The Effect of Virtual Reality Technologies Usability on Museum Visitor Experience and Satisfaction

Marina Ezdina

Abstract— **The expansion of opportunities for the use of Virtual Reality technologies increases the scope of scientific research. The usability of VR technologies and the Experience Economy play an important role in satisfaction of Museum visitors. Based on the theory of Experience Economy, this study looks at the impact of usability on the overall experience of visitors and their satisfaction with visiting the Museum. In this study, we developed a model that links usability with four realms of experience, identifies the dependencies of visitor satisfaction and willing to recommendations, and conducted an empirical analysis based on data collected mainly among visitors to Russian museums and art galleries. A total of 312 data units were collected and analyzed using SmartPLS3.0 (SmartPLS GmbH, Hamburg, Germany). Usability turned out to be an important component that positively affects the complex experience of visitors, on which a direct dependence of satisfaction with visiting the Museum was revealed. The results of this study are important both for scientific research and in practical work for the correct organization of the VR exhibition.**

Index Terms— **Experience Economy, Satisfaction, Usability, Virtual reality technology.**

I. INTRODUCTION

Technological innovation has a huge impact on the tourism industry, creating a more exciting and memorable experience for consumers and increasing their overall satisfaction. One of the new technologies is virtual reality (VR), which is increasingly used in various fields, including entertainment, marketing, and education [1]. The predominant presence of VR in travel and tourism practice, the literature on the use of VR in the tourism industry has been conceptual [1]-[3] with limited empirical work to date [4], [5]. VR has been recommended as a tool to enhance experiences in the context of tourism [6], increase tourism accessibility and support heritage conservation [1]. Empirical studies associated VR with higher tourists' attention, interest, desire, and action towards destinations [7], as well as elevated enjoyment which resulted in higher liking and preference toward a destination [5].

VR has changed the way travelers experience a destination or attraction, allowing them to have a more interactive and diverse experience [8]. Definitions of user satisfaction incorporate overarching constructs, including user attitudes [9] and end-user satisfaction [10]

Manuscript received April 11, 2021
Marina Ezdina, **MBA**, The School of Management, Hefei University of Technology, Hehei City, Anhui Province, China

However, studies on usability and user experience to launch a virtual user experience and assess the usability of the product received insufficient attention and thus a critical need to study the experience of Museum visitors and behavioral intentions associated with the use of Virtual Reality technologies.

The concept of usability is somewhat situation dependent in that the characteristics of the context (such as the user, tasks, and environment) influence usability [11]. Ideally, usability measures assess how actual users use the product in an authentic context, and the final results of the entire user experience and their satisfaction with the final product depend on usability. Usability studies are important for evaluating and iteratively improving not only VR but also AR systems [12], [13].

In addition to usability, in order to better understand consumers attitudes towards VR applications, as well as their intentions to use VR technologies, a number of previous studies have used Experience Economics to identify potential influencing factors [14], [15]. In recent years, there has been an increase in the number of studies examining the effectiveness of VR technology in enhancing user experience in heritage sites, museums, science festivals and other [14]-[16]. Although numerous scholars [17]-[19] applied the Experience economy framework in other tourism and hospitality contexts, several limitations remain. Prior research has mostly applied experience economy to explain relished constructs, such as loyalty [17].

This study complements previous research with a new and highly management-oriented construct: Visitor Engagement. Previous research in the field of tourism has focused on the use of three types of experience [20], to a lesser extent, all four experiences were investigated, and the results were scattered [21], [22], in our study comprehensively studied the impact of Entertainment, Educational, Esthetic and Escaping experiences without exception, this gives a complete picture of the impact of the use of new technologies on the satisfaction of Museum visitors. Based on theory of experience economy, we identified entertainment, educational, esthetic and escape experience, to be important system factors that will enhance usability of virtual reality technology.

Then the article is organized as follows: the second section is a review of relevant theories and research. In section 3, we develop a research model and hypotheses. Section 4 describes the research methodology used to test hypotheses. Section 5 presents the results. This article

concludes with a discussion of the findings, implications for theory, practice, and opportunities for future research in sections 6 and 7.

II. THEORETICAL FOUNDATION

A. *Usability*

It is not so easy to determine the meaning of the word usability, it is easier to do it based on specific examples. [23] states, it can be best summed up as a being a general quality of appropriateness to a purpose of any particular artifact. Pertaining specifically to VR, [24] give the following definitions - the effectiveness, intuitiveness, and satisfaction with which specified users can achieve specified goals in particular environments, particularly interactive systems. Effectiveness is the extent to which the achievement of a goal correlates with the resources spent. Intuitiveness is how easy it is to learn and use the system. Satisfaction is how easy and comfortable it is to use the system.

There are two key concepts related to the usability of the interface - “transparency” and " intuitiveness” [25]. Both of these characteristics are very important for the technology to work well. Transparency allows the user to ignore the environment and fully believe what they see, which is one of the main characteristics for Virtual Reality technologies; and intuitiveness allows the technology to anticipate the user's actions and intentions, which in turn also creates the illusion of complete immersion. Interface evaluation of a software system is a procedure intended to identify and propose solutions for usability problems caused by the specific software design [26]. The term “evaluation” usually refers to the process of collecting and processing data on the usability of a technology by a special group of users in a particular context [27], the validity and reliability of the results of usability analysis methods are not yet well understood, and the methods themselves are in the process of development and rarely perform the same thing in all studies [28].

The System Usability Scale (SUS) provides a broad global view of subjective assessments of usability. In a study of a number of previously unpublished usability studies, SUS accounted for 43% of the use of post-test questionnaires [29]. There are many survey options that can be used to evaluate usability, such as After-Scenario Questionnaire (ASQ), Computer System Usability Questionnaire (CSUQ), Post-Study System Usability Questionnaire (PSSUQ) [30], but SUS has several significant advantages: this tool is used for evaluating a fairly wide range of products and services; this system has good reliability and validity indicators, and benchmarks that interpret the results are quite reliable [31].

Table 1. System Usability Scale

Item	Standard	Positive
1	I needed to learn a lot of things before I could get going with this system.	I needed to learn a lot of things before I could get going with this system.
2	I found the system unnecessarily complex	I found the system to be simple
3	I thought the system was easy to use	I thought the system was easy to use
4	I think that I would need the support of a technical person to be able to use this system	I think I could use the system without the support of a technical person
5	I found the various functions in the system were well integrated	I found the various functions in the system were well integrated
6	I thought there was too much inconsistency in this system	I thought there was a lot of consistency in the system
7	I would imagine that most people would learn to use this system very quickly	I would imagine that most people would learn to use this system very quickly
8	I found the system very cumbersome to use	I found the system very intuitive
9	I felt very confident using the system	I felt very confident using the system
10	I needed to learn a lot of things before I could get going with this system	I could use the system without having to learn anything new

SUS is a “fast and dirty” usability scale, it has become a frequently used questionnaire for post-technology usability assessments [23], [32], [33]. Research done with SUS has shown that the system is really quite fast, but the evaluation is not as dirty, because the typical minimum reliability goal for questionnaires used in research and evaluation is 0.70 [34], and in these studies, the alpha coefficient was more than 0.85 [35]. It is so common due to the fact that it is free and short—with 10 elements that alternate between positive and negative usability statements about usability (odd items positive, even items negative). It has also been the subject of some recent investigations [35]-[38], which makes it a good candidate to manipulation. If the negative and positive elements are assumed to be equivalent, then when the negative elements are counted back, the resulting aggregate score should have reduced the agreement biases. At the same time, data began to appear that questionnaires with the inclusion of a mixture of positive and negative elements creates more problems [39]. [36] found that respondents gave relatively high scores for negative elements, and relatively low scores for positive elements. This suggests that people tend to agree slightly more with negative statements and disagree slightly more with positive ones [40]. They conducted two experiments comparing the use of a mixed and fully polarized SUS scale, and as a conclusion, found little evidence of any differences in agreement or extreme deviations in responses. The overall SUS scores between the standard and all positive SUS versions were not significantly different, suggesting that changing the wording of the paragraphs in this way does not appear to have a strong effect on the resulting SUS measurements [40], [41]. So, we can use all the positive versions with confidence because respondents are less likely to make mistakes in the answer, in the analysis is less likely to make mistakes, and the estimates will be similar to the standard SUS. The positive and standard usability scale from [40] is shown in the Table 1

B. *Experience Economy Theory*

According to [42] an experience is not an ephemeral concept; it is also comparable in the market with goods and services. Experiences are inherently individual, they exist only in the mind of the person who was involved in them at all levels of perception - emotional, physical, intellectual and spiritual level. Experience can also be defined as something that rises above everyday life to become unforgettable and that contributes to the personal enrichment of the person experiencing it [43]. Thus, there are no two people who have had the same experience, because each experience is unique and follows from the

interaction between the staged event and the state of mind of the individual [42].

[19] believe that experience has served as a key construct in travel and tourism research as well as destination positioning, everything tourists go through at a destination can be experience. As [44] suggests, tourist experiences can't be bought. They have the ability to form only in the mind of the tourist himself and only he can have control over the experiences, although in most cases even the tourist is not able to fully have such control. The model of the tourist market shifts from focusing on a product or service to improving the tourist experience [14], [19], [42].

[42] propose that experiences embody four realms (educational, entertainment, escapist and esthetic) that manifest across two continuous dimensions (Figure 1).

In an education experience, tourists tend to participate in activities in tourism destination in order to increase their skills and knowledge [19]. Education refers to the mental results of consumption, such as learning, received information, or increasing knowledge. When seeking to provide an educational experience, the museum can offer historical recreations, art exhibits, guided tours, and audio guides that interpret what the museum has to offer [43], AR and VR technologies can also serve this purpose. Most research on Museum visitor experiences focuses only on the educational role of the Museum and how to improve it, while omitting other types of Museum visitor experiences [43], however, museology today recognizes that learning in museums is a diverse experience [45]. In the educational realm, visitors actively participate in tourism activities to gain new skills and knowledge [19]. The educational experience is a dynamic and absorbing experience, with visitors themselves playing a fundamental role in shaping their experience, with the resulting increase in their skills and knowledge [46]. Some studies have confirmed the role of VR as a productive learning tool, creating an easy-to-remember component, such as the ability to get information about a destination or research object [14].

Entertainment involves amusement, enjoyment, and having fun, usually when adopting an inactive attitude. This is the result of passively absorbing experiences through the senses, although there is less relational connection with the event, since it is observed from outside. Entertainment in the domain of museums is achieved when visitors can enjoy

Fig.1. Experience Economy by Pine and Gilmore

the visit in a relaxed manner, deriving pleasure and fun from an activity [43]. Entertainment provides one of the oldest forms of experience and it is one of the most developed and pervasive in today's business environment [47]. Museums are perceived as interesting and entertaining places, and when the aspects of informativeness and fun in visiting a museum coincide, then we mean the aspects of education and entertainment [47], [48]. Entertainment is one of the oldest and most developed forms of experience that is widespread in the modern world [47]. According to [46], entertainment shows and live concerts, theme parks and cruise trips are all elements of the entertainment process. Museums are often perceived by people as places that provide opportunities for entertainment [48].

Escapism entails visitors observing things which can raise their awareness, stir their imagination, and help them to discover magic, delight, fascination, and ecstasy in objects as well as get away from the routine of everyday life [43]. Avoiding everyday life and choosing a destination tend to become secondary issues of decision, as the tourist is most motivated by the opportunity to participate in a different character or identity through active immersion in targeted activities at the destination. These components of escaping, diving into a destination, and engaging in a different character involve different tourist behaviors and require different approaches to managing the destination [19], [42]. Escapism Experience is extent to which an individual is completely engrossed and absorbed in the activity [49], and it is greater than that of an entertainment and educational experience [19]. Tourism is viewed in the context of an escapist experience, as a way to escape from everyday routine and return to normal life after an unusual, extraordinary experience [19], [46].

Esthetic experiences refer to observing and enjoying the environment or physical atmospherics of a place. It implies higher levels of customer immersion but low levels of customer participation. The esthetic experience can be achieved through sensory perceptions, especially visual and haptic ones [43]. In the esthetic experience, tourists enjoy staying in the destination environment without affecting or changing the nature of the environment presented to them. They passively evaluate or are influenced by how the destination addresses their feelings, regardless of the level of authenticity of the destination environment. Such experiences let them just be there [19]. So, AR and VR technology can best provide an Esthetic experience. Esthetic experience can be attributed to the surrounding atmosphere and the spirit of the physical environment [47]. Esthetic realm refers to visitors' interpretation of the physical space around them [46]. Many tourist excursions and activities are experiences of aesthetic experience [19]. [14] considered escapism and aesthetic experiences, with the advent of AR and VR systems in the tourism industry, to be increasingly significant.

To meet the modern needs and requirements of the market, it is important to create and implement a vibrant experience. The most intense experiences can cover all aspects of all four realms, forming a "sweet spot" around the area of the encountered spectra [42], therefore, all four dimensions, not equally, but still, should influence the

overall satisfaction of the visitor with the festival and Museum [18].

In the context of a heritage museum, it can be argued that cultural rituals belonging to a specific cultural group are of little interest to outsiders if they do not learn about these rituals [50]. Museums are a good example of organizations involved in offering customers memorable experiences, as noted in their research work [43]. They define museums as places that offer a completely controlled and well-defined experience, both in terms of space and time. In contrast to other tourist destinations, visitors' activities in museums are clearly defined and delimited. But still, the experience of visitors is not limited to either visiting or offering the Museum on the spot, and is accumulated through the process of joint creation, which covers the period both before and after the visit.

New technologies encourage whole new genres of experience [42]. In tourism research, little attempts have been made to examine factors enhancing visitor experience using both AR and VR technologies [14]. Augmented reality technology makes it possible to provide digital signage and content for cultural heritage sites without damaging the original architecture or landscape [15]. Virtual reality gives tourists the opportunity to visit endangered sites, thereby replacing the real visit, it allows you to preserve the heritage sites for future generations [1].

C. Satisfaction

One interpretation of satisfaction put forward by [51] is "the consumer's judgment that a product or service provides a satisfactory level of satisfaction related to consumption". Customers are satisfied when performance is higher than expected, and dissatisfied when it is lower, respectively, and at the same time, the level of customer satisfaction can be affected by all sorts of factors, sometimes even beyond the influence or changes from outside [52]. Overall satisfaction has a much greater impact on consumers' verbal and reverse decisions than their satisfaction with each separate purchase episode or from transaction to transaction [53].

[54] in their study found a significant causal relationship between travel satisfaction and destination loyalty. Satisfaction is also the most important indicator of the success and effectiveness of an information system [33], and, according to [55], satisfaction assessment is a post-consumer process in terms of travel experience. [56] define the concept of satisfaction through the emotional state of the traveler after the trip.

Some studies claim that there are significant differences between visitors from different cultures and nationalities as to what they expect at their destination, whether it is a hotel or a Museum [57]. For museums, clients are an important element of their managerial success, believing that the concept of visitor satisfaction is a major component of the success of the Museum experience [58]. Positive Museum activities create positive emotions, create pleasant impressions for visitors, and provide a high degree of satisfaction [59].

Satisfaction is assessed according to a certain standard, based on which socially significant values, desires and expectations of the visitor are interrelated, their impact on the expectations of tourists should be shown in satisfaction indicators [57]. Most managers of tourism products and organizations regularly perform surveys of tourist satisfaction [52]. Satisfaction can be considered on two levels-attributive and General, which are different concepts, but they are interrelated [50]. Considering the direction of our research and previous research related to museums [58], we decided to measure visitor satisfaction with the Museum experience at a General level.

D. Word-of-Mouth

[43] believe that in the domain of museums, visitor experience is a key factor in ensuring the museum's sustainability and even its very survival. The experience should be so rewarding and pleasing that it leads to the intention to repeat. Many museums are also under increasing financial pressure, leading to the need to operate in a way that optimally meets the needs of visitors, achieves customer satisfaction, and spreads positive word-of-mouth messages [50].

According to the results of the study of [60], based on the model by Word-of-Mouth, it was found that there is a strong correlation relationship between overall satisfaction with the tourist destination and the intention to return again, as well as between tourists who are satisfied with the destination and their intention to recommend this place to visit their friends and relatives. [54] research empirically prove that if tourists are satisfied with their travel experience, they are ready to return and willingness to recommend it to friends.

In a situation where expectations exceed the perceived result, we get a positive confirmation, leaving the tourist satisfied, with a likely desire to repeat the visit; if there is a negative confirmation, the tourist feels dissatisfied and will look for alternative travel destinations [62]. In many previous studies in the field of tourism, the manifestation of tourist loyalty to the place of visit is expressed in the intention to return and in readiness to recommend the destination to other people. "Intention to return "and" willingness to recommend" are indicators of loyalty intent and satisfaction [62]. As a result of their research, [61] concluded that tourists with a higher level of satisfaction with travel, and thus, with a stronger intention to return or recommend, spend more time at the destination, which can bring additional economic benefits. Some of previous research has focused on both the intention to re-purchase and the willingness to recommend or certain words positive Word-of-Mouth.

Expected attractions and activities at the destination must be obtained by tourists to increase the competitiveness of the destination, since increasing internal sources of motivation of tourists affect their repeated visits to destinations and recommendations to others [54]. Having the same degree of satisfaction, tourists with different personality traits that make up their character may report different behavior towards their destination, in terms of their loyalty [63]. [54] emphasize that tourist destinations are interpreted as a product that has the ability to be re-sold and recommended by potential tourists.

[61] revealed that a high level of satisfaction more correlated with willingness to recommend than intention to

return that is due to the fact that having a positive experience of visiting the tourist spots a visitor would rather recommend it to your friends and family than to make a repeat trip as travel associated with certain financial costs, and the supply of tourism is so great that the tourist can select an alternative new destination.

III. RESEARCH HYPOTHESES AND MODEL

A. Relations between Usability and Experience

The usability of an IT system includes the efficiency, effectiveness, and satisfaction with which certain users achieve certain goals in specific environments [36]. Information systems-based usability models focus on two main goals: problem solving and technology usability [64]. Usability can be expanded by rethinking it in terms of users ' personal goals, including perceptual and emotional aspects [65]. The process of getting information and events depends on the quality of the technology [66], [67]. Usability and quality have been reviewed and evaluated in studies on human-computer interaction [68], [69], and only a small number of studies have focused on the impact on the overall user experience [8], suggesting that this experience reflects any interaction between the user and the product [70]-[72]. [65] defines user experience as "a consequence of the presentation, functionality, performance of the system, interactive behavior, and auxiliary capabilities of an interactive system, both hardware and software", which, according to [8] can be considered as a consequence of the user's previous experience. User experience in its development is an important area of human-computer interaction, including aspects such as usability, utility, and emotional impact [72], [73].

We assume that the usability of Virtual Reality technologies has an impact on all types of Museum experiences.

Hypotheses 1: Usability of VR technology has a positive effect on educational experience

Hypotheses 2: Usability of VR technology has a positive effect on entertainment experience

Hypotheses 3: Usability of VR technology has a positive effect on escapism experience

Hypotheses 4: Usability of VR technology has a positive effect on esthetic experience

B. Relations between Experience Economy and Satisfaction

According to [18], experiences allow people to draw upon the events to paint a picture of their lives and allow them to assess an individual's perception of the self-image that is the totality of their life experience. They argued that individual experiences are incredibly important for consumers' views and satisfaction of products or services. In addition, within the experience economy, there is sufficient evidence of the strong influence of the experience economy spheres on satisfaction. For example, the impact of education and entertainment on tourist satisfaction in the context of a film festival was confirmed by [74] and [21] confirmed that education strongly affects satisfaction within the tourism context. In a Museum context, various key elements of the Museum experience are related to visitor satisfaction [75].

We assume that the quality of all possible Museum experiences leads to overall satisfaction of Museum visitors.

Hypotheses 5: Educational experience has a positive effect on satisfaction

Hypotheses 6: Entertainment experience has a positive effect on satisfaction

Hypotheses 7: Escapism experience has a positive effect

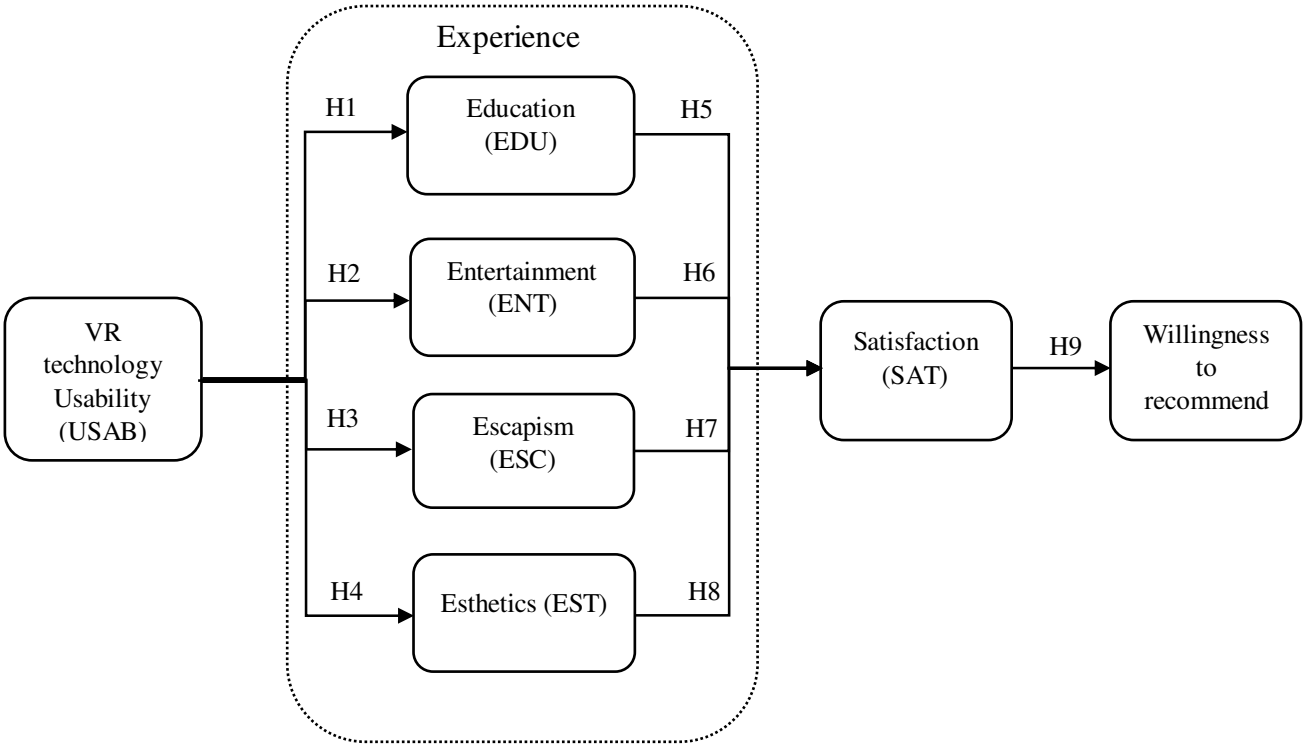

Fig. 2. Research Model

on satisfaction

Hypotheses 8: Esthetic experience has a positive effect on satisfaction

C. *Relations between Satisfaction and Willingness to recommend*

In tourism, the high quality of service and resulting customer satisfaction leads to positive verbal endorsements, recommendations to friends and acquaintances, and repeated visits, which ultimately affects the financial success and performance of service providers in the tourism industry [52]. Website user satisfaction predicts repeat visits, word of mouth, willingness to recommend, and repeat purchases [76]. In previous studies, it was found that tourist satisfaction is compared with loyalty to the destination in the Museum environment and affects the attitude to revisit intention [75].

Satisfaction is a source of positive results from positive word of mouth and repeat purchases, satisfied consumers are willing to give positive recommendations to their relatives and friends, leading to the promotion of a product or service and free advertising [77]. Consequently, we expect that visitor satisfaction will influence the willingness to recommend a Museum.

Hypotheses 9: Satisfaction in the Museum has a positive effect on Willingness to recommend.

All these relationships are presented in the research model in the Figure 2.

IV. RESEARCH METHODOLOGY

A. *Measures*

Measures for all the variables were adapted from previous studies. Seven-variables were measured in this study: Usability (USAB), Education Experience (EDU), Entertainment Experience (ENT), Escapism Experience

Table 2. Measures of constructs.

Construct	Item ID	Items	Reference
VR technology usability	USAB01	I think that I would like to use VR technology frequently	[40]
	USAB02	I found VR technology to be simple	
	USAB03	I thought VR technology was easy to use	
	USAB04	I think that I could use VR technology without the support of a technical person	
	USAB05	I found the various functions in VR technology were well integrated	
	USAB06	I thought there was a lot of consistency in VR technology	
	USAB07	I would imagine that most people would learn to use VR technology very quickly	
	USAB08	I found VR technology very intuitive	
	USAB09	I felt very confident using VR technology	
	USAB10	I could use VR technology without having to learn anything new	
Education Experience	EDU01	I learned something new during VR technology use experience	[16], [19], [50]
	EDU02	VR technology use experience was highly educational to me	
	EDU03	VR technology use experience really enhanced my skills	
Entertainment Experience	ENT01	VR technology use experience was an unusual experience	
	ENT02	VR technology use experience was amusing	
	ENT03	VR technology use experience was entertaining	
Escape Experience	ESC01	I felt I played a different character during VR technology use experience	
	ESC02	I totally forgot about my daily routine during VR technology use experience	
	ESC03	I avoid interactions with others during VR technology use experience	
Esthetic Experience	EST01	VR technology really showed attention to design detail	
	EST02	VR technology use experience was very attractive	
	EST03	VR technology use experience was very pleasant	
Satisfaction	SAT01	I am satisfied with the overall VR experience	[22]
	SAT02	I have a good feeling about overall VR experience	
	SAT03	Overall VR experience is better than I expected	
Willingness to recommend	WTR01	I am willing to tell other people about the good aspects of the experience of using VR technology in museum	[4]
	WTR02	I am willing to recommend museums using AR/VR technologies to others	

Table 3. Sample Demographics.

Category	Number (%)	Category	Number (%)
Gender		In a relationship	94 (30.13 %)
Male	189 (60.58%)	Married	106 (33.97 %)
Female	123 (39.42%)	Divorced	23 (7.37 %)
Age		Other	2 (0.64 %)
< 18 years	9 (2.89 %)	**Education**	
18–25 years	72 (23.08 %)	Middle School	27 (8.65 %)
26–35 years	128 (41.03 %)	High School	84 (26.92 %)
36–45 years	64 (20. 51 %)	Bachelor's degree	99 (31.73 %)
46–55 years	29 (9.29 %)	Master's degree	73 (23.40 %)
56–65 years	9 (2.88 %)	Doctor's degree	8 (2.57 %)
> 65 years	1 (0.32 %)	Other	21 (6.73 %)
Nationality (Homeland)		**Employment**	
Russian	224 (71.79 %)	Employed (full-time)	158 (50.64 %)
Ukrainian	18 (5.77 %)	Employed (part-time)	52 (16.66 %)
Other	70 (22.44 %)	Student and employed (part-time)	9 (2.89 %)
Marital status		Student	50 (16.03 %)
Single	87 (27.89 %)	Unemployed	43 (13.78 %)

(ESC), Esthetics Experience (EST), Satisfaction (SAT) and Willingness to recommend (WTR). For an unbiased assessment of the results in our study, a seven-point Likert scale with a range of 1 was used (I strongly disagree) up to 7 (I strongly agree). The measures for the variables are shown in Table 2.

Usability (USAB) measured by ten-item System Usability Positive Scale adapted from [40]. The three-item scale measures in our study Education (EDU), Entertainment (ENT), Escapism (ESC), and Esthetics (EST) Experiences. All scales were taken and converted from previous studies [16], [19], [50]. Satisfaction (SAT) is measured by a three-item scale adapted from [22]. The four-item scale for Willingness to recommend (WTR) was also adapted from previous studies [4].

Based on the above scales, we developed a survey questionnaire. After compiling the English version of the questionnaire, the items were translated into Russian.

B. *Sample and Data Collection*

An empirical study was conducted to confirm the above study model. Respondents of our study were 312 people from 34 countries, the majority (224 people) from Russia, which explains the fact that among the visited museums were marked by Russian museums. Also, 41 respondents are residents of Russian-speaking countries that were formerly part of the USSR. Data collection took place within 3 months, all respondents are people who visited the Museum, which had the opportunity to use Virtual Reality, and used it.

In order to improve ambiguous expressions, awkward formulations or distortions of the original values, a pilot study was conducted using 85 responses. Results were satisfaction, this allowed data collection to continue.

Respondents were given small gifts for completing the questionnaire. Gift with a value of about 8 rubles ($0.13). (Table 3).

V. RESULTS

A. *Measurement model*

The means and loadings of each measured item and the descriptive statistics of each item are given in Table 5. The loadings of all the items were above the threshold of 0.7, indicating that the observed variables had high convergent validity. In addition, the loads showed us a high correlation value between the observed and structural variables [78].

The validity of the measurement model was assessed by the level of reliability of individual elements, internal coordination between elements and convergent and

Table 4. Measurement model results.

	Composite Reliability	Cronbach's Alpha	AVE[1]	EDU	ENT	ESC	EST	SAT	USAB	WTR
EDU	0,907	0,847	0,766	**0,875**						
ENT	0,880	0,795	0,710	0,668	**0,842**					
ESC	0,853	0,741	0,659	0,610	0,492	**0,812**				
EST	0,921	0,871	0,795	0,705	0,724	0,541	**0,892**			
SAT	0,909	0,799	0,833	0,700	0,711	0,586	0,760	**0,912**		
USAB	0,938	0,927	0,604	0,806	0,792	0,628	0,845	0,822	**0,777**	
WTR	0,931	0,852	0,871	0,675	0,595	0,551	0,681	0,740	0,775	**0,933**

[1]AVE standard for Average Variance Extract.

discriminant validity of the model. SmartPLS 3.0 (SmartPLS GmbH, Hamburg, Germany) was used to evaluate the measurement model. Table 4 shows the composite reliability, Average Variance Extracted (AVE), and the square root of AVE, as well as the correlations between constructs.

The reliability of the scale is a significant indicator of the adequacy of the scale. When scale reliability is high, variables measuring a single factor share a high degree of common variance [79]. The Cronbach's alphas of the seven constructs were all above the recommended criterion of 0.70 [80], showing that the measures were internally consistent. The composite reliability values of all the constructs were above 0.85, exceeding the cut-off value of 0.70 [81], which indicated adequate internal consistency [80]. The AVE for each construct was higher than 0.60, suggesting that the observed items explained more variance than the error terms [82]. In addition, the square root of AVE for each construct was higher than the correlations between the construct and all other constructs, suggesting superior discriminant validity. The results obtained show that all scales of the measurement model demonstrate sufficient internal consistency for further analysis of the constructed model.

B. Structural Model

Structural equation modelling was applied to analyze data while using the partial least squares method using SmartPLS 3.0. The parameter estimated in the structural model shows the direct influence of one construction on another. A significant coefficient at a certain level of α reveals a significant relationship between latent constructs (Figure 3, Table 6).

In this study, we use Bootstrapping (n = 1000) to perform the significance tests of hypotheses. The results are shown in Table 5.

H1, H2, H3 and H4, which hypothesized a positive relationship between Usability and Education, Entertainment, Escapism, Esthetic Experiences were supported (path coefficients = 0.806, 0.792, 0.628, 0.845; $p < 0.01$). As shown in Figure 2, the comprehensive effect R^2 of Education Experience 0.649, thus explaining 64.9% of the variance in this variable. The comprehensive effect R^2 of Entertainment Experience reached 0.627, thus explaining 62.7% of the Entertainment Experience. The comprehensive effect R^2 of Escapism Experience reached 0.395, thus explaining 39.5% of Escapism Experience. The comprehensive effect R^2 of Esthetics Experience reached 0.713, thus explaining 71.3% of the Esthetics Experience. H5, H6, H7, H8, which hypothesized a positive relationship between Education, Entertainment, Escapism, Esthetic Experiences and Satisfaction were supported (path coefficients = 0.179, 0.246, 0.155, 0.372; $p < 0.01$).

And last Hypothesis 9, which hypothesized a positive relationship between Satisfaction and Word-of-Mouth (WOM) was supported (path coefficients = 0.740; $p < 0.01$). The comprehensive effect R^2 of visitor Satisfaction reached 0.673, thus explaining 67.3% of the Satisfaction. The comprehensive effect R^2 of Word-of-Mouth reached 0.547, thus explaining 54.7% of Word-of-Mouth. In this way, the variables were fully explained.

Table 5. Descriptive statistics of the measure.

Construct	Item Statistics			
	Construct Items	Mean	Std. Deviation	Loading[1]
VR technology usability	USAB01	5.70	1.33	0.793
	USAB02	5.97	1.14	0.818
	USAB03	5.84	1.18	0.756
	USAB04	5.80	1.35	0.781
	USAB05	5.74	1.29	0.724
	USAB06	5.98	1.12	0.806
	USAB07	5.66	1.37	0.710
	USAB08	5.93	1.33	0.806
	USAB09	6.08	1.18	0.799
	USAB10	5.92	1.25	0.768
Education Experience	EDU01	5.77	1.25	0.872
	EDU02	5.83	1.32	0.894
	EDU03	5.48	1.38	0.858
Entertainment Experience	ENT01	5.77	1.33	0.805
	ENT02	5.82	1.24	0.865
	ENT03	5.96	1.22	0.856
Escape Experience	ESC01	5.43	1.48	0.807
	ESC02	5.30	1.52	0.824
	ESC03	5.35	1.52	0.803
Esthetic Experience	EST01	5.87	1.15	0.867
	EST02	5.97	1.20	0.905
	EST03	5.95	1.21	0.903
Satisfaction	SAT01	6.06	1.14	0.912
	SAT02	6.00	1.17	0.913
Willingness to recommend	WTR01	6.01	1.16	0.937
	WTR02	5.90	1.25	0.929

[1]The loading is reported by SmartPLS 3.0. It shows a high correlation level between observed variables and structural variables.

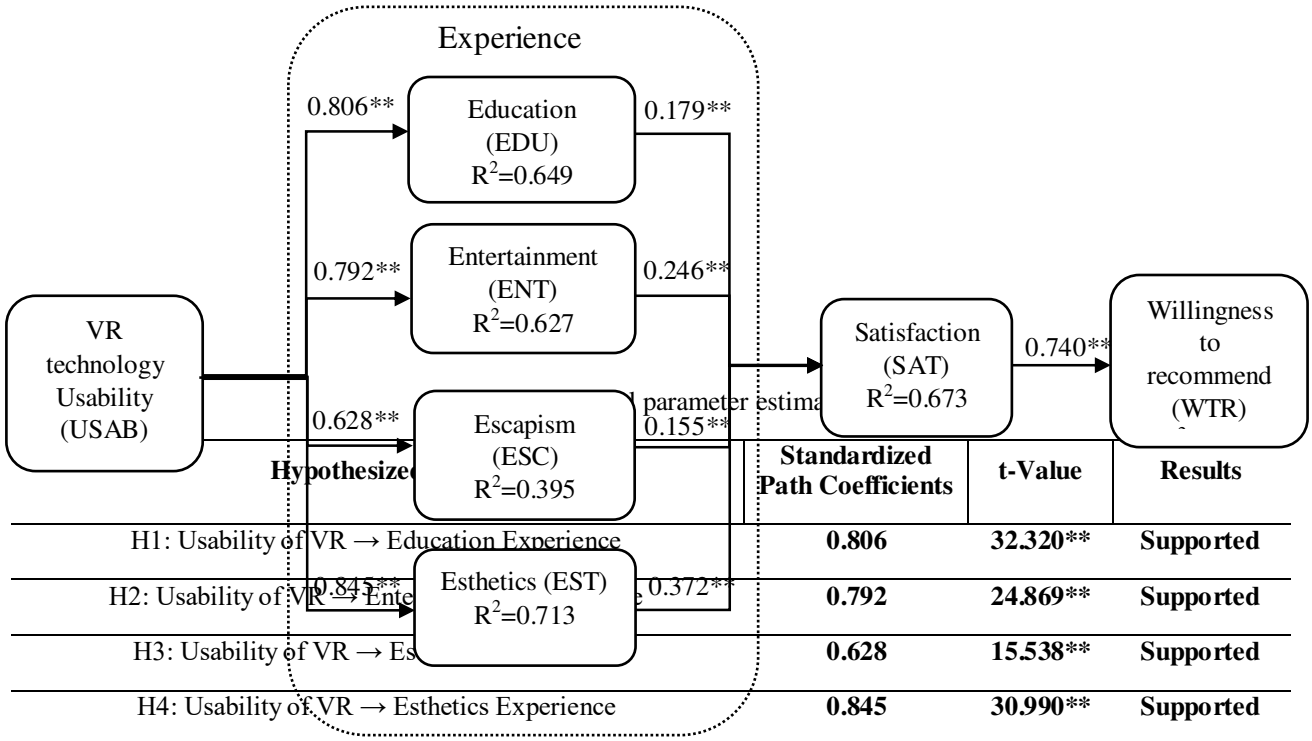

Fig 3. Model results. Path coefficients with *t*-value in parentheses; * represents ρ ≤ 0.05; ** represents ρ ≤ 0.01.

Hypothesized	Standardized Path Coefficients	t-Value	Results
H1: Usability of VR → Education Experience	**0.806**	**32.320****	**Supported**
H2: Usability of VR → Entertainment Experience	**0.792**	**24.869****	**Supported**
H3: Usability of VR → Escapism Experience	**0.628**	**15.538****	**Supported**
H4: Usability of VR → Esthetics Experience	**0.845**	**30.990****	**Supported**
H5: Education Experience → Satisfaction	**0.179**	**2.883****	**Supported**
H6: Entertainment Experience → Satisfaction	**0.246**	**3.348****	**Supported**
H7: Escapism Experience → Satisfaction	**0.155**	**3.313****	**Supported**
H8: Esthetics Experience → Satisfaction	**0.372**	**4.507****	**Supported**
H9: Satisfaction → Willingness to recommend	**0.740**	**19.494****	**Supported**

* represents ρ < 0.05; ** represents ρ < 0.01.

VI. DISCUSSION, IMPLICATIONS AND LIMITATIONS

A. *Discussion*

In this study, we focused on the effect of the usability of virtual reality technologies on four realms of the Experience Economy, and hence visitor satisfaction and positive WOM in Museum. The empirical results confirmed all the hypotheses of the study and proved the positive effect of the usability of virtual reality technologies on the experience of Museum visitors. Supported H1, H2, H3, and H4 indicate that the usability of virtual reality technologies in the Museum has a significant positive effect on the Educational, Entertainment, Escapism, and Esthetic Experience of visitors, while supported H5, H6, H7, H8 indicate that the four realms of Experience Economy affect the overall satisfaction of Museum visitors. The empirical results of the H9 study showed that visitor satisfaction has a large positive effect on the willingness to recommend the Museum.

This study describes the subjective usability of Virtual Reality technologies in the context of museums in relation to elements of the experimental economy. The characteristics of these evaluations should help developers and managers of museums to better understand how their projects affect attendance. We assume that the possibility of full immersion with a clear study of the design of the image and sound, allows you to get a full experience of using.

One of the goals of this study was to test how visitor experiences of using VR technology affect visitor satisfaction and ultimately the desire to recommend that experience in the context of a Museum visit. The results showed that VR experience design technology and harmonious implementation of content and features are necessary to provide visitors with an Educational, Entertaining, Escapism and Esthetics Experiences. In theory, this study shows that the Experience Economy in the context of VR technologies in museums consists of four independent dimensions, as in previous studies [14], [50], who tested experience measurements at the same level but often did not find all four experience measurements meaningful, the present study supported all four measurements.

B. *Implications*

Some practical implications have been identified from this study.

First, usability is an important component influencing on the Experience Economy for the VR experience in a Museum, which clearly shows the importance of interface and hardware in VR technologies for Museum managers and technology developers. Second, Education, Entertainment, Esthetics, and Escapism Experiences through VR technology have a positive effect on Satisfaction. Hence, the experience in the Museum will bring a more vivid and satisfied experience for visitors during the visit to the Museum. It follows that Museum managers and developers of VR technologies should strive to develop a more informative, diverse, immersive VR experience for Museum visitors, not

limited to just one type of excursion. Since the satisfaction of visitors directly affects the good reviews about the Museum itself and the use of VR technology, museums benefit from developing more and more virtual reality excursions. In General, this study has focused on museums, but the results may be important for managers from different disciplines involved in creating different experiences using immersive technologies.

Based on this, our findings show that the usability of VR technologies acts as a steppingstone to creating entertaining and immersive experiences that ultimately lead to visitor engagement. Thus, previous examples from science festivals, schools and art galleries have shown the benefits of VR and AR, and our findings confirm the importance of this innovative technology to create a vivid and satisfying experience and receive positive feedback. Consequently, usability and the four realms of Experience Economy are extremely important in the context of tourism, and Museum exhibition organizers and other entertainment and education managers are encouraged to incorporate these characteristics into their events to ensure visitor engagement.

C. *Limitations and Future Directions*

This study has some limitations that should be considered in the future. First, the four realms of Experience Economy can be combined with other factors in relation to usability, to identify complex and asymmetric relationships between these constructs to explain the desired outcomes. This could lead to higher explanatory power and a deeper understanding of the mechanisms that drive VR technology consumer response. Second, our results relate to the usability of VR technologies assessed by people with different characteristics (age, gender, culture, country, etc.). We did not consider the impact of these characteristics on the results, but future studies may reveal the impact of usability on experience depending on these social factors, for a more detailed study. In addition, this study focuses on visitor interaction from a tourist perspective, and further research could explore the differences between domestic and international tourists, which could have important implications for improving both domestic and international tourism for countries.

VII. CONCLUSION

In this study, we studied the usability of VR technologies, their impact on the experience of Museum visitors and behavioral intentions associated with the use of these technologies, the impact of entertainment, educational, Esthetic and Escapism impressions without exception was comprehensively studied, which gave a complete picture of the impact of the use of new technologies on the satisfaction of Museum visitors.

All hypotheses of this study were confirmed, the model proved to be workable. The results are useful for both theoretical research and practical applications. Virtual Reality technologies are increasingly being introduced into our lives, becoming cheaper and more accessible for everyone. The results of the usability effect suggest the possibility of widespread introduction of VR-technologies not only in state museums, but also in large regional museums of different countries, to attract visitors, and, accordingly, the Museum performs its main functions.

REFERENCES

[1] D. A. Guttentag, "Virtual reality: applications and implications for tourism", *Tourism Management*, Vol.31 No.5, 2010, pp.637-651.

[2] N. Moorhouse, M. C. tom Dieck and T. Jung "Technological Innovations Transforming the Consumer Retail Experience: A Review of Literature. In: Jung T., tom Dieck M. (eds) Augmented Reality and Virtual Reality. Progress" in *IS. Springer*, Cham, 2018, 133-143.

[3] M. Saren, T. Harwood, J. Ward, A. Venkatesh, "Marketing beyond the frontier? Researching the new marketing landscape of virtual worlds." *J. Market. Manage.* 29 (13/14), 2013, 1435–1442.

[4] M. J. Kim, C. K. Lee and T. Jung, "Exploring consumer behavior in virtual reality tourism using an extended stimulus-organism-response model." *Journal of Travel Research*, 2019, 1–21.

[5] I. P. Tussyadiah, D. Wang, T. H. Jung, and M. C. tom Dieck. "Virtual Reality, Presence, and Attitude Change: Empirical Evidence from Tourism." *Tourism Management*, 2018, 66: 140–54.

[6] S. J. Barnes, "Understanding virtual reality in marketing: Nature, implications and potential." (Retrieved from *SSRN Electronic Journal*. 2016 doi.org/10.2139/ssrn.2909100 Accesseddate: 14 January 2018)

[7] C.-H. Yeh, Y.-S. Wang, H.-T. Li, and S.-Y. Lin, "The effect of information presentation modes on tourists' responses in Internet marketing: The moderating role of emotions." *Journal of Travel & Tourism Marketing*, 34(8), 2017, 1018–1032.

[8] D. I. Han, M. C. tom Dieck and T. Jung, "User experience model for augmented reality applications in urban heritage tourism." *Journal of Heritage Tourism*, 2017, 1-16.

[9] P. Cheney and G. Dickson, "Organizational Characteristics and Information Systems: An Exploratory Investigation." *Academy of Management Journal*, Vol. 25, 1982, pp. 170-184.

[10] W. J. Doll and G. Torkzadeh, "The measurement of end-user computing satisfaction." *MIS Quarterly*, 12 (2), 1988, pp. 259–274.

[11] S. Yoon, J. Laffey and H. Oh, "Understanding usability and user experience of webbased 3D graphics technology," *International Journal of Human-Computer Interaction,* 24 (3), 2008, pp. 288–306.

[12] J. L. Gabbard and J. E. Swan, "Usability engineering for augmented reality: Employing user-based studies to inform design. Visualization and Computer Graphics," *IEEE Transactions* on, 2008, 14(3):513–525.

[13] M. E. C. Santos, J. Polvi, T. Taketomi, G. Yamamoto, C. Sandor and H. Kato, "Toward Standard Usability Questionnaires for Handheld Augmented Reality." *IEEE Comput. Graph. Appl.*, vol. 35, no. 5, 2015, pp. 66–75.

[14] T. Jung, M. C. tom Dieck, H. Lee and N. Chung, "Effects of Virtual Reality and Augmented Reality on Visitor Experience on Museum." In Inversini, A. and Schegg, R. (Eds.). Information and Communication Technologies in Tourism 2015, *Springer International Publishing*, Heidelberg, 621-636.

[15] D.-J. Han, T. Jung and A. Gibson, "Dublin AR: Implementing Augmented Reality in Tourism." In: Information and Communication Technologies in Tourism 2014. *Springer*, 2013, pp 511-523.

[16] M. C. tom Dieck, T. Jung and D. J. Han, "Mapping requirements for the wearable smart glasses augmented reality museum application." *Journal of Hospitality and Tourism Technology*, 7(3), 2016, 230-253.

[17] A. Manthiou, S. Lee, L. Tang and L. Chiang, "The experience economy approach to festival marketing: vivid memory and attendee loyalty." *Journal of Services Marketing*, 2014, 28(1): 22–35.

[18] M. Mehmetoglu and M. Engen, "Pine and Gilmore's concept of experience economy and its dimensions: an empirical examination in tourism." *Journal of Quality Assurance in Hospitality & Tourism*, 2011, 12(4): 237-255.

[19] H. Oh, A. M. Fiore and M. Jeoung, "Measuring experience economy concepts: Tourism applications." *Journal of Travel Research*, 2007, 46: 119-132.

[20] M. C. tom Dieck, T. Jung and P. A. Rauschnabel, "Determining visitor engagement through augmented reality at science festivals: an experience economy perspective." *Comput. Human. Behav*. 82, 2018, 44–53.

[21] D. Quadri-Felitti and A. M. Fiore, "Destination loyalty: Effects of wine tourists' experiences, memories, and satisfaction on intentions." *Tourism and Hospitality Research*, 2013, 1-16.

[22] H. J. Song, C. Lee, J .A. Park, Y. H. Hwang and Y. Reisinger, "The influence of tourist experience on perceived value and satisfaction with temple stays: the experience economy theory." *Journal of Travel & Tourism Marketing*. 2014.

[23] J. Brooke, "SUS: A „quick and dirty" usability scale." In P.W.Jordan, B. Thomas, B.A. Weerdmeester, and I.L. McClelland (Eds.) *Usability Evaluation in Industry*, 1996 , pp. 189-194. London: Taylor and Francis.

[24] R. A. Blade and M. L. Padgett, "Virtual environments standards and terminology." In K. M. Stanney (Ed.), Handbook of virtual environments: Design, implementation, and applications, 2002, pp. 15-27. Mahwah, NJ: *Lawrence Erlbaum Associates*.

[25] J. Nielsen, "Usability Engineering." *Academic Press*, San Diego, 1993.

[26] A. Karoulis, S. Sylaiou and M. White, "Usability evaluation of a virtual museum interface." *Informatica*, 17(3), 2006, 363-380.

[27] J. Preece, Y. Rogers, H. Sharp, D. Benyon, S. Holland and T. Carey, 'Human-Computer Interaction." *Addison-Wesley Publ*., London, 1994.

[28] A. M. Wichansky, "Usability Testing in 2000 and Beyond." *Ergonomics*, 43(7), 2000, 998-1006.

[29] J. Sauro and J. R. Lewis, "Correlations among Prototypical Usability Metrics: Evidence for the Construct of Usability." In: *The Proceedings of CHI* 2009 (to appear, 2009).

[30] J. R. Lewis, "IBM computer usability satisfaction questionnaires: Psychometric evaluation and instructions for use." *International Journal of Human–Computer Interaction*, 7, 1995, 57–78.

[31] P. T. Kortum and A. Bangor, "Usability Ratings for Everyday Products Measured With the System Usability Scale," *International Journal of Human-Computer Interaction*, 29:2, 2013, 67-76.

[32] J. R. Lewis, "Usability testing." In G. Salvendy (Ed.), Handbook of *Human Factors and Ergonomics* (3rd

ed.), 2006, pp. 1275-1316. New York, NY: John Wiley.
[33]M. Zviran, C. Glezer and I. Avni, "User satisfaction from commercial web sites: The effect of design and use." *Information & Management*. 43, 2006, 157178.
[34]J. C. Nunnally, "Psychometric Theory." *McGraw-Hill*, 1978, New York.
[35]J. R. Lewis and J. Sauro, "The factor structure of the System Usability Scale." In M. Kurosu (Ed.), *Human Centered Design*, HCII 2009, pp. 94–103. Berlin, Germany: Springer-Verlag.
[36]A. Bangor, P. T. Kortum and J. T. Miller, "An empirical evaluation of the System Usability Scale." *International Journal of Human-Computer Interaction*, 6, 2008, 574-594.
[37]K. Finstad, "The System Usability Scale and non-native English speakers." *Journal of Usability Studies*, 1, 2006, 185–188.
[38]K. Finstad, "Response interpolation and scale sensitivity: Evidence against 5-point scales." *Journal of Usability Studies*, 5(3), 2010, 104-110.
[39]J. J. Barnette, "Effects of stem and Likert response option reversals on survey internal consistency: If you feel the need, there is a better alternative to using those negatively worded stems." *Educational and Psychological Measurement*, 60(3), 2000, 361–370.
[40]J. Sauro and J. R. Lewis, "When designing usability questionnaires, does it hurt to be positive?" In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems,* 2011, pp. 2215–2224. New York, NY: ACM.
[41]J. R. Lewis, B. S. Utesch and D. E. Maher, "UMUX-LITE: When there's no time for the SUS." In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems,* 2013, pp. 2099–2102. New York, NY: ACM.
[42]B. J. II Pine and J. H. Gilmore, "Welcome to the Experience Economy." *Harvard Business Review*, 1998, 76 (4): 96-105
[43]C. Antón, C. Camarero and M. J. Garrido, "Exploring the experience value of museum visitors as a co-creation process." *Current Issues in Tourism*, 21, 2018, 1406–1425.
[44]T. D. Andersson, "The Tourist in the Experience Economy." *Scandinavian Journal of Hospitality and Tourism*, 2007, 7 (1): 46-58.
[45]L. Dierking and J. Falkon, "The museum experience," *Whalesback books*, 1992, Washington.
[46]S. Hosany and M. Witham, "Dimensions of cruisers' experiences, satisfaction, and intention to recommend." *Journal of Travel Research* 49(3), 2010, 351–364.
[47]B. J. II Pine and J. H. Gilmore, "The experience economy." *Boston: Harvard Business School Press,* 1999.
[48]C. Scott, "Branding museums." In R. Rentschler, & A. Hede (Eds.), Museum marketing: Competing in the global marketplace, 2007, pp. 169-185. Oxford: *Butterworth-Heinemann*.
[49]M. Csikszentmihalyi, "Flow: The Psychology of Optimal Experience: Steps toward Enhancing the Quality of Life." New York: *Harper & Row*, 1990.
[50]L. Radder and X. Han, "An examination of the museum experience based on Pine and Gilmore's experience economy realms." *The Journal of Applied Business Research*, 31(2), 2015, 455– 469.
[51]M. Srivastava and D. Kaul, "Social interaction, convenience and customer satisfaction: The mediating effect of customer experience." *Journal of Retailing and Consumer Services*, 21(6), 2014, 1028-1037.
[52]M. N. I. Ismail, M. H. Hanafiah, N. Aminuddin and N. Mustafa, "CommunityBased Homestay Service Quality, Visitor Satisfaction, and Behavioral Intention," *Procedia - Social and Behavioral Sciences* 222, 2016, 398-405.
[53]W. Boulding, K. Ajay, R. Staelin and V. A. Zeithaml, "A Dynamic Process Model of Service Quality: From Expectations to Behavioral Intentions." *Journal of Marketing Research*, 30 (1), 1993, 7-27.
[54]Y. Yoon and M. Uysal, "An examination of the effects of motivation and satisfaction on destination loyalty: a structural model." *Tourism Management*, 26, 2005, 45–56.
[55]M. Kozak, "Repeaters' behaviour at two distinct destinations." *Annals of Tourism Research*, 28, 2001, 784–807.
[56]D. A. Baker and J. L. Crompton, "Quality, satisfaction and behavioural intentions." *Annals of Tourism Research*, 27(3), 2000, 785-804.
[57]S. (Sam) Huang and J. Crotts, "Relationships between Hofstede's cultural dimensions and tourist satisfaction: A cross-country cross-sample examination." *Tourism Management*, 72, 2019, 232–241.
[58]P. Harrison and R. Shaw, "Consumer satisfaction and post-purchase intentions: An exploratory study of museum visitors." *International Journal of Arts Management*, 6(2), 2004, 23–32.
[59]C. C. Izquierdo and M. J. G. Samaniego, "Strengthening Members' Relationships through Cultural Activities in Museums." *Journal of Leisure Research*, 43(4), 2011, 560–588.
[60]M. Kozak and M. Rimmington, "Tourist satisfaction with Mallorca, Spain, as an off-season holiday destination." *Journal of Travel Research*, 38(3), 2000, 260–269.
[61]P. Oom do Valle, J. A. Silva, J. Mendes and M. Guerreiro, "Tourist satisfaction and destination loyalty intention: A structural and categorical analysis." *International Journal of Business Science and Applied Management*, 1(1), 2006, 25–44.
[62]J. Bigne, M. Sanchez and J. Sanchez, "Tourism image, evaluation variables and after purchase behavior: Inter-relationships." *Tourism Management*, 22(6), 2001, 607–616.
[63]V. Mittal and W. A. Kamakura, "Satisfaction, Repurchase Intent, and Repurchase Behavior: Investigating the Moderating Effect of Customer Characteristics," *Journal of Marketing Research*, 38 (February), 2001, 131–42.
[64]M. Blythe and P. Wright, "From Usability to Enjoyment." In Blythe, M. et al. (Eds), Funology – From Usability to Enjoyment, *Kluwer Academic Publishers*, Dordrecht, 2005, 8-15.
[65]ISO/IEC, 9241-11 International Standarization Organization. Ergonomic requirements for office work with visual display terminals (VDT)s - Part 11 Guidance on usability. 1998: *ISO/IEC 9241-11: 1998* (E).
[66]S. Mahlke, "An integrative model on web user experience." Paper presented at the *IADIS International*

Conference WWW/Internet, 2005, 91-95.
[67]M. Hassenzahl, "From usability to enjoyment." In Blythe, M. et al.(Eds), Funology – From Usability to Enjoyment, *Kluwer Academic Publishers*, Dordrecht, 2003, 32-42.
[68]E. L.-C. Law, "The measurability and predictability of user experience." Proceedings of the *EICS,* 2011, 1-10.
[69]R. Harrison, D. Flood and D. Duce, "Usability of mobile applications: literature review and rationale for a new usability model." *Journal of Interaction Science*, 1(1), 2013, 1-16.
[70]L. Arhippainen and M. Tähti, "Empirical evaluation of user experience in two adaptive mobile application prototypes." Proceedings of the *2nd International Conference on Mobile and Ubiquitous Multimedia*, 2003, 27-34.
[71]M. Kuniavsky, "User experience and HCI." In A. Sears & J. A. Jacko (Eds.), The human-computer interaction handbook: Fundamentals, evolving technologies, and emerging applications 2nd ed., 2007, Lawrence Erlbaum Associates, New York.
[72]M. Hassenzahl, "The thing and I: Understanding the relationship between user and product." In Blythe, M. et al.(Eds), Funology – From Usability to Enjoyment, *Kluwer Academic Publishers*, Dordrecht, 2005, 31-42.
[73]Z. Zahidi, Y. Lim and P. C. Woods, "Understanding the user experience (UX) factors that influence user satisfaction in digital culture heritage online collections for non-expert users." Paper presented at *Science and Information Conference*, 2014, London.
[74]M. Park, H. Oh and J. Park, "Measuring the experience economy of film festival participants." *International Journal of Tourism Sciences*, 10(2), 2010, 35-54.
[75]J. H. Kang, J. C. Jang and C. Jeong, "Understanding museum visitor satisfaction and revisit intentions through mobile guide system: moderating role of age in museum mobile guide adoption." *Asia Pacific Journal of Tourism Research,* 23(2), 2017, 95–108.
[76]S. Gounaris, S. Dimitriadis and V. Stathakopoulos, "An examination of the effects of service quality and satisfaction on customers' behavioural intentions in e-shopping", Journal of Services *Marketing*, Vol. 24 No. 2, 2010, pp. 142-56.
[77]Y. Wang, K. K. F. So and B. A. Sparks, "Technology readiness and customer satisfaction with travel technologies: A cross-country investigation." *Journal of Travel Research*, 56(5), 2017, 563–577.
[78]J. F. Jr. Hair, R. E. Anderson, R. L. Tatham and W. C. Black, "Multivariate data analysis (5th ed.)." Upper Saddle River, NJ: *Prentice-Hall,* 1998.
[79]N. R. Sanders and R. Premus, "Modeling the relationship between IT capability, collaboration, and performance", *Journal of Business Logistics*, Vol. 26 No. 1, 2005, pp. 1-24.
[80]J. C. Nunnally and I. H. Bernstein, "Psychometric theory." (3rd edition.) New York: *McGraw-Hill*, 1994.
[81]R. P. Bagozzi and Y. Yi, "On the evaluation of structural equation models." *Journal of the Academy of Marketing Science*, 16(1), 1988, 74-94.
[82]C. Fornell and D. F. Larcker, "Evaluating structural equation models with unobservable variables and measurement error." *J. Mark. Res*. (18), 1981, 39–50.

Marina Ezdina, **MBA**, The School of Management, Hefei University of Technology, Hehei City, Anhui Province, China