AUGMENTED AND VIRTUAL REALITY THE NEW SILVER BULLET OF MARKETING? -AN OVERVIEW OF APPLICATIONS WITH THE AIDA MODEL

Roger Seiler, Michael Klaas
Zurich University of Applied Sciences,
Winterthur, Switzerland

Abstract
Purpose: Great advancements in the technical implementation of augmented reality (AR) systems have been made in recent years. Mobile devices are AR ready and software is available. There is also potential for marketing, as it has been shown that AR has positive effects on product knowledge, customers' attitudes towards brands, purchasing intentions, trust and cognitive processes in general, such as learning guided by additional, context-relevant information and interactivity, thus potentially supporting all phases in the ADIA (Attention Interest Desire Action)model. Nevertheless, no extremely successful applications exist for AR or commonly accepted usage scenarios supporting marketing.

Research questions: Which usage scenarios exist for AR and how are they connected to the different phases of the AIDA-model? Is there a focus on a specific phase and why?

Method: We analysed cases from AR field applications and categorised the cases by using an extended version (AIDAA (Attention Interest Desire Action Aftersales)) of existing theoretical models, such as the AIDA model.

Results: Most applications focus on the awareness and interest stage of the AIDA-model. Only a few applications are able to cover the full buying process, as well as after-sales stages. On the second dimension (games, explanation and experience) of our classification model explanation followed by experience are categories holding most of the applications analysed. Our analysis yielded seven hypotheses. One hypothesis states that the lack of action and transaction in AR applications leads to low prioritisation in business; another states that implementation is complex and cost intensive and, therefore, solutions focus on awareness and interest; and a final hypothesis identifies that an unclear value proposition and unclear customer perceived value lead to technical-driven solutions, leaving out large areas of an application's potential.

Conclusions: Existing literature and research have shown that AR has broad positive effects on marketing-relevant aspects, such as product knowledge, customers' attitudes towards brands and cognitive processes, resulting in better learning. Currently AR applications of companies in the field focus on the low-hanging fruit of easy-to-implement applications with a focus on awareness and interest stage of the AIDA-model and AR applications. AR solutions supporting the whole purchasing process, as well as solutions that are not driven by technology, are scarce and yet to be implemented in larger numbers.

Keywords: AR, VR, marketing applications, AIDA-model, AIDAA-model, TAM

1. Introduction

Latest research of Liao (2014, p. 317) shows that developer investment in AR (augmented reality) are on the rise with positive forecast for future investments in the field of marketing as marketers discover the benefits that this technology can have on customer experience. AR application to marketing can have positive effects on customer's attitude towards brands (Li, Daugherty, & Biocca, 2002, p. 53), on purchase intention (Daugherty, Hairong, & Biocca, 2005, p. 24) as well as trust (self assessed information is seen credible information thus leading trust to build (Daugherty et al., 2005, p. 20; Ng-Thow-Hing et al., 2013; Olsson, 2013, p. 228)) as an essential component of customer relationships and CRM (customer relationship management) and central to building long term customer relationships.

Not only is AR interesting from a research- as well as marketing perspective, but facts and figures from the field are just as interesting. An impressive figure regarding the business impact of marketing activities by using AR is the one drawn from the case of IKEA that could increase their furniture sales on Sundays via an AR app by 35% (Liao, 2014, p. 321). The authors propose that much research has been conducted with a technology perspective (see the meta analysis of Zhou, Dun, & Billinghurst (2008)) and would like to contribute to the marketing literature by taking a closer look at applications of AR. The application of AR in the marketing industry is relevant and AR applications are being applied by companies.

This study takes brief look at technology developments before carrying on to relevant theory concepts with aspects relevant to the field of marketing before explaining the methodology used as well as closing by elaborating on concluding results of the AR cases analysed.

1 Theoretical Foundation

Technical development goes back to the 1950s with Morton Heilig's development of the 'Sensorama', which was later to be patented (Yuen, Yaoyuneyong & Johnson, 2011, p. 122). In recent years, technological development has accelerated, and many commercial VR (virtual reality) HMDs (head mounted devices) have been launched, for example, Google Cardboard, Microsoft HoloLens, Samsung's Gear VR, HTC Vive, Sony PlayStation VR, FOVE VR and Zeiss VR One, to name a few (see Arth et al. (2015a)) for a comprehensive overview). An overview of the historical development may be drawn from Yuen et al. (2011, p. 122) or (Arth et al., 2015).

Early definitions of augmented reality (AR) were coined by Azuma (1997), who identified AR as a combination of the real and virtual worlds as being interactive in real time and as being registered in 3D. All three factors are relevant from a marketer's point of view, as they connect to other relevant theories, such as the media richness theory (Daft & Lengel, 1986) or technology acceptance models (Davis, 1986) that are related directly or indirectly to buying decisions on one hand and, on the other, to having a direct influence on marketing goals such as consumers' attitudes towards a brand (Li et al., 2002, p. 53) or purchasing intentions (Daugherty et al., 2005, p. 24). Since the purpose of this paper is not to give a new definition of AR but to focus on the fields of application of this technology, we briefly introduce definitions of relevant concepts to be clear about the terms used as well as their boundaries.

According to Arth et al. (2015a, p. 2), AR dates back to the 1960s with referral to the Sutherland System, whereas the term itself was coined by Tom Caudell and David Mizell (Arth et al., 2015, p. 3). Azuma (1997, p. 356) defined AR based on three components: a real/virtual world, real time and 3D. He further stated that 'AR allows the user to see the real world with virtual obects superimposed upon or composited with the real world. Therefore, AR supplements reality, rather than completely replacing it' (Azuma, 1997, p. 356). As can be concluded from the definition, the real and virtual worlds mix. This aspect is covered by Milgram's continuum for classifying AR displays on a continuum with the real world on the left and the virtual environment on the right (Milgram & Kishino, 1994). In between is the mixed-reality zone where both worlds blend with the help of AR technology. An extension of the concept of AR with social media components and functionality was provided by Langlotz et al. (2012), who coined the term *AR 2.0*.

Further terms worth mentioning are *telepresence* and *social presence*. Both can play a role in electronic marketing communication and, therefore, are briefly introduced. Grüter & Myrach (2012) elaborated on the concept of telepresence in their meta-analysis and were the first to carefully distinguish between telepresence and virtual experience. They concluded that the definition of Steuer (1992) is the most appropriate one for telepresence: 'Telepresence is the experience of presence in an environment by means of a communication medium' (Steuer, 1992, page number). Bente, Rüggenberg, Krämer and Eschenburg (2008) linked social presence to trust and, within their research, concluded that definitions differ remarkably, mainly due to the understanding of subdimensions related to spatial presence. They cited an early conceptionalisation from Short, Williams and Christie (1976) with the words 'the degree of salience of the other people in the interaction' (Short et al., 1976, p. 65), as well as later conceptualisations of Biocca, Harms and Gregg (2001), who developed the original social presence construct into a more psychological variable and defined social presence as 'the moment-by-moment awareness of the copresence of another sentient being accompanied by a sense of engagement with the other'. Making the link between the constructs mentioned and AR, we conclude that AR technology has the potential to positively influence these constructs and, in return, have positive effects on the relevant marketing aspects mentioned earlier in this paper.

To identify specific focus areas with an impact on marketing activites, two dimensions must be described. One focuses on the usage scenario of AR, defining for what purpose the application was built. The other dimension aims to identify the stage of the sales channel in which the AR was used. Here we focus on the AIDA model, which will be extended to cover the whole buying process.

Various established models mainly from information science are relevant to AR as well. Some models focus on the technology's characteristics (Li, Daugherty & Biocaa, 2001). Others are more in line with our research focus, such as the technology acceptance model (Daugherty et al., 2005; Davis, 1986; Rese, Schreiber, & Baier, 2014, p. 875; Venkatesh, Morris, Davis, & Davis, 2003), which focuses on human acceptance of technology by including the dimensions of perceived ease of use and perceived usefulness, which are both dimensions that can be associated with a customer's perspective on technology but in essence are technology

driven and rooted in the field of information science. Other models are more akin to the field of marketing, and we, therefore, take a closer look at these.

A popular model for analysing communication channels and media is the media richness theory (Daft & Lengel, 1986). This model links the complexity of a task to the richness of a transportation channel or medium and helps one decide on which channels to use for what tasks. An additional model related to consumers is that of virtual experience (Li et al., 2002, p. 50), which incorporates consumer and product characteristics and links these to the virtual experience. This model fit our research goals but is rather complex compared to another model, the AIDA model. In the field of marketing, the AIDA (Attention, Interest, Desire and Action) model may be seen as the widely accepted standard model in understanding consumer behaviour just as the SOR (Stimulus-Organismus-Respons) model is. The AIDA model dates back to Butler (1914), and we use it in this paper as it is well-established, covers important phases of the purchase decision process and is simple in nature. As it is missing the post-purchase part of the buying process and we would like to cover this as well, we add an additional stage called *after sales* to the AIDA model, extending it to AIDAA (see Figure 1). Especially in the field of CRM, this latter stage where customer service comes into play (see service profit chain (Heskett, Jones, Loveman, Sasser, & Schlesinger, 2008)]) is an important one that we would be able to cover with this model.

Marketing-relevant impacts, as well as positive effects of the application of AR in marketing activities, have been shown by various researchers in the field of AR. Li et al., (2002) reported a positive impact on the brand. Olsson, Kärkkäinen, Lagerstam & Ventä-Olkkonen (2012, p. 29) even state that it 'holds the potential to revolutionise the way in which information is accessed and presented to people', which is no understatement from our point of view with respect to the marketing perspective and effects that AR can have on it. This cited statement becomes more clear if one takes a closer look at the effects AR has on marketing-relevant aspects such as learning. When customers are exposed to AR applications, they have greater product knowledge, and their brand attitudes and purchasing intentions can be positively influenced (Daugherty et al., 2005, p. 24), as well as learning in general (Daugherty et al., 2005; Ibáñez, Di Serio, Villarán, & Delgado Kloos, 2014, p. 1). AR's positive effect on purchasing intentions, as well as brand connection, are also reported by (Baek, Yoo, & Yoon, 2015). Furthermore, there are postive effects of AR on presence (Daugherty et al., 2005, p. 32). Taking a glance at VR, where the training of medical staff in VR has positive effects on their real world skills (Haque & Srinivasan, 2006, p. 56), one can conclude that both VR and AR have positive effects on marketing-relevant aspects such as learning. Even though some problems may occur in AR (see Kruijff, Swan II & Feiner, 2010, p. 4, for an overview and Azuma, 1997, p. 367, for a more detailed discussion of problems and errors in AR technology) that are mainly rooted in the technical realm, which we explicitly rule out in this paper, we pose the hypotheses that AR has potential in the field of marketing, as it has numerous positive effects on aspects relevant to marketing.

An overview of research conducted in the AR field during the last ten years may be drawn from (Zhou et al., 2008, p. 194), whose research shows that mobile or mobile apps, which are highly relevant to marketing, cannot be found in the top ten most frequentlycited papers. Therefore, the technical perspective is predominant. Thus, in this paper, we would like to contribute by applying well-established models in the field of marketing to the new technology of AR and ruling out the hassle of bits and bytes. Before analysing the cases, following is a closer look at the classifications of AR applications and use cases.

Applications of AR are multifaceted and cover a broad range of applications if one looks more closely. Museum guides (e.g. METAIO (Carmigniani et al., 2011)), medical [e.g. laparoscopic surgery], manufacturing/repair, visualisation, robot path planning, entertainment and military are just a few (Azuma, 1997, p. 356). WikitudeDrive, Firerighter 360, Le Bar Guide, and Darpa and Babak Parviz contact lenses are some of the AR applications in the field of research. MIT, as another example, has come up with applications such as the Sixth Sense, MyShopping Guide and TaPuMa (for additional examples, see Carmigniani et al., 2011, p. 367). Let us take a closer look at consumer applications. Bus jogging, furniture shopping and virtual mirrors (self-augmentation by adding virtual clothes to your reflection, as presented in (Olsson, Lagerstam, Kärkkäinen, & Väänänen-Vainio-Mattila, 2013, p. 33) are applications that clearly have a customer focus. In contrast, the customer-centric scenarios industry provides various examples of AR applications too: facility management (Irizarry, Gheisari, Williams, & Walker, 2013, p. 11), crash tests at Volkswagen, concept cars and dashboard usability designs at Daimler Chrysler (as mentioned in van Krevelen, Poelman, Krevelen & Poelman, 2010, p. 10), assembly at BMW and other companies, such as Boeing and EuroFighter, are making use of AR in an industrial setting. Not only production and assembly lines use AR to help their workforces fulfill their tasks, but service and maintenance tasks can be simplified by using AR technology as well (see(Fuchs et al., 1998)).

AR can also either protect human beings – pedestrians, for example – or help build trust between humans and technology, such as self-driving cars (Ng-Thow-Hing et al., 2013).
Which applications provide the most value? A starting point may be Olsson et al. (2013, p. 293), who stated that AR is most useful when displaying additional information related to places, people, public transport or any momentarily relevant issues nearby.

Figure 1: AIDAA model of AR

The AIDAA model covers the stages of the purchase process, but what about the fields of application that AR technology covers?

Arth et al. (2015a), with a mostly technical viewpoint, have a eight-category classification (research, mobile phone, mobile PC, hardware, standard, game, tool and deal). As we do not wish to overcomplicate things in this early stage, we chose to go for a simple but purposeful model and, therefore, agreed on games, explanation and experience for a classification of AR marketing applications. Last but not least, an overview of reasons for installing and using an AR application (Olsson & Salo, 2011, p. 72) is given. The arguments mentioned, as well as aspects covered previously, lead us to our research questions.

In reviewing the current literature, we identified the need to take a closer look at usage scenarios that exist in AR and how they connect to the different phases of the model. Established models (AIDA) for conducting this analyis have been extended (AIDAA) to fit this purpose and then applied. The second research question addresses the phases and answers the question of whether there is a focus on a specific phase and why.

2 Research Method

To gather AR applications from the field, desk research was conducted by using search engines, as well as referring to scientific databases and articles to gather AR applications applied in a marketing context by companies engaged in marketing activities.
In detail, the following cases (see **Table 1**) are identified and used within the context of this paper:

Case	Source	Branch
Artvertizer	https://www.youtube.com/watch?v=epKqR9cQfl8	Art / culture
AR Online Shopping	https://vimeo.com/25552429	Fashion
Autodesk	https://www.youtube.com/watch?v=i-o51gBh6i0	CAD Software
Band Aid	https://www.youtube.com/watch?v=lm5-KPW0x3U	Medical
Ben and Jerry's	https://www.youtube.com/watch?v=JiTcAkfzwC0	Food industry
Guinness World Record Book	https://www.youtube.com/watch?v=-4e1q2rr7eI	Publishing
Heinz	https://www.youtube.com/watch?v=GbplSdh0lGU	Food industry
Hugo Boss	https://www.youtube.com/watch?v=4q4Aew-zx3w	Fashion
IBM AR Cebit	https://www.youtube.com/watch?v=EAVtHjzQnqY	Retail (application)
Ikea	https://www.youtube.com/watch?v=vDNzTasuYEw	Furniture / living
Land Rover	https://www.youtube.com/watch?v=LEPR8DfBsZQ	Automotive
Lego	https://www.youtube.com/watch?v=PGu0N3eL2D0	Toys
McDonalds	https://www.youtube.com/watch?v=AHuwaqwyDN0	Food industry
Modiface	https://www.youtube.com/watch?v=MSR77aDkcdw	Beauty industry
Pepsi	https://www.youtube.com/watch?v=Go9rf9GmYpM	Drinks and food industry
Ray Ban	https://www.youtube.com/watch?v=Ag7H4YScqZs	Fashion
Show in Room	https://www.youtube.com/watch?v=Vx42KxHKv0M	Furniture / living
Tissot	https://www.youtube.com/watch?v=m9oeAlOY4Vs	Watch
Warbot	https://www.youtube.com/watch?v=qBuMCPYyRmQ	Toys
Valpak	https://www.youtube.com/watch?v=u8LmequffO0	Compliance / recycling
Virtual Honeymoon	https://www.youtube.com/watch?v=i6yMqXLnpN4	Hospitality
VW	https://www.youtube.com/watch?v=iYUNTZmrUXw	Automotive
Yihaodian	https://www.youtube.com/watch?v=hJqIpIlR3nI	Retail

Table 1: List of cases with sources

Drawing on the theoretical base given in the first part of this paper, the authors independently classified the cases by using the AIDAA model. The classifications were then compared, discussed and finally consolidated to a final classification with minor adjustments to the individual initial classifications.

3 Findings

The cases analysed are depicted in Figure 2. The final classification is presented in Table 2. As we did not conduct quantitative or in-depth qualitative interviews regarding the cases' descriptive statistics and regarding the classification, it is appropriate to give an overview of the AR application. Most cases are used in the awareness stage of the AIDAA model, followed by the decision stage. These two stages precede the interest stage with five cases in total. Action and after sales each have one case. A possible explanation could lie in the complexity of AR applications in these phases. In order to be able to take action in AR applications, for example in an e-commerce app, many aspects, such as product information (e.g. price or stock), purchase functionality (shopping basket), payment interface and data from the registration process (e.g. customer's information) must be implemented, which is a more complex task than adding a video or animated character to a book (e.g. *Guinness Book of World Records*).

Taking a look at the dimensions of games, explanations and experience, one can conclude that apps focusing on customer/product experience are followed by those focusing on explanation. Last but not least, games are a field of application for AR apps in the area of marketing.

	Game	Explanation	Experience
Awareness	Hugo Boss Mc Donalds GWR2014	Ben Jerry Valpak Modiface	Virtual Honeymoon Pepsi
Interest	Warbot	Heinz Artvertizer	VW Land Rover
Decision		Lego Box IBM Autodesk	Ray Ban Ikea AR Online Shopping Tissot Show in Room
Action			Chinese Virtual Shopping (VR)
After Sales	Band Aid		

Figure 2: AIDAA model of AR

	Game	Explanation	Experience	Totals
Awareness	3	3	2	**8**
Interest	1	2	2	**5**
Decision	0	3	5	**7**
Action	0	0	1	**1**
After Sales	1	0	0	**1**
Totals	**5**	**8**	**10**	**22**

Table 2: Descriptive statistics

It was difficult to assign some cases to a specific usage scenario or to a specific position in the AIDAA model. For example, in the case of Band Aid, the connected media campaign can be and was used to create awareness and to support the decision process, even though the app is mainly used after the product has already been purchased. The authors decided to focus on the perceptions of the actual user of the AR application; therefore, this example belongs to the after-sales process. In the case of the Chinese Virtual Mall, the connected marketing campaign mainly focuses on the decision process, as the availability of the stores is the centre of the campaign. Nevertheless, it was the only example that included the actual sales process as well as a connection to the backend processes. After having analysed the cases, we would like to set up hypotheses (see Table 3) that are to be tested in future research. We did not see many applications that allow for business transactions.

It became apparent that many cases aim for awareness creation for a brand or a product or service, rather than actually focusing on the decision and action processes. It seems that companies use the buzz that is created by the use of new technologies to project a specific image on a brand or product, rather that supporting sales processes directly.

The use of AR to enhance the experience within the decision phase is also a focus area; nevertheless, there was no data available on the success of these tools in regard to sales increases or the ROI (Return on Investment) of the activities. Therefore, we set up the hypothesis that this may result or account for a low business prioritisation, as there seems to be no direct connection between the use of AR in marketing and an increase in sales. Furthermore, implementation of AR solutions, especially those with interaction and buying functionality, requires special skills and is complex in comparison with less complex solutions, resulting in a focus on simpler AR applications in the stages of awareness and interest. A further argument may be that, to date, AR technology does not provide a seamless shopping experience. A more organisational and cultural aspect may explain the lack of integrated solutions covering the entire buying process namely the fact that marketing and sales departments are seldom aligned. Switching to customer perception, we think that the value proposition may not be crystal clear and, therefore, that current solutions are technology-driven and not business initiated. An additional customer rooted aspect is usability. We hypothesise that usability can be improved by AR, as it has the potential to reduce complexity, thus making it easy for customers to use and may come with a possible positive side effect of building trust (see Luhmann, 1968, for the link between complexity and trust). A last hypothesis relates to the hardware and the hassle of installing an app and using its AR functionality, as all customers are neither equally familiar with the technology nor equally tech savvy.

H_1	Lack of action and transaction leads to low prioritisation in business.
H_2	Implementation is complex and cost intensive, and, therefore, many solutions focus on awareness and interest.
H_3	Devices do not support a ‘seamless’ shopping experience.
H_4	No alignment between marketing and sales exists; therefore, solutions cover only part of the buying process.
H_5	An unclear value proposition, as well as unclear customer perceived value, leads to technology-driven solutions, leaving out large parts of AR applications’ potential.
H_6	Usability is improved by AR.
H_7	Hardware is too much hassle with respect to the value delivered by the technology.

Table 3: Overview of the hypotheses

4 Discussion, Limitations and Further Research

The case analysis showed that most initiatives and applications of AR focus on the awareness and interest stage. Furthermore, we did not find integrated applications that cover the entire buying process. Following this line of argumentation, it is no surprise that AR applications in marketing focus on experience followed by explanation. Especially the AR technology that enriches the real world with context-specific and, therefore, the mostly highly relevant information is suitable for applications in augmenting the experience of a product or explaining it better. Possible explanations for these findings are that the applications are obvious as well as low-hanging fruit regarding the complexity of implementing them. Therefore, we noticed a lack of focus re-

garding true business value and customer perceived value of AR solutions that help customers interact with products and simplify their purchasing decisions, as well as supporting the entire buying process. Lee, Chung and Jung (2015, p. 481) showed that AR has positive effects on perceived ease of use, as well as perceived usefulness, and is, therefore, relevant for marketing. It may be necessary to keep cross- and omni-channel aspects in mind to achieve a holistic solution that provides this functionality whilst simultaneously maximising the customer's experience.

Nevertheless, current literature has shown that AR has broad and positive effects on marketing aspects and can help marketers craft a customer experience that can differentiate among competing companies. Crucial from our point of view is to focus on the customer's perception of the technology and avoid negative experiences either from high complexity, fumbly handling, bad usability and technical errors (e.g. installation, high latency and other problems).

A limitation is the fact that effects of AR are product specific and dependent on the product category (Li et al., 2002, p. 53). Therefore, we identify the product type as an interesting field for further research and maybe an opportunity to add to our classification by extending the model used in this study by the product type as a dimension.

As this research does not claim to have exhaustively covered all applications of AR in marketing, we suggest that extensive research on AR applications in the field of marketing, as well as related fields of research such as psychology, be conducted to gain a holistic and interdisciplinary view of AR.

Moreover, we suggest that quantitative research may elaborate further and lead to deeper insights regarding the topic and research questions of this preliminary study.

Little research has been done on customer acceptance of this new technology; therefore, this is an aisle that future research may go down.

Last but not least, we suggest testing the hypotheses derived in this study in further research.

5 Conclusion

A focus of applications of AR in marketing may be identified in the first phases of the AIDA model, such as the awareness, interest and decision phases. Latter phases are under-represented, presumably because of the higher complexity these stages tend to bring with them. Experience, explanation and games are applications of AR that are more equally distributed in the field of marketing, even though experience and explanation are highly attractive applications with respect to the positive effects, such as a customer's product knowledge and a customer's attitudes towards a brand. Last but not least, the customer's purchasing intentions can be positively influenced, and, therefore, we advise that AR applications be shipped with buying functionality.

6 Authors

Dr. Roger Seiler, „Is a Senior Lecturer at the Institute of Marketing Management (ZHAW) at the competence unit CRM ."

Dr. Michael Klaas, "Is a Senior Lecturer at the Institute of Marketing Management (ZHAW) at the competence unit Integrated Communications."

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