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The use of Augmented Reality in the marketing mix of physical products: current practices and future implications

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ABSTRACT

The current book chapter intended to explore what are the current practices in place regarding the use of AR in the marketing mix of physical products and the implications for the future. While exploring this research question, the study contributes for identifying common aspects and drawing recommendations for future studies and practices. For addressing the research question proposed, twenty cases of physical products using AR as part of their marketing mix were identified and analysed for their characteristics. The EPI Cube framework and its contextualization in the customer experience (Flavian et al., 2019) was used as theoretical model for guiding the analysis. Findings are presented and implications for theory and practice are discussed.

Keywords: Augmented Reality; EPI Cube; Customer Experience;.Customer Journey; Virtual Reality; Marketing Mix; Product Innovation; Pop-up shops

INTRODUCTION

The adoption of new technologies like Augmented Reality (AR) and Virtual Reality (VR) are evolving rapidly, with applications in various areas including marketing (Loureiro et al., 2019). The current book chapter focuses on the use of AR as integral part in the development of the marketing mix, where the applications have evolved in the direction of augmenting the product features, packaging systems, services offered and brand communications (e.g. use of interactive features, product usage instructions and training, virtual try-ons). These types of applications have evolved in a fast pace, with no attention so far being given to the relevance of understanding the practices in place and discussing future perspectives.

The current book chapter intends to address this research gap. While doing so, it focuses on analysing the use of AR applied to physical products instead of services as, in this context, AR offers an opportunity for bridging some of the barriers intrinsic to the lower level of interaction that characterize physical products. Moreover, it focuses on business to consumers and, as a consequence, on mobile facilitated AR apps available for smart phones and tablets, due to their larger penetration when compared to other technologies (e.g. smart glasses, or smart mirror).

In sum, the current book chapter approaches the topic of AR with the following research question: what are the current practices in place regarding the use of AR in the development of the marketing mix of physical products and the implications for the future. While exploring this research question, the study contributes for identifying common aspects and drawing recommendations for future studies and practices.

For addressing the research question proposed, twenty examples (cases) of physical products using AR as part of their marketing mix were identified and analysed for their characteristics. The EPI Cube framework and its contextualization in the customer experience (Flavian et al., 2019) was used as theoretical model for guiding the analysis.

BACKGROUND

Literature Review

Reality-Virtuality: conceptualizing Augmented Reality

Several mediated realities exist between real environment and virtual environment. Augmented reality is proposed to be somewhere in middle of this Reality-Virtuality continuum as it combines three dimensional real and virtual objects in real time (Milgram and Kishino, 1994; Flavián et al., 2019). This understanding is captured on Azuma's (1997) conceptualization of AR. The author argues that AR combines virtual and real objects, the opportunity of interacting with these virtual objects in real time and the accurate position of three dimensional virtual objects over real ones (Goff, 2018).

The devices used for AR vary from fixed overhead camera and screen for projecting the image (Wojciechowski et al. 2003) or 'heads-up display' devices, to tablets, computers and smart phones (Pence 2010), which are gaining increased relevance for its ease adoption.

Theoretical framework: EPI Cube and Customer experience

- *EPI Cube*

Flavian et al., (2019) have proposed that the new technologies evolving in the spectrum reality-virtuality are classified in three dimensions, namely: *technology embodiment*, *sense of presence* and *interactivity*. These dimensions constitute the EPI Cube, which was proposed as a criteria for creating the taxonomy of virtual related technologies.

Technology Embodiment represents the extension according to which the technology is incorporated in users' body. As such, it may assume various nuances between two extremes, namely: internal devices being fitted to human body (e.g. wearables) and unintegrated external devices (e.g. image projectors). The level of technology embodiment impacts the level of immersion experienced by the user, with higher levels of embodiment generating more immersive experiences (Biocca, 1997; Tussyadiah, 2014; Flavian et al., 2019). *Interactivity* is related to users' possibility to interfere in the virtual experience, modifying it (Flavian et al, 2019). The behavioural component of interactivity is also apprehended in Steuer (1992: 14) who defines it as "extent to which users can participate in modifying the form and content of a mediated environment in real time". *Sense of presence* is defined as users' sensation of being elsewhere different from their reality (Flavian et al., 2019). As a psychological state, sense of presence is subjective to the one who experiences it and, influenced by the level of immersion promoted by the technology embodiment (Thornson, Goldiez, & Le, 2009) and also the level of interactivity.

In the current book chapter, the authors have used the EPI Cube as a general guiding framework as the model captures some of the most important characteristics that impact the virtual related technologies. However, for our purpose, the framework needed some adaptations, as it was originally meant for embracing a large scope of technologies and not specifically analysing one of them.

Regarding the *technology embodiment*, as the focus of the study was in mobile facilitated AR apps available for smart phones and tablets, embodiment was not considered as a criteria for characterization. However the different levels of immersion captured in the model by the dimension of embodiment were still apprehended based on the type of technology used for creating the virtual image, namely marker-based, location-based and superimposition-based AR (Cheng and Tsai, 2013; Wojciechowski and Cellary, 2013; Flavian, et al, 2019). In marker-based AR the device recognizes physical objects, based on tags like QR codes associated to the real object and, places the virtual object accordingly. In this case, the virtual image is projected irrespectively of the real environment and the level of immersion is expected to be lower (e.g. <https://www.youtube.com/watch?v=tYWR-TnAoW0>). In the location-based AR, the virtual image is projected based on a GPS or Wi-fi positioning, so it requires a location tracking system (Koutromanos et al. 2015; Goff, 2018) and the virtual object is delivered as an add on to the real environment (e.g. https://www.youtube.com/watch?v=mAwhbhmU_o4). In the superimposition-based AR, the object is recognized and the original view is fully or partially replaced by an image which is juxtaposed (e.g: <https://www.youtube.com/watch?v=HoSjmiVLsLU>). Due to the fact that it creates a new reality over the real one, superimposition-based AR is expected to evoke higher immersion than the others.

Regarding *interactivity*, EPI Cube framework fits well as mobile facilitated AR apps available for smart phones and tablets provide different levels of interaction, with users' being capable of modifying the context accordingly. Finally, the *sense of presence* was originally defined in the literature as being related to users' sensing themselves somewhere different from where they are in reality (Flavian et al.,2019). As such, the new reality is perceived as a real reality. In the scope of the current book chapter, the sense of presence in AR context is adapted, with the high sense of presence being represented by the sense of having the virtual elements as integral part of the user (e.g. images of shoes that are projected over the feet of the user as if for real <https://www.youtube.com/watch?v=UmJriqzDUTo>). In this context, the user is transported in real time to the virtually transformed reality in which he takes an

integral part. On the other hand, the lower level of presence derives from virtual elements being projected over the users' surroundings, but with no integration of the virtual object (e.g.: <https://www.youtube.com/watch?v=imEry7nCGvQ>).

While analysing the dimensions proposed in EPI Cube, it is important to highlight their interrelation as both technology and interactivity influence the levels of immersion that users experience (Flavian et al., 2019; Yim et al., 2017). This on the other hand has impact on the sense of presence perceived by the user (Baños, et al., 2004). This interrelations will be further explored in the analysis and discussion of results.

- *Customer experience*

The EPI Cube is proposed as a framework to be explored along the various stages of the purchase journey (before, during and after purchase) and considered for creating different types of customer experiences (*supported* and *unsupported*; *related* and *unrelated*).

Customer experience is defined as the “customer's cognitive, emotional, behavioral, sensorial, and social responses to a firm's offerings during the customer's entire purchase journey” (Lemon & Verhoef, 2016; p. 71). The effort of managing customers' experience has evolved into a competing strategy used for differentiation, with companies trying to identify the key touchpoints with their customers and creating memorable experiences (Brakus et al., 2009; Accenture, 2015).

Considering EPI Cube, technology-enhanced experiences vary in the type of *support* technologies offers to the core experience provided. *Directly supported* experiences assist customers in their core experience by directly acting on the real world. *Indirectly supported* experiences occur with no integration with the real world. Moreover, technology-enhanced experiences also vary in their relation with the core experience. From this perspective, related *empowered* experiences refer to the creation of new experiences that are somehow *related* to the core experience. Meantime, in *diverted* empowered experiences, the new experience is intended for diverting consumers from their core experience.

Methodology

In view of the objectives proposed, a group of twenty examples (cases) of physical products using Augmented Reality were identified. In order to generate the list of cases, two practitioners and experts in augmented reality were contacted and asked to prepare an initial list. A list with forty (40) examples was generated and screened for the criteria of being related to physical products and based on mobile facilitated AR apps available for smart phones and tablets. The final list of cases and links used for the analysis is available in Table 2. Some of the cases had their analysis complemented by active observation (AO) as indicated in Table 2. In these cases, the researcher downloaded the app. and used its features. All apps available to the researcher in Apple and/or Google Store, in the period between September and October 2019 in Portugal, were analysed.

As for the measures used for the analysis, criteria were adapted from the literature as in Table 1. The data analysis has followed a descriptive approach with cases being organized according to their position in the EPI cube and the type of customer experience.

Table 1: Definitions used for analyzing the cases

<i>Behavioral: Interaction</i>	
<i>Adapted from: Flavian et al., (2019)</i>	
1 - Low	The user does not interact with the image being projected, neither modify it
2 - Medium	The user interacts and modifies the image projected at a lower level (1-3 options of interaction)
3 - High	The user interacts and modify the image projected at a higher level (>4 options of interaction)
<i>Phychological: Sense of presence</i>	
<i>Adapted from: Flavian et al., (2019)</i>	
1- Low	The image projeted creates a new object over the users´environnement, with no integration
2 - Medium	The image projected is an add-on integrated to a real object
3 - High	The image projected is an add-on to the user himself or to , changing his real reality
<i>Tecnology: Image positioning</i>	
<i>Adapted from: Flavian et al., (2019)</i>	
1 - Marker-based	Tag/QR code is recognized and a standard image is projected
2 - Locations-based	Location is recognized and image is projected over the real environment
3 - Superimposed-Based	The real object is recognized and the image is juxtaposed, with change in the real
<i>Customer Experience: Empowered</i>	
<i>Adapted from: Flavian et al., (2019)</i>	
1 - Related	The new experience created by the tecnologia is related to the core experience
2 - Diverted	The new experience created by the tecnologia diverts consumers from their core experience
<i>Customer Experience:Supported</i>	
<i>Adapted from: Flavian et al., (2019)</i>	
1 - Indirectly	It assists customers in their core experience with no integration with the real world
2 - Directly	It assists customers in their core experience by directly acting on the real world
<i>Customer Journey</i>	
<i>Adapted from: Lemon, K. N., & Verhoef, P. C., (2016)</i>	
1 - Pre-purchase	Need recognition, consideration, search
2 - Purchase	Ordering, payment, choice
3 - Post-purchase	Consumption, usage, reordering, service request

Results

In total twenty cases were collected, as listed and described in Table 2. The cases were distributed among the following product categories: fashion (5), food and drinks (4), entertainment (4), automobile (3), hygiene and personal care (3) and furniture (1). Their names and short descriptions are available in Table 2.

Table 2: Cases analyzed

	Brand	Product Category	Type of initiative	Description	Link	AO
a	Honda	Automobile	Product Catalogue	The catalogue is presented. Once the bike is chosen, the image is projected on the real environment as a new image. Users can change the colour of the object, rotate it, manipulate its size, location, take a picture and share. Also, they may contact a sales representative, watch videos for the bikes they selected.	https://play.google.com/store/apps/details?id=com.hondaeu.africatwin&hl=en_IN	yes
b	Nissan Drivers Guide	Automobile	Users' Guide	When the user wants detailed information about a particular bottom or switch, simply point the camera of the smartphone at that object or area containing the object. An interactive pop up appears on the screen. The user may choose among the options that are juxtaposed over the real image.	https://www.youtube.com/watch?v=tYWR-TnAoW0	yes
c	Gucci	Fashion	Product Catalogue	AR is used for the try-on of limited models of eye glasses, lipsticks and sneakers. Users may choose the colours and models/details for try-on.	https://www.youtube.com/watch?v=hhVo6uy-Uhw	yes
d	Cube AR	Entertainment	Users' Guide	AR helps users to solve the puzzle. It detects the CUBE, scan it and draws arrows which are juxtaposed on the cube and indicates the rotation needed. The user follow the arrows in the real CUBE for solving the puzzle.	https://www.youtube.com/watch?v=yCjZ77MV6BY	yes
e	Lego Catalog 3D	Entertainment	Product Catalogue	Lego catalogue is projected in 3D being juxtaposed on the environment. Users may choose the product and modify size, rotation and zoom-in.	https://www.youtube.com/watch?v=imEry7nCGvQ	yes
f	Curiscope	Fashion	Product Feature	A T-shirt has markers which once identified show on the device parts of the body organs. The user may select, zoom in and change position.	https://www.youtube.com/watch?v=QOHfdqgvFU&t=136s	no

g	IKEA Places	Retail Furniture	Product Catalogue	Images from the IKEA catalogue are juxtaposed over real environments. The user may choose, adjust the size, colour, rotation, zoom in and position on the environment.	https://www.youtube.com/watch?v=vDNzTasuYEw	yes
h	Wanna Kicks	Retail Fashion	Product Catalogue	The product catalogue is presented and a try-on is made available for a large collection of shoes. The user may choose the model, colour and rotation.	https://www.youtube.com/watch?v=UmJriqzDUTo	yes
i	Warby Paret	Retail Fashion	Product Catalogue	The virtual image of glasses are juxtaposed on the user. The user may choose the type of glasses and see it in try-on.	https://www.youtube.com/watch?v=HoSjmiVLsLU	no
j	Fanta	Food and Drinks	Packaging	A marker is scanned and the image is projected, allowing users to interact, choosing to create a try-on filter or apply for prizes related to purchase. The filters could be turned into an augmented reality, being projected as billboards. Users may choose options along the game, try-on images and share.	https://www.youtube.com/watch?v=FaNtoxc_Ww	no
k	Zara	Retail Fashion	Product Catalogue	A marker is scanned and the virtual image of the clothes are projected in a catwalk.	https://www.facebook.com/watch/?v=10156037834675907	no
l	Lego Pop-up store	Entertainment	Pop-up store	A marker is scanned and a pop-up animated shop is presented to the user. The user can navigate in the shop. Products are presented in 3D. Users may choose what to look at more specifically in the product line.	https://www.youtube.com/watch?v=k0KE-XDkdXA	no
m	Vespa	Automobile	Product Catalogue	The product catalogue is presented. Once the bike is chosen, the image is projected on the real environment as a new image. Users may change the colour of the object, rotate it, manipulate its size, location, take a picture and share and do a test-drive for the bike they created.	https://www.youtube.com/watch?v=CmFh3AkTCTg	yes

n	BookFul	Entertainment	Product features	The virtual image is projected on children's book. The image is related to the story written in each page. The user flips the page and changes the image.	https://www.youtube.com/watch?time_continue=26&v=nxpAGv33QG0	no
o	Kellogs	Food and Drinks	Packaging	The cereal box transforms into an interactive jungle island, with different short games. The user may play the game.	https://www.youtube.com/watch?v=fWHPYeer0Bg	no
p	Maxfactor	Hygiene and personal care	Product Catalog	Shoppers scan Max Factor products and find information, read peer to peer ratings and reviews, view make-up artists' tutorial videos. AR is experienced in the try-on of the cosmetics.	https://www.youtube.com/watch?v=nIM5jleiHx0	no
q	Uncle Bens	Food and Drinks	Product Features	AR enables consumers to trace their rice's journey from Farm to Fork. Users may navigate in the menu of options using AR.	https://www.youtube.com/watch?v=E-rMxkPORXE	no
r	Guinness	Food and Drinks	Packaging	AR allows users to find out more about a limited edition of beer. Participate in a contest and share with friends.	https://www.youtube.com/watch?v=OlgTOUCIexY	no
s	Ariana Grande Perfume	Hygiene and personal care	Packaging	Ariana Grande fans can scan the bottle to get the chance to take a photo with the celebrity in AR and access exclusive music from Spotify. Users may interact in taking a photo with Ariana, buying the perfume, listening to music, watching video.	https://www.youtube.com/watch?v=RoL2SUUbSTA	no
t	Head & Shoulders	Hygiene and personal care	Advertising on print	Head & Shoulders' interactive print advert, published in magazines with AR projecting a menu that allows users to watch an advertising film, request free shampoo samples and access a retailer for reviews and purchase.	https://www.youtube.com/watch?v=sAXK2I9WPDo	no

The initiatives were in most cases related to exploring the product catalogue (9), with brands using AR to create virtual images of their products and project them on the real environment or on users themselves, as depicted from Table 3. In almost all cases (8/9), product catalogues used AR try-ons.

The applications on packaging proposed an expanded experience with some using gamification. For example, in Kellogs (o.) an AR interactive game was proposed to kids, with images of a jungle being projected in 3D. In Fanta's (j.) AR unlocks filters (with images for try-ons) and contests. In Ariana Grande's (s) an AR interactive panel invites users to take a picture with the celebrity and access exclusive playlists. Other examples, used packaging as a way to explore product information. As for example, Uncle Bens uses AR to explore information about the rice and its origins. Guinness explores information about their limited edition of beer.

The uses of AR as users' guide was present in Nissan app. (b.) and Cube AR (d.). In both, users would scan real objects (e.g. the car's inside front panel) and instructions would be projected over the real object. In the case of Cube AR (d.) for example, arrows would indicate how users would turn the cube in order to solve the puzzle.

In the examples of uses applied to product features, the virtual image was an integral part of the product and in both cases, the focus was educational. In case of Curiscope (f.) a T-shirt would hold markers which would let the user access images of the body organs with AR. In the BookFull (n.) the animated characters are projected over the pages of the story, with users changing the images by means of flipping the pages.

The remaining cases are Lego Pop-up shop (l.) and Head & Shoulders (t.). In the first, no physical shop is needed, with users scanning a marker and entering a fully virtual environment of a shop, where product selection, visualization and purchase are available. In the case of Head & Shoulders (t.), the interactive menu is projected over the page of a print ad in a magazine. The menu invites users to watch the advertising film, order product samples and access a partner retailer for reading reviews and purchasing.

Concerning the extend of AR presence in the mobile apps, in most cases it was explored as main part of the users' digital experience, as in Table 4. Remaining cases used AR as an add on to the base functionalities of the app, being used for try-on.

Table 3: Types of AR initiative

	Number of Cases	
Catalogue	9	a., c., e., g., h.,i., k., m., p.
User Guide	2	b.,d
Product Feature	2	f., n.
Packaging	5	j., o., r., s.,q.
Pop-up shop	1	l
Advertising in print	1	t

Table 4: Extend of AR presence in the App.

	Number of Cases	
AR as main part of the experience	16	b., d., e., f., g., h., i., l., k., m.,
AR as an add on to the digital experience in the app (e.g. try-on)	4	a., c., j., p.
	20	

- *EPI Cube*

Regarding the analysis of characteristics in the EPI Cube, as in Figure 1 (alternatively in Table 5), most of cases overall were using low level of technology (low=1) in terms of image positioning (14/20). These are examples of apps that use marker-based technologies, with tags/QR codes being recognized and a standard image being projected. The sense of presence is also predominantly low (low=1). In most cases (13/20) the virtual images projected creates a new object over users' environment and no integration with the real object takes place. Differently, the level of interactivity is predominantly at a medium level (medium=2) (12/20), with users being able to interfere with the virtual objects modifying it by means of selecting, changing their size and colouring (as e.g.).

While analysing specific positions, it is possible to identify a concentration of cases (e; f; j; l; q; r; s) in a position characterized by low technology, medium interaction and low presence (e.g. <https://www.youtube.com/watch?v=imEry7nCGvQ>). In these cases, users see the virtual objects in their environment, but the experience is limited to modifying some of its characteristics. In second position, there are two groups of cases which are concentrated in an equal number. One of them (a; m; o; s) is at a position which is very comparable with the first group, with the main difference of providing higher number of possibilities for users to modify the object (e.g. <https://www.youtube.com/watch?v=CmFh3AktCTg>). The other group (c; h; i; p) is represented by cases which are high in technology, medium in interaction and high in sense of presence. Among them are some of the apps that allow try-ons with the images being juxtaposed over the image of the user (e.g. <https://www.youtube.com/watch?v=UmJriqzDUTo>).

It also worth commenting on the single example which is classified as being high for every dimensions, Ikea Places (<https://www.youtube.com/watch?v=vDNzTasuYEw>) is an AR mobile app that allows users to enjoy virtual images of furniture that are juxtaposed on the image of their real living room, allowing users to see their images integrated in the experience and modify and extend number of features.

Figure 1: EPI Cube applied to AR cases

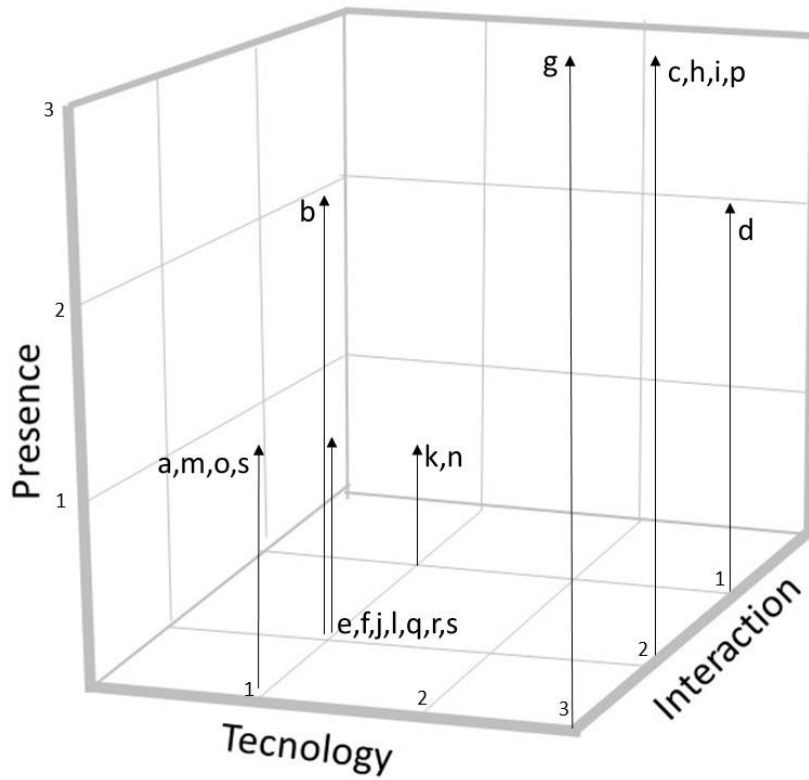


Figure based on Table 5

Table 5: Characterization according to EPI Cube

Case	Tecnology	Interaction	Presence
a	1	3	1
b	1	2	2
c	3	2	3
d	3	1	2
e	1	2	1
f	1	2	1
g	3	3	3
h	3	2	3
i	3	2	3
j	1	2	1
k	1	1	1
l	1	2	1
m	1	3	1
n	1	1	1
o	1	3	1
p	3	2	3
q	1	2	1
r	1	2	1
s	1	3	1
t	1	2	1

Low (1) Medium (2) High (3)

- *Customer experience*

Overall regarding the customer experience, as in Figure 2 (alternatively Table 6), cases are split between pre-purchase(11/29) and post-purchase (9/20). Most of cases integrate AR experience as part of the purchase funnel, with links to purchase being integrated among the features, as in Table 7. Concerning the *empowerment*, it is predominant the presence of AR experiences which are *related* to the core experience associated to the product. The few exceptions are Kellogs (o.) and Curiscope (f.), with both proposing activities to engage the user in educational and entertainment content.

Moreover regarding the support provided by the mobile app, the cases are well balanced between *indirect* experiences, where AR assists customers in their core experience with no integration with the real world, and the *direct* experiences. As an example of *indirect* support is Guinness (r.) with their AR experience transporting users to the imaginary world of their limited edition beer (e.g. <https://www.youtube.com/watch?v=OlgTOUCIexY>). On the other hand, an example of *direct* support is the case of Zara (k.) with AR experience being projected on the real world and creating a virtual catwalk (e.g. <https://www.facebook.com/Zara/videos/10156037834675907/>).

Figure 2: Customer Experience

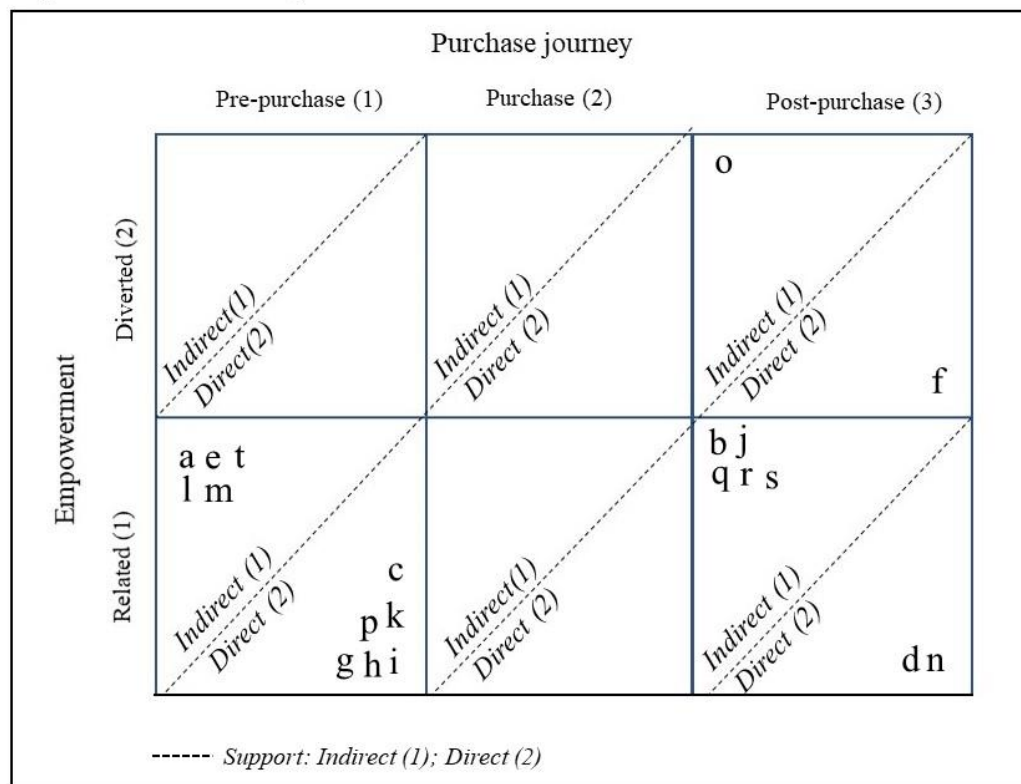


Table 6: Customer experience

Case	Journey	Empowerment	Support
a	1	1	1
b	3	1	2
c	1	1	2
d	3	1	2
e	1	1	1
f	3	2	2
g	1	1	2
h	1	1	2
i	1	1	2
j	3	1	1
k	1	1	2
l	1	1	1
m	1	1	1
n	3	1	2
o	3	2	1
p	1	1	2
q	3	1	1
r	3	1	1
s	3	1	1
t	1	1	1

Empowerment: Related (1), Diverted (2)

Support: Indirect (1), Direct (2)

Purchase journey: Pre-purchase (1), Purchase (2),
Post purchase (3)

Table 7: Integration of with purchase

	Number of Cases	
Link to purchase is integrated among the features	14	a.,c.,e.,g.,h.,i.,j.,l.,m.,p.,q.,r.,s.,t
Link to purchase is not integrated among the features	6	b.,d.,f.,k.,n.,o

20

CONCLUSION

The current book chapter intended to explore what are the current practices in place regarding the use of AR in the marketing mix of physical products and the implications for the future. While exploring this research question, the study contributes for identifying common aspects and drawing recommendations for future studies and practices.

For addressing the research question proposed, twenty cases of physical products using AR as part of their marketing mix were identified and analysed for their characteristics. The EPI Cube framework and

its contextualization in the customer experience (Flavian et al., 2019) was used as theoretical model for guiding the analysis.

In terms of overall description, results reveal that AR is present across various industries, from fast moving consumer goods to durable goods. Among AR's types of initiatives most often put in place are its use in product catalogues and on packaging. In most cases, AR integrates the main part of the experience.

Regarding EPI Cube analysis, most cases analysed present low levels in technology concerning image positioning and sense of presence. Interactivity is the dimension which is more evolved, with most cases offering a medium level. Main exceptions of from this pattern are characterized by apps with try-ons included and product users' guides in which AR integrates with users' real environment.

Concerning customer experience, most mobile apps are designed for driving users along the purchase funnel, by means of including links to the online shops. Most cases analysed present experiences that are *related* to the core experience. The few exceptions involve entertainment (gaming) and educational content. Moreover, concerning the type of support, *direct* and *indirect* experiences are both present, with some AR mobile apps projecting the virtual image on users' real world and others evolving into indirect experiences.

- *Implications for theory*

The implications for practice are related to the extended use of *EPI Cube* and *Customer experience* theoretical models. The models were originally proposed for understanding the taxonomy of different technologies in the reality-virtuality spectrum (Flavian et.al., 2019). In the current study, the original principles were applied to the context of AR, with adaptations being implemented at the level of technology and sense of presence. In view of results obtained, the novel model proves to be a useful framework for analysing AR, as it allows different categorizations among cases and offers an enriched guidance for analysis.

Moreover the current study helps to position AR's uses for its high potential in designing the marketing mix of physical products across a large scope of product categories. Additionally, the findings present AR as a tool for different applications in the marketing mix, along the whole customer journey. During pre-purchase AR may be considered as *i*) as a platform to integrate the promotional efforts (as in Head & Shoulders); *ii*) as a channel for sampling and try-ons (e.g. Wanna Kicks); *iii*) as a channel for building traffic to the online shops and as *iv*) an online shop itself, as in the example of Lego's Pop-up shop. During the post-purchase phase, AR may be considered *i*) as basis for customer information support (e.g. Nissan users' manual); *ii*) as a platform for providing entertainment which may not be necessarily related to the core experience associated to the product (e.g. Kellogs). Moreover, the examples of Curioscope and BookFull also help to position AR as resource for product innovation, with AR features occupying an integral part of the product experience designed.

- *Implications for practice*

The cases analysed position augmented reality for its various uses, as abovementioned. Managers could creatively explore these practices while developing their marketing initiatives. While doing that some of cases deserve particular attention, namely:

i) Curiscope and Bookfull as both are examples of new products that incorporated AR among their features and while doing that create unique value propositions in their product categories. Managers could profit from exploring that route and expand it by means of using AR for customization and personalization, both opportunities that were not present in the cases analysed.

ii) IKEA Places which occupies a very distinctive position in the EPI Cube signaling the potential of AR developments, with a high level of technology concerning image positioning, high level of interactivity and sense of presence proposed.

iii) Lego pop-up shop represents another important case for further consideration as it unveils the opportunity for brands to expand their distribution reach and create shopping experiences in places where traditional formats would not be viable.

iv) Nissan users' guide illustrates a perspective of how AR may be used in the future developments of customer service, with virtual interactive menus assisting users in their product usage.

v) Head & Holders presents AR tools as an important evolution in the perspective of integrated marketing communications. In this case, a print ad in a traditional magazine is used as means for impacting the target with advertising films, samples ordering and traffic building to the online shop.

vi) Kellogg uses AR on packaging as means to provide users with entertainment which is not related to the core experience of consuming Kellogg. While doing so, the brand creates new opportunities for emotional bonding with the target beyond the directly commercially intended perspective. The fact that this was among the very few examples where the experience provided was diverted from core experience, reveals the opportunities for managers to further explore that route.

FUTURE RESEARCH DIRECTIONS

Despite the fact that the current study have analysed a variety of AR applications being used in the marketing mix of physical products, the findings are limited within the boundaries of exploratory approaches, with a limited number of cases being analysed. Future studies could address that limitation by means of expanding the list of cases analysed across different types of product categories, brands and geographies.

Moreover, based on previous research the current study accepts that the various positions in the EPI Cube are associated to effects on business measures (e.g. purchase intentions) (Flavian et., al, 2019; Yim et al., 2017, Baños, et al., 2004). Future studies could further validate each individual position and evaluate the different effects in relation to each other.

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KEY TERMS AND DEFINITIONS

Augmented reality (AR) is an interactive experience of a real-world environment where the objects that reside in the real world are enhanced by computer-generated perceptual information, sometimes across multiple sensory modalities, including visual, auditory, haptic, somatosensory and olfactory

Marketing mix is a foundation model for businesses, historically centered around product, price, place, and promotion (also known as the "4 Ps").

Virtual reality (VR) is a simulated experience that can be similar to or completely different from the real world. Applications of virtual reality can include entertainment (i.e. gaming) and educational purposes (i.e. medical or military training).