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Travelers' intention to adopt virtual reality: A consumer value perspective

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ABSTRACT

Through the lens of the value-based adoption model (VAM), this study examines consumers' perceived value and the intention to adopt virtual reality (VR) for evaluating various tourist destinations. The hypothesized model was tested through structural equation modeling using the responses of 208 Indian tourists. This work indicates the importance of perceived immersion and perceived physical risk as the two most vital indicators of benefits and sacrifice respectively. Moreover, perceived value was found to be one of the most important predictors in the adoption of VR. This study also identified that sensation-seeking behavior has a significant favorable influence on the behavioral intention to adopt VR for evaluating various tourist destinations. The study's findings will help departments of tourism and tourism companies attract more tourists through the power of VR.

1. Introduction

Virtual reality (VR) has evolved to become one of the most appreciated technological innovations: one that has the potential to impact the tourism industry. The term 'virtual reality' refers to a computer-generated, three-dimensional, graphical, interactive environment, with a combination of interface devices. Guttentag (2010) stated that VR has three essential characteristics, comprising immersion, interaction, and navigation. Previously, VR was mainly utilized in gaming, to render a feeling of reality to its users. However, due to the rapid growth of VR platforms, content, and devices, it has grown as a technology for experiencing everyday things. Accordingly, Google came into the VR market with its low-cost VR devices for smartphones known as 'Google Cardboard' (Simonite, 2015), which provides an opportunity for travelers to have prior experience of cities, places, and tourist attractions around the world before visiting those destinations.

The Indian Ministry of Tourism joined with Google India to introduce a 360-degree VR video of 'Incredible India' in the year 2018, which showcased India as a varied tourism destination. The Government of India is now planning to provide this immersive technology to all Indian travelers. Additionally, the Minister of Tourism has stated that the domestic tourist footfall could be increased by extending this technology at a small cost or free of charge (Ministry of Tourism, 2018). The current paper portrays VR as a medium for experiencing the tourist destinations, which can help tourists in selecting a destination in a more informed manner.

Recent studies have also witnessed the use and influence of VR in various contexts such as marketing (Loureiro, Guerreiro, Eloy, Langaro, & Panchapakesan, 2018) and e-commerce (Martínez-Navarro, Bigné, Guixeres, Alcañiz, & Torrecilla, 2019). Furthermore, the literature from the past three decades has indicated the significance of VR use for tourism and hospitality marketing (Dewailly, 1999; Guttentag, 2010; Huang, Backman, Backman, & Chang 2016). Although the extant literature has agreed on the importance of using VR for destination management business (Bonetti, Warnaby, & Quinn, 2018; Jung & tom Dieck, 2017; Xu, Tian, Buhalis, Weber, & Zhang, 2016), it has primarily focused on the benefits of using VR for tourism (Castro et al., 2017; Moorhouse, tom Dieck, & Jung, 2018). Yung and Lattimore (2017) have reviewed the literature on VR in tourism by considering 46 studies. The results stated that only 11 studies were based on a theoretical foundation, suggesting that there was a lack of theory-based research in this field, as shown in Web Appendix 1. However, the consumers' value perspective has not been explored in the previous literature of VR adoption in tourism. There lies the research gap.

More than 50% of Indian tourists search for information about the destinations online before visiting it (Phocus wire, 2016). Thus, watching videos and images of the destination online has become a part and parcel of modern tourists' life. Additionally, Indian tourists mostly travel with their families during vacations and are, therefore, concerned about the happiness, safety, and security of the entire family (Gautam, 2012). Moreover, being a multi-cultural and multi-lingual country, domestic tourists in India often find it difficult to communicate with the residents of destinations as well as follow the signages and signboards written in the local language. Thus, VR may provide the benefit to the

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tourists of having an immersive and detailed 360-degree experience of the destination. They will get detailed information about the destination. Therefore, the use of VR can provide potential tourists a more immersive experience than any other virtual form and mass media. Such immersive experience can result in in-depth knowledge about the destination, and subsequently more informed and enhanced decision making.

Every benefit comes, however, with some cost. As with any other technology, the cost involved in the use of VR technology can be a deciding factor in its adoption (e.g. the cost of VR head-mounted device and Internet-data pack required for experiencing a destination through VR). The higher the price of the technology, the lower is its adoption and vice versa. Various scholars have also demonstrated the importance of cost in using technology as one of the critical factors in the adoption of Internet of Things (IoT) (Hsu & Lin, 2016), mobile coupon application (Liu, Zhao, Chau, & Tang, 2015) and GPS navigation app (Wang, Lin, Wang, Shih, & Wang 2018).

When individuals use a technology, they think about the trade-off between benefit (usefulness) of using it and the cost involved in using it (sacrifice) (Yu, Seo, & Choi, 2019). However, most of the extant studies have considered attitude-based VR adoption (Tussyadiah, Wang, Jung, & tom Dieck, 2018) while ignoring value-based VR adoption. For example, the technology adoption model (TAM) considers the perceived usefulness and perceived ease of use as the antecedents of technology adoption intention. Some of the extended versions of the TAM have included system quality, habits (Rafique, Almagrabi, Shamim, Anwar, & Bashir, 2020), technological anxiety, social influence, trust, facilitating conditions, perceived risk, and resistance to technology (Kamal, Shafiq, & Kakria, 2020) as additional antecedents of the intentions to use technology. However, all these are either technical or attitudinal factors. The contributions of benefits, sacrifice, and perceived value in the adoption of new technologies have thus been ignored in the literature, particularly in the context of the adoption of VR in evaluating tourism destinations.

The value-based adoption model (VAM), in contrast, posits perceived benefits and sacrifices as the two most important determinants of perceived value while predicting and explaining the adoption intention (Kim, Park, & Choi, 2017; Yu et al., 2019). The VAM considers the benefit-sacrifice trade-off in technology adoption over and above the constructs of the TAM (Kim, Chan, & Gupta, 2007). This study therefore investigates the elements influencing the VR adoption in experiencing the destination through the tenets of the VAM in the context of domestic tourism.

The present work examines the effect of perceived benefits (perceived enjoyment, perceived usefulness, and perceived immersion) and perceived sacrifices (perceived complexity, perceived physical risk, and perceived cost) on perceived value. It then examines the impact of perceived value on behavioral intention to use. Consumers often seek novelty while searching for information about a tourist place, and VR technology can offer them a novel way to experience and feel the destination. Hence, the current study also postulates the impact of the sensation-seeking behavior of consumers on their VR adoption intention. Additionally, this study also examines the moderating influence of gender, as suggested by Davis (1989), in the TAM.

The present work has several academic implications. First, the current study leads the way to examine the tourist's benefits and sacrifices involved in the adoption of VR when selecting a destination. Thus, this study pioneers in exploring the consumers' VR adoption intention for choosing a tourist destination from a value perspective. Secondly, perceived immersion and perceived physical risk are identified as the most critical elements of perceived benefits and sacrifice, respectively. Moreover, while perceived value is found to be the most important predictor for the intention to adopt VR, this study indicates that sensation-seeking behavior also has a positive effect on the intention to adopt VR for evaluating various tour destinations. The current research work examines the VR-adoption intention of tourists for selecting tour destinations from both the technology and service consumer perspectives. Additionally, this work extends the VAM by incorporating three primary constructs (perceived immersion, perceived physical risk, and sensation-seeking behavior) in it. Third, perceived cost, an indicator of perceived value in the VAM, is found to have an insignificant impact on the perceived value in this study.

2. Literature review

2.1. Virtual reality and tourism

Steuer (1992, pp. 76–77) defined VR as "a real or simulated environment in which a perceiver experiences telepresence." VR provides a computer-simulated interactive environment where users feel that they are present in that environment (Diemer, Alpers, Peperkorn, Shiban, & Mühlberger, 2015). Previous studies have considered two types of VR devices and explained the benefits of using VR for tourism-related purposes. These VR devices are classified into two categories: untethered (mobile VR) and tethered (PC based VR) (Tussyadiah et al., 2018). Tethered VR devices, such as HTC Vive and Oculus Rift, need to connect with a computer system to process the graphical data. These VR devices contain a display to view the VR content and have multiple sensors (internal/external) to track the users' movement/position. Tethered devices are costlier compared to untethered VR devices due to the higher minimum system requirements, while providing increased immersive experience due to its wide field of view and high pixel density (Hillmann, 2019). As a result, most consumers cannot afford this technology. Untethered devices, in contrast, are mobile-compatible and known as mobile VR headsets. They include Google Cardboard and Samsung Gear. These devices allow users to plug their smartphones into the VR headset to enjoy the VR content. The power of smartphones and the availability of mobile VR content are thus crucial for their adoption. The mass-market penetration of smartphones has made the VR technology quite affordable and accessible to many (Byond, 2016). This is also complemented by the easy availability of high-speed cheap data, which is required to play the VR content (in this case, to play the destination VR content). This study looks specifically at the smartphone VR head-mounted device (HMD), as the smartphone penetration is high in India (Deloitte, 2018).

Berger et al. (2007) stated that through VR, users experience a destination virtually, which enhances their likelihood of visiting the tourist destination. Previous studies in this context have highlighted the benefits of VR for leisure and business travelers (Guttentag, 2010; Jung, Lee, Chung, & tom Dieck, 2018; Tromp, 2017; Xu et al., 2016). Cho, Wang, and Fesenmaier (2002) indicated that VR provides a substantial advantage to potential tourists over the traditional brochure and websites due to its content richness and informative experience. The use of VR has also been examined in tourism education (Hsu, 2012). That study considered eight college students and performed qualitative research after giving them a tour of 3D-based simulation systems. The results of the study indicated that the participants have a positive attitude toward Second Life in the context of acquiring tourism-related knowledge. Further, tom Dieck, tom Dieck, Jung, and Moorhouse (2018) conducted an exploratory study by interviewing 35 participants in the context of VR adoption and found various elements that affect the tourists' intention to use VR. They categorized the influencing factors in terms of usability (perceived control, perceived ease of use, comfort, and personalization), hedonic benefits (enjoyment and experienced realism), personal benefits (perceived usefulness) and emotional benefits (place attachment), affecting the attitude towards visiting the Lake District National Park in the UK. Another study by Kim and Hall (2019) adopted the "hedonic motivation system adoption model" by integrating flow state, perceived easiness, enjoyment, and subjective well-being, to examine the continuous use of VR across the visitors and non-visitors for tour-related activity. The results of that study revealed that perceived easiness does not have any influence on flow state across visitors and

non-visitors. Yung and Lattimore (2017) conducted a literature review in the context of VR application in tourism and found eleven studies in this domain. Most of these studies used the TAM, diffusion of innovation, and theory of planned behavior in the context of VR adoption. The above studies have stated the criticality of perceived usefulness and ease of use in VR adoption for tourism-related purposes. All the past studies have been conducted from the technology user's viewpoint. VR has emerged as a technological game-changer in the tourism industry with affordable HMD and Internet data plans in India. As the Indian tourism industry contributes significantly to the country's GDP and is expected to grow by 6.9% per annum (World Travel & Tourism Council, 2018), so, the use of VR as a tool to attract more tourists is worth examining.

2.2. Value-based adoption model

Kim et al. (2007) proposed the concept of the VAM while examining consumer's adoption of the mobile Internet. They argued that the VAM considered the adoption from the consumer's viewpoint rather than the technology user's perspective. The VAM is grounded in the concept of perceived value, defined as "the consumer's overall assessment of the utility of a product (or service) based on perceptions of what is received and what is given." Zeithaml (1988, p. 14).

Kim et al. (2007) argued that the TAM is limited in explaining the adoption of new technology and considered information and communication technology (ICT) users only as technology users rather than 'consumers.' The consumer is different from the user in terms of bearing the cost and risk. Furthermore, the TAM has also been criticized for its limited applicability beyond the workspace and showing varied results across different contexts (Kleijnen, De Ruyter, & Wetzels, 2007). As per the TAM, the perceived usefulness and perceived ease of use are the determinants of the intention to use a particular technology. The VAM, meanwhile, focuses on the benefits and sacrifices to determine the perceived value and, subsequently, the adoption intention. In other words, the perspective of the VAM is how the consumers maximize their perceived value. It suggests that people would be involved in a specific behavior if they perceive a high payoff. The differences in the personal preferences of the consumers impact their evaluation of the product and services (Bolton & Drew, 1991). Therefore, the same product and service can be perceived differently by different customers. Wang (2008) argued that the TAM only considers perceived usefulness to be one of the components of perceived benefits and ignores monetary or non-monetary elements such as perceived cost and perceived risk in the acceptance of information services. However, the VAM considers the benefits (utilitarian and hedonic) in addition to the sacrifices (monetary or non-monetary). Meuter, Bitner, Ostrom, and Brown (2005) empirically tested the TAM and found that the results were inconsistent and inconclusive, raising a question on its validity. Previously, scholars have stated that a positive attitude towards new technology is not always an important element in predicting the consumers' intention to use it (Jackson, Chow, & Leitch, 1997; Taylor & Todd 1995). Value may be an essential driver towards the intention to use as compared to attitude (Chang & Wildt, 1994). Consumers examine the value of all alternatives available by analyzing the benefits and sacrifices (Kim et al., 2007; Lin, Wu, Hsu, & Chou, 2012). Additionally, users view the usage cost as a sacrifice in voluntary ICT adoption, and the cost is born by the user (Wang, Yeh, & Liao, 2013). It is one of the most crucial elements and a critical deciding factor in the adoption of technology. The VAM also explains the technology adoption behavior of service consumers based on the TAM while incorporating the concepts of perceived benefits, sacrifices, and perceived value in it. Hence, the study considered both the benefits and sacrifices in the context of the adoption of VR in tourism.

Introduced by Kim et al. (2007), the VAM has been efficaciously employed for examining individual behavior mostly in the areas of Internet shopping (Gupta & Kim, 2010), tourism (Chung & Koo, 2015), and hospitality (Kim, Bae, & Jeon, 2019), etc. A recent study by Lau, Chui, and Au (2019) adopted the VAM to test the adoption of augmented reality (AR) technology in the context of hospitality and tourism. The authors considered usefulness and enjoyment in using AR to be perceived benefits, and technicality and captivating inputs to be perceived sacrifices, and found these elements to be significant predictors of adoption intention. Further, Hsiao and Chen (2017) have used an extended VAM to analyze consumer behavior towards e-book subscription-service adoption. They found that perceived value was the most critical predictor of the intention as compared to the attitude. Additionally, the VAM has also been used in examining the human behavior in the context of wearable devices (Yang, Yu, Zo, & Choi, 2016), smart home Kim, Park, & Choi, 2017, social commerce (Chen, Hsiao, & Wu, 2018) and AI-based products (Sohn & Kwon, 2020). Sohn and Kwon (2020) also compared the TAM, the unified theory of acceptance and use of technology and the VAM in context of artificial intelligence-enabled products and found the VAM to be the most appropriate model for analyzing consumers' adoption. Table 1 describes how various studies in different streams have used the VAM since 2007. It also lists the variables of perceived benefits and sacrifices considered in those studies.

Cognitive evaluation theory categorizes motivation into two: intrinsic and extrinsic. Intrinsic motivations denote the internal element, evolving during an ongoing activity, while extrinsic motivation is denotes behavior that is intended to accomplish an objective (Chen et al., 2018). Kim et al. (2007) considered perceived usefulness to be an intrinsic element and perceived enjoyment as an extrinsic one while studying the adoption of mobile Internet. They also stated that both the motivations could be termed 'perceived benefits,' which further leads to the perceived value and subsequently to the intention to adopt mobile Internet. Various past studies have noted the influence of both the motivations on users' perceived value and intention (Chen & Yao, 2018; Roostika, 2012). Perceived immersion is a characteristic of VR through which the user of the VR feels actual realism during its experience (activity), leading to an in-depth knowledge of destination compared to other traditional sources (e.g. two-dimension video and pictures). The present paper therefore postulates that perceived immersion is a perceived benefit.

The other essential element of voluntary technology adoption is involved cost in the use of technology. Wang et al. (2013) state that the cost of using technology is a monetary sacrifice as perceived by users. As the VAM suggests, perceived sacrifices can be of two types: perceived monetary and non-monetary sacrifice. Perceived monetary sacrifice is about the user's perception of the cost involved in using technology. Time, effort, and other psychological costs involved in the use of VR can, m meanwhile.be considered non-monetary sacrifices (Kim et al., 2007). Perceived cost (monetary sacrifice) refers to the users' cost perception in the use of VR. Perceived complexity is like the perceived ease of use construct of the TAM and relates to the users' understanding of how sophisticated VR technology is for experiencing the destination as compared to the other means. Additionally, perceived physical risk can be an essential element and refers to the users' perception of the using VR may harm their physical health (e.g. eye strain, headache). Hence, this study considers perceived benefits (perceived usefulness, perceived immersion, and perceived enjoyment) and perceived sacrifices (perceived cost, perceived complexity, and perceived physical risk) as antecedents of the perceived value of using virtual reality for destination experience purpose. The paper proposes VR as a new means for experiencing destinations by travelers before visiting the place, which could result in a more informed decision.

3. Conceptual framework and hypothesis development

The study proposes a research framework based on the VAM, which will help in understanding the consumers' adoption of VR for experiencing destinations based on the perceived value of the technology (VR). The perceived benefits and sacrifices are the two essential elements

Table 1
The main streams of research applying VAM.

Authors Year	Context	Perceived Benefits	Perceived Sacrifices
Kim, Chan, & Gupta 2007	Mobile internet	Usefulness, enjoyment	Technicality, perceived fee
Chu & Lu 2007	Online music	Perceived usefulness, perceived playfulness	Perceived price, perceived ease of use
Wang & Wang 2010	Hotel reservation	Information quality, system quality, service quality	Technological effort, perceived fee, perceived risk
Gupta & Kim 2010	Internet shopping	Convenience, pleasure	Perceived price, perceived risk
Lin, Wu, Hsu, & Chou 2012	IPTV[a]	Personalization, high quality, value-added services, content richness	Perceived fee, change of Viewing Habits, Technicality, Knowledge of Alternatives
Wang, Yeh, & Liao 2013	Online content	Perceived usefulness, perceived enjoyment	Technicality, perceived fee
Setterstrom, Pearson, & Orwig 2013	Web- enabled wireless	Perceived usefulness, enjoyment	Technicality, perceived fee
Liu, Zhao, Chau, & Tang 2015	Mobile coupon application	Perceived money savings, perceived convenience, perceived enjoyment	Perceived privacy risk, perceived fees
Chung & Koo 2015	Tourism	Information reliability, enjoyment	Complexity, effort
Yang,Yu, Zo, & Choi 2016	Wearable devices	Perceived usefulness, perceived enjoyment, social image	Performance risk, financial risk
Yu, Lee, Ha, & Zo 2017	Media tablet	Perceived usefulness, perceived enjoyment, social image	Perceived risk
Kim, Park, & Choi, 2017	Smart home	Facilitating conditions, usefulness, enjoyment	Privacy risk, innovation resistance, technicality, perceived fee
Kim, Joo, & Park. 2017	Tablet pc	Perceived low usefulness to internal management, perceived low usefulness to customer management	Cost, low usability, privacy and security concerns, low compatibility
Hsiao & Chen 2017	e-book	Perceived content, perceived context, perceived infrastructure	Perceived price
Wang, Lin, Wang, Shih, & Wang 2018	Mobile GPS navigation app	Compatibility, relative advantage, perceived enjoyment	Complexity, perceived cost
Chen, Hsiao, & Wu 2018	Social commerce	Flow, enjoyment, perceived usefulness	Perceived sacrifices, perceived risk
Hsu & Lin 2016	IoT[b] services	Perceived usefulness, perceived enjoyment	Perceived privacy risk, perceived fee
Kim, Oh, Park, & Joo 2018	Electric vehicle	Operational economic benefit, eco-friendly benefit, driving enjoyment benefit	Price and battery cost, technological performance risk, charging risk
Jun, Cho, & Park 2018	Mobile easy payment	Compatibility, simplicity, economic value	Switching costs, perceived privacy risk
Yu, Seo, & Choi 2019	Self-customization service	Perceived usefulness, perceived enjoyment	Technicality, perceived fee, innovation resistance, anxiety
Lau, Chui, & Au 2019	MICE[c] tourism	Usefulness, enjoyment	Perceived technicality, perceived captivating inputs
Kim, Bae, & Jeon 2019	Hospitality	Usefulness, enjoyment	Technicality, perceived fee, perceived risk
Sohn & Kwon 2020	AI[d] based products	Usefulness, enjoyment	Technicality, perceived fee

[a] IPTV: internet protocol television.
[b] IoT: internet of things.
[c] MICE: meetings, incentives, conferences and conventions, and exhibitions.
[d] AI: artificial intelligence.

contributing to the formation of perceived value by an individual. Further, the study examined the influence of perceived value on VR adoption intention.

3.1. Perceived value

Zeithaml (1988, p. 14) defined perceived value as "the consumer's overall assessment of the utility of a product based on perceptions of what is received and what is given." According to the VAM, "perceived value is the result of an overall evaluation of the relative perceived benefits and sacrifices associated with the offering" (Kim et al., 2007, p. 115). From the consumer-value viewpoint, numerous studies in the past have indicated the effect of perceived value in online travel purchase (Ponte, Carvajal-Trujillo, & Escobar-Rodríguez, 2015), IoT (Hsu & Lin, 2016) and social commerce (Chen et al., 2018). Wang et al. (2018) noted the influence of benefits and sacrifices in the formation of perceived value, which further leads to the intention to adopt a GPS navigation app by the consumers. They found perceived value to be a crucial element in GPS navigation app adoption. A recent study by Yu et al. (2019) noted the criticality of perceived value in the adoption of self-customization service and found it as a positive predictor of behavioral intention. Since VR is also a high-tech product, the present study hypothesizes that consumer's high-value perception about the use of VR will result in the VR adoption. Hence, value perceptions about VR may depend on the evaluation of the benefits and the sacrifices perceived by the consumers, leading to the intention to adopt VR. Therefore, the following hypothesis can be formulated:

H1. Perceived value of VR technology has a positive effect on the intention to use VR.

3.2. Perceived benefits

Deci (1971) categorized motivations into two: intrinsic and extrinsic while conceptualizing the cognitive evaluation theory. According to Rogers (1995), these motivations (intrinsic and extrinsic) are similar to the hedonic and utilitarian benefits and have a significant impact on perceived value and intention. The existing literature has proposed perceived usefulness and perceived enjoyment as motivational (intrinsic and extrinsic) factors in the usage of ICT (Lin & Lu, 2011). Dube-Rioux (1990) suggested that customers also evaluate a product based on cognitive and affective facets. Further, perceived immersion is a unique characteristic specific to VR (Disztinger, Schlögl, & Groth, 2017). It is a feeling provided to the users of the technology of being present in the actual environment. Since intrinsic motivation is a cognitive element, it can be said that perceived immersion can also be considered as an intrinsic element. Numerous studies have stated the importance of perceived benefits in the evaluation of perceived value in different contexts (Chen et al., 2018; Hsiao & Chen, 2017; Lau et al., 2019). For example, Hsu and Lin (2016) considered perceived usefulness and perceived enjoyment as perceived benefits in the adoption of IoT services and found that the perceived benefits had a more significant influence on perceived value. Rogers (1995) stated that intrinsic and extrinsic factors (such as utilitarian and hedonic elements) have a

significant impact on perceived value and intention. The present study proposes the use of VR not only for its perceived usefulness but also for the enjoyment and immersion while using it. Hence, it postulates that perceived usefulness is utilitarian, and perceived immersion and perceived enjoyment are hedonic elements of perceived benefits contributing to overall perceived value.

3.3. Perceived usefulness

Davis (1989, p.320) defines perceived ease of use as "the degree to which a person believes that using a particular system would be free of effort." Further, Yu, Lee, Ha, and Zo (2017) consider perceived usefulness to be similar to the functional benefits of using products or services. Perceived usefulness was found to be one of the prominent factors in the determination of travel intention in the context of VR adoption (Li & Chen, 2019). In that study, perceived usefulness was defined as the degree to which a person believes that using a VR device for experiencing a destination would enhance his or her decision-making ability while choosing a tourist destination. Kim et al. (2007) classify perceived usefulness as intrinsic motivation and adopt it from the TAM in the context of mobile Internet adoption. Furthermore, they define the combination of intrinsic and extrinsic motivations as 'perceived benefits.' Additionally, the evaluation of 'perceived benefits' influences the perceived value of the customer's intention to adopt new technology. In a recent study, Vishwakarma, Mukherjee, and Datta (2020) note the criticality of perceived usefulness of VR technology and its influence on the intention to adopt VR for experiencing destinations.

For example, in the context of IoT services adoption, Hsu and Lin (2016) found the perceived usefulness of IoT services to be a predictor of perceived value. The existing literature also confirms the positive relationship between perceived usefulness of technology and perceived value in various contexts [for example, wearable devices (Yang et al., 2016), user acceptance of media tablet (Yu et al., 2017) and social commerce (Chen et al., 2018)]. Therefore, the use of VR may allow the consumer of VR technology to experience a destination (task-related need), which helps them to understand a destination in a better way and facilitates their decision-making. Since VR is a technological intervention, it is posited that the perceived usefulness of using it for experiencing the destination will have a positive influence on perceived value. Hence, the following hypothesis is advanced:

H2. Perceived usefulness of VR technology has a positive effect on perceived value.

3.4. Perceived enjoyment

Davis, Bagozzi, and Warshaw (1992, p. 1113) defined perceived enjoyment as "the extent to which the activity of using the computer is perceived to be enjoyable in its own right, apart from any performance consequences that may be anticipated". Disztinger et al. (2017, p. 260) desfine perceived enjoyment as "the degree to which a system or a service is perceived to be enjoyable." In the VAM (Kim et al., 2007), perceived enjoyment is considered to be a benefit that shapes the perceived value of the users in the adoption of mobile Internet. Numerous past studies have considered perceived enjoyment to be an intrinsic motivation in the adoption of information technology (Agrebi & Jallais, 2015; Yang et al., 2016). The feeling of enjoyment arises out of the excitement and fun in using a technology irrespective of the consequences of using it (Lau et al., 2019). Therefore, virtually experiencing a destination using a technological intervention like VR can also be considered as an enjoyable activity since it offers consumers a unique way to feel the destination as they have never experienced before.

Previous studies have also confirmed the significant positive relationship between perceived enjoyment and perceived value (Chen et al., 2018; Hsu & Lin, 2016; Liu et al., 2015). A study by Wang et al. (2018) found that perceived enjoyment in using a GPS navigation app can be an essential predictor of perceived value that leads to the purchase intention of navigation apps. A study in the context of AR adoption in the hospitality and tourism domain also found enjoyment to be an essential element in the formation of perceived value (Lau et al., 2019). Therefore, consumers who find the VR enjoyable in exploring a destination can perceive a higher value of VR technology. Hence, the following hypothesis is proposed:

H3. Perceived enjoyment in using VR technology has a positive effect on the perceived value.

3.5. Perceived immersion

Perceived immersion can be defined as "perception of being physically present in a nonphysical world. The perception is created by surrounding the user of the VR system with images, sound, or other stimuli that provide an engrossing total environment"" (Shin, 2019, p. 1214). According to Teng (2010), immersion is a unique feature of the virtual environment. In their recent study, Shen, Wang, Chen, Nelson, and Yao (2020) defined immersion to be a perception/feeling of users of being physically present in an environment (non-physical). The perception of being present is a result of the environment provided by VR, such as sound, images, and free movement in any direction (control). Immersion has been recognized as an imperative element in VR research and also its influence on users' feeling of presence (Rose, Nam, & Chen, 2018). Perceived immersion has been found to be one of the significant predictors of the adoption of VR in the context of destination experience (Vishwakarma et al., 2020). Disztinger et al. (2017) stated that VR technology offers an immersive experience of reality in virtual settings and thereby enhances the perceived value. In a VR environment, users forget their actual surroundings, situation, and life and immerse themselves in the activity of exploring the destinations. Through VR, travelers have the opportunity to experience the destinations before visiting the place. In traditional modes, the traveler used to extract destination information from online websites (text/images/video), electronic brochures, possibly from friends, etc. However, none of these ways can offer the immersive features that VR provides. VR provides travelers an opportunity to explore the destination through VR, having plenty of experienced information which would have a significant impact on their decision-making. Hence, the travelers' VR experience can be considered to be hedonic and for this to lead to the benefit from the technology. Therefore, it is postulated that when travelers decide to select a destination based on the use of technology, they will perceive that technology to be beneficial. Thus, the following hypothesis can be proposed:

H4. Perceived immersion in using VR technology has a positive effect on perceived value.

3.6. Perceived sacrifice

Zeithaml (1988) states that perceived sacrifice comprises monetary (the price of the product) as well as non-monetary (time, effort, and energy) elements. From the viewpoint of consumers, the adoption of VR technology not only incurs an extra cost but also causes some harm to themselves. The travelers may feel that engaging in VR through a HMD may lead to health-related problems. Researchers have in the past identified perceived sacrifices as a significant influencing factor in the adoption of IoT (Hsu & Lin, 2016) and mobile services (Chung & Koo, 2015). Therefore, similar to the previous studies, this study also considers perceived cost as a financial sacrifice, perceived complexity, and perceived physical risk as non-monetary sacrifices.

3.7. Perceived complexity

Rogers (1995, p. 16) defines perceived complexity as "the degree to which using a particular IT innovation is perceived as relatively difficult to understand and use." Furthermore, innovation that is complex to use

negatively impacts adoption (Rogers, 1995). The perceived ease of use has been widely used as a dimension of technicality as per the VAM. According to Kim et al. (2007), technicality is perceived as a non-monetary sacrifice which affects the perceived value and has an impact on IT adoption. In other words, technology that is perceived to be easy to use and less complicated will have higher acceptance by the consumers (Shih & Fang, 2004). Following Rogers (1995), in this study, perceived complexity (or low perceived ease of use) is considered to be the degree to which the use of VR is perceived to be difficult in experiencing a destination. While studying the adoption of the Internet, Chuang, Nakatani, and Zhou (2009) stated that innovation that is perceived to be difficult to understand and use would have a negative influence on its adoption. Numerous past studies have examined the influence of technicality on perceived value and, subsequently, on innovation adoption. The component of technicality includes the level of effort required by the users to understand and learn the new technology and thereby is analogous to perceived complexity (Chung & Koo, 2015; Kim et al., 2019). The recent literature on technical innovation has also indicated a significant negative relationship between technical complexity and perceived value (Chung & Koo, 2015; Wang et al., 2018). In the context of GPS mobile app adoption, Wang et al. (2018) found that if the users perceive the use of GPS mobile apps to be time-consuming and hard to learn, their perceived value of adopting it will deteriorate. Similarly, in the Indian context, VR technology is relatively novel. Notably, its application in experiencing tourism destinations is almost a new phenomenon. Hence, if users of VR technology perceive that the use of VR technology for experiencing a destination requires too much mental effort, their perceived value of VR will likely be reduced. Therefore, in this case, consumers who perceive VR use in experiencing a destination as a complex process (hard to learn, how to use) can have a low perceived value, which can subsequently result in reduced VR adoption intention. Hence, the following hypothesis is proposed:

H5. Perceived complexity in using VR technology has a negative influence on perceived value.

3.8. Perceived cost

Machogu and Okiko (2012) define perceived cost as the cost incurred in the adoption of technology and consider it to be a barrier in the adoption of innovation. Moreover, perceived cost is a prominent factor in information system adoption (Mathieson, Peacock, & Chin, 2001). Past studies have revealed the importance of perceived cost in technology adoption (de Sena Abrahão, Moriguchi, & Andrade, 2016; Hanafizadeh, Behboudi, Koshksaray, & Tabar 2014; Kim, Joo & Park, 2017). In the VAM, perceived cost has been considered as a sacrifice from the consumer's perspective. For example, Kim et al. (2007) indicated that the costs of using mobile application follow a subscription-based model or pay-per-use system that acts as a perceived fee for the consumers. The perceived fee or perceived cost has been found to be negatively associated with the adoption of smart home technology (Nikou, 2019). Additionally, Liu et al. (2015) suggested that perceived cost or fee has a negative effect on perceived value in the adoption of mobile coupon application. Further, Wang et al. (2018) also verified a negative relationship between perceived cost and perceived value in the adoption of the GPS navigation app. Another study by Niknejad, Hussin, Ghani, and Ganjouei (2019) indicated that the perceived fee of using smart wearable wellness devices diminishes perceived value by the Malaysian population. In the present study, perceived cost is considered to be the economic expense that consumers have to bear to use VR technology (e.g. HMD devices, the Internet). In the use of VR technology for exploring tourism destinations, the traveler incurs expenses in buying VR devices and the subscription fees for using mobile Internet services. The literature has indicated that the perceived cost of any technology usage inversely affects its perceived value. Hence, it is hypothesized that:

H6. Perceived cost of using VR technology has a negative influence on perceived value.

3.9. Perceived physical risk

According to Schiffman and Kanuk (2004), perceived physical risk refers to the likelihood that the product may physically harm the consumer and others close to him/her. González Mieres, Díaz Martín, & Trespalacios Gutiérrez, 2006 explained it as the consumers' fear that the use of a particular product can damage their health. Luo, Li, Zhang, and Shim (2010) also accepted the importance of physical risk in technology adoption in their proposed 'risk framework.' A study conducted by Alimamy, Deans, & Gnoth, 2017 revealed the influence of perceived physical risk on the intention to adopt AR. Moreover, various studies have established the impact of physical risk on the intention to adopt the technology (Herz & Rauschnabel, 2019; Wu & Ke, 2015). The extant literature indicates that consumers' perceived value for adopting technology is negatively influenced by the perceived risk (Jiang, 2016; Zauner, Koller, & Hatak 2015). Previous studies have conceptualized perceived physical risk as a part of perceived risk. They have also indicated that perceived physical risk negatively influences the perceived value of any technology (Stollery & Jun 2017; Wu, Vassileva, Noorian, & Zhao, 2015) and stated the importance of perceived physical risk and its influence on perceived value in the context of Airbnb. Similar to AR, in the context of this study, consumers may perceive the fear of damaging their physical health by using VR. Since consumers need to wear a VR head-mounted device, they may fear that the technology will hurt their eyes or brain while using it. The following hypothesis is therefore advanced:

H7. Perceived physical risk in using VR technology has a negative influence on perceived value.

3.10. Sensation-seeking

Perse (1996) stated that sensation seeking is a personality trait that reflects an individual's desire to search for a novel, varied, and intense stimuli. Zuckerman (1979) also state that novelty-seeking is a facet of sensation-seeking. Sensation-seeking behavior has been studied in the previous literature from the perspective of new product adoption (Mittelstaedt, Grossbart, Curtis, & Devere, 1976). Extant research has indicated that high sensation-seekers are more attentive towards alternatives and have an inclination towards innovation adoption as compared to low sensation-seekers (Kim, Almanza, Ghiselli, & Sydnor, 2017). For example, Chan (2017) indicated that for adopting dating apps, the sensation-seeking behavior acts as a significant predictor. Another study also examined the influence of sensation seeking and found a significant positive relationship with automated vehicle adoption (Zhang et al., 2020). Since VR can be considered to be a new technological innovation that provides users an immersive and vivid environment, it may help users in feeling the sensation while exploring destinations through VR in a virtual setting. Therefore, it is reasonable to suggest that sensation-seeking travelers would have a positive intention to adopt VR. The above discussion leads to the following hypothesis:

H8. Sensation-seeking behavior has a positive influence on the intention to use VR.

3.11. Effect of gender

Gefen and Straub (1997) concluded the influence of gender on the adoption of IT. Previous studies have argued that gender has a significant moderation effect on the perceived benefits and sacrifices and the perceived value of products/services. This may be due to the different risk perception, perceived ease of product/services, information

processing, and social norms among males and females (Martins, Oliveira, & Popovič, 2014; Wang, 2010). For example, Riquelme and Rios (2010) indicated that females perceive the use of mobile banking to be easier than males. Moreover, women are believed to be more prone to hedonic perception than men (Borges, Babin, & Spielmann, 2013). The influence of gender has also been found to be significant in the context of e-learning (Dečman, 2015; Tarhini, Hone, & Liu, 2014). Specifcally in the context of the VR environment, Yoon, Choi, and Oh (2015) argued that gender has an essential effect on information visualization. Hence, the following hypothesis has been proposed:

H9. Relationship between the variables in the proposed model will be different for male and female.

4. Methodology

4.1. Sample and data analysis

The respondents were chosen from Kolkata and Kharagpur, Tier 1 and a Tier 2 cities respectively in West Bengal, India. Being one of the biggest metropolitan cities and business centers of India, Kolkata is a home of people of several regions of the country. Due to the presence of the zonal headquarters of the Indian Railways in south-east India, Kharagpur is the home of the people who belong to the different parts of the country. Furthermore, students from the Indian Institute of Technology Kharagpur were also considered for the study. The Indian Institute of Technology Kharagpur is an institution in the country that was set up under the Ministry of Human Resource Development (MHRD) (NIRF, 2018). The respondents who took part in the study consisted of students, employees, and faculty members belonging to different parts of the country. As the respondents came from different parts of the country, it is evident that they belong to distinct subcultures, languages, and religions representing the entire country's population.

Offline printed questionnaires were used for data collection. Screening questions were asked to ensure that only those people who had traveled for leisure at least once in the past year were recruited. Before distributing the questionnaires, a screening question, "Are you aware of VR?" was asked to identify suitable respondents. Those who answered 'yes' were considered for the study. All the respondents who said 'yes' to the screening questions and had not used VR in the past were considered for the study. Hands-on experience of VR was therefore provided to the respondents. They were asked about their understanding of how to use smartphone-based VR HMD (setup a device including software and VR box). To make their experience uniform, a sample 360-degree VR video of India Gate (available on YouTube) was shown for their VR experience, since they had not used this technology in the past. After that, the research objective was communicated to the respondents. They were then presented with a scenario to select a destination for their future trip with the help of VR. They were told to recall the VR experience provided in the sample VR video. They were also asked to check their desired destination VR content, for its availability. They were then asked questions based on theoretical knowledge.

Almost 1100 respondents were approached, out of which only 411 were aware of VR and were asked to answer the questionnaire. After removing the outliers and incomplete responses, 208 responses were used for further analysis. The final sample consisted of 121 (58.17%) males and 87 (41.83%) females. The respondents' characteristics are given in Table 2.

This study followed Anderson and Gerbing's (1988) methods to test hypotheses, utilizing structural equation modeling (SEM). The analysis was carried out in AMOS 24.0. In this study, a sample of more than 200 has used, as suggested by Kline (1998). In the first stage, the confirmatory factor analysis was conducted to test the reliability and validity of the measures. After that, the path model was used to examine the proposed causal relationships among the constructs.

Table 2
Respondents profile.

Characteristics	N	%
Gender		
Male	121	58.17
Female	87	41.83
Age (years)		
18–24	34	16.34
25–30	130	62.5
31–35	44	21.16
Education		
Undergraduate	45	21.64
Postgraduate (MBA, M.Tech, etc)	134	64.42
PhD	29	13.94
Traveling with		
Friends	55	26.44
Family	143	68.75
Solo	10	4.81
Income (per month)		
25000-30000	98	47.11
30001-35000	85	40.86
35001-40000	20	9.62
40001 and above	5	2.41

n = 208.

4.2. Instrument development

As per the literature, the current study identified the following elements: perceived immersion, perceived usefulness, perceived enjoyment, perceived complexity, perceived cost, perceived physical risk, perceived value, sensation seeking, and intention to adopt. Given the context of the study, three items of perceived usefulness (Davis, 1989), four items of perceived enjoyment (Agarwal & Karahanna, 2000), four items of perceived immersion (Jennett et al., 2008), three items of perceived cost (Luarn & Lin, 2005), three items of perceived physical risk (Stone & Grønhaug, 1993), three items of perceived complexity (Davis, 1989; Li & Buhalis, 2006), three items of perceived value (Sirdeshmukh, Singh, & Sabol, 2002), four items of sensation-seeking (Hoyle, Stephenson, Palmgreen, Lorch, & Donohew, 2002) and three items of intention to adopt (Fishbein & Ajzen, 1975) were adopted. The study employed multi-measurement items to capture all the attributes of the constructs. The questions were measured on a five-point Likert scale anchored at "1" = strongly disagree, and "5" = strongly agree. The list of items used in the questionnaire is written in Table 3.

5. Results and discussion

5.1. Measurement model

Confirmatory factor analysis (CFA) was conducted to test the measurement model. The results of the CFA revealed that the data fitted the model adequately according to the relevant indices: $\chi^2/df = 1.197$, CFI = 0.97, TLI = 0.96, RMSEA = 0.03 (Hair, Black, Babin, Anderson, & Tatham, 2010). For all the items, the factor loadings were found to be greater than 0.50. Hence, all the items used in this study were considered to be significant (Hair, Anderson, Tatham, & Black, 1992). The internal consistency of the model was measured using composite reliability (CR) and the average variance extracted (AVE). The values of CR and AVE were greater than 0.70 and 0.50 respectively (Bagozzi & Yi, 1988; Fornell & Larcker, 1981). Hence, construct reliability was achieved. As suggested by Fornell and Larcker (1981), the AVE (bold diagonal) of each construct in this study was greater than the inter-construct correlations, confirming discriminant validity of scale (see Table 4).

5.2. Path model

The data fitted the path model well, with the relevant indices being

Table 3
Results of confirmatory factor analysis. FL: Factor Loading.

Constructs	Items	FL
Perceived enjoyment (PENJ)	(AVE: 0.53, CR: 0.81)	
	PENJ1: Use of VR for travel planning is enjoyable.	0.74
	PENJ2: I have fun using VR technology.	0.75
	PENJ3: The use of VR technology in experiencing destination provides me lot of enjoyment.	0.84
	PENJ4: Using VR in experiencing destination bores me [a].	0.55
Perceived immersion (PIM)	(AVE: 0.51, CR: 0.80)	
	PIM1: Once into VR, I was unaware of what was happening around me.	0.55
	PIM2: Once into VR, I feel disconnected from the outside world.	0.57
	PIM3: I felt that I was actually traveling during my experience of VR.	0.84
	PIM4: During VR experience, I feel is in another world.	0.84
Perceived usefulness (PU)	(AVE: 0.52, CR: 0.77)	
	PU1: Use of VR will help me to choose a destination in a better and comfortable way.	0.68
	PU2: Use of VR in planning destination travel is very useful for me.	0.72
	PU3: Using VR technology will help me to select a destination travel plan more conveniently.	0.77
Perceived cost (PC)	(AVE: 0.59, CR: 0.81)	
	PC1: The VR technology (VR device and internet data pack) would be pricey to me.	0.76
	PC2: I am not pleased with the cost of VR technology.	0.79
	PC3: There are financial barriers (e.g., HMD devices, data cost) to me in using VR technology.	0.75
Perceived physical risk (PPR)	(AVE: 0.62, CR: 0.83)	
	PPR1: Using VR technology could result in eyestrain.	0.72
	PPR2: I am concerned that using the VR technology may lead to uncomfortable physical side effects such as bad sleeping.	0.87
	PPR3: I am concerned about the potential health-related risks associated with the use of VR.	0.76
Perceived complexity (PCOM)	(AVE: 0.58 CR: 0.80)	
	PCOM1: The use of VR is very clear to me[a].	0.67
	PCOM2: Using VR technology is complicated in use.	0.90
	PCOM3: I feel, it is not easy to use VR technology for experiencing the destination.	0.69
Perceived value (PV)	(AVE: 0.61 CR: 0.82)	
	PV1: Compared the fee of VR I need to pay, it offers better value in planning travel.	0.75
	PV2: Compared to the time I need to spend, the use of VR in travel planning is worthwhile to me.	0.78
	PV3: Overall., the use of VR in travel planning delivers better value to me.	0.80
Behavioral intention (BI)	(AVE: 0.67 CR: 0.86)	
	BI1: I plan to use VR for travel plan in the near future,	0.76
	BI2: I intend to use VR in travel plan in the future.	0.86
	BI3: I predict, I will use VR technology in the future in travel planning.	0.83
Sensation-seeking (SS)	(AVE: 0.51 CR: 0.80)	
	SS1: I would like to explore strange places.	0.85
	SS2: I like to do frightening things.	0.62
	SS3: I would like to try bungee jumping.	0.79
	SS4: I would love to have new and exciting experiences, even if they are illegal.	0.55

[a] (Reverse coded).

χ^2/df = 1.239, CFI = 0.96, TLI = 0.96, RMSEA = 0.03. This indicated that the perceived usefulness, perceived immersion and perceived enjoyment had significant positive impact on perceived value ($\beta_{PU\rightarrow PV}$ = 0.26, *t*-value = 3.32, $p < 0.001$; $\beta_{PIM\rightarrow PV}$ = 0.39, *t*-value = 5.10, $p < 0.001$; $\beta_{PENJ\rightarrow PV}$ = 0.27, *t*-value = 3.72, $p < 0.001$) supporting *H2*, *H3* and *H4*. Similarly, perceived physical risk and perceived complexity had significant negative impact on perceived value ($\beta_{PPR\rightarrow PV}$ = −0.34, *t*-value = −4.63, $p < 0.001$; $\beta_{PCOM\rightarrow PV}$ = −0.20, *t*-value = −2.48, $p < 0.05$) supporting *H5* and *H7*. Moreover, perceived value and sensation-seeking ($\beta_{PV\rightarrow BI}$ = 0.72, *t*-value = 8.95, $p < 0.001$; $\beta_{SS\rightarrow BI}$ = 0.14, *t*-value = 2.15, $p < 0.05$) had positive influence on intention supporting *H1* and *H8*. Unexpectedly, perceived cost ($\beta_{PC\rightarrow PV}$ = 0.11, *t*-value = 1.52, $p = 0.13$) did not have a significant influence on perceived value. Hence, *H6* was not supported. The variance explained (R^2) by perceived value and intention to adopt were 0.58 and 0.53, i.e. higher than the cut-off value of 0.10 (Falk & Miller, 1992). The path coefficients are shown in Fig. 1 and the results are presented in Table 5.

5.3. Multi-group analysis

A multigroup analysis was used to test for the impact of gender. Accordingly, two models were formed, including an unconstrained model and a fully constrained model. In the fully constrained model, all the parameters were fixed. All the parameters were allowed to vary in the unconstrained model. A χ^2 difference test was performed to obtain $\Delta\chi^2_{diff}$ value to compare these two models (Werner & Schermelleh-Engel, 2010). The values of the difference test were as follows: $\Delta\chi^2$ (8) = 13.211, *p*-value = 0.105. Since the $\Delta\chi^2_{diff}$ value was not found to be significant, it was concluded that the two models were not significantly different. Hence, *H9* was not supported. Therefore, gender did not have a significant influence at the model level in the present research.

6. Discussion

Using the VAM, this study examined the factors influencing consumers in adopting VR technology from the perspective of perceived value and individual differences.

First, the present research found that perceived value is an essential determinant of the VR adoption intention. The outcome of the study was consistent with previous studies indicating that perceived value is a significant predictor in new ICT adoption (Chen et al., 2018; Hsu & Lin, 2016; Kim et al., 2007). It indicates the crucial role of perceived value in the adoption of VR for experiencing the destination.

Second, the perceived benefits have a more substantial influence on perceived value than perceived sacrifices. The dimensions (perceived enjoyment, perceived usefulness, and perceive immersion) forming perceived benefits were found to be significant and have a positive impact on perceived value. The above finding is consistent with a recent study in the context of GPS navigation app adoption (Yu et al., 2017). Among the components of perceived benefits, perceived immersion of VR has been found to be a major predictor of perceived value of VR compared to perceived enjoyment and perceived usefulness ($\beta_{PU\rightarrow PV}$ = 0.26, *t*-value = 3.32, $p < 0.001$; $\beta_{PIM\rightarrow PV}$ = 0.39, *t*-value = 5.10, $p < 0.001$; $\beta_{PENJ\rightarrow PV}$ = 0.27, *t*-value = 3.72, $p < 0.001$).

Third, it is interesting to note that the perceived cost does not influence the perceived value of using VR. The possible reason could be the availability of cheap VR devices (e.g. Google Cardboard) and cheap 4G Internet data (e.g. Jio 4G). However, perceived physical risk was the most influential ($\beta_{PPR\rightarrow PV}$ = −0.34, *t*-value = −4.63, $p < 0.001$; $\beta_{PCOM\rightarrow PV}$ = −0.20, *t*-value = −2.48, $p < 0.05$) sacrifice factor in determining the perceived value followed by perceived complexity. The above finding is consistent with the study of Hirunyawipada and Paswan (2006) in the context of the adoption of high- technology products. The findings might have resulted from the consumer's fear that the use of VR could harm their health (e.g. eye strain and headache). Additionally, perceived complexity in the use of VR also has a significant effect on perceived value. It indicates that consumers perceive the use of VR to be a tedious job.

Fourth, the results indicate that sensation-seeking behavior has a positive effect on the VR adoption intention, which is inconsistent with the findings of Choi and Ji (2015). This result is due to the consumers who perceived the use of VR to be unique and exciting. They will have more positive VR adoption intentions for experiencing a tour destination. The use of VR provides consumers a unique 360-degree view of the

Table 4
Discriminant validity.

	PU	PENJ	PIM	PC	PPR	PCOM	PV	BI	SS
PU	0.72								
PENJ	0.29	0.73							
PIM	0.17	0.16	0.71						
PC	0.01	0.06	0.06	0.77					
PPR	−0.10	−0.16	0.01	0.14	0.79				
PCOM	−0.02	0.07	0.28	0.35	0.26	0.76			
PV	0.37	0.46	0.36	0.04	−0.44	−0.12	0.78		
BI	0.44	0.33	0.49	−0.02	−0.23	−0.04	0.68	0.82	
SS	−0.02	0.11	0.30	0.01	0.06	0.05	0.15	0.24	0.71

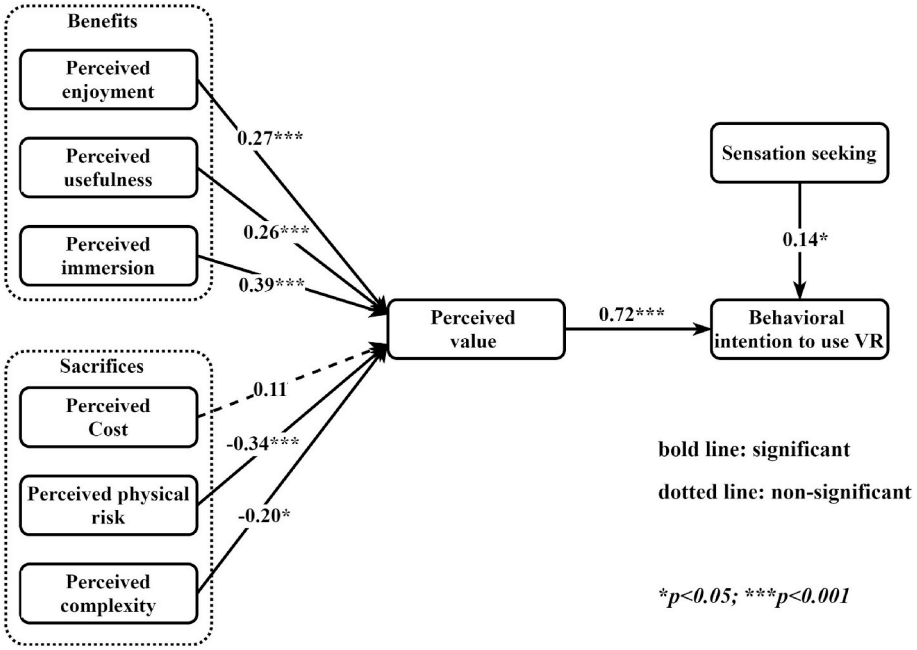

Fig. 1. The conceptual model with the results of hypothesis testing.

Table 5
Summary results of hypothesized model testing.

Hypothesis	Path	Standardized coefficient (β)	t-value	Result
H1	PV → BI	0.72	8.95***	Supported
H2	PU → PV	0.26	3.32***	Supported
H3	PIM→ PV	0.39	5.10***	Supported
H4	PENJ → PV	0.27	3.72***	Supported
H5	PPR → PV	−0.34	−4.63***	Supported
H6	PC → PV	0.11	1.52	Not Supported
H7	PCOM → PV	−0.20	−2.48*	Supported
H8	SS → BI	0.14	2.15*	Supported

destinations with exclusive interactive audio-video content, which helps them select a destination compared to the existing technologies.

Fifth, the study also tested the impact of gender differences at the model level and found it to be insignificant. It indicates that both males and females possess the same intention to adopt VR. The above finding contradicts the existing literature (Ameen, Willis, & Shah, 2018; Venkatesh, Morris, & Ackerman, 2000; Yoon et al., 2015). However, gender had a significant influence on technology adoption and was driven by the culture of the geographic area (Faqih & Jaradat, 2015). The respondents involved in the research were mostly young urban consumers of India, which was consistent with Umrani and Ghadially (2008). Hence, it can be concluded that males and females shared similar VR adoption intentions for experiencing a destination.

7. Conclusions

This study has examined VR adoption for experiencing a tourism destination grounded on the VAM. concentrating on domestic tourism and tourists. The theoretical model consists of eight hypotheses. Although seven hypotheses were supported, it was identified that perceived cost did not significantly influence the perceived value of using VR. The results suggest that VR adoption is affected by the perceived value appraised by the users based on the benefits and sacrifices associated with it. Perceived immersion and perceived physical risk were identified as the two most important factors of benefits and sacrifices, respectively. These had a more significant influence on perceived value than the rest of the antecedents. Further, gender influence was not found significant in VR adoption.

7.1. Academic implications

The present study adds value to the existing body of literature of both VR and its application in tourism. Minimal theory-based research has been conducted in the past in the context of VR adoption. Moreover, the existing literature claims that there is a dearth of theory-based research that exists in the context of VR technology adoption in tourism, and studies have examined consumer behavior from technology users (Yung

& Lattimore, 2017). Previous studies have considered VR adoption by considering travelers as technology users, rather than from the value perspective. This study is the first attempt to examine VR adoption based on consumer's perceived benefits and sacrifices. Based on the VAM, perceived benefits (perceived usefulness, perceived enjoyment, and perceived immersion) and perceived sacrifices (perceived cost, perceived physical risk, and perceived complexity) were examined in the context of travelers' perceived value and VR adoption intention. The research argues that the higher perceived value leads to the adoption of VR. The VAM has been used to examine the adoption and purchase behavior in the context of intention to purchase mobile apps (Hsu & Lin, 2016) and mobile-based payments (Jun, Cho, & Park, 2018). However, the use of VAM in VR adoption for selecting a tourist destination is entirely novel.

Second, this study examines traveler's VR adoption intention for selecting tourism destinations from both the technology and service consumer's perspectives. Additionally, this study has extended the VAM by incorporating perceived immersion, perceived physical risk, and sensation-seeking-behavior as three new and vital constructs in it. Therefore, this study may be considered as an extension of the VAM, specifically in the domain of VR application in tourism.

Third, Kim et al. (2007) indicated that perceived usefulness and perceived enjoyment are beneficial elements that lead to perceived value while investigating mobile Internet adoption. However, while wearing a HMD to view VR contents of a destination, the consumer is temporarily cut-off from reality and is completely immersed in the contents. Therefore, in this study, perceived immersion has been identified as a major and essential element of benefits compared to rest (perceived enjoyment and perceived usefulness), leading to perceived value. It indicates that the more immersive the technology is, the more would be the relevance of perceived immersion for developing perceived value-adding knowledge to the VR literature.

Fourth, the existing literature on the adoption of high-technology products (Hirunyawipada & Paswan, 2006) has indicated the relevance of perceived physical risk in adoption behavior. However, the element of perceived physical risk has not been studied in the context of VR until now. This study considered perceived physical risk to be a component of perceived sacrifice. Perceived physical risk influences perceived value and has not been studied earlier in the VR literature. In this study, perceived physical risk had a strong negative impact on the perceived value of the tourists compared to the other sacrifice elements (perceived cost and perceived complexity). Hence, the present study adds knowledge to the literature of the VAM, VR, and tourism by identifying the relevance of this construct from the value perspective.

Fifth, as Natarajan, Balasubramanian, and Kasilingam (2017) have indicated, Indian consumers are price sensitive. However, the results revealed that the perceived cost of VR does not have a significant impact on the perceived value of VR. It may be due to the travelers who perceived more benefits in using VR for destination experience than the cost involved in using it. The other reason behind such contradiction is the cheap availability of VR devices in the market, starting from just above INR 200 (Amazon India, 2018) (1 INR = 0.014 USD and 0.013 EURO as on 7th February 2020). This could be due to the evolution of Google Cardboard (basic HMD) and an increasing number of VR brands, which has created strong competition in the market, resulting in affordable HMD. The other possible reason is that when users use the VR device for experiencing a destination, they would want to play VR content of the destination, which requires high-speed data. This data also becomes available at an affordable price to all Indian users. India has secured the first rank in providing high-speed data at a cheaper price (1 GB = 0.26 USD) than all other countries in the world (BBC, 2019; Forbes, 2019; The Economic Times, 2019). It implies that if technological innovation is inexpensive, the perceived cost of procuring it is lower. In such a situation, the perceived cost has an insignificant impact on perceived value.

Sixth, Zheng (2018) has introduced the sensation-seeking behavior in the context of the traveler's choice of destinations. In the context of technology adoption, the concept of sensation-seeking behavior is novel. Notably, this concept has never been used in the context of the VR technology adoption for choosing a destination. This study is pioneering insofar as it includes sensation-seeking behavior in the VAM and analyzes its effect on the intention to adopt VR for experiencing a tourism destination. This is a unique contribution of this study. Yoon et al. (2015) found that the influence of gender on information visualization in the context of the VR environment. However, males and females had similar intentions to adopt VR for experiencing a destination, which is inconsistent with the findings of Yoon et al. (2015). Gender could have a significant influence on technology adoption and the culture of the geographic area drives it. All the respondents considered in the research belonged to young-generation consumers. A study by Umrani and Ghadially (2008) conducted on Indian urban and young consumers also found similar results and stated that technology adoption is gender independent. Consistent with the finding of the above research, this study has found that the male and young female consumers show a similar intention to use VR for experiencing a tour destination.

7.2. Implications for practice

The outcomes of the present study have demonstrated the importance of perceived benefits and sacrifices in respect of VR adoption for experiencing destinations. The results guide tour marketers towards concentrating on enhancing perceived benefits and reducing perceived sacrifices. Destination marketing organizations should showcase the power of VR to the general public by placing the VR stalls at famous tourist places or other events like Mahotsava (large religious festivals, e.g., Kumbhmela, Durga puja, Diwali), cultural events, etc. Further, marketers should promote VR as a time-saving technology in acquiring tourism-related information and improved decision making. Additionally, marketers should also make the consumers aware of the availability of immersive 360-degree content in the optimized form so that they can use VR using their smartphones.

The relationship between perceived cost and perceived value was not found to be significant in this study. This may be due to the wide variety of low-priced VR devices available in India. However, the relationship between perceived physical risk and perceived value was found to be significant. Hence, tourism agencies should reduce their perception of risk by making the general public familiar with it. In order to make the tourists aware of VR technology, marketers can set up a VR experience stall, online launch and TV promotion campaigns, and hire opinion leaders (e.g. YouTube channels). These actions together lead to the reduction of the level of perceived physical risk and people them comfortable with technology. The complexity of using VR also acts as a barrier to adoption. Therefore, marketers should provide a full demo of how to set up the devices and communicate with consumers through different communication channels like social media, online advertisement, in-box guides, etc.

The study reveals that the tourists who look for novelty in searching and experiencing the destination would be a better target for marketers. The significant relationship between sensation-seeking and intention indicates that marketers should promote VR among tourists seeking novelty in selecting a destination based on their previous travel history. Tourists who seek novelty among different places are probably the best target for using VR for destination selection, as they are adventurous and do not mind the challenge of taking the risk would love to experiencing VR.

There are several online travel agencies available in India, including national and international brands. These brands promote the destination by showing the images and the videos. These brands can integrate VR content of destinations on their platforms so that potential tourists can experience the destination right on the platforms, resulting in more conversion rates.

The Indian Ministry of Tourism has started promoting destinations

through VR. The other destination marketing organizations should participate in this initiative and develop more optimized VR content of destinations (destinations with presently no VR content). Through this, a large number of destinations will have VR content, which provides higher options for tourists to explore places and select best out of that based on their preference.

The online travel brand should add an option to their platforms about the helpfulness of the VR content versus other information (images/videos) and ask the visitors to rate their experience. It will help in evaluating the effectiveness of VR.

7.3. Limitations and future research directions

The current study has some limitations. First, the respondents were aware of VR technology but not exposed to VR technology in the past. As VR is a relatively new technology in India, especially in the context of tourism, it is yet to make headway. It was difficult to find consumers who owned a VR HMD. Nonetheless, future researchers can replicate this study on the respondents who own VR devices and can compare with the people who are familiar with VR.

Second, most of the respondents in the research were young. Therefore, there is a need to conduct future research on the elder and middle-aged groups to examine the moderating impact of age on the hypothesized model. This study was limited to Indian respondents and, therefore, can be replicated in other cultures for increased generalizability.

Third, the study has been conducted only on the urban VR users, and hence the impact of the gender gap for technology adoption was found to be blurred. Therefore, the intention to adopt VR by rural consumers was beyond the scope of the present study. Notably, mobile-Internet penetration of the Internet in rural India is significantly lower than in urban India (The Economic Times, 2018). Although Reliance Jio, with its low-cost 4G network, is all set to pave its way in rural India (Business Standard, 2018), the digital gender gap is still wide in rural areas (The Economic Times, 2018). Future researchers can therefore conduct a comparative study of rural and urban travelers to examine the difference in their adoption intention for using VR to select tour destinations. Additionally, future studies can investigate the behavior difference in the adoption of VR across urban and semi-urban areas.

The present study has examined the moderation of gender on the behavioral intention of using VR for exploring a tour destination. Further studies can also consider the element of VR technology awareness and can check the moderation across all the hypothesized paths in the conceptual framework.

Although the study addressed the essential elements of VR adoption in the light of the VAM, there are some other critical factors such as availability of VR content, quality of VR device, and the quality of VR content that can be considered in future studies.

Declaration of competing interest

None.

CRediT authorship contribution statement

Pankaj Vishwakarma: Conceptualization, Methodology, Formal analysis, Writing - original draft. **Srabanti Mukherjee:** Conceptualization, Supervision, Writing - review & editing. **Biplab Datta:** Validation, Writing - review & editing.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jdmm.2020.100456.

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