

Consumer Experience and Augmented Reality Wine Label Application

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Abstract. Augmented reality (AR) applications are regarded as effective experiential marketing practices that can help companies promote their products/services in an interactive manner and deliver exceptional consumer experiences. The purpose of the present study is to evaluate a wine-label AR mobile application by examining its impact on consumer experience dimensions, satisfaction, and re-usage intentions towards the application, as well as attitude and purchase intentions towards the wine product. Moreover, to test the effect of product-consumption related factors (consumption frequency, amount of spending, wine expertise, and attention to wine labels) and technology-related factors (consumers' familiarity with smartphone applications, number of AR applications used in smartphone, and extent of information search for wine-related information through smartphones) on the experiential dimensions of entertainment, flow, escapism, and education. Towards this end, a wine AR label application was developed and evaluated using a quantitative survey. In total, 306 respondents answered a self-administered questionnaire after interacting with the application. Results indicate that the AR application induced the entertainment and educational dimensions of consumer experience. The AR experience was also able to increase respondents' satisfaction with the application and in turn help them form positive attitudes and purchase intentions for the wine. Moreover, the present study revealed that respondents' expertise for wine, attention to wine label, familiarity with smartphone applications, and information search for wine-related information through smartphones are important factors that have an impact on the experience lived by consumers when using the AR label application.

Keywords: Augmented reality, wine labels, consumer experience, flow, entertainment, escapism, education, evaluation, antecedents, Digital Marketing, Digital Transformation

1 Introduction

Augmented reality (AR) technologies have been used as a viable marketing strategy for promoting in an innovative way products and services and are characterized as

effective alternative means for delivering valuable experiences to consumers [1]. AR technologies can support marketing and promotional activities of companies and in turn foster the relationships of consumers with the brands [2]. Marketers are utilizing these technologies to provide augmented and immersive content for a product/service using a physical background [3]. These applications can be used across the customer journey affecting pre-consumption (attitude formation), consumption (core experiences and emotions) and post-consumption experiences (satisfaction and re-purchase intentions [4].

AR technologies can offer exceptional experiences to consumers since they aim at enhancing consumers' interactions with the product/service [5]. Herein, consumer experience is a multidimensional construct [6] that encapsulates various dimensions such as hedonism-entertainment, flow, escapism, learning, challenge, socialization, and communitas [7]. AR applications used for marketing purposes can enhance consumers cognitive, emotional, esthetic, and social experience with the product/service [8] and can also lead users to a state of flow where consumers are absorbed and immersed in an activity such as using their mobile phones to scan a product and interact with augmented reality information [9].

Consumers' experience from an AR product-related application can have a varying impact on consumers depending on a number of factors. Until now the majority of studies that test the antecedents of consumers' evaluation of AR product-related applications have mainly utilized the TAM framework [10]. The present study enhances the literature on antecedents of consumers' experience from AR mobile applications by examining the impact of consumers' product consumption and technology related factors on four experience dimensions namely, entertainment, flow, escapism, and education. Thus, the aim of the study is three-fold. First, to evaluate a wine-label AR mobile application by examining its impact on consumer experience dimensions, satisfaction and re-usage intentions towards the application, as well as attitude and purchase intentions towards the wine product. Second, to test the effect of product consumption-related factors (consumption frequency, amount of spending, wine expertise, and attention to wine labels) on the four experiential dimensions. Third, to decipher the impact of technology-related factors such as consumers' familiarity with smartphone applications, number of AR applications used in smartphone, and extent of information search for wine-related information through smartphones on the experiential dimensions of entertainment, flow, escapism, and education.

2 Augmented Reality Wine Label Application

Wine companies nowadays are increasingly utilizing AR technologies to promote their products. With the help of augmented-reality technology, wineries are able to provide rich digital content to their customers through videos, 2D/3D animations, photos, and text to enhance their experience [11]. Specifically, consumers can download an AR application on their smartphones and then scan the label to interact with the product.

To test the objectives of the present study, an AR wine label application was developed using Unity 2018.4.31f1 and Vuforia Engine 10.2 platforms. The underlying application was implemented for Android mobile devices.

Upon launch of the wine “live” label application to the user mobile device, users are prompt to target their mobile camera to the front bottle label. Once the camera recognizes the target image, the AR application generates the augmented multimedia content which is then shown on the users’ smartphone. Specifically, the AR content of the application includes:

- Videos of the winery's production procedures such as harvesting and crushing grapes, fermenting, maturing, and bottling.
- Interactive and 360° videos of the infrastructure of the winery.
- Videos and animation narratives about wine products.
- Information about the wine ingredients and calories in text format and short animated clips.

The user can interact with the AR content by selecting the proper action from the application menu and the corresponding information pops up. Furthermore, once the user presses the info button that is located on the bottom right side of the application, a 2D animation character appears on the screen providing additional information in both text and audio form such as wine ingredients, calories, and storage temperature.

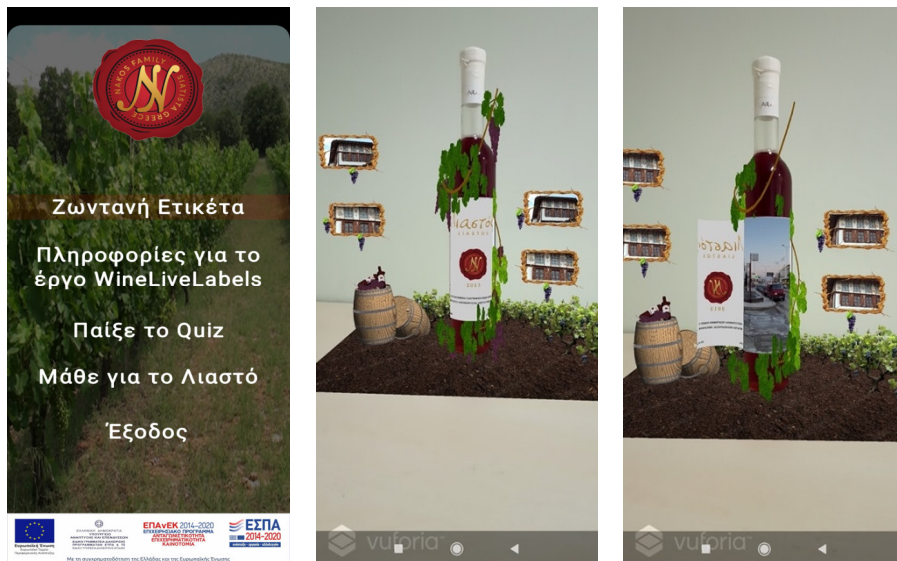


Fig.1. Indicative screenshots of the AR wine label application

Furthermore, one important feature of the wine “live” label application is the way the front image label interacts with the user. Once the image target is recognized by the AR application, a virtual augmented front image label appears to open as a “virtual door”. This feature reveals hidden information to the user in the form of a short

intro animation video. The intro video plays for a few seconds and the “virtual door” automatically closes so the user can navigate freely inside the application. Also, a short 3D animation appears to the screen that depicts vine branches that progressively start to grow around the bottle. Figure 1 shows some indicative screenshots of the wine “live” label application.

A help section is also displayed at the bottom left of the screen of the mobile device that explains how to use the application or provides additional information about it. The video menu that surrounds the target image label also contains important information about the application. The user may select a video which is then displayed in full screen. After watching the previous video, the user can switch to the next one by pressing the "Next" button.

In addition, an assessment of the user's knowledge of the wine label is carried out through a short quiz game incorporated into the "live" label application. Users are asked questions about the wine product via a small multiple-choice survey during this phase. While choosing between four possible answers, the user is provided with feedback regarding his/her success or failure. Finally, following the completion of all questions, a summary of correct and incorrect answers is displayed to the user.

3 Method

To evaluate the AR application and test the study's objectives, a survey was conducted with a self-administered questionnaire through a convenience sampling approach. More specifically, the questionnaires were delivered during the Hotelia exhibition in Thessaloniki, Greece (November 18-20, 2023) that was directed to professionals in the field of hotel equipment, as well as catering and coffee services. Seven university students approached attendees of the exhibition and asked them to participate in the survey. Participants that agreed to take part in the survey, were first shown the application by scanning the label of the wine bottle. Then, they completed the questionnaire. In total, 325 questionnaires were completed. However, only 306 were used in subsequent analysis due to incomplete data.

The questionnaire was comprised of five sections. The first section included questions about the wine consumption frequency, consumer's wine expertise, money spending on wine, attention to wine labels, and factors affecting the choice of wine. The second section asked participants to indicate their level of familiarity with new technologies (e.g., smartphones, smartphone applications), the number of AR applications used in their smartphones, and the degree to which they search information about wines through their smartphones. The third section included questions about the application's experience. Specifically, the experience was measured through four dimensions and 12 items, namely: entertainment, flow, escapism, and knowledge. The items that comprised each dimension were derived from the consumption experience scale of [7]. All items were rated on a five-point likert scale ranging from 1: strongly disagree to 5: strongly agree. The fourth section asked participants to evaluate their satisfaction with the application and re-usage intentions concerning the AR application (Kim, Kang, Song, and Lee, 2020). Moreover, the questionnaire included ques-

tions about respondents' attitude towards the wine and their intentions to consume the wine in the future (Graham and Wilder, 2020). Satisfaction and re-usage intentions items were measured using five-point scale ranging from 1: not at all to 5: very much. The last section of the questionnaire was comprised of the demographic characteristics of the sample (gender, age, income).

4 Results

4.1 Sample

In total 306 respondents participated in the survey. Table 1 shows the demographic characteristics of the sample. Most of them were males (52.3%) and had a bachelor's degree. 28.1% of respondents aged between 18 to 25 years old and 27.1% between 26 to 35 years old. Moreover, most respondents had a monthly income ranging from 801 to 1500 euros (45.2%).

Table 1. Demographic Characteristics of the Sample

Gender	Percent	Age	Percent
Males	52.3%	18-25	28.1%
Females	46.1%	26-35	27.1%
Other	1.6%	36-45	15.4%
		46-55	19.3%
		56-65	8.8%
		66 +	1.3%
Education		Monthly Income	
Primary Education	0.3%	Up to 800 euros	27.2%
Secondary Education	18.5%	801-1500 euros	45.2%
Bachelor	52.8%	1501-2000 euros	12.0%
Master	27.1%	More than 2001 euros	15.3%
Ph D	1.3%		

Regarding respondents' wine consumption, 26.5% were characterized by low consumption levels (up to 1 time per month), 42.2% by medium consumption (2 to 3 times a month), and 31.4% by high consumption levels. Moreover, 27.1% of the respondents were low wine product spenders (up to 20 euro), 59.8% were moderate spenders (21 to 40 euros), and 13.1% were characterized as high spenders (more than 41 euros).

Figure 2 shows the mean scores of the factors that affect respondents when making decisions about wine purchases. Based on the findings, respondents rated as the most important factors when choosing wine, the grape variety ($M=3.78$), the color of the wine ($M=3.70$), and the brand name ($M=3.67$). Regarding respondents' expertise in

wine, the majority of them were characterized by low (68.6%) and moderate experience (24.5%).

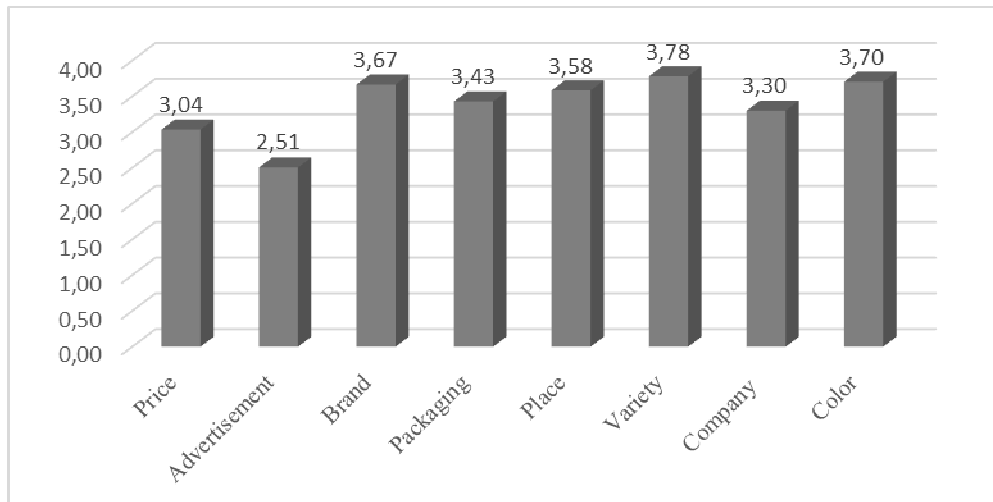


Fig 2. Factors affecting wine choice

In addition, 75.8% of respondents evaluated themselves as high in familiarity with using applications on their smartphones, and 59.5% of the sample had more than one application on their smartphones. Moreover, 57.7% of respondents indicated that they do not search frequently via their smartphones for information about wine, 22.6% of them search in a moderate frequency, and 19.6% of the sample search extensively through their smartphone for wine related information.

4.2 Experience with AR Application

Next, four scales were created by summing the items that comprised each of the four experience dimensions and subtracting them with the number of items. All scales exhibited satisfactory internal reliability as the value of Cronbach's alpha exhibited the 0.70 threshold (entertainment: 0.884, flow: 0.844, escapism: 0.860, educational experience: 0.817). Figure 3 shows the mean scores for each experience dimension concerning the AR wine label application. Based on the results, respondents rated the AR experience as highly educational ($M=3.82$) and entertaining experience ($M=3.68$). Flow was experienced in a moderate level by participants ($M=3.37$) while escapism was experienced to a lesser extent ($M=2.80$).

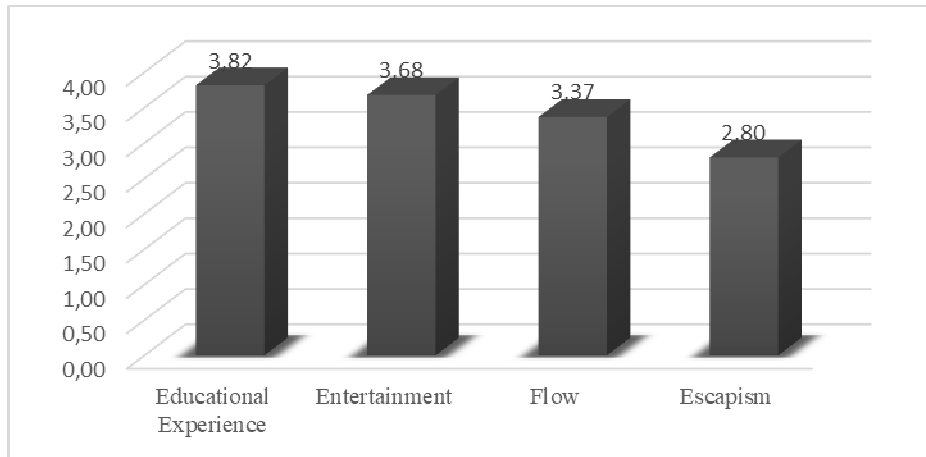


Fig. 3. Mean scores of experience dimensions with AR application

4.3 Satisfaction, Attitude, and Re-Usage Intentions

Again, four new scales were developed regarding respondents' satisfaction with the application and their re-usage intentions as well as their attitudes towards the wine and their intentions to buy the wine in the future. All scales had Cronbach's values above the 0.70 cut off criterion (satisfaction with application: 0.893, application re-usage intentions: 0.897, wine attitude: 0.744, intentions to buy the wine: 0.879). Figure 5 shows the mean scores of the four scales.

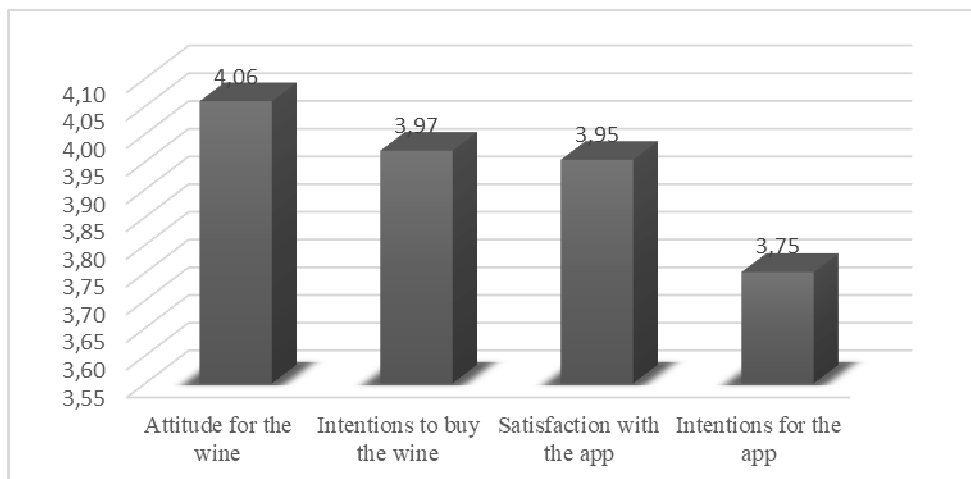


Fig. 4. Mean scores of respondents' satisfaction, attitude, and intentions

As Figure 4 illustrates, participants showed a positive attitude for the wine ($M=4.06$) and high intentions to buy the wine ($M=3.97$). Moreover, they were highly

satisfied with the application ($M=3.95$) and exhibited moderate to high intentions to re-use the application ($M=3.75$).

4.4 Antecedents of AR wine label experience

To test whether certain factors shown in Figure 6 have an impact on the the four experiential dimensions, Pearson rho product moment correlation tests and analyses of variance (ANOVA) were conducted.

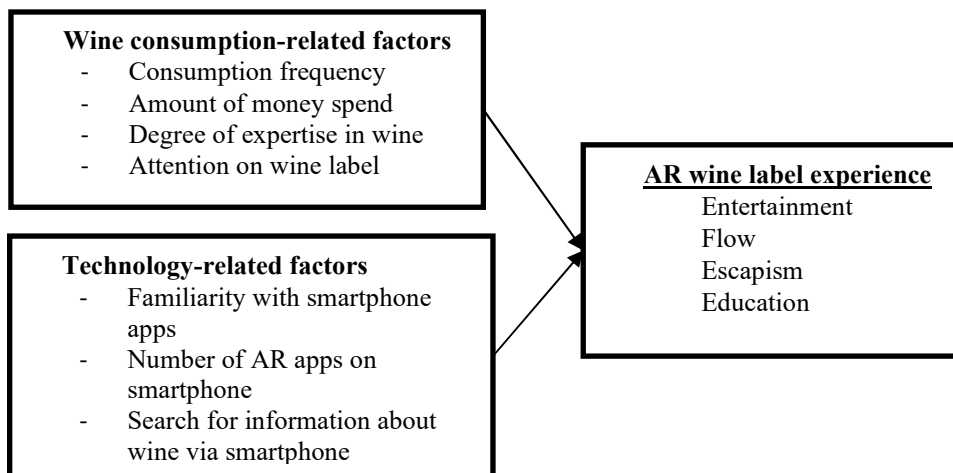


Fig. 6. Conceptual model

4.4.1 Wine consumption related factors

To test the impact of wine consumption frequency, money spend, and wine expertise on AR experience one-way analyses of variance were conducted. Results suggest that *the frequency of wine consumption* did not have a significant ($p<0.05$) effect on entertainment ($F=0.478$, $\text{sig}=0.621$), flow ($F=0.061$, $\text{sig}=0.941$), escapism ($F=0.289$, $\text{sig}=0.750$), and educational experience ($F=0.571$, $\text{sig}=0.561$) associated with the AR application. In a similar vein, no significant differences were found across the different types of wine spenders (low, moderate, high) in the mean scores of the entertainment dimension ($F=1.495$, $\text{sig}=0.226$), flow ($F=0.850$, $\text{sig}=0.428$), escapism ($F=2.290$, $\text{sig}=0.103$), and educational experience ($F=1.212$, $\text{sig}=0.299$).

Regarding, the degree of *expertise in wine*, results of analysis of variance show only a marginal significant effect on ($p<0.1$) on the escapism dimension of AR application. More specifically, those characterized as wine experts exhibited higher mean scores on escapism ($M=3.28$) compared to the respondents with moderate ($M=2.85$), and low ($M=2.72$) levels of wine expertise. No other differences were found across

for the experience dimensions of entertainment ($F=1.411$, $\text{sig}=0.246$), flow ($F=1.438$, $\text{sig}=0.239$), and education ($F=1.699$, $\text{sig}=0.185$).

To examine the interaction between *wine label reading frequency* and the four-experience dimension, Pearson's correlation coefficient was calculated. Based on the results wine label reading frequency was marginally correlated ($p<0.1$) with the entertainment dimension ($r=0.109$, $\text{sig}=0.056$) and significantly correlated at the 0.05 level with the educational dimension of the AR experience ($r=0.121$, $\text{sig}=0.034$). These correlations were low in strength. No significant correlations were found between wine label reading frequency, flow ($r=0.079$, $\text{sig}=0.168$) and escapism ($r=0.040$, $\text{sig}=0.489$).

4.4.2 Technology-related factors

Analysis of variance was conducted to test whether respondents' familiarity with smartphone applications and the number of smartphone applications had an impact on the four experience dimensions. Based on the findings, significant differences were found across *familiarity* segments in the mean scores of the escapism dimension ($F=3.075$, $\text{sig}=0.391$). Specifically, respondents with low familiarity ($M=3.14$) experience higher levels of escapism by the AR application compared to respondents with moderate ($M=3.02$) and high ($M=2.71$) levels of familiarity with smartphone applications. No other differences were found between the familiarity levels in the mean scores of entertainment ($F=0.797$, $\text{sig}=0.452$), flow ($F=1.007$, $\text{sig}=0.366$), and educational experience ($F=0.941$, $\text{sig}=0.391$).

No significant differences were found in the mean scores of entertainment ($F=0.919$, $\text{sig}=0.400$), flow ($F=1.469$, $\text{sig}=0.232$), escapism ($F=0.957$, $\text{sig}=0.385$), and educational experience ($F=0.707$, $\text{sig}=0.494$) based on the *number of AR applications* that respondents use in their smartphones. Next, Pearson rho was calculated to test the relationship between the *extent of smartphone information search for wine issues* and the four dimensions. Results indicate that low positive and significant ($p<0.05$) correlations were found between the extent of information search through smartphones for wine-related issues and the dimensions of entertainment ($r=0.142$, $\text{sig}=0.013$), flow ($r=0.199$, $\text{sig}=0.001$), escapism ($r=0.148$, $\text{sig}=0.009$), and education ($r=0.196$, $\text{sig}=0.001$).

4.5 Conclusions

The purpose of the present study was to examine the impact of Augmented Reality smartphone applications embedded in wine labels on consumers' experience and their subsequent perceptions and intentions. Moreover, this paper aims to test the effect of a number of wine consumption and technology-related factors on consumers' experience with the AR application.

Findings indicate that the AR wine label application induced the entertainment and educational dimensions of consumer experience while feelings of flow and escapism were triggered by the AR application to a lesser extent to respondents. Thus, positive

feelings and new knowledge can be generated through wine AR label applications. The AR experience was also able to increase respondents' satisfaction with the application and in turn enable them to form positive attitudes and purchase intentions for the wine. Hence, AR wine label applications can have a positive effect on consumers' perceptions and behavioral intentions towards the wine product, thus making them an effective marketing tool for the wine industry.

Moreover, the present study revealed that respondents' expertise for wine, wine label reading frequency, familiarity with smartphone applications, and information search for wine issues through smartphones are important factors that have an impact on the experience lived by consumers when using the AR label application. More specifically, consumers' who are self-perceived as wine experts felt higher feelings of escapism compared to non-experts. Thus, wine experts were able to escape from reality through the AR application. Escapism was also related to respondents who were not familiar with smartphone applications. Moreover, respondents who pay attention to wine labels were more inclined to feel positive emotions and gain knowledge about the wine product compared to the other consumers. In addition, all experience dimensions were positively influenced by the extent to which respondents search wine information through their smartphones. Thus, a holistic experience is lived for consumers who active seekers of wine information through their smartphones.

Important practical implications could be derived from the findings of the present study. First, an AR application in the labels of wine bottles is an effective experiential marketing practice. Moreover, wine marketers can introduce this type of application to consumers that are regarded as wine experts and like to search for wine related information through their smartphones. In addition, these applications could target to consumers with low familiarity in smartphone applications.

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