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Towards a theoretical framework for augmented reality marketing: A means-end chain perspective on retailing

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ABSTRACT

Augmented reality (AR) merges virtual lements with our physical context. Although re s vidence n marketing that AR may be superior to alternative formats, re s a lack of work xplaining from he ground up why s s case. Consequently, we applied m ans-end ain ory o identify specific AR-features (.g., ontextualization, nteractivity, portability) hat drive benefits (.g., inspiration, better decision-making, me savings, risk reduction). These benefits ontribute o onsumers ' goal achievement (e.g., self-confidence, self-expression, reduced purchase regret). A subsequent study organized these factors into a practical framework (SEAD and SALES). This s udy ontributes to a better understanding of AR.

1. Introduction

In augmented reality (AR) marketing, branded v rtual ontent is realistically ntegrated into a user's perception of he real world [1,2]. Marketing practitioners ave realized AR's potential, as is reflected by numerous use cases, such as when displaying products (IKEA Plac), ntertaining consumers (Toy ‘ ’ Us), supplementing products (19 Crimes wine), or offering new forms of customer service (Toyota). AR apps hat visualize products are now an "almost s andard" feature across platforms. For example, Amazon has made t possible to v sualize many of he products t offers using AR [3], Google r ntly integrated an AR feature nto its shopping search [4], and Meta offers AR ryouts for makeup and sunglasses [5], not o mention the many other AR apps at brands launch o display their products or how advancements in WebAR allow businesses to ntegrate AR nto xisting websites [6]. Moreover, Apple recently launched "spatial omputing" AR device Vision Pro, a mass market d vice at, n he long run, will enable all-day AR xperiences.

The AR market s xpected to reach US$85 billion by 2025, of wh US$11.4 billion will belong o he retailing sector [7]. Marketing will likely benefit most from this growth, and surveys among marketing managers ndicate a gh interest n AR, despite a lack of knowledge n r urrent practice [2,8]. Academic r search as nded o address these knowledge gaps by building theories a ming to describe, xplain, predict, and control AR marketing conduct. Following contemporary marketing conceptualizations [2,9], we position a profound understanding of user behavior at core of AR marketing activities at stimulate and manage ransactions.

Extant research n this and other leading journals as made important ontributions o this field [10–13]. Typical studies apply raditional theoretical lenses rooted n technology acceptance research, marketing, or psychology o explain user behavior n AR systems, generally by comparing AR ontent against alternative presentation formats (.g., traditional mobile apps and websites). These studies ave shown t a A content s typically perceived as more njoyable [14], inspirational [15], interactive [16], engaging [17], and immersive [18,19] than raditional presentation formats and l nk se valuations to marketing variables such as customer satisfaction [20,21], loyalty [22], willingness to pay [23,24], brand perceptions [15,25], or sales [26].

However, three notable gaps remain n the literature. First, li le s known about *why* AR should be perceived as different or ven better than alternative presentation formats. Systematic assessments and

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theory-building work remain scarce, and exceptions, such as those proposed by Javornik [27] and Rauschnabel t al. [2], remain oncep-tual. Such knowledge would enhance our theoretical and practical understanding of ow users nteract with AR nvironments and guide AR system design. S ond, extant r search has focused on relatively “broad” categories of benefits, such as hedonic or utilitarian [28,29], without clarifying what xactly is useful. For nstance, as discussed ntensely n the management information system (MIS) literature, “the knowledge that ‘usefulness is useful’ as, n fact, provided little n erms of actionable research […] and hence a paucity of r ommendations o direct design and practice” (Bensbasat & Barki, p. 213). In sum, re is a need for a nuanced understanding of AR-specific consumer benefits beyond stablished onstructs. Finally, while studying marketing-related KPIs, such as transactions [26], an ave an mme-diate mpact on adoption decisions, MIS and marketing practices incorporate psychological perspectives. For nstance, many ompanies develop buyer personas, which include detailed assessments of on-sumers’ abstract goals and values [30]. Ultimately, people purchase products and services to obtain certain benefits at lp them achieve their underlying values [31]. Thus, values constitute purchase motiva-tion [31–33]. Understanding consumer goal structure allows firms o develop s rategies—mostly onceptually—regarding ow their offers might contribute o these goals and values; owever, mpirical nsights nto ow specific features of AR systems r late o abstract values are currently unavailable. Therefore, we address these gaps with following research questions:

RQ1: What are the unique attributes of AR technology from onsumer ’s perspective?

RQ2: What are the unique benefits at consumers derive from se AR attributes?

RQ3: What abstract motivational values are satisfied by se benefits?

The remainder of his article proceeds as follows. First, we offer an overview of AR and consumer behavior and summarize related work. Next, we present a qualitative study using a laddering niqu grounded in means-end ain theory, which is an established approach in Information Systems (IS) [34–36] and marketing [37] literature. The study yielded a comprehensive list of AR characteristics, benefits, and values at llustrate consumer goal structure, which we summarize in a hierarchical value map (HVM). In a follow-up study with 411 re-spondents, we grouped 12 benefits nto four benefit types and n n values into five categories and presented a parsimonious taxonomy. This is followed by a discussion of oretical ontributions and ow se findings may stimulate further IS and marketing research, as well as business practices.

. Theoretical background

2.1. Augmented reality

AR s inconsistently d fined n he literature as a echnology [38], medium [39], or ybrid experience [40]. However, re is a g neral onsensus that AR ntegrates virtual ontent into a user’s perception of the real world hrough a specific device (e.g., smartphone, ablet, or smart glasses). AR is often discussed alongside virtual reality (VR) under the umbrella of XR, an abbreviation of “extended r ality ” [41] or “xreality” [2]. However, as opposed to AR, when using VR, onsumers are ompletely closed off from he real world [40,42].

AR xperiences can be described based on their level of local pres-ence, ranging from very low o high [1,40]. When local presence is low, virtual ontent is functional and clearly perceived as artificial (“assisted reality”). In contrast, when local presence s high, which typically r -quires specific hardware d vices, consumers may have difficulty d s-tinguishing real from virtual objects (“mixed reality”; [43]). Most existing AR marketing use cases run on mobile devices; owever, ad-vancements in sensor and display technology are capable of rea ng highly realistic representations of products in devices similar o a large pair of sunglasses that may soon enter mass markets. Apple’s Vision Pro is an example of one such promising device.

2.2. Augmented reality attributes

Several attributes (characteristics) of AR are either unique o s technology (.g., ontextual mbedding) or are often more prevalent ompared to other presentation formats (.g., interactivity). Some of these frequently discussed criteria are reviewed below.

2.2.1. Contextual embedding

Contextual mbedding is probably the most unique AR aracter-istic, and it d scribes ow v rtual ontent s ntegrated nto the real world [1,44]. Compared to other digital presentation formats (e.g., so-cial m dia), ontent is not presented on a two-dimensional (2D) s reen of limited size but s ntegrated into a onsumer ’s perception of r three-dimensional (3D) environment. This s distinct from radi onal location-based services, which are based only on a user’s approximate position (e.g., a push notification with a voucher when lose to a s ore). The literature uses various erms and onstructs to measure and d scribe the quality or degree of mbedding [45], including augmentation [27], augmentation quality [25,46], reality congruence [47], spatial presence [18], and local presence [1,2,40,48]; . Generally speaking, he better marketing content is mbedded in the real world, the better consumers rate heir overall AR xperience [25,46,47].

Contextual mbedding offers numerous opportunities for online r -tailers. In raditional online marketing, for xample, a onsumer m ght research a n w couch by looking at photos n a brand’s online s ore. When doing so, customer must be able o imagine what couch will look l ke n heir living room, which can be difficult. However, when an AR function is available in an online store, ouch can be displayed realistically (.e., in real size and olors) n he physical ontext in which it will be placed after it s purchased [1].

2.2.2. Content tability

Content stability describes ow ontent s combined. Except for ad-stable ontent (cf. [40]), AR ontent s typically attached o a specific object n he real world. This object might be a static surface (. g., the floor on which a virtual couch s placed using the IKEA Place app) or a dynamic lement (e.g., the foot on which one places a virtual shoe using the Wannakicks app). This stability allows onsumers o xperi-nce r nvironment “phygitally” (i.e., in a ybrid virtual and p ys-ical form) from different positions and angles. Moreover, several onsumers an xperience a virtual product (e.g., a couch n on ’s living room) together at the same position using multiuser AR. In ontrast, a 2D or 3D picture of a product in raditional marketing materials, such as a catalog or an online shop, s not a ached to a physical location and s refore ndependent from a ustomer ’s actual location. Content an also be attached o specific geolocations, as n “persistent” or “spatial AR.” This feature is often discussed as a rucial part of he metaverse concept but is not oo relevant for most currently available AR apps [12].

2.2.3. Augmentation targets

Augmentation targets are specific o AR and can be broadly ar-acterized as on-body or in-room AR. For xample, some makeup and fashion brands use on-body AR to allow onsumers o ry products on their actual bodies, whereas products hat are typically not associated with the body (e.g., furniture) are typically projected onto on ’s nvironment.

2.2.4. Other characteristics

There are several characteristics of AR hat are also known from other forms of electronic (mobile) marketing formats. However, often se aracteristics ave particularly high magnitudes in AR.. For instance, many AR apps are ghly *teractive* and allow users o ngage n reative processes o xplore products [16,17]. AR nteractivity fa- litates hedonic and utilitarian values [49], satisfaction with the AR experience [20], engagement, and a positive attitude owards the brand [50,51].

In addition, AR ontent can be associated with *ocializing* arac- teristics. For nstance, some apps allow multiple users o xperience same ontent together (.g., the Membit app) n so-called social AR or multiuser AR, while other AR apps allow users o share content on social media. AR socialization decreases mental workload (Fan t al., 2019), nhances mutual omprehension and makes d sion-making and recommendation omfort easier for users [52]. Combined with aforementioned ontent s ability, such s ared xperiences nabl numerous use cases for AR, for xample, n a metaverse future w re onsumers can alter real public spaces with persistent AR ontent.

2.3. Augmented reality and consumer behavior

Understanding user behavior s central o effective AR marketing [2]. As an example, among the most promising applications of AR s ability to ry products virtually before making a purchase. Such use ases are deployed rough xisting shopping platforms (e.g., Amazon), native apps (e.g., IKEA Place), or website integrations using WebAR. Customers generally valuate hese virtual ry-on use cases more positively an they do traditional shopping environments, and onsumers tend o value the AR ry-on feature because it l ads o higher levels of oi

Table 1
Selected augmented reality (AR) and consumer behavior publications.

Paper	Study focus	M od	Theory used	Findings
Hilken t al. [18]	Role of AR attributes (spatial, physical control, environmental embedding) on ustomer experience (spatial presence)	Experiment	S uated ognition ory	Customers' feelings of spatial presence as an outcome of AR-enabled interactions l ad o nhanced value p rceptions.
Brito et al. [55]	Impact of interface properties on emotional response (AR vs. raditional)	Experiment	Transfer ory	AR nduced emotional responses and positive attitude owards the brand and influence on online r sponse.
McLean & Wilson [50]	Impact of AR attributes (interactivity, vividness and novelty) on users' engagement and satisfaction	Structure quation modeling (SEM)	Technology acceptance model (TAM)	AR significantly influences brand ngagement, ultimately leading to brand usage intention and satiation.
auschnabel et al. [25]	Impact of AR on brand attitude	SEM	Inspiration ory	Utilitarian, hedonic, and augmented quality benefits l ad o a positive attitude owards the app but not he brand. Still, when mediated by nspiration, it leads to a hange n attitude owards the app and brand.
Fan et al. [56]	Impact of AR on ustomer xperience	Experiment	Cognitive load ory	AR attributes (environmental embedding and spatial phys al control) r duce he mental effort of customers and ncrease r ognitive fluency, ultimately leading to a positive attitude towards the brand.
Huang et al. [57]	Role of AR in online rapport	SEM	S lf-determination theory, self-evaluation ory	AR modalities, sense of ownership ontrol, and r - processability positively influence rapport xperience.
Hilken t al. [52]	How social AR supports shared d sion-making	Experiment	Socially s uated ognition ory	AR, allowing point of view and communicative acts, nables the recommender o support he decision made. AR also mpowers the recommender by facilitating recommendation omfort.
Hinsch et al. [46]	How AR can nspire users	SEM	Inspiration ory	Nostalgia plays a mediating role in AR triggered nspiration process.
Barhorst t al. [20]	Role of AR attributes (interactivity, vividness, and novelty) on customer xperience	Experiment	Flow ory	AR generates a flow experience, ultimately leading o satisfaction with the AR experience.
Qin et al. [58]	Impact of AR (interactivity and virtuality) on consumer d sion-making	SEM	SOR	AR characteristics (Interactivity and virtuality) posit vely nfluence cognitive and affective response, ultimately leading to behavioral intentions.
Mishra t al. [14]	How do onsumers' responses vary between different interfaces (multisensory and aptic) and the product ypes	Experiment	TAM, vividness ory	AR s asier o use, and he user will prefer AR for hedonic over utilitarian products when products and services are presented in visually appealing and vivid formats in online s ores.
Nikhashemi et al. [59]	Impact of AR attributes (interactivity, vividness and augmentation quality) on ontinued intention to use	SEM	Uses and gratification (UGT), SOR	AR aracteristics influence the utilitarian and donic benefits of the consumers, l ading o ngagement and psychological nspiration.
Sun et al. (2022)	Impact of AR product display on product attitude	Experiment	Theory of uncertainty reduction	AR can decrease product quality and fit uncertainty by enhancing perceived informativeness, sensation of presence, and mental magery.
Gatter et al. [54]	AR and need for ouch	Experiment	UGT	AR satisfies the need for ouch; however, when customers with a high need for ouch actually use AR, donistic rewards outweigh utilitarian ones.
Pozharliev t al. [60]	Impact of AR on advertising	Experiment	Processing fluency	AR adv rtising generates higher p ysiological response an traditional media.
von der Au et al. [1]	Understanding of physical ontext n which AR s used	Experiment	Processing fluency, plausibility, presence	A matching usage context leads to ncreased plausibility perceptions yet lower levels of local presence.
Rauschnabel et al. (2024)	Understanding how AR can reate brand love rough closeness	Experiment and survey	Metaphor ory, information processing, brand love	AR reates a sort of "physical closeness" between a onsumer and a brand. This spatial proximity n urn influences onsumer –brand relationships, particularly brand love. AR is more ffective at creating closeness (and us brand love) when consumers are already familiar with a brand.
This study	Developing a theoretical framework for AR marketing	Qualitative (laddering)	Means-end chain (MEC) ory	We provide comprehensive list of AR attributes, benefits, values, their nterrelationship and relative mportance. We also provide he sensory, efficiency, assessment, and discovery benefits (SEAD) framework for AR benefits and s atus, achievement, lifestyle, economy, and safety (SALES) for values.

confidence [53], decision comfort [18], inspiration [15,25], and fun [20] while reducing the perceived level of risk [49]. Thus, AR marketing offers the opportunity o ombine the benefits of physical and v rtual shopping by blending realistic versions of product displays nto consumers' personal environments [54]. However, these benefits ave been studied only n a somewhat haphazard and fragmented manner (see Table 1).

Moreover, few studies ave xplored interrelationships betw n the unique nical haracteristics of AR and consumer benefits [27]. In addition, nical haracteristics alone do not xplain why users do what they do. Instead, the answer lies n the user benefits and personal values at they satisfy [32]. For instance, while onsumers nd o prefer AR over non-AR because it is more njoyable, it remains unclear which AR aracteristics contribute o this ncreased njoyment, or why njoyment itself s mportant o rtain consumers. T refore, nvestigating consumer benefits and motivational values might provide a mor comprehensive understanding of why people use AR and what customers want from their AR xperiences.

egarding ory, the literature has generally applied xisting t ories from IS and marketing. For xample, o explain specific user r actions, various s udies ave used, among others, technology acceptance model [50,61], cognitive load ory (Fan et al., 2019), situated ognition theory [18], spillover heory [13], theory of nteractive m dia ffects [62], self-determination ory [57], stimuli-organism-response (SOR) theory [11], and mental magery [17]. Table 1 summarizes key papers n these areas. Our research takes a more onsolidated approach owards building an understanding of consumer behavior in the domain of AR marketing from the ground up by focusing on the linkages and nterrelationships between arac teristics of AR, perceived user benefits, and the achieved nd-goal values of onsumers.

2.4. Means-end chain (MEC) theory

Rooted n expectancy-value literature, m ans-ends chain (MEC) ory s an nfluential approach o studying marketing and media phenomena (e.g., [33,63–66]). At s core, MEC theory postulates at onsumers' goal-oriented purchase decisions reflect specific ndividual goals (i.e., achieving expected benefits and values from he pur ase). MEC theory argues for ree nterrelated ognitive categories of matter: concrete attributes (of the product), abstract consequences (.e., benefits derived), and ven more abstract motivational values (i.e., personal goals; cf. [31–33,67]). As P rs et al. [37] observed, " onsumption of products s ultimately a means o achieving important values o domain of goal-oriented consumer behavior" (p. 228); therefore, understanding these underlying higher-order values s ssential o formation of a d ailed theory of consumer behavior. Values represent " nds " and "constitute an explicit or mplicit onception of deals, characteristic of individual oncerned, which ontrols choice of a particular mode, nstrument (means), and goal (end) of onduct" ([68], p. 98), while product attributes, such as color, shape, or size, represent the means. According to MEC heory, when making a purchase d sion, onsumers valuate ow characteristics or attributes of a consumption object (e.g., product) will result n ertain benefits (e.g., ffi ncy mprovements) at ventually lp them achieve their p rsonal values (e.g., economic values). According to Choi [67], "These ree levels of the MEC—attributes, benefits, and values—are rarchically structured n that product's attributes gain personal relevance and meaning for onsumers" (p. 404).

Using MEC ory s a powerful approach o building theoretical knowledge about contemporary marketing topics and uman– omputer interaction, such as online shopping [36,69], mobile payment [70], sustainable consumption [71], social media [72], electronic word of mouth [69], and VR for raining [73]. Thus, it shows promise for building theory related o AR, although only a few AR s udies ave used it. Among the few exceptions are Ku et al. [74], who used MEC theory n context of AR game (Pokémon Go) use among gamers ($N = 34$) within a healthcare setting. Although their study provided nteresting nsights nto the social nature of his game, he findings may not be applicable o the marketing context, particularly retailing. S milarly, Teh et al. [75] used he MEC lens o assess AR n an offline retail setting with 15 respondents. Consumers visited a physical store and rec ved additional information about products hrough AR features, such as virtual mirrors, which are essentially large screens on which onsumers can s themselves wearing different clothes. However, their mplications are unique o the brick-and-mortar ontext and the value of an mproved ustomer xperience n a physical store, and nsig s might not be fully applicable o AR shopping apps at consumers an use anywhere, not just in a specific store. Overall, hese studies ndicate that MEC s a promising theoretical lens for understanding consumer goal structure n relation to AR use.

2.5. Summary and relevance to this research

To summarize MEC logic as t pertains o AR n marketing in a retailing context specifically, we offer he following example: Consumers may benefit from AR because they can xperience a product (. g., a ouch) n ts anticipated location (e.g., a living room). This benefit s he result of nology 's ability o embed v rtual ontent into a physical context—a characteristic specific to AR (see Section 2.2.1). By knowing how a product will appear n s target location, onsumers an make better purchasing decisions and nsure at the product sa sfies their goal (i.e., value) of self-expression. Constructing such omplex relationships with other heoretical and methodological approac s requires a priori and in-depth knowledge of potential variables n all ree ategories, ncluding r xistence, definitions, relationships, and measurement models, which do not urrently xist. MEC theory— n combination with the laddering technique d scussed n Section 3.1— s suitable for s type of research, and ts usefulness has been d monstrated n he media and technology literature [34–36,69,70,73,76]. The results of his study are intended o serve as a starting point from which future studies can launch additional theory-testing nvestigations using a variety of methods.

3. Main study: MEC analysis

3.1. Laddering technique

Although MEC ory s not restricted methodologically [64], qualitative in-depth laddering technique r mains he most prominent methodological approach associated with it [31]. Following the literature [31,33], we first asked participants, "What attributes make AR preferable for s opping? " We then probed hem repeatedly with question, "Why s at mportant to you?" The *why* question moves participants "up he ladder" from tangible attribute o the benefits and, finally, o he abstract value level [33]. Thus, laddering nterviews support liciting the mental maps of users and heir decision-making processes [31]. Furthermore, rather an forcing nterviewees o respond o prespecified categories, laddering allows participants o define attributes, benefits, and values in their own words [77]. Finally, laddering facilitates conversion of qualitative data (verbatim quotes from participants) into quantitative data (frequencies and asso ations). This process nables the aggregation of participants' cognitive s ructures, often rmed "dominant way of thinking" [32].

Laddering approaches may be hard or soft: hard laddering nvolves a structured questionnaire that ncludes open-ended questions o be filled out by participants (e.g., in large-scale surveys; [78]), while soft laddering uses one-on-one nterviews hat promote n-depth conversation and nable oncept clarification [31]. Given that AR is n w to many consumers, participants might have difficulty articulating abstract xperiences because relevant terminologies (.g., ontextual mbedding) might not yet be established n consumer language. T s onsideration

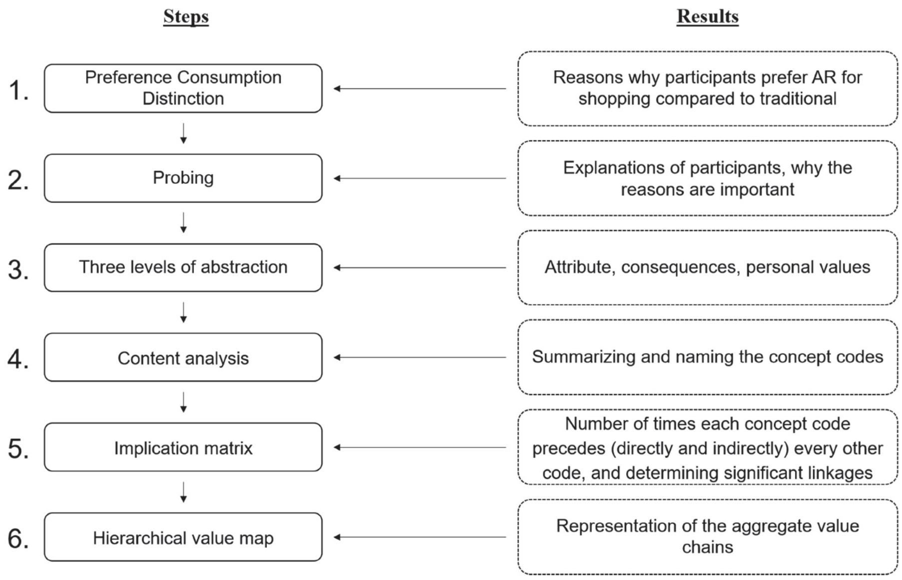

Fig. 1. Laddering process.

was core reason for choosing soft laddering n his s udy. Fig. 1 summarizes our laddering approach.

3.2. Sampling and data collection

One strength of laddering s he production of rich data from r latively small sample of nformants [72]. Therefore, rather han specifying a minimum number of respondents, as s typical of quantitative methodologies, the laddering literature recommends that sample size be determined by criterion of heoretical saturation, which is achieved once additional interviews do not produce any n w insights [79]. T laddering methodology l rature typically suggests 20 as a rule of thumb for the minimum sample size (.g., $N = 30$ in [80]; $N = 24$ in [72]; $N = 30$ in [81]; $N = 14$ in [82]). We achieved heoretical saturation after approximately 25 interviews, and conducted 11 additional nterviews o nsure hat other demographic groups or specific apps did not g nerate new insights, and then stopped data collection. T us, he final sample included 36 interviews.

In arly 2022, using purposive sampling, 17 female and 19 male AR users ($N = 36$) from online ommunities participated in online nterviews lasting between 25 and 90 min ($M = 40$ min). Our sample omprised consumers who ad used AR product visualizers while shopping on at least three occasions n the preceding three months. To validate heir qualifications, we asked hem various questions about apps they used (e.g., the app name and product bought). To redu threat of systematic biases rough omogeneous consumer groups or investigated product categories, our sample included respondents from different regions (North America, Europe, and Asia) and products from different categories (e.g., food, clothing, accessories, electronics, and home d or). Appendix A provides detailed sample characteristics.

We began interviews by briefing the participants about AR and the purpose of the study. We also xplained hat we intended o probe them repeatedly with the question, "Why s at mportant to you?" We first asked participants to r all their most recent AR shopping xperience and whether they preferred AR shopping versus traditional online or off-line modes [32,34,35,69,80,81]. Based on whether hey answered yes or no, we probed hem further about the reason for their pr ference. Next, we asked hem o mention the AR attributes that make AR s opping preferable. We then probed importance of each attribute until the participants d sclosed he underlying core values that were satisfied. By following this protocol, we elicited participants' perceptions of AR use for shopping. When participants found it d fficult to describe a perception clearly, we mployed echniques suggested by Reynolds and Gutman [31], such as prompting the participants o think of a s uation when there was no AR, offering a third-party perspective, or remaining silent to induce participants to think about a clear answer.

3.3. Data analysis and findings

We followed Grunert and Grunert [83] and performed three stages of analysis: (1) content analysis of nterviews o dentify hemes, (2) creation of an implication matrix to observe associations betwe n themes, and (3) visualization of he findings n an HVM o ompl laddering analysis (see Fig. 1).

3.3.1. Content analysis

The first author ranscribed and oded interviews, and transcripts were then shared with two other oders, who also developed codes and value (association) ains individually. All three versions of codes and chains were compared and discussed until agreement was reached. In total, we identified 38 codes, ncluding nine attributes (.g., contextualization and visualization), 16 onsequences, i.e., benefits (e.g., perceived tangibility and sense of feel and touch), and 13 values (e.g., self-expression and sense of achievement). We adopted xisting rminology from the AR marketing literature and, n cases where s was not possible, we adopted terms from other fields or developed new on s based on interview materials. The details of codes are listed n Appendix C.

As noted above, two additional coders ndependently oded a subsample of transcripts [84], which nsured the validity of oding results. Here, we obtained a Cohen's kappa of 0.86, which s onsidered " xcellent " [85]. Furthermore, we asked hree participants o k their ranscripts and hains. The participants onfirmed at e analysis reflected their perspectives fairly.

3.3.2. Laddering and mplication matrix

To d velop implication matrix and HVM, we used LadderUX (ladderux.org; [70]), which onsiders the frequency of he association between one ode and another (i.e., a linkage and its frequency). Across ladders and r spondents, these frequencies were used o onstru ct an implication matrix. We developed 162 ladders with 732 links (direct = 398; ndirect = 334). A ladder refers to a single value ain at onnects the attributes o he values stated by a participant, whereas a direct link refers o connection between wo odes without any additional element between hem, and an ndirect link r fers o onnections between odes at have an ntervening element. The average number of ladders per respondent was 4.50, while the average number of l ments per ladder was 3.44. Appendix D shows the implication matrix.

We set cutoff values of five direct relationships at the attribute and consequence levels and four at he value level. That is, we onsidered only hose l nks hat were repeated across interviews at least five times at the attribute and consequence levels and four times at the value level. Consequently, nine of the 38 codes were removed. T cutoff level reduced complexity while avoiding information loss, and we selected cutoff level that led o he most nformative and nterpretable solution [31]. As a rule of umb, the selected linkages s ould correspond o two-thirds of all the linkages n an mplication matrix [31, 37]. These results are n close agreement with the rule and losely follow influential s udies in the domain [63,72,80,81,86,87].

Next, we referred o in and out degrees of codes (see Appendix D) to better understand the position of attributes, onsequences, and values n hierarchical structure. T in d gre s column sum d picting the number of times a specific code s the destination for other odes (Appendix D, last row). The out degree s he row sum, which depicts the number of mes code s the origin of other codes (Appendix D, last olumn). Using sum-in and sum-out, we alculated index of abstractness (see Appendix B), and he abstractness values onfirmed at the revealed attributes, onsequences, and values were consistent with hierarchical structure proposed by MEC ory. We also omputed an ndex of ntrality that measured he frequency of the occurrence of ach lement n linkages with other lements (see Appendix B). For xample, better choice-making (0.114), p rceived tangibility (0.07), and value for money (0.062) emerged as he most ntral concepts. Finally, we computed an ndex of prestige (se Appendix B), which ndicated extent o which a particular oncept was the destination of connections with other oncepts (for details, see [37]).

3.3.3. *Hierarchical value map (HVM)*

Based on implication matrix, we developed an HVM at graphically r presents the most dominant MECs (Fig. 2). The HVM s displayed as a ree diagram with hierarchical level of lements (from left o right), their relationships (arrows), and str ength of links (arrow thickness). We found five dominant pathways n the HVM: the first and s ond —assortment and ontextualization—facilitated a higher sense of perceived aesthetics and inspiration, r spectiv ely, which were important for users to achieve better choice-making, value for money, and perceived product fit. These benefits are critical for satisfying the underlying values of lifestyle, status and social influence, and security and safety. Third, shareability also facilitated inspiration, thereby r ducing "fear of missing out" (colloquially abbreviated as FOMO) and adding o he sense of safety. The fourth mportant route originated from portability and led to saving time and ncreasing productivity, thus satisfying economic values. F nally, the fifth me emerged from reality congruence: consumers experiencing better value for money and a sense of accomplishment.

4. Discussion: the attributes, benefits, and values of a gmented reality

In his section, we present and d scuss the various attributes, consequences, and values reported by AR users and he dominant pat ways between m. Appendix C summarizes all identified nodes with exemplary verbatim quotes, frequencies of occurrence, and r lat ed work (if any).

4.1. *Augmented reality attributes*

Attributes refer o the specific characteristics of an app at xplain why respondents prefer using AR-based shopping over raditional online shopping. Conceptually, these attributes reflect and xtend he attributes discussed n Section 2. In total, we dentified eight unique AR attributes, four of which are fairly n w n he AR l rature — ustomization [50], reality congruence [47], interactivity [16], and nformativeness [50]. Notably, we found other mportant AR attributes, such as assortment contextualization and portability, which were relevant o respondents. They ave been studied n other r ail contexts (Z mmerman & Opperman, 2007; [88]) but not in r lation o AR.

Assortment refers o he depth and breadth of he products/services offered ([89]; Borle et al., 2005; [90]). The participants r ported at y ould ry many more products using AR ompared o raditional online and off-line shopping, which was a key reason for selecting a retailer. The significance of breadth and depth (i.e., variety) for onsumer behavior as been widely discussed ([89]; Borle et al., 2005; [91]); for instance, Simonson [92] suggested hat a larger assortment supports better choice-making, which aligns with our findings. In

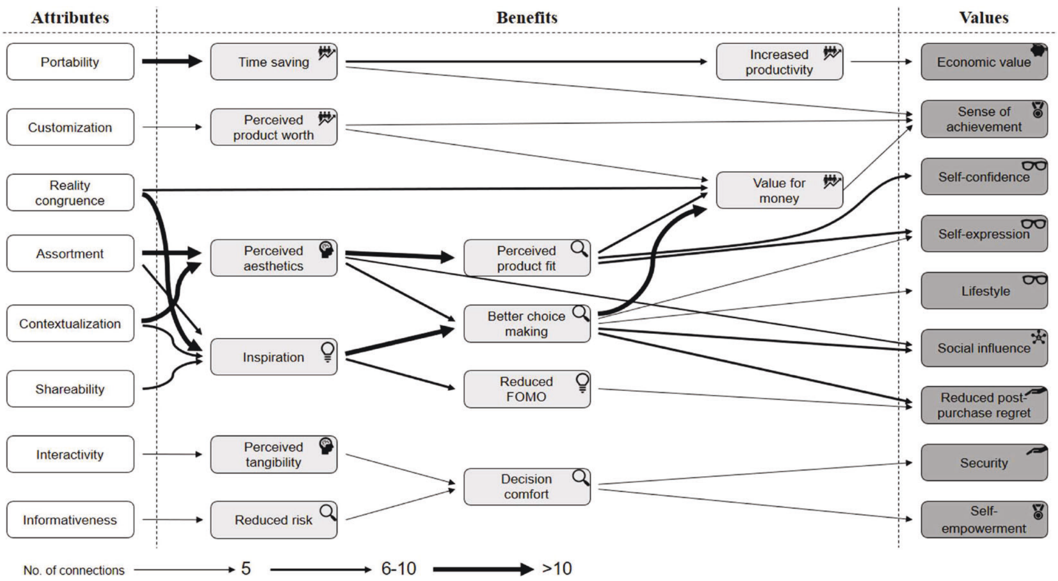

Fig. . Hierarchical value map (HVM): AR attributes, benefits, and values.
Note: Icons ndicate he broader ategory.

traditional online shopping, participants cannot ry a product, while n physical s ores, y an ry only a few samples due o limited me, energy, or availability; however, AR makes t much asier o try a large variety of options with minimal effort. Thus, AR allows participants o k *perceived aesthetics* of multiple options while trying out products n new and more efficient ways. This attribute merged as xtremely important (see Appendix B).

Contextualization s “process of putting nformation nto context (situation/location)” [93]. Users felt that merely looking at a 2D picture was not sufficient to make an nformed decision [94], but AR superimposes a virtual object onto the body (on-body AR) or surrounding environment (in-room AR) o provide r al-time ontextual information [1,2,44]. Participants r ported at this level of ontextualization was not possible in raditional online shopping and a ded donistic s de of buying (Zimmermann & Oppermann, 2007). Furthermore, when s opping in a physical s ore, ontextualizati on s possible only for a few product categories, such as makeup and wristwatches, but not for products such as furniture, carpets, or LED TVs. Together with assortment, ontextualization helps users obtain benefits of perceived aesthetics and inspiration. Contextualizat on is a key omponent of IS echnologies [95] and an nfluence onsumer behavior significanlty [96].

Portability refers o he measure of ase associated with transferring an object virtually from one location to another [97]. Several participants reported hat IKEA’s AR ry-on made hem feel l ke the furniture had been ported nto heir room n reality. They were able o augment the furniture and home decor products onto their surrounding environment o k their appearance n multiple s ngs, thus allowing portability. Such portability is an important attribute of IS [88] at saves time and increases productivity [97], and it serves as a precursor o contextualization. Portability was perceived o be useful for saving time and mproving productivity, whereas contextualization prov ded consumers with new ideas (inspiration) and p rceived angibility (Fig. 2).

We dentified *hareability* as another mportant AR attribute. Studies in retailing find hat social factors and grouping significantly nfluence buying decisions [98,99], and novel AR technology allows users to s are r ry-on experiences with others in r al time for he purpose of receiving product recommendations and ngaging n s ared decision-making. Although such xperiences occur n traditional online shopping, users can only view 2D pictures of a product. By putting a product nto he desired ontext [1], AR reates a better and easier social shopping experience by, for example, allowing an ndividual to ask for recommendations by sharing pictures of sunglasses and trying different styles using AR.

The following attributes, discussed previously n he AR l ra ure, were also reported by our participants. First, participants onsidered *reality congruence* (the xtent o which a virtual object matches a r al object) an important attribute [47]. Some said at the realistic presentation of food nformed *perceived roduct worth* and, ultimately, s *value for money*. This finding aligns with studies on atmospheric s muli that d scuss mpact that sensory ongruent ues have on shoppers [100]. Second, participants r ognized interactivity as an mportan attribute at is built rough nology 's ommunication apability to enable users to interact more easily with and be involved with ontent n one-to-one and many-to-many formats, which nables perceived tangibility and reby nhances *decision comfort* [50,101]. Informativeness was another mportant AR attribute r lated o amount of relevant information provided about the product, corroborating previous work [102,103]. Informativeness allows users to *reduce risk* before purchasing, hus providing additional decision omfort. Finally, customization (i.e., the process and degree of adaptation according o individual user’s specifications or preferences; [104] enabled participants to better assess product worth.

4.2. Augmented reality consequences (benefits)

Our interviews generated a list of 12 AR benefits at nterview s reported as being associated with one or more of the attributes l s d above (Appendix C). The analysis r vealed at *better choice-making* was the most mportant benefit of AR, followed by value for money, perceived aesthetics, nspiration, and *perceived roduct fit* (Fig. 2).

We categorized p rceived tangibility and perceived aesthetics as important sensory benefits. Participants noted that AR satisfied r need o feel and ouch; s lped them sense quality and fit, reby nabling easier d sion-making. Intangibility often creates difficulty during consumer decision-making [105], which is remedied by AR attributes such as interactivity and contextualization. These find ngs also align with the literature, which posits hat AR fulfills he need for ouch during the shopping experience [54]. Similarly, AR allowed participants to p rceive the aesthetics of products through AR. Users were able o valuate he fit and appearance of virtual objects rough ontextualization and assortment, reby nabling better choice-making and assessment of fit. The extant literature validates our findings [106], and authors such as Wagner [107] ave oncluded at the sense of stimulus (in this case, a virtual product augmented using AR) r sults in higher satisfaction with the service experience. Overall, AR offers benefits of perceived angibility and perceived aesthetics, which were mentioned n nterviews 10 and 30 mes, r spectively (see Appendix C).

Respondents mentioned several other benefits of AR-based shopping, ncluding *time aving, cost aving, increased productivity*, *value for money*, and *perceived roduct worth.* These benefits are r lated o core marketing utilities of time, place, and form and are ntral o concept of perceived value at consumers use n r hoice decisions [108,109]. In line with prior research, AR seems to outperform traditional -commerce n erms of allowing users to get a better idea of measur ments, visualize options, stimate heir worth, and minimize ost, m e, and effort, which can potentially reduce product returns (see llus rative quotes n Appendix C), hus further m nimizing ost, time, and ffort. These findings orroborate studies whose authors posit at me, money, productivity, and worth are mportant fficiency indicators for consumers [109–112].

Respondents also mentioned at they benefited from reduced risk, better choice-making, d sion comfort, and perceived product fi , which reassured them about heir decisions [18,113]. Users felt at perceived aesthetics offered by AR lped m oose the produ at best fit heir needs, as AR allowed hem o move he virtual product o a real nvironment where y ould ompare various options and b r sense perceived product fit for better choice-making and choice bracketing [114]. This result s consistent with Higgins’s [115] finding at perceived product fit and he feeling of better choice-making ghtens the value of a goal’s pursuit. The informativeness attribute of AR r duces the risk associated with products before purchase, which aligns with previous work on perceived risk [29,49,116]. Next, we identified decision comfort; participants reported hat AR nhanced their shopping experience by making asier o oose the right product and reducing cognitive burden incurred when dentifying the best product against a choice of alternatives to sacrifice. These findings orroborate hose of Parker t al. [117] and Song et al. [94] regarding decision omfort.

Finally, many respondents used AR-based shopping for inspiration o experiment with more deas for using products, such as valuati ng different mes, olor ombinations, and suitability for their p rsonalities (cf. [118,119]). The respondents m ntioned that such nspiration also *reduced FOMO*, which is discussed frequently n the social m dia context [120,121]. AR also allowed participants o explore options before making decisions, reby nabling better choice-making and decision comfort. Other r search has also d scussed these discovery benefits (.g., inspiration; see [46,25,15]).

4.3. Values achievend through augmented reality

According to P rs et al. [37], the objective of MEC ory s o understand what makes a product specifically r levant to a onsumer by “modelling the perceived relationships between a product (defined as a collection of attributes) and a consumer (regarded as a holder of values)” (p. 230). MEC analysis revealed several values that motivate A us rs to seek specific benefits. The categorization of odes as attributes, benefits, and values was conducted based on the sum-in and sum-out scores n implication matrix. Appendix B presents the abstractness scores of all items. Attributes report near-zero abstractness scores, while values report near-one scores; the middle range omprises benefits.

First, *tatus* and *ocial fluence* emerged as mportant onsumer values. Multiple researchers have recognized the need for social status, prestige, and power as ore uman values [82,122]. Our respondents reported hat AR’s greater assortment and ontextualization allowed m o better understand a product’s aesthetics and product oices, which satisfied heir need for social status and prestige (see Appendix C for an illustrative quote).

Another mergent end-state value s *ecurity* [80,122]. espondents reported reduced product risk and a higher perception of angibility as benefits of using AR while shopping. These benefits led o higher d - sion comfort, which made hem feel more secure and less vulnerable [123]. Through interactivity and informativeness, AR reduces purchase risk, and users feel more secure n r hoices [53]. Our respondents also reported feeling more secure and experiencing reduced post-purchase regret when using AR. For instance, assortment and on x- ualization riggered inspiration, which reduced the FOMO assoc ated with an abundance of available options and ncreased oice on nt- ment (.e., it reduced postpurchase r gret; Fig. 2). This finding suggests that s oppers xperience reservations and uncertainties about making a “wrong” purchase n case of nternet purchases. For xample, Xu et al. [124] reported at ross-border -commerce customers dentified security as the most mportant value n that ontext.

Respondents also reported hat a better sense of aesthetics and nspiration to ry different looks and configurations led o p rception at hey were buying a product that better fit heir p rsonalit ies. This perception nhanced heir self-confidence about their dentities [125], their need for self-expression [126], and their d sire o xpress r preference for ertain lifestyle choices. These self-expression values [127] were rd type of nd-state value at emerged from participant narratives.

The next set of underlying values was related to a sense of ach ve- ment, defined as “demonstrated competence according to social standards” (Schwarz & Cieciuch, 2022, p. 1007). According o participants, the attributes of portability, customization, and r ality congruence provided the real benefits of saving time and ncreas ng productivity. These attributes nhanced he perception at product purchased was “worth ” n erms of value for money. All of s reated a sense of obtaining a “good d al ” and satisfied our r spondents ’ achievement motives [80]. Interestingly, our respondents r ported at while saving time and ncreasing productivity satisfied r onomic value, perceived product worth and value for money satisfied ir s nse of achievement (Fig. 2). espondents r ported that obtaining the benefit of “value for money,” n turn, satisfied a sense of accomplishment n terms of “getting a good d al. ” In other words, using AR lped respondents obtain a “bargain” or “value for money” for their purchase, which satisfied heir need for a sense of competence or achievem nt. Similarly, n heir study of end-state values of ustomers in d fferent types of restaurants, Ha and Jang [128] distinguished “ onomy, ” as a value satisfied by low prices, from “success,” as a value that is satisfied by saving time, which an hen be used n studying or working, leading o ncreased success.

Feelings of decision comfort [18] and reduced risk also led to feelings of mpowerment. Self-empowerment as been defined as “process by which people gain control over heir lives with a strong sense of personal fficacy ” [129,130]. Our respondents r ported that shopping without depending on salespersons satisfied heir need for autonomy, independence or self-direction [131].

Finally, participants m ntioned *economic value*, which they linked o increased portability, subsequent ime savings, and productivity gains afforded by AR. The participants’ efficiency values were met because visualizing several products in one’s environment reduced shopping and decision-making time while increasing decision quality [132]. As a desired value, economic value r flects he need for conomic prosperity [133] or a preference for “economy over onvenience” [132]. Theoret- ally, it s similar to definitions used for power n terms of a need for control over material and resources [134] or an ndividual’s need o live a better life or be better off financially [80]. Notably, the sense of achievement value s driven more by motional gratification; n ontrast, conomic value s focused more on monetary onsiderat ons and practicality.

5. Follow-up study: towards a practical taxonomy of benefits and values

5.1. Objectives

The MEC literature typically reports HVM findings using a oncep map (see Fig. 2), which offers valuable nsights nto how attributes ranslate nto values (through benefits); owever, as onstructs and ladders ncrease, so does he complexity of the concept map. Managers and scholars nterested in AR might benefit from a simpler axonomy of benefits and values at can answer questions “How can onsumers benefit from AR?” and “To which consumer goals can AR ontribute? ” Thus, grouping multiple benefits into larger ategories ncreases practical and heoretical mplications of the research. For group values, this s accomplished n one of two ways. The first approach s orrela- tional, such as by grouping variables based on similarities n their r - lationships within he HVM. This procedure, however, would be predominantly a more condensed form of HVM. A second approach s o lassify he nodes more “generically,” based on their m anings, nde- pendent from he HVM, and we ose this second approach because i omplements he HVM. HVM ladders xclusively link attributes to values; owever, scholars and managers might also be interested in generic categories of benefits and values at y can use n heir work. Therefore, this follow-up study aims to develop such a taxonomy.

5.2. Methodology

We started by grouping the benefits and values based on conceptual similarities ndependent of dentified chains [135]. That is, rather than grouping by orrelation (e.g., grouping two factors hat appear together frequently), we grouped hem based on onceptual ara r- istics. Per discussions n the group and going back and forth b ween interview materials, prior research, and our nterpretations [136], we identified four groups of benefits (SEAD) and five groups of values (SALES), as discussed later.

To validate he assignment of benefits and values into broader at- egories, we applied an established procedure from the qualitative literature: a sorting ask.[1] Card sorting is a qualitative r search method used to group, label, and describe information based on feedback from customers or users. Through an international research agency, we surveyed 411 adults (male = 292, female = 119 average age of 37 years) who had bought something using AR apps within the last three months and who were familiar with AR echnology. Since sorting tasks r quire gh ognitive effort among respondents, respondents sorted r benefits (n = 208) or values (n = 203). We asked about he benefit of using a “ ypical” AR shopping app, such as IKEA or Sephora (which were

[1] We ank the associate ditor for this suggestion.

mentioned frequently n the main study). The question provided four options representing broader categories o which the benefits b longed, and respondents were asked o select the most appropriate category for each benefit. We applied he same procedure for status, achievem nt, lifestyle, conomy, and safety (SALES). Since respondents assigned onstructs o the proposed categories (see Appendixes E and F for de- ails), he results validated our classification (See Appendixes E & F). Fig. 3 summarizes taxonomies nto sensory, efficiency, assessment, and discovery benefits (SEAD) and he values into SALES.

6. General d scussion

Although AR marketing has received significant attention in r nt years [28,40,52] the literature is dominated by work that applies xisting ories o AR rather han developing theoretical fram works for the unique context of AR. T current research aims to addr ss s gap n he literature using a theory-building approach. More sp fically, by building on MEC theory and applying the laddering technique, we propose a heoretical framework hat shows how specific AR ara - ristics trigger benefits hat subsequently ontribute o consumers' values. Specifically, we ave dentified ontextualization, assor ment and portability as n w constructs while replicating existing AR arac- teristics, ncluding interactivity, socialization, customization, nforma- tiveness, and r ality congruence. We have also demonstrated whi benefits onsumers receive rough se characteristics, which we classify as SEAD. These benefits, n urn, ontribute o onsume rs' values, particularly he nine different values that we lustere d as SALES. These findings r veal how AR and ts unique aracteristics contribute o creation of onsumer value; moreover, y ontribute o A marketing theory and generate mplications for managerial practice, as discussed below.

6.1. Theoretical contributions

This r search ontributes o the existing body of knowledge by pre- senting a comprehensive framework at lucidates how newly denti- fied and established AR characteristics mpact consumer values rough specific benefits. This framework s underpinned n he MEC literature and s stablished hrough a rich qualitative s udy that uses nformation from a heterogeneous sample of onsumers and product categories. The proposed framework offers a novel heoretical understanding of mechanisms by which AR can nfluence consumer behavior. In parti - ular, the HVM (Fig. 2) outlines he detailed relationships between spe- fic AR aracteristics at rigger benefits at ontribute o onsumers ' values. Such a detailed assessment complements prior research, for example, by replicating certain well-known benefits, such as nspiration (e.g., [15]), and ntegrating m nto a broader on- xt —the link between AR characteristics and values.

The comprehensive model also extends prior work from a value perspective, specifically xtant research grounded in uses and gratifi- cations or technology acceptance research, which has revealed importance of utilitarian benefits—a onstruct at overs ow "useful" or "practical" onsumers consider an AR app (e.g., [47,137]). Our study extends these findings through the additional explanation of why some apps are more or less useful than others, for xample, by proposing me savings as a specific benefit, reby ontributing significantly o the IS literature. The same appears for hedonic benefits, such as aesthetics and inspiration [15]. From a broader p rspective, the authors deduce wo subframeworks, SEAD (benefits) and SALES (values), which group certain variables nto broader categories. As s own n Fig. 4, framework can be used n a parsimonious way o xplain ow AR marketing impacts value. These benefit and value categories may serve as generic sets of variables for r searchers to nclude n r ories. Overall, his r search nhances xisting understandings of AR nol- ogy use behavior and provides a framework to guide future research in this area.

Second, current s udy complements prior research by xamining values. Most prior studies n AR marketing assess how AR drives sp fi marketing outcomes [25,49,54,55,58,138,139], such as purchase n- tentions [1,18], word of mouth [140], willingness to pay a premium price [59], brand love [141], or anges in brand attitudes [25,15]. We omplement extant research landscape by onsidering the gen ral values at consumers pursue during the AR shopping process. Su values are of gh oretical nterest since they are onsider d prime determinants of users' actions and behavior [31,142], and might be potentially rucial n building long-term relationships.

Third, his s udy contributes most prominently o the online r ailing discipline by dentifying the benefits and values relevant to r tailing. For years, retailing scholars have r ognized the potential of AR [113] and its relevance o the retailing discipline's aim to develop solutions for practical problems, such as high product returns or store loyalty. By showing how AR features may increase assessment benefits (e.g., better product assessments might reduce product returns) or ertain ot r benefits, this study benefits r ail theory. This s particularly r levant since WebAR and established AR features n existing shopping apps (. g., Amazon) might make AR a standard feature, alongside onsume r reviews and detailed product descriptions, of omorrow's retailing landscape.

Finally, our research ontributes o existing body of MEC ory literature, specially n the field of XR. A few prior s udies ave employed MEC heory and laddering techniques solely o address research nquiries, and our nvestigation provides further vidence of

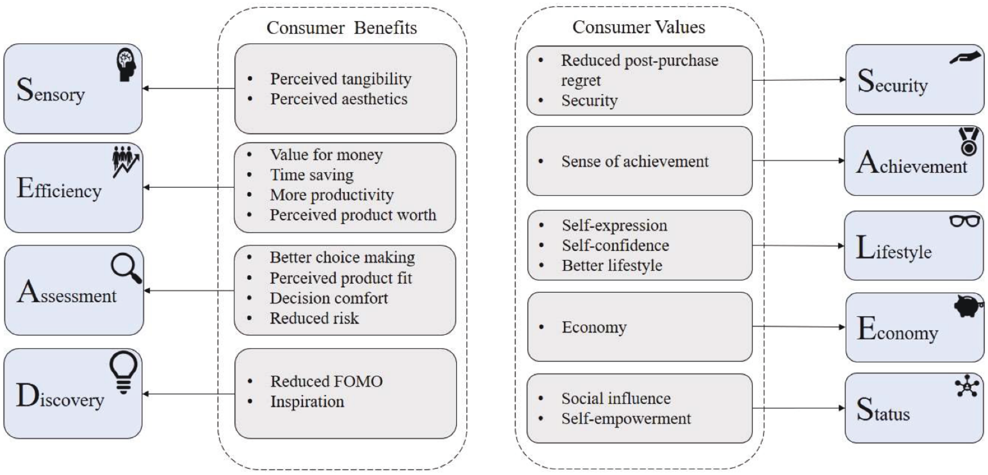

Fig. 3. The SEAD and SALES frameworks for augmented reality consumer b nefits and values.

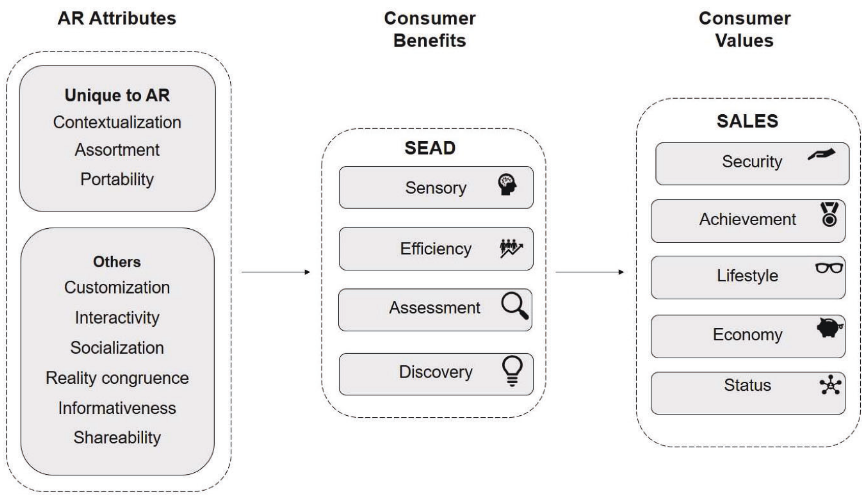

Fig. 4. Theoretical framework for augmented reality marketing (simplified).

this approach's fficacy n context of AR technology. Notably, AR applications are not l mited o retailing, and numerous opportunities remain for further advancements in MEC heory within AR and AR marketing. Additionally, although our study uses a soft laddering approach, which aligns with MEC literature recommendations regarding early-stage research [31,142], hard laddering remains a viable alternative m od at involves generating open-ended surveys hat require coding or hecking predefined codes obtained from a priori laddering [78,143,144]. Our findings support this process and should assist o r scholars n nhancing their r search endeavors. Finally, we on tribute o the MEC literature by proposing a means of simplifying complex HVMs using categories and sorting tasks, which offer more validity and simplicity to the HVM and thus facilitate higher adoption.

6.2. Managerial mplications

While AR and onsumer behavior are poorly understood among managers [2], the less informed manager can use our findings n following ways. First, we provide an exhaustive list of AR attr butes, benefits, values, and r nterconnections and significance. Thus, managers can design appropriate AR strategies by using se d ntified characteristics and benefits as " klists. " Additionally, strategy and marketing managers can use identified values and associated benefits as ools for s gmentation, targeting, and positioning (STP) s rategy planning. For nstance, firms may ncorporate he degree to whic certain values are desired by onsumers as segmentation variables and deduce he requirements for apps (i.e., specific benefits). Espec ally since more and more companies work with "buyer personas" (i.e., specific, prototypical, yet fictitious consumers), nformation about values s a core nterest in many firms.

Second, gh cart abandonment and product return rates are ore challenges for many online retailers. As an example, globally, half of garments purchased online are returned [145], and AR, particularly associated assessment benefits, presents a potential solution to his ssue rough its sensory, assessment, discovery, and efficiency benefi s. Overall, consumer goal structures at inform AR use are ghly relevant to IS scientists interested n designing and implanting better AR technology nto internet business marketplaces.

6.3. Limitations and future research directions

As any s udy, this s udy as some limitations. First, the MEC ory, in particular when analyzed using laddering techniques, relies on subjective, self-reported, and verbalized data as he most ommon qualitative approaches. Although our sample of AR users is quite broad and large ompared to other studies, AR users might be more nnovative and -savvy an average onsumers. On the one and, this s a s rength since s "bias" might represent ommon AR users quite well. Furthermore, innovative, and nthusiastic onsumers might share r r nformation in surveys, making it l kelier hat relevant aspects are covered. However, on the other and, and as s ommon in qualitative research, the frequency with which certain aspects were mention d might not be representative (for a summary of strengths and weaknesses of laddering techniques, see [64,78] Replications and xtensions of s study with other methodologies, such as raditional surveys, or xperimental d signs, an help overcome hese limitations. For nstan , augmenting large scale MEC-approaches with observational data (.g., sales, onsumer omplaints .) ould g nerate nsights nto "profitable" ains.

The identified and proposed constructs and their nterplay can s rve as a starting point for future studies n validation and xtens on. In addition, ard laddering can generate further data across large samples [78], and allow ombinations with further variables (e.g., about user, such as personality, or he usage ontext, e.g., where e AR application is used) or methodologies (.g., clustering). Such approaches can also compare d fferent types of AR use cases, such as in-room vs. on-body AR. Lastly. It would be worth exploring other foundational marketing theories such as service – dominant logic o he new AR projects n conjunction with means nd ain ory.

7. Conclusion

While re s onsiderable vidence that AR an reate value for consumers and businesses, re have been few "AR-specific" heories as to why s s case. This research applies MEC ory to provide nsights nto the unique haracteristics of AR and s ontribu on o lping consumers achieve their goals. We ope at this r sear ch will inspire future research now and n a "phygital" metaverse and/or spatial computing future where virtual elements can be an integral part of our understanding of reality.

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Contribution statement

We declare the work s original. All contributions and funding's ave been duly acknowledged.

CRediT a thorship contribution statement

Harish Kumar: Conceptualization, Data curation, Formal analysis, Methodology, Software, Writing – original draft, Writing – review & diting. **Philipp A. Rauschnabel:** Conceptualization, Writing – review & editing, Writing – original draft, Supervision, V sualization. **Madhushree Nanda Agarwal:** Writing – review & editing, Supervision, Validation, Data uration. **Rajesh Kumar S ngh:** Supervision, Funding acquisition,   sources. **Ritu Srivastava:** Supervision, Funding acquisition, Writing – review & diting.

Declaration of ompeting nterest

We declare no conflict of interest.

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Appendixes

Ap endix A Demographic details

ID	Age	G nder	Country	Products
1	19	Female	USA	Furniture
2	20	Female	India	Cosmetics
3	22	Female	India	Cosmetics
4	23	Male	India	S oes
5	24	Female	India	Sunglass
6	24	Female	India	Sunglass
7	24	Female	India	Paint
8	24	Male	G rmany	Furniture
9	25	Male	India	Sunglass
10	25	Male	India	Sunglass
11	26	Female	India	Cosmetics
12	26	Female	India	Paint
13	26	Male	India	Paint
14	27	Male	India	Sunglass
15	27	Male	India	J welry
16	28	Male	India	Sunglass
17	28	Female	India	Sunglass
18	29	Male	G rmany	Furniture
19	29	Male	India	Floorings
20	30	Male	D nmark	Furniture
21	31	Female	Iraq	Floorings
22	32	Male	India	Furniture
23	32	Female	India	Sunglasses
24	32	Male	Pakistan	Cosmetics
25	34	Female	Ireland	Sunglasses
26	34	Female	India	Paint
27	35	Male	Portugal	Shoes
28	35	Female	India	TV
28	36	Male	India	Interior decor
30	38	Male	USA	Curtains
31	40	Male	India	Sunglass
32	40	Male	India	Sunglass
33	42	Male	USA	Food
34	46	Female	USA	J welry
35	49	Female	India	Sunglass
36	49	Female	USA	J welry

Ap endix B Relative mportance of codes

Code	In degree	Out degree	Sum-in/out degree	Centrality	Abstractness	Prestige
1. Assortment	0	38	38	0.048	0.000	0.000
2. Contextualization	0	35	35	0.044	0.000	0.000
3. Portability	0	13	13	0.016	0.000	0.000
4. Interactivity	0	9	9	0.011	0.000	0.000
5. Realistic v sualization	0	23	23	0.029	0.000	0.000
6. Customization	1	10	11	0.014	0.091	0.001
7. Informativeness	4	13	17	0.021	0.235	0.005
8. Easy process	0	2	2	0.003	0.000	0.000
9. Shareability	0	8	8	0.010	0.000	0.000
10. P rceived tangibility	8	10	18	0.023	0.444	0.010
11. Amplifying options	7	9	16	0.020	0.438	0.009

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Code	In degree	Out degree	Sum-in/out degree	Centrality	Abstractness	Prestige
12. educed obligation to buy	2	0	2	0.003	1.000	0.003
13. P rceived aesthetics	17	39	56	0.070	0.304	0.021
14. Time savings	18	23	41	0.052	0.439	0.023
15. educed risk	9	9	18	0.023	0.500	0.011
16. Cost-effective	3	6	9	0.011	0.333	0.004
17. Inspiration	26	18	44	0.055	0.591	0.033
18. Collective decision-making	2	2	4	0.005	0.500	0.003
19. Increased productivity	9	15	24	0.030	0.375	0.011
20. educed FOMO	8	8	16	0.020	0.500	0.010
21. Perceived product fit	27	21	48	0.060	0.563	0.034
22. B r choice-making	51	40	91	0.114	0.560	0.064
23. Perceived product worth	10	7	17	0.021	0.588	0.013
24. D sion comfort	23	10	33	0.041	0.697	0.029
25. Value for money	33	16	49	0.062	0.673	0.041
26. Economic value	12	1	13	0.016	0.923	0.015
27. S lf-expression	20	7	27	0.034	0.741	0.025
28. T riftiness	6	0	6	0.008	1.000	0.008
29. educed postpurchase r gret	14	0	14	0.018	1.000	0.018
30. B r lifestyle	12	3	15	0.019	0.800	0.015
31. Safety	7	0	7	0.009	1.000	0.009
32. Work–life balance	4	0	4	0.005	1.000	0.005
33. Social recognition	5	0	5	0.006	1.000	0.006
34. Happiness	7	2	9	0.011	0.778	0.009
35. Social influence	11	1	12	0.015	0.917	0.014
36. S lf-confidence	18	0	18	0.023	1.000	0.023
37. Sense of achievement	16	0	16	0.020	1.000	0.020
38. S lf-empowerment	8	0	8	0.010	1.000	0.010
	398	398	796			

Ap endix C dentified attributes, benefits, and values (content codes)

Constructs	Frequency	Definition	Verbatim	levant literature (AR marketing)	Relevant literature (general)
Attributes					
A1. Assortment	38	Depth and breadth of he product/ service offered or variety	“I just swipe right or left and see another model overlaid. That allowed m to ave more options hat are available to m . ”	N/A	Oppewal & Koelemeijer [89]; Borle et al. [146]; Kangas & Bergeman [90], S monson [92]; Ross & Creyer [91].
A2. Contextualization	35	Process of putting nformation nto the context (situation/location)	“I get to see with my own yes how the shoes fit in my feet hat were for me v ry important and made a huge difference.”	N/A	Jeandrain [93]; Zimmermann & Oppermann [147]; Henricksen [95]
A3. Portability	13	Ability to ransfer/carry he object from one place to another	“I had this problem with my furniture and carpets, but you know AR brings m to your ome for your decision omfort. ”	N/A	Poole & Waite (1975); Di Martino et al. [88]
A4. Interactivity	9	Technology’s system apability to enable users to more asily nteract with and be involved with content	“Lenskart app allowed me to s left and right side view of my sunglass, which is a problem while buying off-line.”	Yim et al. [16]; McLean & Wilson [50]	Kiousis [101]; Hoffman & Novak [148]
A5. Reality ongruence	23	Extent o which the augmented product matches the real product	“I ordered my food using ‘KabaQ,’ and s augmentation was too realistic, so I nk is a much more powerful way an a photograph would produce.”	Kowalczuk et al. [47]	Helmefalk & Hult ́n [100]
A6. Customization	11	Process of tailoring or adapting according o the user’s specifications or preferences	“Once I scanned my face, it suggested to me some sunglasses that suits best on me.”	Mclean & Wilson [50]	Lampel & Mintzberg [149]; Hvam t al. [104]
A7. Informativeness	13	Amount of relevant nformation provided about the product	“Best part for me was g ng information on the options, fitments, quality, and suitability.”	Kang et al. [103]	Goldsmith & Koriat [102]
A8. Easy process/ rial	2	Being able to try the product with less ffort/time	“It s like fingers play; you swipe right/left and change your shoes.”	McLean & Wilson [50]	Kempf & Smith [150]
A9. Shareability	8	Being able to share the xperience/ resources with others simultaneously	“The deluxe app allowed me to share design with my family member.”	Carrozzi et al. [151]	Crowston [152]
Benefits					
C1. P rceived angibility	10	Sense of aste, feel, touch, or smell good or s rvice ’s attributes	“Trying on with AR s very similar o off-line shopping for me; you can actually feel the product.”	Gatter et al. [54]	Laroche et al. [105].
C2. Amplifying options	9	Screening of different possible alternatives	“So much variety allowed me to see different permutations and ombinations.”	N/A	enn [153]
C3. duced obligation to buy	2	Consumers’ decision-making under pressure situations rough persuasion and influence from nvironment	“It’s not just my effort, but it s more salesperson’s effort. I feel bad if I don’t buy after I see them, but with AR try-on, I feel less obligated.”	N/A	Amirpur & Benlian [154]

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Constructs	Frequency	Definition	Verbatim	levant literature (AR marketing)	Relevant literature (general)
C4. P rceived aesthetics	30	Evaluation/judgment about the fit or appearance of the objects in nvironment	"It's not like medicine; whatever the doctor prescribes, you buy it; I want o be sure before buying how it looks on me."	N/A	Goldman [106]; Wagner [107]
C5. Time savings	2	Ability o omplete the purchase n less me han the alternative options	"I don' have o carry an nch tape o measure the dimensions for the furniture, so hat saves a lot of time."	N/A	Alreck & Settle [110]; Morganosky & Cude [155]; Voropanova [109]
C6. duced product risk	9	Consumer's concern about quality and suitability (e.g., size, fit) of he product	"It as appened to m many imes that I ordered something and returned. That's why I now use AR to onfirm design and quality."	Kumar & Srivastava [49]	Jacoby & Kaplan [29]; Vonkeman t al. [116]
C7. Cost savings	5	Ability to omplete the purchase at a lower cost than the alternative options	"Probably, I will first use AR. and hen, like visualize everything and see what would be my ost estimate basis. I nk that saves a lot of costs."	N/A	Kohli t al. [112]; Wu t al. [156]
C8. Inspiration	25	Mental stimulation of new ideas about onsumption possibilities	"Thanks o the Dulux app, it lped me think about the new way to paint my room."	auschnabel t al. [25]	Böttger et al. [118]; Thrash et al. [119]
C9. Collective decision-making	2	Involvement of two or more p ople in the decision-making process	"So, I shared my makeup pictures with my friends to s k their opinions and what could be anged. "	Hilken t al. [52]	Aikenhead [157]
C10.Increased productivity	13	Consumers seeking to m nimize me/effort/money to gain donic or utilitarian value from xperience	"From my experience, I can say that se AR apps allow you to see so much variety at ome in a much shorter time. I believe somehow it ncreases my productivity."	N/A	Voropanova [109]; Atkins & Kim [111]; Ingene [108]
C11. Reduced FOMO	8	Feeling of being left out or believing that others have superior xperiences, knowledge, or possessions	"Now I can ry more than 50 shoes for me, so I am sure I did not miss one made for me."	N/A	Przybylski et al. [121]; Abel et al. [120]
C12. Perceived product fit	25	Degree of ongruence between product and consumer 's requirements	"Because, of course, in online s opping, it is d fficult to find a product that works for you personally, so I prefer AR."	Tan et al. [26]	Smith & Andrews [158]; Shen [159]
C13. Better oice-making	48	Most positive consumer evaluation of the goal pursuit among alternatives	"I ought red couch would look fine, but I tried it on and found at it looks horrible with my blue curtains, so I n d another dea, and I think AR an help you."	Hilken t al. [52]	Higgins [115]; Amason [160]
C14. Perceived product worth	9	The perceived value of a product	"I see one design and then compare between multiple designs, and then I see; Is it worth spending that additional four, five lakhs for his kind of d sign? "	Shapiro et al. [161]	Dodds [162]
C15. Decision omfort	19	The degree of psychological (and physiological) ease, contentment, and well-being one feels about a specific decision	"Let us say you shopped for cosmetics through Sephora; somehow, you do not have o magine ow it would look on me. So, for me, AR certainly makes it asier to decide among the alternatives."	Song et al. [94]	Parker t al. [117]
C16. Value for money	31	The utility that a customer derives from product/service in return for the economy (money) spent on	"The more ry-on allows me to oose best for me. So I feel hat, yeah, I ave spent my money on something worthwhile."	N/A	Pigou [163]; Glendinning [164]
Values					
V1. Economic value	12	Intrinsic value a customer places on a good or service, ncluding factors like quality, price, brand reputation, personal preference, and perceived utility	"You know the schedule s very ght n such jobs; hus, optimum utilization of my 24 is mportant for me. I an 't spend 3–4 h on shopping."	N/A	Lee et al. [165]; Bednar & Spiekermann [166]
V2. Self-expression	20	Expression of one's unique dentity and personal aracteristics	"The curtains should match me of my bedroom. I mean, it should be n sync because your personal space ells a lot about yourself."	Yim & Park [21]; Javornik et al. [167]	Aaker [168]
V3. Thriftiness	6	Using money and other r sources carefully and not wastefully	"When I say I get to see more option, it helps m choose he best that fits my budget."	N/A	Gatersleben t al. [169]; Evans [170]
V4. Reduced postpurchase regret	14	Regret due to foregone alternatives, lack of consideration, or not oosing the right product	"I would ave selected one or wo colors and would have applied hat paint on wall, but there would always be that doubt in my mind at this olor m ght look different. Or, there is always a possibility at re is a scope of improvement. But with this feature, I'm satisfied hat I ave osen he best out of ."	N/A	Lee & Cotte [171]; Park & Hill [172]
V5. Lifestyle value	15	Specific patterns of behavior, activities, and onsumption choices that align with one's preferred way of l ving	"It allows o reate much better aesthetic appeal and it's important for me to show other ow professional I am."	N/A	Sobel [173]; Jensen [174]
V6. Security	7	Keeping oneself free from financial arm	"Being financially safe by saving money and time is mportant for me to navigate the life uncertainties with confidence."	N/A	Kahle [175]

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Constructs	Frequency	Definition	Verbatim	levant literature (AR marketing)	Relevant literature (general)
V7. Work–life balance	4	Striking a balance between one's job and personal life	"The hassle-free shopping xperience saves much ime, which makes my life easier as I have wo kids oo."	N/A	Guest [176]; Lockwood [177]
V8. Social recognition	5	Public acknowledgment of one's status or m rits	"Everybody wants the best for m because you know at is when people will notice you."	N/A	Friedkin [178]
V9. Happiness	9	State of contentment, pleasure, and satisfying experience in one's life as a whole	"I feel appy if I get the right product for me."	N/A	Judge & Kammeyer-Mueller [179]; Veenhoven, [180]
V10. Social nfluence	11	Change n behavior hat one p rson causes n another, ntentionally or unintentionally	"To s how they look on me s important for me o choose best for me; at 's the way I an reate a *wow* factor in my friend rcle. "	N/A	C aldini & Goldstein [181]
V11. S lf-onfidence	14	Belief in one's ability to achieve desired outcomes or positive assessment of one's worth/value	"If I find a good outfit hat suits my personality, then I am onfident about myself and feel more motivated to go o the party."	Yaoyuneyong et al. [182]	Bearden et al. [183]
V12. Sense of achievement	15	The feeling of having done something worthwhile	"By saving money and time n shopping gives me inner satisfaction and a proud shopper."	N/A	S warz & Cieciuch [184]
V13. S lf-mpowerment	8	A process by which one gains ontrol over their life with a strong sense of personal fficacy	"I do not want to shop under pressure of he salesperson, so now AR is the new salesman for m . "	N/A	appaport [130]; Perkins & Zimmerman [129]

Ap endix D mplication matrix

	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	Sum-Out
1. Assortment		4|0		3/6			0|2	7/0		0|1	7/0	7/2	8/6	0|1	0|1	0/7	0|1	0/7	0|2	0|4	0|2			0|1	0|3	0|4	0|4	0|5		38|59
2. Contextualization	3|0		1|0	8|4	1|0	1|0		7|0		0|1		6|2	6|5		1|1	1|4		0|9		0|4	0|2			0|3	0|3	0|3	0|4		0|1	35|46
3. Portability			1|0		11|0					0|7							0|6				0|1		0|2		1|1			0|2		13|19
4. Real-time nteractivity	5|0	1|0		0|1								1|0	0|1		0|6			0|1			0|1					0|1	0|1		0|5	9|17
5. Realistic v sualization				4|1	1|2	3|0	2|0	1|0				2|0	3|2	1|0	4|0	0|7	0|4	0|2	0|2	0|1	0|1		0|1	0|1		0|2	0|2	1|2	0|1	23|31
6. Customization		1|0			2|1					0|1		4|0	2|1			0|5		1|0	0|2	0|1	0|1					0|1	0|1	0|2		10|16
7. Informativeness						5|0				0|1			3|0	3|0	0|5	1|3	0|1	0|1		0|1	0|1	0|5					1|0	0|2		13|20
8. Easy process		1|0			1|1																				0|1			0|2		2|4
9. Shareability				0|1				6|0	2|0				0|8								0|5									8|14
10. P rceived tangibility				2|0						0|1			2|1	1|0	5|0					0|2	0|2						0|2		0|5	10|13
11. Amplifying options				0|2	2|0		1|0			0|1		1|0	4|0		1|0	0|2		0|1	0|1	0|1	0|1					0|1		0|1		9|11
12. duced obligation to buy																														0|0
13. P rceived aesthetics						0|1		4|0	0|1			5|0	5|0					6|0			2|2			1|1	2|2	6|0	8|0			39|7
14. Time savings										9|0					3|0	1|0	3|4				1|2		3|1		1|1			2|3		23|11
15. educed risk													1|0		5|0	2|0					0|1	0|5						0|1	1|0	9|7
16. Cost-effective								1|0								1|0			4|0			0|1								6|1
17. More ideas											1|0	1|0	10|1	2|0	1|0	1|5		2|1	0|1	0|2	0|5			0|1	0|1		0|1	0|1		18|19
18. Collective decision-making													2|0																	2|0
19. More productivity												0|1	2|1	0|1		2|0	5|0				2|0	1|0						3|0		15|3
20. educed FOMO													3|0			1|1		0|1		4|1	0|1									8|4
21. Perceived product fit														1|0	1|0	5|1		6|1	0|2	2|0		0|1			1|0	1|3	3|3	0|1	1|0	21|12

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	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	Sum-Out
22. B r choice-making														2|0	2|0	13|0	0|4	5|0		6|1	5|0			2|1	0|2	0|3	1|0	3|2	1|0	40|13
23. P rceived product worth																5|0	0|1			1|1		0|1						1|0	0|1	7|4
24. D sion comfort																	0|1	0|1				5|0							5|0	10|2
25. Value for money																	4|0		2|0	1|0	2|0	1|1			1|0			5|0		16|1
26. Economic value																							1|0							1|0
27. S lf-expression																								2|0	1|0	3|0	1|0			7|0
28. T riftiness																														0|0
29. educed post purchase regret																														0|0
30. B r lifestyle																											3|0			3|0
31. S urity																														0|0
32. Work–life balance																														0|0
33. Social recognition																														0|0
34. Happiness																										1|0		1|0		2|0
35. Social influence																											1|0			1|0
36. S lf-confidence																														0|0
37. Sense of achievement																														0|0
38. S lf-empowerment																														0|0
Sum-In	7|0	2|0	17|15	18|4	9|1	3|2	26|0	2|1	9|13	8|0	27|5	51|26	10|2	23|13	33|35	12|22	20|25	6|10	14|19	12|28	7|14	4|4	5|8	7|14	11|18	18|18	16|24	8|13		

Note: For 4|0 against Code 1. Assortment for he vertical label 11 means that assortment led o amplifying the options 4 imes d rectly and 0 me indirectly. Sum-out scores of assortment 38|59 depict the number of times assortmen s he origin for other variables regarding direct (38) and ndirect relationships (59). The sum-in s ore (7|0) for assortment d picts he number of mes the variable is the destination for other variables directly or indirectly.

Ap endix E Card sorting results for SEAD benefits

Benefits	Sensory	Efficiency	Assessment	D scovery
Perceived Tangibility	165 (79 %)	9 (4.3 %)	27 (13 %)	7 (3.4 %)
Perceived A sthetics	128 (61 %)	11 (5.3 %)	58 (28 %)	11 (5.3 %)
Time saving	14 (7 %)	168 (80.8 %)	18 (8.7 %)	8 (3.8 %)
Reduced Product risk	50 (24 %)	20 (9.6)	112 (54 %)	27 (13 %)
Inspiration	46 (22 %)	9 (4.3 %)	23 (11 %)	130 (62.5 %)
Increased Productivity	9 (4.3 %)	161 (77.8 %)	25 (12 %)	12 (5.8 %)
Reduced FOMO	22 (10 %)	24 (11.5 %)	56 (27 %)	126 (50.4 %)
Perceived Product Fit	46 (22 %)	18 (8 %)	123 (59 %)	21 (10 %)
Better Choice Making	11 (5.3 %)	28 (13 %)	143 (68.7 %)	26 (12.5 %)
Perceived Product Worth	18 (8 %)	153 (73.5 %)	28 (13.4 %)	9 (4.3 %)
Decision Comfort	45 (21.6 %)	20 (9.6 %)	114 (57 %)	24 (11.5 %)
Value for Money	12 (5.8 %)	108 (51.5 %)	75 (36.1 %)	13 (6.3 %)

Ap endix F Card sorting results for SALES values

Values	Safety	Achievement	Lifestyle	E onomy	Status
Economy value	10 (4.9 %)	8 (3.9 %)	28 (13.8 %)	156 (76.8 %)	1 (0.5 %)
Self-expression	5 (2.5 %)	22 (10.8 %)	143 (70.4 %)	4 (2 %)	29 (4.3 %)
Post-purchase regret	55 (27.1 %)	51 (25 %)	20 (10 %)	50 (24.6 %)	27 (13.3 %)
Security	147 (72.4 %)	2 (1 %)	12 (5.9 %)	38 (18.7 %)	4 (2 %)
Sense of achievement	3 (1.5 %)	153 (75.4 %)	20 (9.9 %)	5 (2.5 %)	22 (10.8 %)
Self-empowerment	3 (1.5 %)	64 (31.5 %)	51 (25.1 %)	6 (3 %)	79 (38.9 %)
Self confidence	8 (3.9 %)	64 (31.5 %)	71 (35 %)	5 (2.5 %)	55 (27.1 %)
Better Lifestyle	5 (2.5 %)	17 (8.4 %)	152 (74.9 %)	10 (4.9 %)	19 (9.4 %)
Social influence	6 (3 %)	8 (3.9 %)	27 (13.3 %)	4 (2.2 %)	158 (77.8 %)

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