Cooperation with:

Springer Nature

Suggested Citation: Grimm, Malek Simon; Wagner, Ralf (2022) : Challenging the linearity assumption of intra-brand image confusion, Journal of Marketing Analytics, ISSN 2050-3326, Springer Nature, Berlin, Vol. 12, Iss. 2, pp. 355-374,
<https://doi.org/10.1057/s41270-022-00202-6>

This Version is available at:

<https://hdl.handle.net/10419/306413>

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Challenging the linearity assumption of intra-brand image confusion

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Revised: 25 August 2022 / Accepted: 19 November 2022 / Published online: 5 December 2022
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Abstract

The purpose of this study is to clarify and consolidate the components and consequences of intra-brand image confusion (IBIC). In addition to validating previous research results on IBIC in a fresh context (different product category with its brands), this study challenges the linearity assumption usually underlying studies of branding impacts and IBIC. A national representative online survey was conducted in the United Kingdom investigating the smartphone market. Explorative factor analyses were conducted in order to assess the components of IBIC. Structural equation modeling reveals the extent and consequences of IBIC. Multiple regressions were conducted to further explore non-linear response at the sub-domain and higher-order construct level. The results confirm and solidify previous results on the relevance of the construct of IBIC. This study supports the relevance of intra-brand image confusion's three components. A novel contribution arises from the fact that customers with a moderate involvement level are more confused than people with lower involvement levels. A U-shaped response indicates that lower involved prospective customers are at higher risk of a confusion by too broad assortments. Brand managers are well advised to pay strong attention to the structure of an assortment and to sub-brands to prevent the occurrence of an IBIC.

Keywords Intra-brand image confusion · Brand portfolios · Assortment · Brand image · Portfolio strategy · Non-linear effect

Introduction

A well-elaborated brand image is crucial for the long-lasting success of a company, because it is key to differentiating products from direct competitors and has considerable direct influence on the overall brand equity (Sikkel 2013; Ballantyne et al. 2006; Faircloth et al. 2001). The effects of brand extensions, the brand's category fit, and the extension's effect on the authenticity of a brand's image are well researched (Salinas and Pérez 2009; Falkenreck and Wagner 2010; Spiggle et al. 2012). However, these studies widely neglect the fit and consistency within an assortment despite their relevance for understanding and theory-based explaining of consumers' brand appreciation and its direct implications for practitioners' assortment planning. While existent

literature partly extensively discusses the concepts and their effects of brand confusion (caused by physical similarities; Dugar and Moorthi 2022), consumer confusion (broader and more elaborated understanding of the brand confusion concept by including unconscious and conscious states; Mitchell et al. 2005), brand image confusion (caused by too akin brands, Weers 2008), no previously established construct quantifies a confusion that arises within a brand due to too akin sub-brands under own parent brand. The literature on brand extensions and their impact on brand image perception (of the parent brand) investigate the influence of extensions on the brand image (Salinas and Pérez 2009), deterioration of the brand image (Martínez and Pina 2003), fit, familiarity and possible brand image dilution (Arslan and Oylum 2010), extension evaluation (Dall'Olmio Riley et al. 2014), or success factors of extensions (Hem et al. 2003). These studies have a commonality among them. They all investigate single extensions. IBIC is a holistic approach that assesses either a single widening or the entire assortment with all sub-brands, i.e., the effect of single or multiple extensions. Moreover, investigating the confusion that arises due to increasing sub-brands in this regard is a novelty. Additionally, IBIC takes

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the assortment consistency into account and derives at the same time outcomes for highly buying relevant consumer aspects that either indirectly or directly have an impact on a business performance.

The concept of intra-brand image confusion provides an explanation for customer-sided confusion-causing aspects of assortment widenings and highlights the substantial negative effects for companies if such confusion arises. This confusion emerges from the perception of an assortment's ambiguity, similarity, and/or implausibility. In a pioneering study, Grimm and Wagner (2021) recently introduced the concept of intra-brand confusion and validated a measurement approach using the domain of the automotive industry. However, it remains unclear whether the concept applies as well to industries in which customers are generally less involved and whether non-linear effects are existent. Therefore, this study aims

1. to investigate the appropriateness of the concept in an industry in which customers are often less involved, and
2. to examine non-linear effects of the IBIC construct.

In order to pursue this research purpose, 500 people from the United Kingdom evaluated the assortments of the most prominent smartphone brands. The country was chosen as representants for Western people. Individuals from Western countries tend to be more individualistic, whereas people from South Asian countries tend to be more collectivistic (Aliyev et al. 2019).

The remainder of this manuscript is structured as follows: in section “Literature review”, the theoretical foundation of the construct of intra-brand image confusion is introduced and the effects of the concept are outlined. In section “Hypotheses”, the research questions are highlighted. Within section “Context, method, and data sample”, the research context, the method, and the data sampling process are explained in detail. Subsequently, the results are provided in section “Results”, and they are discussed alongside further findings in section “Hypotheses and findings”. The study closes with a discussion of the results and findings in section “Discussion and contributions”, where an additional outlook is provided.

Literature review

Intra-brand image confusion

The common assumption positing that consumers generally benefit from wider assortments is widespread in brand management. In fact, classical economic theories postulate that larger assortments should always be beneficial for consumers, because wider product ranges are more able to provide a

higher potential for a sufficient fit between consumer preferences and product attributes than narrow assortments (Wang et al. 2021; Chernev 2003). However, an assortment expansion can also be accompanied by negative effects; for example, an increased complexity of production processes or the loss of economies of scales can diminish the initial benefits of an increased product demand (Trattner et al. 2019; Bayus and Putsis 1999). Assortment widenings can, therefore, simultaneously have positive and negative effects. In this vein, Grimm and Wagner (2021) shed light on the relationship between product assortment size, consistency, and the accompanying effects on the image of a brand. Thereby, evidence proving the existence of intra-brand image confusion was reported for the automotive industry. Intra-brand image confusion arises through the sub-dimensions of ambiguity, similarity, and implausibility and is considered to be consciously perceived by customers. The thematically related concept of brand image confusion can be seen as the theoretical foundation of intra-brand image confusion (Weers 2008). While *brand image confusion* refers to confusion between independent brands, *intra-brand image confusion* describes confusion within one brand. Figure 1 illustrates the theoretical foundation of *intra-brand image confusion*, which applies as well to brand image confusion.

The sub-dimension *ambiguity* refers to incongruent information between several products (same-level comparison) or inconsistencies between a product and the image of the superordinate brand (cross-level comparison). *Ambiguity* can be described by the use of schema theory and consistency theory. Firstly, schema theory (Wagoner 2013; Bartlett 1932) assumes that information is stored within the semantic long-term memory in a hierarchically ordered schema (Gilboa and Marlatte 2017). Schemas vary in terms of strength depending on comprehensiveness, degree of differentiation, strength of consolidation, and the cognitive effort used for the evaluation of information. Schemas are constantly influenced by external environmental changes, which affect certain schemas depending on their strength (Tse et al. 2007), because weak schemas are more easily changeable than stronger ones. Second, the virtue of brand *ambiguity* can be explained by consistency theory, which refers to interdependencies between (hierarchically) conflicting stored information. An assumption of consistency theory (Prince 2020; Abelson et al. 1968) is that (prospective) customers strive to overcome or reduce perceived inconsistencies, imbalances, disharmonies, or cognitive dissonances between two objects (Kruglanski et al. 2018). It is generally assumed that individuals are reluctant against contradictory cognitions. Those inconsistencies can arise between (inter-consistency) or within (intra-consistency) stored schemas. An inter-consistency can arise if an individual has a positive attitude toward brand A and a negative attitude toward shop B. If the given individual hears that his beloved brand A will



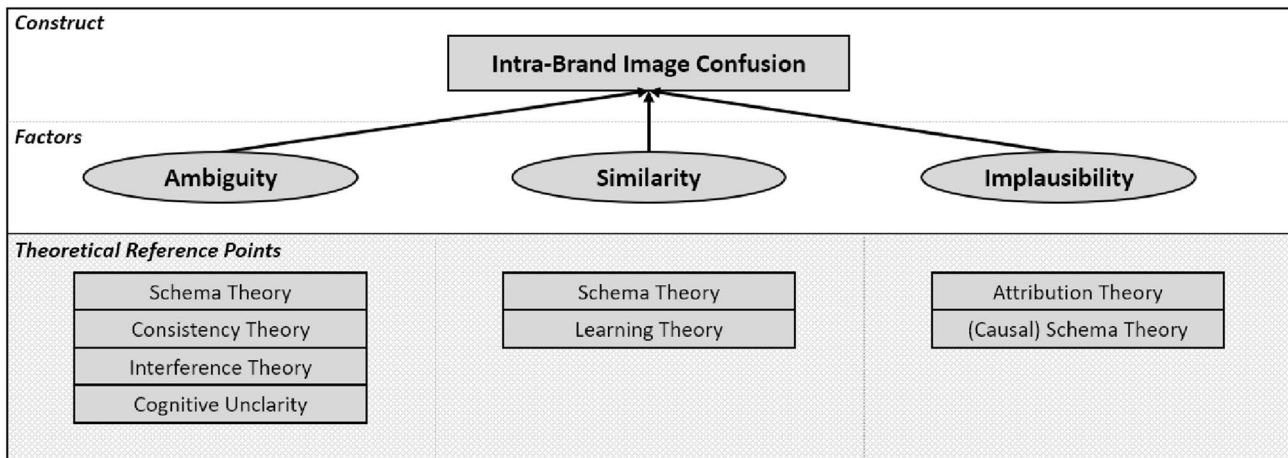


Fig. 1 Theoretical foundation of intra-brand image confusion based on the brand image confusion theory of Weers (2008)

be from now on distributed through the despised discount shop *B*, cognitive inconsistency will probably arise, as, for the individual, the two aspects are not compatible with each other. As a result, to overcome the displeasing contradiction, the individual is motivated to change his attitude, either about the brand or about the discount shop.

Interference theory (Anderson 2003; Underwood 1957; Disson Or et al. 2021) provides a complementing explanation for brand *ambiguity*; the interference theory postulates that acquired and learned information is permanently stored within the semantic part of the long-term memory (Shiffrin and Atkinson 1969). However, information can be forgotten or overlaid, and the recall of information can be interfered with by newly acquired (contradictory) information that is overlaid on previously acquired information (Underwood 1957). Lastly, brand *ambiguity* can be explained by referencing the theory of cognitive unclarity (Cox 1967), which can be described as a lack of rational cognitive comprehensibility due to the content of information, which leads to vague feelings of discomfort and, as a result, has inhibiting effects on purchase decision (Mitchell et al. 2005; Walsh and Mitchell 2010). Notably, the main concerns are not caused by quantitative aspects (internal amplitude of mental representation) but by qualitative ones. Transferred to the case of perceived brand *ambiguity*, formerly clear brand information can become unclear over time if, for example, unclear information is acquired or is overlaid on older information.

The dimension of *similarity* captures a lack of distinguishability between products under one brand umbrella. Brand *similarity* can also be explained by referring to schema theory (Bartlett 1932; Wagoner 2013) and to how knowledge is stored and arranged within the semantic part of long-term memory. Information and knowledge concepts within semantic memory are stored in a hierarchical manner, and the arrangement follows a top-down organization (Cooper and Shallice 2006). Superordinate concepts (e.g.,

furniture) possess certain attributes, whereas subordinate concepts (e.g., chair) possess more specific attributes (Schmidt et al. 1995). Therefore, the subordinate fragments also inherit or entail the attributes of their parent instance (Cooper and Shallice 2006). Stored schemas enable us to memorize, filter, and organize huge amounts of information in a fast and efficient manner. This implies that the brands of an identical product category are always to some extent seen as similar because of the inherited attributes of the relevant subordinate product category. The fundamental assumptions of stimulus-response learning theories (Guthrie 1935; Sherlin et al. 2011) provide another explanation of brand *similarity*; known conditioned stimuli provoke a certain reaction or activate certain attributes. In the case of brand *similarity*, stimuli that are highly similar to learned and already stored competing stimuli (which provoke a learned or conditioned reaction) can potentially lead to an identical reaction due to the high *similarity* of the stimuli.

The dimension of *implausibility* describes a negative process whereby consumers develop confusion concerning a brand's reliability and integrity. Attribution theory (Manusov and Spitzberg 2008; Kelley 1967) and (causal) schema theory (Kelley 1973; Schmidt et al. 1995) serve as the theoretical foundations of this dimension. Attribution theories are based on the understanding that individuals place great emphasis on ascribing (perceived) behaviors or occurrences within their environment to certain causes or causes in general (Harvey and Weary 1984; Malle 2011). The cause attribution of someone's or someone else's actions, success, or failures serves, i.e., for the estimation of future situations or the estimation of abilities (Graham 1991; Kelley and Michela 1980). Kelley (1973) extended existing attribution theories to postulate that attributions that have been observed once are checked against attributions that have been observed multiple times. The aim is to explain (or identify the causes of) behaviors if the initiating reason



is not evident or has to be derived in the condition of a lack of information. By doing so, the cause can be ascribed, whether to a certain person, entity (e.g., brand), or situation. Decisive for the attribution is consensus, consistency, and the distinctiveness of a stimulus (Zuckerman and Feldman 1984). Brands will appear as implausible if consensus, consistency, or distinctiveness has a low amplitude (Sparkman and Locander 1980), e.g., low consensus of opinion about brands, inconsistencies in commercial coherence, an identical effect through other brands, etc. The causal schema theory of Kelley (1972) tackles a problem of his attribution theory: in some circumstances, conclusions cannot be drawn or causes cannot be attributed due to missing information in consensus, consistency, or distinctiveness or an attribution is not possible or willed due to a lack of time or motivation. By doing so, it is relied on immigrations (causal schemas) how effects could have occurred (Hastie 1984).

The three dimensions have been proven to be central to the *intra-brand image confusion* concept. If such confusion arises, a brand loses central brand-related core functions, for example, orientation guidance during a purchase process, the identification function, or the trust function.

Previous empirical results quantifying intra-brand image confusion

Grimm and Wagner (2021) provide empirical evidence of *intra-brand image confusion*'s substantial effects on (1) brand sympathy, (2) brand identification, (3) customers' assessment of the assortment, (4) the tendency to delay purchases, (5) recommendation propensity quantified by net promoter score (NPS), and (6) an increased tendency to use heuristics during product evaluations.

Their results indicate that *ambiguity* especially has considerable effects on sympathy, identification, and the NPS evaluation. While the effects of *implausibility* were as hypothesized, the dimension of *similarity* shows partly unpredicted effects as. On the basis of these contradictory effects of the *similarity* dimension, a non-linear, inverted U-shaped relationship is theorized for this dimension. It is assumed that moderate *similarity* is beneficial for customers because it contributes to a certain degree to a brand's perceived cohesiveness but becomes a more negative trait if the degree of *similarity* is too low or too high. The effects have been observed in the automotive industry which represents an industry for which customers generally show a high cognitive and affective involvement (Ratchford 1987).

Weers (2008) investigated the closely related concept of brand image confusion. His results indicate that the construct, which has the same sub-dimensions as the *intra-brand image confusion* construct, also has considerable effects on (1) the information behavior of customers, (2) the focus on price, and (3) the private label preference. Even

though different effects are investigated, the topically related study underlines the significance of brand confusions.

Hypotheses

In order to prove *intra-brand image confusion* within the smartphone industry, we pursued the research questions of Grimm and Wagner (2021). By reproducing the identical methodology, the construct is validated by embedding in the same nomological network (Bagozzi 1984).

It is known that consumers tend to simplify decision-making processes by applying (purchase) heuristics if the amount of information (that needs to be processed) increases (Falkenreck and Wagner 2010; Boatwright et al. 2008; Cowan 2001). Therein, the tendency to apply heuristics is more affected by the number of alternatives than by the total amount of information (Payne 1976). Weers (2008) determined a causal relationship between the brand image confusion dimension of brand *ambiguity* and the tendency of customers to seek further brand-related information. Grimm and Wagner (2021) proved that the *ambiguity* dimension of the *intra-brand image confusion* construct has an especially considerable effect on the tendency of customers to apply heuristics during the assortment evaluation. Consequently, we hypothesize a corresponding effect.

H1: Intra-brand image confusion significantly increases the use of heuristics during the evaluation of an assortment.

H1a: An increase of ambiguity in intra-brand image confusion significantly increases the use of heuristics during the evaluation of an assortment.

H1b: An increase of similarity in intra-brand image confusion significantly increases the use of heuristics during the evaluation of an assortment.

H1c: An increase of implausibility in intra-brand image confusion significantly increases the use of heuristics during the evaluation of an assortment.

As mentioned in section "*Intra-brand image confusion*", it is assumed that *intra-brand image confusion* leads to a loss of a brand's central core functions (e.g., the orientation function, symbolic function, and trust function). Vanished or diminished core functions reduce a potential sympathy or identification with a brand, and dysfunctional brands lack in self-expression potential (Hammerl et al. 2016; Trudeau and Shobeiri 2016). On this basis, a negative effect of *intra-brand image confusion* on brand identification and brand sympathy was hypothesized and partly proven. In this context, sympathy is defined as a "person's awareness of the



feelings of another, but not absorption in the feelings themselves” (Escalas and Stern 2003), whereas brand identification is defined as “a customer's psychological state of perceiving, feeling, and valuing his or her belongingness with a brand” (Lam et al. 2010). In order to understand the relations in an extended context, we follow previous hypotheses and assume the following relationships:

H2: Intra-brand image confusion significantly decreases brand sympathy.

H2a: An increase of ambiguity in intra-brand image confusion significantly decreases brand sympathy.

H2b: An increase of similarity in intra-brand image confusion significantly decreases brand sympathy.

H2b: An increase of implausibility in intra-brand image confusion significantly decreases brand sympathy.

H3: Intra-brand image confusion significantly decreases brand identification.

H3a: An increase of ambiguity in intra-brand image confusion significantly decreases brand identification.

H3b: An increase of similarity in intra-brand image confusion significantly decreases brand identification.

H3c: An increase of implausibility in intra-brand image confusion significantly decreases brand identification.

In section “*Intra-brand image confusion*”, we elucidated that schemas are hierarchically structured within mental representation (Gilboa and Marlatt 2017). Thereby, subordinate elements inherit the characteristics of the respective superordinate element (Schmidt et al. 1995). Therefore, comparable schemas entail similar characteristics. This applies as well to brands: akin brands are perceived on a basis of *similarity*. Weers (2008) theorizes in this context that this leads to weaker and less defined subordinate schemas. Hence, it is justifiable to assume that consumers cannot clarify differences in sub-products if an assortment is too complex. As a result, single products are perceived as superfluous. A superfluous product can be defined as a product “that seems expendable in relation to other products, is not substantially different from other products, has an unclear reason for existing in relation to other products, and/or can be removed from the assortment without tangibly harming consumers’ perceived brand image” (Grimm and Wagner 2021). On the basis of this summary, the following hypotheses are assumed:

H4: Intra-brand image confusion significantly increases consumers’ perception that individual products within an assortment are superfluous.

H4a: An increase of ambiguity in intra-brand image confusion significantly increases consumers’ perception that individual products within an assortment are superfluous.

H4b: An increase of similarity in intra-brand image confusion significantly increase consumers’ perception that individual products within an assortment are superfluous.

H4c: An increase of implausibility in intra-brand image confusion significantly increase consumers’ perception that individual products within an assortment are superfluous.

Due to decision complexity and the accompanying rising time costs for a final decision, consumers can be tempted to delay their purchase decision(s) (Loewenstein 1999). Notably, overwhelming variety leads to a significantly longer decision-making time (Iyengar and Lepper 2000; Otter et al. 2008). Moreover, evidence shows that choices on the basis of an extended variety are perceived as more frustrating than choices that are made on the basis of fewer options (Iyengar and Lepper 2000). Therefore, it is assumed that *intra-brand image confusion* leads to a tendency of customers to delay purchases.

H5: Intra-brand image confusion significantly delays consumers’ purchase decisions.

H5a: An increase of ambiguity in intra-brand image confusion significantly delays consumers’ purchase decisions.

H5b: An increase of similarity in intra-brand image confusion significantly delays consumers’ purchase decisions.

H5c: An increase of implausibility in intra-brand image confusion significantly delays consumers’ purchase decisions.

Mitchell et al. (2005) assume in the context of consumer confusion a negative relationship between brand *ambiguity* and brand similarity and word-of-mouth recommendations. In order to pursue this assumption, we hypothesize a similar relationship in the context of *intra-brand image confusion*. Positively and negatively oriented word-of-mouth recommendations can be measured with the NPS (Reichheld 2003; Grisaffe 2007; East et al. 2011). This measurement is considered as a proxy for word-of-mouth recommendations (East et al. 2008), therefore, and to keep the congruence to the study of Grimm and Wagner (2021), word-of-mouth recommendations are measured with the NPS metric.



H6: Intra-brand image confusion significantly decreases the NPS rating.

H6a: An increase of ambiguity in intra-brand image confusion significantly decreases the NPS rating.

H6b: An increase of similarity in intra-brand image confusion significantly decreases the NPS rating.

H6c: An increase of implausibility in intra-brand image confusion significantly decreases the NPS rating.

Context, method, and data sample

In 2017, smartphones were the most used device for accessing the internet, with a share of 50.9%, surpassing desktop personal computers (44.8%) and tablets (4.3%) (Bröhl et al. 2018). In 2019, 1.37 billion smartphones were sold worldwide, but the number of sold units has declined since 2016, when 1.47 billion smartphones were sold (Mongardini and Radzikowski 2020). Hence, it is assumed that sales had already peaked in 2016 and could further decline in the next years. Within the smartphone sector, the brand itself is the most important attribute for purchase decisions (Kim et al. 2020). This underlines the importance of an assessment within the smartphone industry.

An online survey was conducted in the United Kingdom in order to measure *intra-brand image confusion* and its effects within the smartphone industry. This national market was chosen as a specimen of a highly competitive Western market with well-established brands allowing to use the original scale of Grimm and Wagner (2021) in English. Translation errors are avoided, and a basis for direct comparisons of results co is established. The brands Apple, Samsung, Huawei, Sony, and Nokia were evaluated.

The product ranges of all brands were examined and clustered so that the construct could be measured on the product variety level. The resulting product variety-based assortment has been summarized on an overview chart on which, for each brand, all currently provided product variants have been displayed with information on the respective product prices and display sizes.

The initial survey started with a query involving sociodemographic questions (country region, gender, age, marital status, education level, monthly net income, and household size) and the participants' smartphone affinity. People who indicated on a 5-point Likert scale that they had at least some affinity for the product category (value = 2 – indicating lower involvement) could participate in the survey. The actual survey started with an assessment of brand awareness, because awareness of a brand is a prerequisite for the manifestation of a brand image (Martínez and Pina

2003; Romaniuk et al. 2017). Subsequently, the participants indicated their respective brand linking by answering the C-OAR-SE-based brand love scale of Rossiter (2012). Each participant evaluated one randomly assigned known brand in depth. The assortment of the randomly assigned brand was largely displayed with the instruction to carefully look at the product range. Afterward, the questions of the *intra-brand image confusion* scale were asked (cf. Table 7), in which the respective assortment was one more time displayed. Next, the heuristic usage scale according to Hong and Sternthal (2010) was surveyed, wherein the term “product” was changed to “product variant.” Single-item measurements were used to survey brand sympathy, identification, assessment of superfluous products, and potential purchase delays. Finally, the question for the NPS metric was asked.

Data were gathered using an online panel. The field date range for the United Kingdom sample ($N = 500$) was from 23.12.2020 to 23.01.2021. The sample meets national population with respect to age groups and gender. Throughout the field date range, the data quality of both samples was checked multiple times, and respondents were removed (Grimm and Wagner 2020) if their answers showed indications of straightlining, answer patterns, or inconsistent answer behavior or if they answered the entire survey in less than 150 s or skipped the brand assortment presentation page after less than 4 s. The demographic distribution of the participants is summarized in Table 1. Figure 5 and Table 8 (both Appendix) provide an overview of the different answers per variable and brand and depict the differences between the brands. The NPS was scaled from 0 to 10, while all other variables are scaled from 1 to 5.

Results

Measurement models

An initial explorative factor analysis (EFA) was conducted in order to examine the appropriateness of the *intra-brand image confusion* scale for the smartphone industry, even though the item and factor allocation was already predefined.

Table 1 Demographical distribution of the samples

	United Kingdom		
	<i>n</i>	Nat. rep. distribution	Ratio
Male	241	245	98%
Female	258	255	101%
Divers	1	0	–
18–35 years	176	180	98%
36–55 years	222	220	101%
56–69 years	102	100	102%



Fitting the original measurement model did not meet the common quality standards and was, therefore, reduced and optimized according to the results of the EFA for each dimension. Items with factor loadings below 0.60 were eliminated from the relevant dimension. During this procedure, the eight items (listed in Table 8) were removed from the model. The final solution is considered to be customized to the smartphone industry.

Measurement model fitting

On an aggregated level, the internal consistency of the *intra-brand image confusion* scale was $\alpha = 0.904$. The Kolmogorov–Smirnov and Shapiro–Wilk tests indicated that the data indicated a non-normal distribution. Normal distribution was additionally tested with regard to the critical ratio level for skewness and/or kurtosis; except for the variable s4, all the items had critical ratio levels above |2.57|, which is another indicator that the data were not normally distributed (Gao et al. 2008). The EFA was, therefore, conducted with a principal axis factor extraction method with a direct Oblimin rotation (Finch and West 1997). The Kaiser–Meyer–Olkin (KMO) value was 0.854, and Bartlett’s test was highly significant ($p < 0.001$); therefore, the items can be seen as appropriate for an EFA. Additionally, a parallel analysis was conducted and Velicer’s minimum average partial test was computed in order to determine the recommended number of factors to extract (O’Connor 2000). Both tests indicated that two factors should be extracted. However, the screen test and eigenvalues suggested an extraction of three factors, which was in accordance with the original measurement model and its underlying theory.

In order to investigate the adequacy of the items again, the inadequate measure of sampling adequacy (MSA) values were investigated. All the items had MSA values above 0.728. The final three-factor solution explained 61% of the variance of the total construct. Cross-loadings above 0.20 were not present. The final item factor allocation was as desired, meaning that the existence of a single factor’s *ambiguity*, *similarity*, and *implausibility* could be re-proven. The factor loadings for the dimension of *ambiguity* ranged from 0.55 through 0.73. The factor loading range for *similarity* was 0.57 through 0.77, and the factor loadings for *implausibility* ranged from 0.50 through 0.81. The internal consistency of the single factors was as follows: $\alpha_{\text{ambiguity}} = 0.743$; $\alpha_{\text{similarity}} = 0.703$; $\alpha_{\text{implausibility}} = 0.804$.

The structure was investigated by computing a confirmatory factor analysis (CFA) with the program R and the lavaan package (version 0.6–7). In accordance with Grimm and Wagner (2021), the model was estimated with the maximum likelihood (ML) estimation method and the Satorra–Bentler (SB) correction due to the non-normally distributed data (Fig. 2).

The CFA using the ML estimation method with SB correction resulted in $\chi^2 = 111.1$, $\chi^2\text{-SB} = 86.4$, $p < 0.001$, $p\text{-SB} < 0.001$, $df = 51$, $\chi^2/df = 2.18$, $\chi^2\text{-SB}/df = 1.69$, RMSEA = 0.05, RMR = 0.06, SRMR = 0.05, GFI = 0.96, AGFI = 0.95, CFI = 0.97, TLI = 0.96, and NFI = 0.94. All three dimensions and all factor loadings were significantly measured and estimated. The average of the factor loadings was $\lambda = 0.68$ (range 0.54–0.80). A Harman’s test was conducted in order to test for common method bias. Therein, only 33% of the variance was explained by an unrotated single factor; common method bias can, therefore, be excluded. Therefore, the responses of the participants were not affected by the type of measurement.

Overall, the convergent and discriminant validity revealed sufficient measurement quality. Convergent validity describes the degree to which two measures of the same concept are correlated, whereas discriminant validity assesses the degree to which conceptually similar concepts are distinct (Hair et al. 2014). Convergent validity can be seen as given if the CR values are above 0.70 and the AVE values are above 0.50. However, AVE is a more conservative measure than CR and often too strict; convergent validity can, therefore, be assessed merely on the basis of CR (Malhotra and Dash 2016). Discriminant validity was assessed by using the heterotrait–monotrait (HTMT) ratio of correlations, which is considered to be superior to the Fornell–Larcker criterion (Henseler et al. 2015). In order to ensure discriminant validity, no inter-correlation should exceed a value of 0.85. Table 2 summarizes the CR and AVE values as well as the HTMT inter-correlations. With the exception of the strict AVE values, all the values met their respective thresholds.

Structural model

A structural equation model (SEM) was computed in order to evaluate the assumed effects and relationships. Again, the model was computed with the ML estimation method and an SB correction. The model fit was as follows: $\chi^2 = 223.6$, $\chi^2\text{-SB} = 181.7$, $p < 0.001$, $p\text{-SB} < 0.001$, $df = 139$, $\chi^2/df = 1.60$, $\chi^2\text{-SB}/df = 1.30$, RMSEA = 0.04, RMR = 0.06, SRMR = 0.04, GFI = 0.96, AGFI = 0.94, CFI = 0.98, TLI = 0.97, and NFI = 0.95. The results of the estimated model are illustrated in Figure 3.

The results are summarized in Table 3. It becomes apparent that especially *ambiguity* and *implausibility* have crucial effects on brand sympathy, brand identification and the NPS which are in line with the hypothesis. However, similarity does not behave throughout as expected, because some positive effects become apparent (e.g., sympathy, identification and NPS). Moreover, similarity increases the delay of purchases, however the constructs superfluous products and delay purchase lacks slightly in purchase quality which can be observed by the R^2 values. This might be due to a u-shape



Fig. 2 Results of the CFA for the construct of intra-brand image confusion in the United Kingdom. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

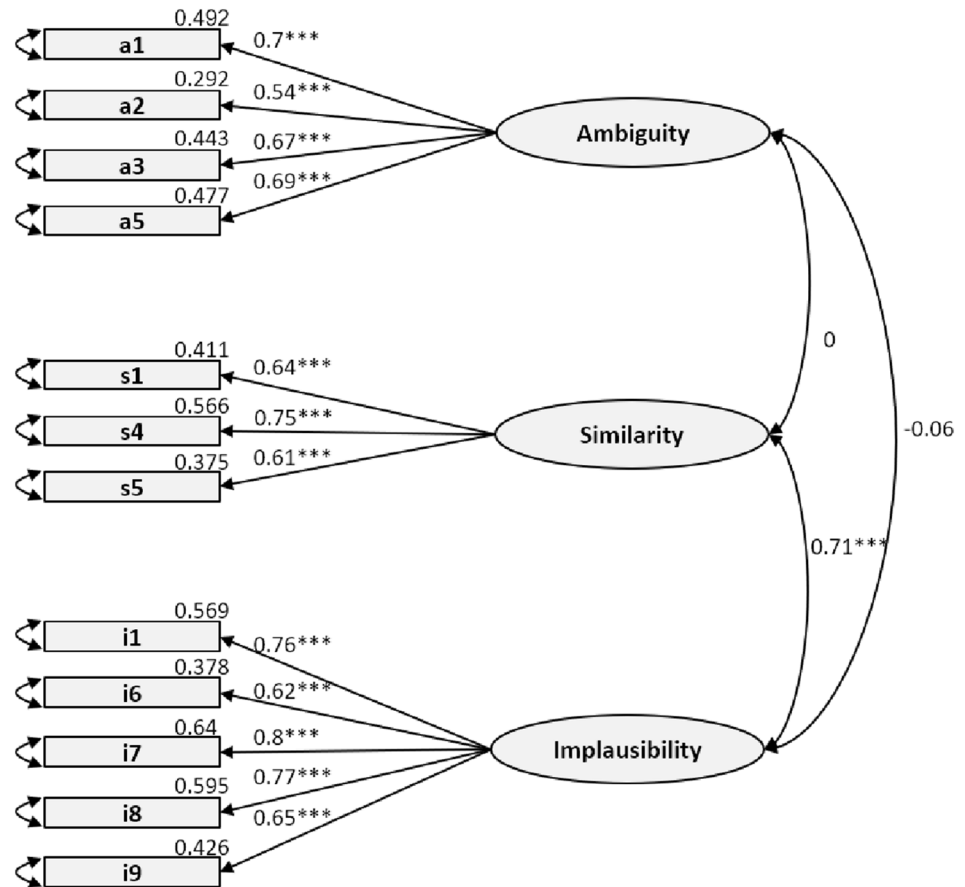


Table 2 Convergent and discriminant validity

	CR	AVE	Ambiguity	Similarity	Implausibility
Ambiguity	0.748	0.431	1.000		
Similarity	0.706	0.447	0.460	1.000	
Implausibility	0.843	0.519	0.155	0.719	1.000

The bold values are the squared AVE's

relation which is elucidated and investigated in Chapter 6.2. This is an interesting pattern, because similarity and implausibility are strongly correlated.

Hypotheses and findings

Hypothesis test

A hypothesis test was conducted in order to pursue the first research aim by validating the IBIC construct in an industry despite the possible divergence in customers involvement. If, and only if, this validation is successful, the second research aim targeting the assumption of linearity by Grimm

and Wagner (2021) among others can be pursued with the data at hand in this study.

A path diagram includes a set of structural equations, which each represented by univariate regression equations (Mueller 1996). They indicate the relationship between exogenous (independent) and endogenous (dependent) variables. The formula is illustrated by Eq. 1:

$$Y = \alpha + \beta Y + \gamma X + \varepsilon, \quad (1)$$

whereas α represents the intercept, Y the endogenous variable, X the exogenous variable, β is the path or structural coefficient in the regression of endogenous variables on other endogenous variables, γ denotes possible structural coefficients of endogenous on exogenous variables, and ε the respective error term. For the vector of endogenous variables, a general path analytical model is given in Eq. 2:

$$Y = \alpha + BY + \Gamma X + \zeta, \quad (2)$$

where α is a column vector ($NY \times 1$) of the intercepts, whereby N represents the number of cases, Y represents a column vector ($NY \times 1$) of the endogenous variables, X indicates the column vector ($NX \times 1$) of exogenous variables, and B is a $NY \times NY$ matrix of structural coefficients



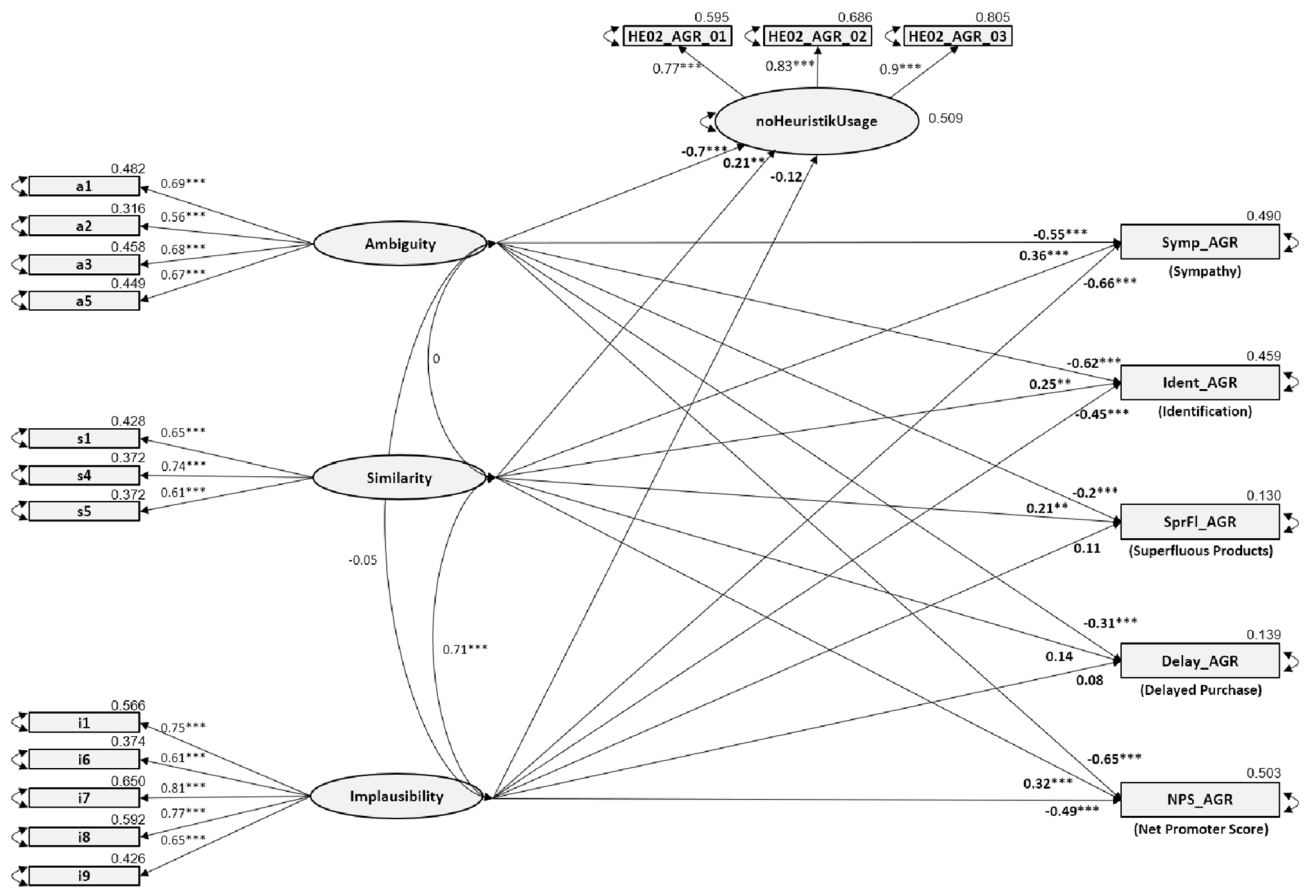


Fig. 3 Results of the SEM for the United Kingdom. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 3 Results of the SEM

		No heuristic usage	Sympathy	Identification	Superfluous products	Delayed purchase	NPS
Ambiguity	β	-0.70***	-0.55***	-0.62***	-0.20***	-0.31***	-0.65***
	$t(139)$	-10.84	-9.92	-11.50	-3.68	-5.59	-11.64
	p	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Similarity	β	0.21**	0.36***	0.25**	0.21**	0.14	0.32***
	$t(139)$	2.58	4.14	3.10	2.34	1.48	3.60
	p	<0.01	<0.001	<0.01	<0.01	<i>n.s.</i>	<0.001
Implausibility	β	-0.12	-0.66***	-0.45***	0.11	.08	-0.49
	$t(139)$	1.45	-7.80	5.78	1.32	0.89	-6.13
	p	<i>n.s.</i>	<0.001	<0.001	<i>n.s.</i>	<i>n.s.</i>	<0.001

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

from endogenous-to-endogenous variables, whereas Γ is a $NY \times NX$ matrix of structural coefficients from exogenous to endogenous variables, and lastly ζ is a column vector of the endogenous error terms. Estimating the parameters by maximizing the log-likelihood function leads to Fisher information matrix (Eq. 3) for assessing the accordant maximum likelihood confidence interval (Eq. 4)

$$I_1 = \text{cov} \left(\frac{\partial \ln f(y; \theta)}{\partial \theta} \right), \quad (3)$$

Equation 3 calculates the Fisher information, whereby cov is the covariance matrix, with the derivation of the logarithmic function of y and θ to θ . Equation 4 provides thereby the double-sided maximum likelihood confidence interval.



$$\hat{\theta}_{ML} \pm Z_{1-\alpha/2} \frac{1}{\sqrt{nI_1(\theta)}}, \quad (4)$$

$\hat{\theta}_{ML}$ is in this context the maximum likelihood estimate, on the basis of the Fisher information that has been derived to θ . Equations 1 till 4 have been applied to test for the hypothesis test.

H1 hypothesized an increasing usage of heuristics during the assortment evaluation. The relationship between the dimension of *ambiguity* and no usage of heuristics was negative and significant [$\beta = -0.70$, $t(139) = -10.84$, $p < 0.001$], which supports H1a. *Similarity* had a significant effect on the non-usage of heuristics in the United Kingdom with $\beta = 0.21$, $t(139) = 2.58$, $p < 0.01$, which implies that fewer heuristics were used due to brand *similarity*, which is a contradictory effect, because the theory and hypothesis assumed an increasing usage of heuristic usage. H1b is, therefore, not be considered as supported. The effect of brand *implausibility* was non-significant [UK: $\beta = -0.12$, $t(139) = -1.45$, $p = n.s.$]. Therefore, H1c is not supported by the analysis of empirical data. Overall, H1 cannot be considered to be supported.

Within H2, a decreased brand sympathy was assumed due to an existent *intra-brand image confusion*. Brand *ambiguity* [$\beta = -0.55$, $t(139) = -9.92$, $p < 0.001$] and *implausibility* [$\beta = -0.66$, $t(139) = -7.80$, $p < 0.001$] indicates considerable negative effects on brand sympathy. Brand *similarity* showed a positive effect of $\beta = 0.36$, $t(139) = 4.14$, $p < 0.001$. Summarized, the tests show that *ambiguity* and *implausibility* have substantial effects on a customer's sympathy for a smartphone brand. H2 can be, therefore, considered to be partly supported.

H3 assumed a negative relationship between *intra-brand image confusion* and the customers' identification with a brand. Again, brand *ambiguity* [$\beta = -0.62$, $t(139) = -11.50$, $p < 0.001$] and *implausibility* [$\beta = -0.45$, $t(139) = -5.78$, $p < 0.001$] had strong negative effects on identification with a brand. For *similarity*, the effect in was $\beta = 0.25$, $t(139) = 3.10$, $p < 0.01$, positively significant, which suggests that brand *similarity* leads to a higher identification with a brand. The effects of *ambiguity* and *implausibility* far outweighed the effects of *similarity*. H3 can, therefore, be seen as partly supported.

Within H4, it was concluded that *intra-brand image confusion* made single products appear as superfluous. The effect of the dimension of *ambiguity* was again to support the hypothesis [$\beta = -0.20$, $t(139) = -3.68$, $p < 0.001$]. However, for *similarity*, both countries showed the assumed effect [$\beta = 0.21$, $t(139) = 2.34$, $p < 0.01$]. *Implausibility* was in non-significant [$\beta = 0.11$, $t(139) = 1.32$, $p = n.s.$]. Due to the considerable effect of *similarity*, H4 can be seen as partly supported. However, the single-item measurement of the evaluation of superfluous products lacked in measurement

quality, which is indicated by the low R^2 values, meaning that not all the relevant antecedents of this construct are captured by the item.

In the framework of H5, it was assumed that *intra-brand image confusion* leads to an increased tendency to delay purchase decisions. Brand *ambiguity* had an unanticipated and significant effect [$\beta = -0.31$, $t(139) = -5.59$, $p < 0.001$], meaning that *ambiguity* could actually decrease purchases. However, the relationship for *similarity* the effect was not significant: $\beta = 0.14$, $t(139) = 1.48$, $p = n.s.$ Likewise, a non-significant relationship for brand *implausibility* was observed [$\beta = 0.08$, $t(139) = 0.89$, $p = n.s.$]. Overall, H5 cannot be considered to be supported and is rejected. As for superfluous products, the measurement quality for the construct was rather poor.

H6 presumed a negative impact of *intra-brand image confusion* and the NPS evaluation. *Ambiguity* [$\beta = -0.65$, $t(139) = -11.64$, $p < 0.001$] and *implausibility* [$\beta = -0.49$, $t(139) = -6.13$, $p < 0.001$] showed considerable negative effects that were in line with the hypothesis. However, *similarity* showed in the United Kingdom a positive and significant effect of $\beta = 0.32$, $t(139) = 3.60$, $p < 0.001$. Overall, H6 can be seen as partly supported (Table 4).

Test for non-linearity

Further explorative data analyses were conducted in order to investigate the partly unexpected effects of the factors of *similarity* and *implausibility*. Grimm and Wagner (2021) theorize in this vein an inverted U-shaped relationship for the factor of *similarity* which is a common phenomenon (Sikkel 2013). Therefore, it was assumed that increasing *similarity* initially has a beneficial effect for customers, because the brand appears as congruent, which indicates brand cohesiveness. Too much *similarity*, however, appears excessively coherent, which leads to a perception of homogeneity between single products and results in negative effects.

It is important to mention that SmartPLS provides as well an elaborated function to test for u-shaped patterns (Basco et al. 2021; Ritter and Walter 2012). However, results have been generated with Rstudio to be in line with the maximum likelihood analysis. In order to pursue this assumption, a U-test was conducted for all factors. Haans et al. (2016) recommend three crucial steps for testing such relations. First, a significant regression with the dependent variable and a squared function of the dependent variable on the independent variable need to be observed. Second, both regressions must have an opposing effect, and both slopes should be sufficiently steep at both ends. Third, the turning point needs to be located within the data range. It is recommended to test the turning point condition by means of a 95% Fieller confidence interval (Fieller 1954).



Table 4 Summary and overview of hypothesis support

	H1	H2	H3	H4	H5	H6
H#: overall	✗	✓	✓	✓	✗	✓
H#a: ambiguity	✓	✓	✓	✗	✗	✓
H#b: similarity	✗	✗	✗	✓	✗	✗
H#c: implausibility	✗	✓	✓	✗	✗	✓

Table 5 Results of the *U* tests for the factors of ambiguity, similarity, and implausibility

	Effects	No heuristic usage	Sympathy	Identification	Superfluous products	Purchase delay	NPS
Ambiguity							
Slope at β	0.00	−0.73***	−0.48*	−0.61***	−1.24	−0.96	−0.23
Slope at β^2	−0.53**	0.17	0.04	0.10	1.07	0.69	−0.31
Extremum point	0.01	10.68	30.49	15.30	2.78***	3.34	−1.77
95% CI, Fieller method	[−9.14, 1.09]	[−, −]	[−, −]	[−, −]	[2.57, 3.18]	[2.89, 5.46]	[−, −]
Similarity							
Slope at β	−0.83***	−0.78**	−0.78	−0.89***	0.07	−0.08	−0.56*
Slope at β^2	0.64**	0.89***	0.60	0.79***	0.20	0.27	0.47
Extremum point	3.33	2.22**	3.26	2.98	−	−	2.98
95% CI, Fieller method	[2.88, 5.92]	[1.75, 2.47]	[2.82, 6.35]	[−, −]	[−, −]	[−, −]	[−, −]
Implausibility							
Slope at β	−1.38***	−0.76***	−1.29***	−1.39***	0.18	−0.23	−1.11***
Slope at β^2	1.08***	0.86***	0.99***	1.21***	0.08	0.43	0.94***
Extremum point	3.37***	2.34***	3.45**	3.02***	−	1.42	3.11***
95% CI, Fieller method	[3.13, 4.12]	[1.91, 2.61]	[3.13, 4.12]	[2.82, 3.34]	−	−	[2.85, 3.66]

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Regressions were computed with SPSS (version 22.0.0.0), and the extremum and Fieller interval were computed using Stata (version 16) with the corresponding *U*-test package (version 1.0). In order to investigate an overall effect for all the variables, an aggregated variable named ‘Effect’ was generated. Inverted items (superfluous products and purchase delay) were inverted beforehand, so the responses were uniformly directed. The equation for the regressions follows the common regression formula that entails an additional squared expression of the explanatory variable (cf. Eq. 5).

$$Y = \beta_0 + \beta_1 X + \beta_2 X^2 + \varepsilon, \quad (5)$$

whereas Y represents the dependent variable, β_0 the intercept term, β_1 and β_2 the slopes, X the respective explanatory variable, and ε the error term of the regression. The extremum point is calculated as shown in Eq. 6:

$$\text{Extremum Point} = -\hat{\beta}/(2 - \hat{Y}), \quad (6)$$

whereas $\hat{\beta}$ and \hat{Y} represent the respective OLS estimates of β and Y including the respective error terms. The results of the *U*-test are summarized in Table 5. While a U-shaped relationship can be rejected for the dimensions of *ambiguity*

and *similarity*, *implausibility* showed clear indications of such a relationship on an aggregated level. Furthermore, the relationship could be proven for all the sub-dimensions of the dimension of *implausibility*, with the exception of the items superfluous products and purchase delay, which lacked in measurement quality. A U-shaped relationship can, therefore, be seen as proven for the dimension of *implausibility*.

Additionally, we investigated the relationship of the *intra-brand image confusion* construct on an aggregated level. For this purpose, an overall construct variable was created in SPSS AMOS (version 24) by rebuilding the entire structure of the construct with an additional higher-order variable. The variable was then computed by an imputation of the data. Interestingly, a significant U-shaped relationship between the overall construct variable and the customers’ product category involvement could be found (cf. Table 6).

In order to validate the results of the U-shaped relationship between the aggregated variable and the involvement level, a two-line test according to Simonsohn (2019) was conducted. The test is considered a valid alternative to linear regression. To perform the test, the two-line script (version 0.52) for R was used. Figure 4 shows the resulting plot. The identical pattern of the u-shape becomes apparent.



Table 6 Results of the *U*-tests for overall construct and customers' involvement

		Category involvement
Intra-brand image confusion	Slope at β	-0.10***
	Slope at β^2	0.28***
	Extremum point	0.18***
	95% CI, Fieller method	[0.02, 0.33]
	Data range	[-1.29, 2.03]

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The results imply that customers with a low and high involvement levels are less confused than people with moderate involvement levels. The causal relationship tips nearly in the middle of the data range and leads to an increasing confusion for highly involved customers. A u-shaped relationship could be observed.

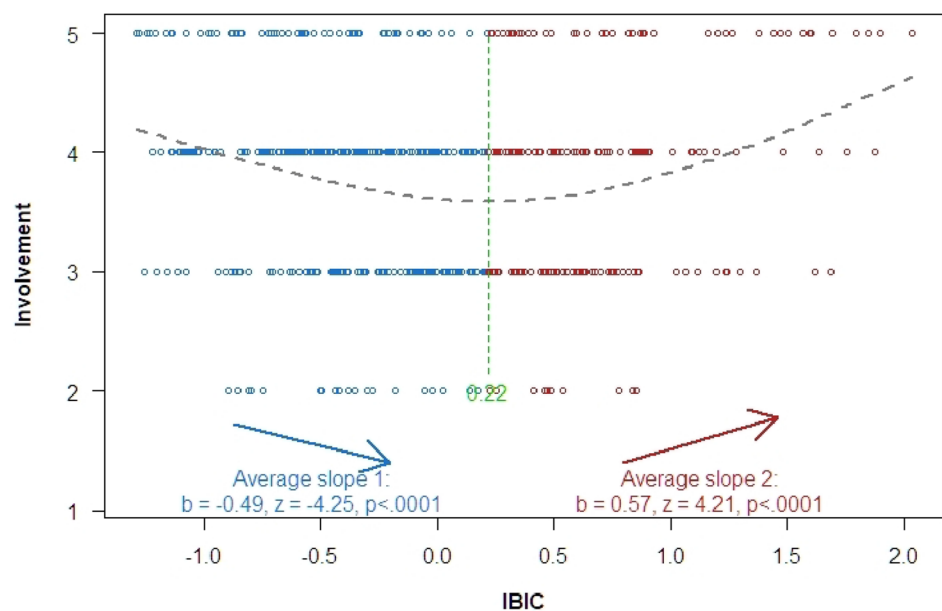
Discussion and contributions

The emerging concept of IBIC intra-brand image confusion is gaining momentum in scholarly research. The objective of this study was to investigate the concept of intra-brand image confusion in an industry sector, where customers are generally less involved and to examine non-linear effects. Therefore, a national representative sample from the United Kingdom served as a basis for the investigation. Despite minor adjustments for the measurement model, the construct IBIC with its theoretical underpinning has been successfully validated could be re-proven in the UK smartphone

industry. Structural equation modeling was used to investigate the assumed effects. The findings are in line with those of Grimm and Wagner (2021) and imply a crucial impact of the construct on the aspects of brand sympathy, brand identification, and the NPS evaluation. All the aspects are key for purchase intentions. Moreover, empirical results indicate that an IBIC and especially *ambiguity* can indeed delay the purchase process—this is crucial since the smartphone market is a relatively innovation-dense and dynamic industry sector (Cecere et al. 2015). The sub-dimensions of *ambiguity* and *implausibility* turns out to have a substantial influence.

Results indicates that *ambiguity* significantly increases the usage of heuristics during purchase decisions, while *similarity* decreases the usage of heuristics, the effect for *implausibility* was not significant. While heuristics are often necessary, useful in complex situations, and can under certain pre-conditions lead to accurate decisions (Gigerenzer and Gaissmaier 2011; Gigerenzer and Brighton 2009), they often lead to lower decision quality, biases, wrong decisions, and can lead to systematic errors (Merlo et al. 2008; Das and Teng 1999; Kahneman et al. 1982). Moreover, heuristics are applied while evaluating products for a consideration set (Hauser 2014). The sub-dimensions pay, therefore, a role when it comes to satisfactory purchase decisions and the fundamental relevance of a brand and its single assortment offerings. Data analysis results of this study imply that an occurrent IBIC and especially the sub-domain *ambiguity* leads to an increased usage of heuristics during the purchase process, which can affect the decision quality or the overall post-purchase satisfaction.

Brand *ambiguity* and *implausibility* turned out to have considerable significant negative effects on brand sympathy, while *similarity* shows a positive effect. It could have been

Fig. 4 Results of the two-line test between the aggregated construct and involvement level

shown that brand sympathy is an affective brand measure, and relates to a (potential) buyer's affective reaction to a brand (Büschken 2007). In an economic context, sympathy and identification correlate to a certain extent with identification (Sally 2002).

The study could examine considerable significant effects of *ambiguity*, *similarity*, and *implausibility* on brand identification. While *ambiguity* and *implausibility* show negative effects, *similarity* shows a positive effect on brand identification. Again, due to the u-shaped behavior of the sub-dimensions, it has to be assumed that *similarity* would have a negative impact as well, if similarity would increase. It could have been shown that brand identification impacts brand loyalty (Kuenzel and Halliday 2010; Nam et al. 2011), which again has an impact on brand equity (Torres et al. 2015; Alhaddad 2014). Moreover, consumers who identify themselves more strongly with a company tend to purchase more products and recommend the company and its products more often (Ahearne et al. 2005). While an IBIC can serve both as antecedent and explanatory construct for brand loyalty, the construct has indirect and direct effects on a company's value.

Highlighting the perception of superfluous products, *ambiguity* had a moderate significant negative effect, while *similarity* had a moderate positive effect. The effect for *implausibility* was not significant. Meaning, *ambiguity* increases the perception of superfluous products, and *similarity* decreases such a perception. These effects are meaningful, because the effect of cross-subsidization shows that (due to uneven allocated costs on the basis of too larger assortments) exotic products are more frequently demanded, while being sold under value (due to costs that are not correctly allocated), leading to a loss of competitive advantages (Berger and Ofek 1995; Chen and Rey 2019).

With regard to purchase delay shows *ambiguity* a direct significant negative effect, while the effects of the other sub-dimension *similarity* and *implausibility* are not significant. Delayed purchases are a strong metric assessing the drive of company's sales numbers. Moreover, purchase intentions are directly linked to future sales behavior (Morwitz et al. 2007). Only a few studies have drawn a link of consumer confusional aspects to purchase delays or aborted purchase (Mitchell et al. 2005; Shiu and Tzeng 2018).

Ambiguity and *implausibility* had negative effects on the NPS, while *similarity* shows—due to the u-shape and the unmatched tipping point—a positive effect. While many companies apply the NPS, academics partly controversy discuss the “the one number you need to grow” with regard to validity, holism, and predictability (Baehre et al. 2022; Fisher and Kordupleski 2019; Grisaffe 2007). Even though it could have shown that the NPS is significantly linked to sales revenue growth and the gross margin (van Doorn et al. 2013), customer retention (Haan et al. 2015), and short-term

growth and can serve as a brand health metric (Baehre et al. 2022). Our results and the considerable effects on the NPS can in general and in a brand-related context, be seen as central for a company's overall and future performance. While our study enriches the scientific understanding of NPS antecedents, practitioners are well advised to avoid ambiguous or implausible assortment compositions, in order to avoid immediate negative financial impacts.

Moreover, companies partly fully intentional apply a price obfuscation where consumers are not totally informed about market prices, partly to increase competitiveness (Chioveanu and Zhou 2013). On the one hand such shrouded prices revealed evidence that they anger customers and modestly lowers company ratings (Chiles 2021). While customers' ratings are not considerably negatively affected, company's increase search costs and are partly able to obtain markups (Ellison and Ellison 2009). While markups directly influence a company's revenue stream, search costs imply that all further actions increase consumers' efforts (Ellison and Wolitzky 2012). The phenomenon of IBIC directly links drawbacks of such a profit maximizing strategy back to the brand manager.

Further investigations of the IBIC construct and additional explorative analyses could investigate a u-shaped relationship for the sub-dimension of *implausibility* and for the overall construct. Moreover, the sub-dimensions *ambiguity* and *similarity* provide strong support for the assumption that they are u-shaped as well, even though the significant tests indicate such a pattern only for some relationships. However, it is justifiable to assume, that the other relationships would become significant as well with an increasing sample size (Lin et al. 2013). The high correlation between *similarity* and *implausibility* underlines this statement. Following this assumption, it becomes clear why the dimension *similarity* does not show all expected effects: each sub-dimension can be seen as u-shaped and each sub-dimension has its individual tipping point. The similarity perception of the assortments is in this context before the tipping point of the curve, therefore, showing partly positive effects. Meaning, till a certain point a brand is perceived as consistent and homogeneous, which increases recognizability and recall certain brand associations, too similar brands are on the other hand perceived as uniform and indistinguishable. The *ambiguity* and *implausibility* perceptions are, on the other hand, after their respective tipping points, so showing the expected effects. The overall u-shape effect of the construct IBIC implies that moderately involved people are more affected by *intra-brand image confusion* than less-involved customers or highly involved people. It is reasonable that customers with a low involvement level are less affected by *intra-brand image confusion*, because they are less willing to actively process all the information. In this vein, it is important to highlight that involvement and cognitive



dissonance are strongly interconnected and that customers experience cognitive dissonance based on their individual involvement (Bolia et al. 2016). Already Festinger (1957) claimed in his theory of cognitive dissonance a u-shaped and inverted u-shaped response pattern for cognitive dissonance. The u-shaped function of cognitive dissonance can appear to be valid for both the u-shaped response of IBIC and the sub-dimensions: Customers experience more and more dissonance due to the confusing information of an assortment which leads to a decrease of involvement; dissonance and involvement are interconnected. More information increases the dissonance, leading to a further decline of the involvement levels (Festinger 1957). The tipping point is due to a change in the cognitive components (e.g., opinion toward the brand). Meaning, customers change their opinion about either the assortment or the brand. After this point, more information decreases cognitive dissonance instead of increasing it, leading to an increase of the involvement level.

Taking these discussions into consideration, this study contributes to the literature in three ways, the study contributes in several ways to scholarly research. First, results show that *intra-brand image confusion* is a validated phenomenon that arises in different industry sectors and in industry sectors where customers show less product involvement. The construct also proved to be significantly impactful in the smartphone industry, which underlines its importance. Second, the investigation of the U-shaped relationships provides a better understanding of the effect and behavior on a holistic and sub-dimensional level, while explaining why not all hypotheses are met and that each sub-dimension has its unique tipping point. Third, as initially described brand extensions are widely researched with regard to perceived fit and authenticity (Park et al. 1991; Spiggle et al. 2012), attitude, and associations toward extensions (Aaker and Keller 1990; Broniarczyk and Alba 1994), or the evolution of brand extensions (Dacin and Smith 1994) while comparatively few studies draw the link to direct or indirect business performance measures (Hennig-Thurau et al. 2009; Smith and Park 1992; Randall et al. 1998). This study contributes in this vein considerably to literature by providing a validated, holistic consumer-sided assortment assessment and linking its effects directly to direct and indirect business performance measures.

The study shows that *intra-brand image confusion* is an aspect that arises across industries. Furthermore, it has to be considered that the confusion arises in industries in which customers are generally less involved. Therefore, practitioners should pay strong respect to the composition and congruence of their assortments, even in industries in which product involvement is generally moderate or lower because of an occurrent IBIC has—as shown—indirect and direct effects on a business's performance. Besides that, the discriminate sub-dimensions serve as single adjustment

levers, to decrease an IBIC, and so increasing a company's performance. The U-shaped effect of the construct indicates that a company especially loses potential customers who are generally moderately involved and willing to engage more closely with the brand, because those people are the most confused ones. This is an important aspect, because customer acquisition is a crucial aspect for companies and their success (Ang and Buttle 2006). One recommendation is to cluster smartphones into buying personas, teenagers, business usage or light usage.

Limitations and future research

The assortment of the brand was displayed during the survey. Therefore, individual knowledge of the single products was not considered. In this vein, further studies may investigate which products are actually known and qualify for the participants' consideration set. Additionally, it would be of benefit if the construct were to be validated in more countries. An investigation of generational effects (baby boomers, Gen Y, Gen Z) would also help provide a better understanding of the construct, as generational differences can play an important role in the perception of a brand (Kim and Brandon 2010). Additionally, it would be of interest to investigate the construct's impact on more brand- or purchase-related aspects. Explorative in-depth interviews could be utilized to explore further influential factors.

While the construct of interest could be re-proven in the smartphone market, it remains unclear why the structure proposed in the seminal study of Grimm and Wagner (2021) was not fully replicated. This indicates that an evaluation in other industries might be beneficial in order to elaborate the core components. Further multi-industry studies could be reasonable for the research questions. Furthermore, studies could also investigate whether the confusion is actually perceived consciously by the customers or whether it is an unconscious mechanism. It would be of interest to know whether the decision-making styles of customers have a moderating effect on the perceived intensity of the confusion. The differentiation between maximizers and satisfiers is in that context central and well researched (Shiner 2015; Polman 2010). Future studies should also take possible cultural differences into account, because only a few studies investigate brand extensions from an international perspective, even though a lot of brand use global brand strategies (Martinez et al. 2008). In this vein, it would be of particular interest if Western and Asian consumers differ in their perception of an IBIC. Moreover, the mere ownership effect results in a tendency of customers to evaluate objects they own more favorable than non-owners, simply because of the possession; this effect applies in material as well as to immaterial objects (Stefanczyk et al. 2021). This could have



an impact of the perception of IBIC. Kirmani et al. (1999) could show that assortment widenings of automotive brands are more favorable perceived by owners, than by non-owners, and that sub-brands can serve as a protection for possible negative brand assessments due to assortment downsizing. It is possible to assume that brand owners are more resistant to an IBIC than non-owners. Additionally, brand love leads to a certain reluctance to negative information (Batra et al. 2012) and brand advocates are more likely to accept new brand extensions or forgive a brand for wrongdoings (Du

et al. 2007). It is likely that these effects are relevant in the perception of IBIC. Future studies should investigate the impact of brand ownership and brand love on the intensity of an IBIC.

Appendix

See Fig. 5, Tables 7 and 8.

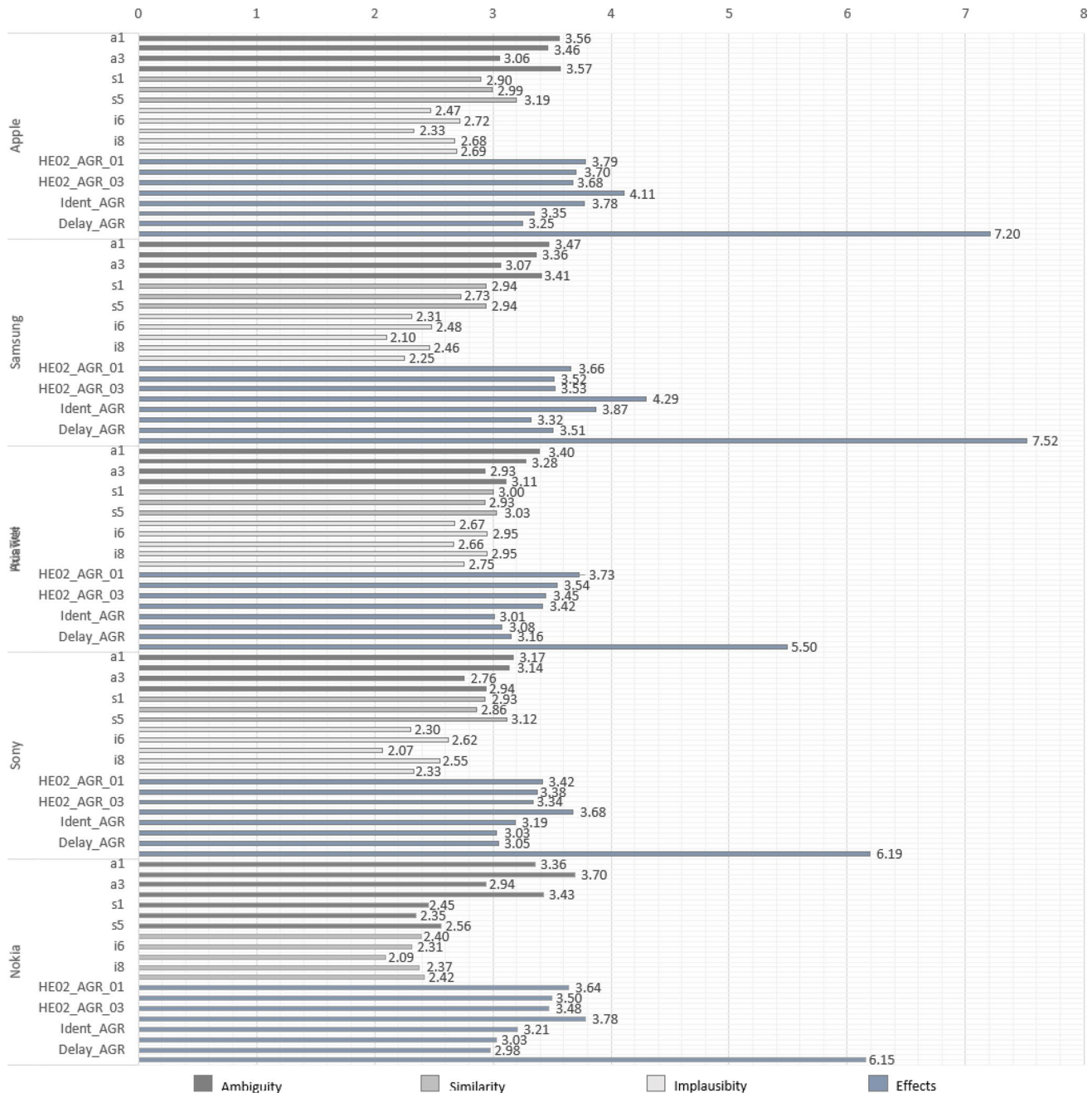


Fig. 5 Distribution of the single answers per brand. Variables are scaled from 1 to 5, while the NPS is scaled from 0 to 10



Table 7 Intra-brand image confusion scale

Dimension (D)	D#	Indicator	Usage
Ambiguity	a1*	I have a clear idea of the central benefit of each product	Used
	a2*	The superiority between the products is pretty obvious	Used
	a3*	I could reveal my personality by using several of the brand's products	Used
	a4*	Choosing one final product from all the alternatives wouldn't be very difficult	Removed
	a5*	I definitely know which products my friends and acquaintances would like the most	Used
Similarity	s1	The price is actually the only difference between the products	Used
	s2	The products actually offer more or less the same thing	Removed
	s3	If I had to picture them as people, the products would have similar character traits	Removed
	s4	There's no difference in what the products embody	Used
	s5	In the end, it wouldn't make a big difference whether I chose option A or option B	Used
	s6	I like all the products equally well	Removed
Implausibility	i1	I mistrust the brand's promises	Used
	i2	The brand's essence appears implausible	Removed
	i3	I don't buy the brand's promises	Removed
	i4	The brand feigns aspects that have nothing to do with its products	Removed
	i5	There is a gap between how the brand presents itself and what it really is	Removed
	i6	If I had to picture it as a person, the brand wouldn't be very trustworthy	Used
	i7	The brand is unreliable	Used
	i8	The brand's statement of its superior quality is, in my opinion, untrustworthy	Used
	i9	In my opinion, the brand's image is inconsistent	Used

Scaling: 5-point Likert scale

Scale anchors: 1 = *doesn't apply at all*; 2 = *doesn't apply*; 3 = *neither*; 4 = *applies*; 5 = *fully applies*

Lead text: Assortment evaluation of brand *x*—Please take a detailed look at the current assortment of brand *x* for the XYZ market and answer the questions listed below. Use the scale to declare to what extent you agree or disagree with the relevant statements. By selecting “neither,” you'll indicate that you don't agree with either extreme. If you have problems deciding, select the answer that best matches your opinion

*Inverted items

Table 8 Mean distribution and standard derivations of the single answers per brand

Dimension	Variable	Apple		Samsung		Huawei		Sony		Nokia	
		<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Ambiguity	a1	3.56	1.00	3.47	1.04	3.40	1.05	3.17	1.00	3.36	1.02
	a2	3.46	0.97	3.36	1.01	3.28	1.04	3.14	1.10	3.70	0.83
	a3	3.06	1.19	3.07	1.10	2.93	1.19	2.76	1.21	2.94	1.13
	a5	3.57	1.15	3.41	1.10	3.11	1.19	2.94	1.19	3.43	1.06
Similarity	s1	2.90	1.21	2.94	1.11	3.00	1.09	2.93	1.23	2.45	1.16
	s4	2.99	1.12	2.73	0.99	2.93	1.01	2.86	1.00	2.35	0.96
	s5	3.19	1.12	2.94	0.99	3.03	1.06	3.12	0.98	2.56	1.02
Implausibility	i1	2.47	1.20	2.31	1.10	2.67	1.13	2.30	1.11	2.40	1.00
	i6	2.72	1.25	2.48	1.22	2.95	1.19	2.62	1.18	2.31	1.01
	i7	2.33	1.23	2.10	1.13	2.66	1.12	2.07	0.97	2.09	0.95
	i8	2.68	1.26	2.46	1.17	2.95	1.14	2.55	1.22	2.37	1.03
Effects	i9	2.69	1.28	2.25	1.07	2.75	1.13	2.33	1.05	2.42	0.99
	HE02_AGR_01	3.79	0.79	3.66	0.88	3.73	0.85	3.42	1.01	3.64	0.91
	HE02_AGR_02	3.70	0.89	3.52	0.98	3.54	0.87	3.38	1.02	3.50	0.92
	HE02_AGR_03	3.68	0.88	3.53	0.94	3.45	0.93	3.34	1.07	3.48	0.94
	Symp_AGR	4.11	1.15	4.29	0.80	3.42	1.27	3.68	1.00	3.78	0.97
	Ident_AGR	3.78	1.38	3.87	1.02	3.01	1.37	3.19	1.15	3.21	1.09
	SprFL_AGR	3.35	1.22	3.32	1.07	3.08	1.11	3.03	1.04	3.03	1.07
	Delay_AGR	3.25	1.37	3.51	1.11	3.16	1.25	3.05	1.26	2.98	1.10
	NPS	7.20	3.23	7.52	2.43	5.50	3.13	6.19	2.61	6.15	2.58

Variables are scaled from 1 to 5, while the NPS is scaled from 0 to 10



Funding Open Access funding enabled and organized by Projekt DEAL.

Data availability The dataset of this study is available from the corresponding author on reasonable request.

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Publisher's Note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

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