

How do ecotourists co-create value on digital platforms? The moderating role of ecotourist typology

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Abstract

Purpose – This study aims to examine the process of value co-creation (VCC) on digital ecotourism platforms and the role of perceived platform usefulness and user participation behavior in that process. The study also seeks to determine the extent to which the typology of the ecotourist moderates VCC.

Design/methodology/approach – A total of 420 users of a digital ecotourism platform participated in a study analyzing the factors that influence VCC. A mediation, moderation and conditional process analysis was used to test the proposed hypotheses. A K-means cluster analysis was also used to classify the ecotourists into four groups.

Findings – The results show that perceived platform usefulness has a strong influence on the generation of VCC and also on user participation behavior. In turn, user participation behavior is an important driver of VCC. This study also highlights the moderating role of the ecotourist typology in the formation of VCC on these digital platforms.

Practical implications – This study offers managers of digital ecotourism platforms a means to identify and motivate those ecotourists with the necessary skills and characteristics to become true co-creators of value.

Originality/value – This study contributes to the existing knowledge on how value is co-created on digital ecotourism platforms, confirming the important antecedent role of perceived platform usefulness and user participation behavior, as well as the moderating role of ecotourist typology.

Keywords Value co-creation, Ecotourism, Digital platforms, Participation, Perceived usefulness, Ecotourist typology

Paper type Research paper

Cómo co-crean valor los ecoturistas en las plataformas digitales? El papel moderador del tipo de ecoturista

Resumen

Propósito – El propósito de este estudio es examinar el proceso de co-creación de valor (VCC) en las plataformas digitales de ecoturismo y el papel de la utilidad percibida de la plataforma y el comportamiento



de participación de los usuarios. El estudio también pretende determinar en qué medida la tipología del ecoturista modera la VCC.

Metodología – 420 usuarios de una plataforma digital de ecoturismo participaron en un estudio que analizaba los factores que influyen en la co-creación de valor. Se utilizó un análisis de mediación, moderación y proceso condicional para probar las hipótesis propuestas. También se utilizó un análisis de conglomerados K-means para clasificar a los ecoturistas en 4 grupos.

Conclusiones – Los resultados muestran que la utilidad percibida de la plataforma tiene una fuerte influencia en la generación de VCC y también en el comportamiento de participación del usuario. A su vez, el comportamiento de participación del usuario es un importante impulsor de la VCC. El estudio también destaca el papel moderador de la tipología ecoturística en la formación de VCC en estas plataformas digitales.

Implicaciones prácticas – El estudio ofrece a los gestores de plataformas digitales de ecoturismo un medio para identificar y motivar a aquellos ecoturistas con las habilidades y características necesarias para convertirse en verdaderos co-creadores de valor.

Originalidad – Este estudio contribuye al conocimiento existente sobre cómo se co-crea valor en las plataformas digitales de ecoturismo, confirmando el importante papel antecedente de la utilidad percibida de la plataforma y el comportamiento de participación de los usuarios, así como el papel moderador de la tipología del ecoturista.

Palabras clave Co-creación de valor, Ecoturismo, Plataformas digitales, Participación, Utilidad percibida, Tipología ecoturística

Tipo de artículo Trabajo de investigación

生态旅游者如何在数字平台上共同创造价值？生态旅游者类型的调节作用

摘要

目的 – 本研究的主要目的是考察数字生态旅游平台上的价值共同创造（VCC）过程，以及感知平台有用性和用户参与行为在该过程中的作用。该研究还试图确定生态旅游者的类型在多大程度上调节了VCC。

方法 – 一个数字生态旅游平台的420名用户参与了一项研究，分析影响价值共同创造的因素。使用调解、调节和条件过程分析来检验所提出的假设。还使用了K-均值聚类分析，将生态旅游者分为4组。

研究结果 – 结果显示，感知的平台有用性对VCC的产生有很大影响，也对用户的参与行为有很大影响。反过来，用户参与行为也是VCC的一个重要驱动因素。该研究还强调了生态旅游者类型学在这些数字平台上形成VCC的调节作用。

实践意义 – 该研究为数字生态旅游平台的管理者提供了一种识别和激励那些具有必要技能和特征的生态旅游者成为真正的价值共同创造者的手段。

原创性 – 本研究对数字生态旅游平台上如何共同创造价值的现有知识做出了贡献，证实了感知平台有用性和用户参与行为的重要前因作用，以及生态旅游者类型学的调节作用。

关键词 价值共创、生态旅游、数字平台、参与、感知有用性、生态旅游者类型学

文章类型 研究型论文

1. Introduction

The tourism sector has become increasingly competitive and complex as a result of the increased use of technology and the fact that tourists are better informed and have access to the global market (Cimbaljević *et al.*, 2019). The competitiveness of tourism businesses and destinations is influenced by the quality of the tourism experience, especially when there are opportunities for consumers to participate, alongside destinations, in the experience of co-creating tourism (Sugathan and Ranjan, 2019).

Tourists are also showing greater awareness of, and responsibility for, sustainable development and care for the environment (UNWTO, 2017). According to Allied Market Research (2021), the ecotourism market was valued at \$181.1bn in 2019 and is expected to reach \$333.8bn by 2027 and register a compound annual growth rate of 14.3% in the period 2021–2027. The United Nations World Tourism Organization (UNWTO, 2018) contends that

ecotourism has become a fundamental mode of tourism *vis-à-vis* the achievement of the United Nations Sustainable Development Goals (SDGs) as part of its 2030 Agenda.

In parallel with these ecotourism trends, digital platforms such as Airbnb or Couchsurfing are playing a fundamental role in empowering tourists and involving them directly in the design of the tourist offer, as active protagonists in the shift toward a more sustainable tourism model (Yoo *et al.*, 2016). For example, Couchsurfing has a global traveler community of over 14 million people (Couchsurfing, 2023), while, as of 2022, Airbnb had 2.9 million hosts worldwide, with 14,000 new hosts joining the platform each month (Statistica, 2022).

All of these data point to the current and potential future importance of ecotourism and digital platforms for both the development of the tourism industry and the achievement of the 2030 Agenda, as they empower tourists to create and share their own content. For this reason, it is worth asking whether such platforms can facilitate value co-creation (VCC) to improve environmental sustainability and contribute to the protection of biodiversity. The present study focuses on digital ecotourism platforms, which have scarcely been analyzed in the scientific literature, to date, despite the growing interest in sustainable tourism and the use of this type of platform.

In the ecotourism literature, some studies have examined VCC in the context of ecotourism experiences (Revilla Hernández *et al.*, 2016), the content generated on TripAdvisor about stays in eco-lodges (Lu and Stepchenkova, 2012) and the factors and behaviors that lead to socialization and knowledge exchange among ecotourists via social networks (Chuang *et al.*, 2013; Sarkar *et al.*, 2014). However, there is a gap in the literature regarding the VCC process on digital platforms relating to the ecotourism sector. This provides an opportunity to investigate in greater depth how the VCC process is developed on digital platforms devoted to ecotourism and to observe how users interact, engage in dialogue and exchange resources.

In the few studies that have addressed such topics (in the tourism field, in general), some antecedents of VCC have been analyzed, such as user participation in platforms (Sigala, 2015b), motivation (Jiang *et al.*, 2021), perceived platform usefulness (Lam *et al.*, 2020; Cheung and To, 2016) and user involvement (McCartney and Chen, 2020). In the present study, we focus on the importance of two factors in particular: perceived platform usefulness and user participation behavior.

The academic literature on VCC has highlighted the need to consider certain traits of users when analyzing their motivation to co-create (Constantinides *et al.*, 2015). More specifically in the context of tourist destinations, it has been found that certain personality traits exert a moderating effect on user-generated content (González-Rodríguez *et al.*, 2021) and on the VCC process in online tourism (Sigala, 2015b). Related to these traits, ecotourist typology may be a determining factor in the way in which ecotourists approach VCC on these platforms, but no previous studies have analyzed this potential moderating effect.

Therefore, the primary aim of this study is to analyze the process by which VCC is formed on digital ecotourism platforms, in light of the antecedent role of perceived platform usefulness and user participation behavior, and to determine the extent to which ecotourist typology moderates that process.

2. Literature review

2.1 Value co-creation and its dimensionality

The concept of VCC refers to how actors behave, interpret, experience, use and evaluate propositions based on the generation of value (Prahalad and Ramaswamy, 2004b). As such, it can be framed within service-dominant logic (SDL) (Vargo and Lusch, 2004). The SDL

literature is concerned with the interaction between actors that involves resource integration – such as the social and economic processes of VCC (Lusch and Vargo, 2006), in which the customer is an operant resource that contributes different skills and knowledge.

One of the main characteristics of VCC is that it enables personalized experiences to be offered that are tailored to the context and are a source of unique value (Pralhad and Ramaswamy, 2004a). Agrawal and Rahman (2017, p. 3) state that “value co-creation essentially involves the participation of actors, resource integration and interaction.” Co-creation is a multi-actor process supported by a shared commitment that contributes to innovation and enables new experiences (Tregua *et al.*, 2020).

Many researchers have sought to determine the dimensionality of the VCC construct (Guan *et al.*, 2020; Randall *et al.*, 2011). It has been examined by some authors from a one-dimensional perspective (Gebauer *et al.*, 2013; Grisseemann and Stokburger-Sauer, 2012; Prebensen *et al.*, 2013), while others consider it to be multidimensional (Agrawal and Rahman, 2017; Busser and Shulga, 2018; Yi and Gong, 2013). These latter studies argue that VCC cannot be understood through a single dimension, due to its multiple characteristics, including: its collaborative aspect (Pralhad and Ramaswamy, 2004b; Lusch and Vargo, 2006); personalized experiences (Payne *et al.*, 2008); interaction between multiple authors (Grönroos, 2008); and resource integration (McCull-Kennedy *et al.*, 2012).

Table 1 lists some of the most relevant works from the literature and the dimensions of VCC that have been identified to date.

As can be observed, some scales focus on the relational aspect of VCC and the interaction between consumers and the firm (Agrawal and Rahman, 2017; Ranjan and Read, 2016; Yi and Gong, 2013), while others focus more on the experiential aspect (Agrawal and Rahman, 2017; Ranjan and Read, 2016). However, few scales offer a perspective on personal value – that is, on the personal facets of co-created value, such as the sense of achievement derived from completing a given task (Agrawal and Rahman, 2017; Busser and Shulga, 2018). Busser and Shulga (2018) contend that the more the individual contributes to the process, the more they will value the result of that process. This scale provides a special understanding of the consumer perspective – specifically, in the tourism sector – on service-provider co-creation initiatives (Busser and Shulga, 2018).

2.2 Value co-creation on digital platforms

The rapid development of information and communication technologies (ICTs) and online resources such as Big Data, mobile internet and digital platforms has changed the process by which users co-create value. Digital platforms, in particular, play an important role in empowering consumers (Füller *et al.*, 2009).

These developments have given rise to research on how platforms are shaping tourist behavior and how new relationships between key actors are affecting co-creation in the tourism industry (Tregua *et al.*, 2020). One of the most widely studied digital platforms in the literature, to date, is TripAdvisor. Some authors, such as Yoo *et al.* (2016), note that the success of this platform is based on continually adding value to its services by expanding its co-creation ecosystem, where users can connect with each other and “play” on the platform to exchange resources.

In the context of ecotourism, Sarkar *et al.* (2014) observed that socialization on digital platforms, such as Facebook and TripAdvisor, enables ecotourists to exchange collective knowledge with each other and thereby derive significant satisfaction from this social aspect. Hence, VCC on digital ecotourism platforms facilitates interpersonal relationships and creates greater opportunities for human interaction, thereby empowering users to put

| Author | Findings | Dimensions |
|------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Ng <i>et al.</i> (2010) | The VCC is a multi-attribute construct with seven dimensions. This scale can help generate internal changes within the organization in terms of roles, governance and responsibilities to ensure more effective interfaces with the customer | <ul style="list-style-type: none"> • Behavioral alignment • Process alignment • Congruence of expectations • Empowerment • Perceived control • Behavioral transformation • Complementary competencies |
| Randall <i>et al.</i> (2011) | These authors demonstrate that connection (which measures the degree of relational connection such as the emotional bond that is formed) is part of the multidimensional construct of VCC. They also highlight that VCC is a higher-order construct and comprises trust, commitment and connection | <ul style="list-style-type: none"> • Trust • Commitment • Connection |
| Yi and Gong (2013) | The VCC is a multidimensional third-order concept consisting of two higher-order factors, each one composed of multiple dimensions | <ul style="list-style-type: none"> • <i>Customer participation behavior:</i> • Information-seeking • Information-sharing • Responsible behavior • Personal interaction • <i>Customer citizenship behavior:</i> • Feedback • Advocacy • Helping • Tolerance • <i>Co-production</i> • Knowledge • Equity • Interaction • <i>Value-in-use</i> • Experience • Personalization • Relationship • Relational value • Personal value • Economic value • Interactional value • Experiential value |
| Ranjan and Read (2016) | The VCC is a third-order construct with two dimensions, each with three underlying elements. VCC is a formative construct. This scale is valid for studying VCC in the consumer–business relationship | <ul style="list-style-type: none"> • Personalization • Relationship • Relational value • Personal value • Economic value • Interactional value • Experiential value |
| Agrawal and Rahman (2017) | The VCC is a reflective construct. The scale measures the value co-created by the consumer in different online contexts. Of the five dimensions, the interactional and experiential dimensions are shown to be the most important for any VCC process | <ul style="list-style-type: none"> • Meaningfulness • Collaboration • Contribution • Recognition • Affective response |
| Busser and Shulga (2018) | The VCC construct is multidimensional, with 5 dimensions and 25 items. VCC can be used as a reflective second-order construct as part of consumer value systems | <ul style="list-style-type: none"> • Meaningfulness • Collaboration • Contribution • Recognition • Affective response |

Table 1.
Dimensionality of
value co-creation

together their own trips to meet their social, leisure and entertainment needs (Chuang *et al.*, 2013).

2.3 Antecedents of value co-creation in digital ecotourism settings

Consumer VCC in the tourism context is particularly important, due to the experiential and hedonic nature of tourism products (Prebensen *et al.*, 2013). Research has previously been conducted on VCC in the tourism context, such as the co-creation of tourist experiences (Sfandla and Björk, 2013), the content generated by users on platforms such as TripAdvisor (Sigala, 2015a) and even the co-destruction of value in ICT-enhanced tourism experiences (Guan *et al.*, 2020). However, few studies have focused on behaviors relating to VCC among ecotourists in virtual communities and digital platforms (Chuang *et al.*, 2013).

Certain factors have been found to affect the VCC construct, such as perceived usefulness (Cheung and To, 2016), ease of use (Lam *et al.*, 2020), interaction (Sfandla and Björk, 2013), user participation (Prebensen *et al.*, 2014) and user motivation (Constantinides *et al.*, 2015). Yet, despite this extensive literature, there remain many questions about other antecedents that may affect VCC, especially in the context of ecotourism and, more specifically, ecotourism platforms. In the present study, we seek to examine in greater depth two aspects that are widely used in ecotourism platforms: perceived platform usefulness and user participation behavior.

2.3.1 Perceived platform usefulness as a motivational antecedent factor of value co-creation. Among the most well-known definitions of perceived usefulness is that of Davis (1989, p. 320), expressed as “the degree to which a person believes that using a particular system would enhance his or her job performance.” More specifically, Wang *et al.* (2012, p. 783) defined perceived digital platform usefulness as “the degree to which a user perceives that the use of a technological platform helps accomplish his/her personal objectives.” Therefore, users expect to obtain benefits or results from the use of these systems or platforms.

Several studies have dealt with (and provided support for) the importance of perceived usefulness in influencing new-technology acceptance (Koh *et al.*, 2007; Chung *et al.*, 2010; Cheung and To, 2016). Perceived usefulness has been found to be one of the main predictors of attitudes and behaviors among members of virtual communities (Chuang *et al.*, 2013). Cheung and To (2016) examined the factors that prompt consumers to co-create on social media and concluded that perceived platform usefulness was an important antecedent among users. More recently, Lam *et al.* (2020) demonstrated that perceived platform usefulness is a positive and significant predictor of the VCC experience on platforms such as TripAdvisor, Booking.com, Agoda or Expedia.

In light of the foregoing theoretical propositions, the following hypothesis is proposed:

H1. Perceived platform usefulness positively influences value co-creation among users of digital ecotourism platforms.

Perceived usefulness is also an extrinsic motivator linked to the different needs and interests of consumers (Füller, 2010). Evidence has been found to support the idea that a system’s perceived usefulness positively influences the desire to participate in it (Koh *et al.*, 2007; Chung *et al.*, 2010; Wang *et al.*, 2012). For example, Igarria *et al.* (1995) analyzed individuals’ reasons for using computer technology and found that perceived usefulness correlated positively with all dimensions of system use, frequency of use, duration of use and number of tasks.

Along similar lines, Teo *et al.* (1999) found that internet users chose to participate in a greater variety of tasks online if they perceived those tasks to be useful. Koh *et al.* (2007)

concluded that the perceived usefulness of a virtual community is strongly linked to viewing activity and that, therefore, perceived platform usefulness is a central construct for examining the decision to participate in such communities.

Elsewhere, [Chung et al. \(2010\)](#) showed that perceived usefulness is positively associated with user participation behavior in online communities. [Wang et al. \(2012\)](#) also found a positive relationship between the perceived platform usefulness of an online community and the degree of active participation among users of that community.

In line with these findings, the following hypothesis is proposed:

H2. Perceived platform usefulness positively influences user participation behavior on digital ecotourism platforms.

2.3.2 User participation behavior among ecotourists as an antecedent of value co-creation. VCC relies on a high level of participation on the part of the user to customize the product or service ([Tussyadiah and Zach, 2013](#)). While [Yi and Gong \(2013\)](#) propose that participation behavior is a component dimension of co-creation ([Table 1](#)), considering participation to be the behavior that is necessary to successfully complete an action ([Yi and Gong, 2013](#)), most research in this area considers it a key antecedent of the VCC process ([Tussyadiah and Zach, 2013](#); [Prebensen et al., 2013](#)). This is because participation is a widely used concept in consumer behavior, thanks to its potential effects on people's attitudes toward an activity, their behavior in relation to that activity and their decision-making ([Prebensen et al., 2013](#)).

Therefore, active user participation has been identified as a necessary component for any digital platform to be successful. In their analysis of online communities, [Chung et al. \(2010\)](#) emphasized that participation can consist of two different types of behavior: active (when users post content) or passive (when users merely observe).

User participation was defined by [Kappelman and McLean \(1992, p. 1\)](#) as “the observable behavior of information system users in the information system development process.” [Barki and Hartwick \(1994\)](#) proposed that participation can be approached from the perspective of frequency (how often one performs a certain activity), effort (the time or energy invested in that activity) or influence (the effect of the activity). According to these authors, any one of these perspectives can provide a valid basis for evaluating user participation (*ibid.*). More recently, [Sigala \(2015b\)](#) framed user contribution or participation as behavioral outcomes. On the basis of the above findings, taken as a whole, the following hypothesis is proposed:

H3. User participation behavior positively influences value co-creation on digital ecotourism platforms.

2.4 Moderating role of ecotourist typology

The academic literature has identified various factors that can moderate the VCC process, such as the characteristics of “lead-users” ([Füller et al., 2009](#)), the source of e-WOM messages ([See-To and Ho, 2014](#)) or consumer involvement ([Cheung and To, 2016](#)). [Omar et al. \(2018\)](#) analyzed the moderating role of the customer's personality in joint value-creation behaviors and the quality of their relationship with other customers. In the context of VCC in tourism destinations, it has been found that personality type moderates the relationship between motivation and participation in user-generated content ([González-Rodríguez et al., 2021](#)). [Sigala \(2015b\)](#) also found personality type to exert moderating effects on the VCC process in online tourism. In short, these studies show that the personality traits of individuals seem to be an important moderator of the VCC process. Hence, it is of interest to better understand

how differences between ecotourists may moderate the VCC process on digital platforms. To the best of our knowledge, no study to date has addressed this challenge.

Ecotourists are broadly defined by their interest in nature-based activities. Dolnicar *et al.* (2008) describe ecotourists as a subgroup of tourists who are particularly respectful of the environment and leave a minimal environmental footprint on the ecotourism destination. Acott *et al.* (1998) suggest that ecotourist roles vary along a continuum from ecocentrism to anthropocentrism. Their premise is that an individual can be an ecotourist ideologically, regardless of whether he or she has actually visited an ecotourism destination. That is, ecotourists can be identified regardless of the places they have visited because the concept of ecotourism is not only descriptive (i.e. nature-based) but also, and more importantly, value-driven, based on their pro-environmental attitudes and support for conservation, sustainability, environmental responsibility and so on (Weaver and Lawton, 2002).

To more fully understand the ecotourism market, however, it is necessary to segment it (Palacio and McCool, 1997; Weaver and Lawton, 2002). Palacio and McCool (1997) identify four ecotourist typologies: *nature escapists*, *ecotourists*, *comfortable naturalists* and *passive players*. These authors were pioneering in their development of an ecotourist typology scale based on a behavioral perspective.

Weaver and Lawton (2007) also used the scale developed by Palacio and McCool (1997) in their own “hard/soft” behavioral model to obtain results on the motivations and activities of ecotourists, noting that these do not constitute a homogeneous market. That work is therefore of particular relevance to the present study as the authors propose a scale for ecotourist-type not according to tourists’ participation in certain activities but according to the benefits they expect to receive by visiting natural locations.

To the best of our knowledge, there are no previous studies that examine the extent to which ecotourist typology affects the VCC process. Here, then, we pose three research questions (RQs) to propose the possible moderating role of ecotourist typology in the VCC process. This approach – examining the possible moderating effect of a variable when there is insufficient theoretical evidence to support the direction of the hypothesis – is advocated in recent works and has previously been used by other authors in the tourism context (Molinillo *et al.*, 2018).

Therefore, in light of the above findings, the following RQs are posed:

- RQ1. Does ecotourist typology moderate the relationship between perceived platform usefulness and value co-creation?
- RQ2. Does ecotourist typology moderate the relationship between perceived platform usefulness and user participation behavior?
- RQ3. Does ecotourist typology moderate the relationship between user participation behavior and VCC?

Figure 1 shows the proposed theoretical model of VCC on digital ecotourism platforms.

3. Methodology

3.1 Data collection

To test the proposed hypotheses and estimate the theoretical model, a quantitative study was conducted, based on a structured questionnaire distributed among ecotourists belonging to the Naturalista Mexico network (<https://www.naturalista.mx>). This is a knowledge platform devoted to the plants and animals of Mexico (and of the world in general), where registered

participants can record and share experiences and sightings of different species with other amateurs and professionals interested in nature (Naturalista CONABIO, 2022).

We selected this digital platform because its users present some of the fundamental characteristics of the ecotourist profile, such as an interest in experiencing direct contact with nature (Báez and Acuña, 2003). Ecotourists have also been found to seek learning experiences and knowledge, as well as opportunities to socialize with other ecotourists (Sarkar *et al.*, 2014). All of these aspects, ideologies and values are reflected in the user profiles on the Naturalista Mexico platform and in the photographs and reviews of different species that users upload onto it. Another of its characteristics that led us to consider it a VCC platform is the exchange of resources that it facilitates between users, itself and other stakeholders [1].

This network is the result of collaboration between the National Commission for the Knowledge and Use of Biodiversity (CONABIO) and the United States iNaturalist.org network. The strength of this platform lies in its diverse and extensive collection of photographs of Mexican plants, animals and fungi, to which a diverse range of publics and scientists continually contribute (Naturalista CONABIO, 2022). There are currently more than 3 million sightings listed on the site, with more than 40,000 species identified, which raises awareness of biodiversity and encourages participation and exploration of local environments.

In the present study, CONABIO, in collaboration with the research team, was charged with distributing an email to all the network's members (from February to June 2021) inviting them to participate in the research, including a link to the online questionnaire. CONABIO also published the link on its social networks and promoted the survey in face-to-face and virtual workshops.

At the time of the research, the network comprised a total of 41,079 members. The condition that had to be fulfilled to participate in the study was that the subjects had actively participated on the Naturalista platform in the 12 months preceding the survey (by recording sightings, identifying species and sharing content). Furthermore, all the platform users who participated in the study had had some experience of ecotourism in the preceding year. The initial sample was based on 593 surveys, of which 439 met the requirement of active participation in the

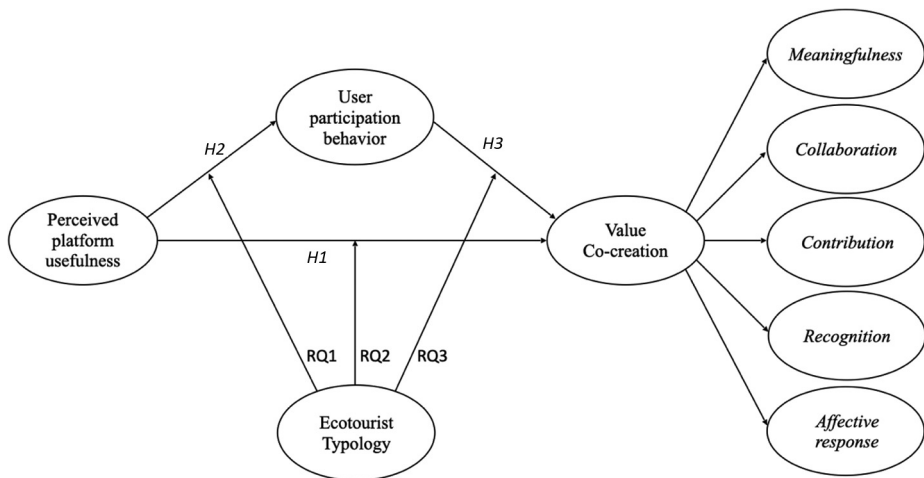


Figure 1.
Conceptual model of
VCC in digital
ecotourism platforms

network. After eliminating some questionnaires that were incomplete or presented an unusual response pattern, the final sample comprised 420 ecotourists (Table 2).

3.2 Measures

To measure perceived platform usefulness, a six-item, seven-point semantic differential scale was used (where 1 = “not important at all” and 7 = “very important”). This scale was originally developed by Wang *et al.* (2012) and adapted to our study context. User participation behavior was also measured using a six-item, seven-point semantic differential scale (where 1 = “never” and 7 = “always”), adapted from Sigala (2015b) (Table 3).

To measure the VCC of the users on the digital ecotourism platform, as a reflective second-order construct, the scale proposed by Busser and Shulga (2018) was used. This is a multidimensional 23-item, 7-point Likert scale (where 1 = “entirely disagree” and 7 = “entirely agree”) comprising 5 dimensions: *meaningfulness* of the VCC process on the platform; degree of *collaboration* perceived on the platform; degree of *contribution* perceived on the platform; degree of positive *recognition* for effort perceived on the platform; and *affective response* generated by VCC on the platform (Table 4).

To classify ecotourists by typology, an adapted version of the scale proposed by Palacio and McCool (1997) was used. This is a 7-point, 18-item Likert scale (where 1 = “entirely

| Profile of respondents | N (%) |
|--------------------------------------------------------------------------------------------------|-------------|
| <i>Gender</i> | |
| Male | 295 (70.2%) |
| Female | 124 (29.6%) |
| Does not answer | 1 (0.2%) |
| <i>Age</i> | |
| 18–20 | 15 (3.6%) |
| 21–30 | 145 (34.5%) |
| 31–40 | 102 (24.3%) |
| 41–50 | 82 (19.5%) |
| 51–60 | 51 (12.1%) |
| 61–82 | 24 (5.7%) |
| <i>Level of education</i> | |
| Elementary School | 2 (0.4%) |
| Middle or High School | 21 (5.0%) |
| College/University | 241 (57.4%) |
| Postgraduate degree (master, doctorate, postdoctoral) | 156 (37.1%) |
| <i>Activity</i> | |
| Biology, biotechnology, ecology, environmental engineering, atmospheric sciences, marine science | 230 (54.8%) |
| Agro-livestock sciences, forest sciences, fisheries Science | 43 (10.2%) |
| Engineering (civil, extractive, metallurgic, computing. . .) | 35 (8.3%) |
| <i>Frequency of platform use</i> | |
| Several times a day | 113 (26.9%) |
| Several times a week | 165 (39.3%) |
| Once a week | 85 (20.2%) |
| Less than once a week | 31 (7.4%) |
| Less than once a month | 26 (6.2%) |

Table 2.
Sample
characteristics

disagree” and 7 = “entirely agree”) that classifies tourists according to their typical motives for traveling to natural environments (Appendix).

4. Results

4.1 Analysis of the psychometric properties of the scales

Prior to estimating the proposed causal model and testing the theoretical hypotheses, a confirmatory factor analysis (CFA) was carried out to ensure that the measurement scales were valid and reliable. The scales analyzed were for perceived platform usefulness, user participation behavior and VCC, the latter being considered a second-order construct with five first-order factors.

The results of the CFA, performed with LISREL 9.3 software using the Robust Maximum Likelihood estimation procedure (Satorra and Bentler, 1986), indicated that the scales had sound psychometric properties (Table 3). Three items had to be removed, due to presenting very low reliability ($R^2 < 0.40$) (Items 3, 4 and 5).

The overall goodness-of-fit indicators were within the recommended limits (SB Chi-Square: 1267.36; p -value: 0.00; Normed Chi-Square: 2.77; RMSEA: 0.06; CFI: 0.98). In all cases, the standardized loads were significant ($p < 0.05$), with a magnitude above 0.70, and the indicators for the composite reliability (CR) and variance extracted (AVE) of the constructs were above the recommended limits of 0.80 and 0.50, respectively (Del Barrio and Luque, 2012). These results indicated that the scales presented convergent validity and reliability. The Fornell and Larcker (1981) criterion showed that all the constructs had adequate discriminant validity (Table 5).

| Constructs | Standardized coefficients | t-value | R^2 |
|----------------------------------------------------------------------------------------------------------------------------------|---------------------------|---------|-------|
| <i>Perceived platform usefulness (Adapted from Wang et al., 2012) (CR = 0.88; AVE = 0.65)</i> | | | |
| Naturalista platform toolkit for ... | | | |
| (PU1) ... information acquisition | – | – | – |
| (PU2) ... information exchange | 0.62 | * | 0.40 |
| (PU3) ... relationship development | 0.93 | 12.54 | 0.86 |
| (PU4) ... relationship maintenance | 0.92 | 11.78 | 0.84 |
| (PU5) ... social and emotional support | 0.70 | 10.48 | 0.50 |
| (PU6) ... entertainment | – | – | – |
| <i>User participation behavior (Adapted from Sigala, 2015b) (CR = 0.87; AVE = 0.57)</i> | | | |
| How often do you ... | | | |
| (PB1) ... contribute content (comments, photos, reviews, etc.) on Naturalista platform? | 0.70 | * | 0.50 |
| (PB2) ... evaluate other’s content (identifications of observations/species, projects, etc.) on Naturalista platform? | 0.70 | 15.61 | 0.49 |
| (PB3) ... update your profile (edit profile settings, observations, species, diary, lists, etc.) on Naturalista platform? | – | – | – |
| (PB4) ... interact with other user’s (follow other observers, post in projects, comment or identify observations/species, etc.)? | 0.71 | 15.98 | 0.51 |
| (PB5) ... visualize the observations/species from other’s? | 0.86 | 16.51 | 0.74 |
| (PB6) ... read other’s identifications about observations/species on Naturalista platform? | 0.79 | 15.21 | 0.62 |
| Notes: (–) Item eliminated; (*) Parameter fixed at 1 to provide scale to the model | | | |

Table 3.
First-order CFA results (perceived platform usefulness and user participation behavior)

| Construct VCC (adapted from Busser and Shulga, 2018) | Standardized coefficients | t-value | R ² |
|-----------------------------------------------------------------------|---------------------------|---------|----------------|
| <i>Meaningfulness (CR = 0.95; AVE = 0.79)</i> | | | |
| (VCC_M1) My activities at Naturalista have meaningful to me | 0.92 | * | 0.84 |
| (VCC_M2) The work that I do at Naturalista is important to me | 0.94 | 37.86 | 0.89 |
| (VCC_M3) The time I spend to Naturalista is worthwhile | 0.82 | 17.19 | 0.67 |
| (VCC_M4) My activities at Naturalista are valuable to me | 0.91 | 24.50 | 0.82 |
| (VCC_M5) My effort at Naturalista is worthwhile | 0.85 | 28.96 | 0.72 |
| <i>Collaboration (CR = 0.94; AVE = 0.76)</i> | | | |
| (VCC_CL1) We are a team | 0.86 | * | 0.74 |
| (VCC_CL2) We create it together | 0.82 | 22.66 | 0.68 |
| (VCC_CL3) We work together | 0.90 | 30.69 | 0.81 |
| (VCC_CL4) We cooperate with each other | 0.90 | 26.68 | 0.80 |
| (VCC_CL5) We collaborate on the project | 0.88 | 20.04 | 0.78 |
| <i>Contribution (CR = 0.92; AVE = 0.75)</i> | | | |
| (VCC_CT1) I share my knowledge | 0.82 | * | 0.68 |
| (VCC_CT2) I contribute my skills | 0.96 | 17.91 | 0.92 |
| (VCC_CT3) I contribute with my experience | 0.93 | 16.94 | 0.87 |
| (VCC_CT4) I contribute with my resources | 0.73 | 10.70 | 0.53 |
| <i>Recognition (CR = 0.90; AVE = 0.69)</i> | | | |
| (VCC_R1) I receive credit for my observations | 0.86 | * | 0.73 |
| (VCC_R2) Our results are recognize | 0.95 | 28.90 | 0.90 |
| (VCC_R3) Others recognize the outcome | 0.85 | 21.18 | 0.73 |
| (VCC_R4) We achieve mutual benefit | 0.64 | 11.88 | 0.40 |
| <i>Affective response (CR = 0.95; AVE = 0.80)</i> | | | |
| (VCC_AR1) It is fun | 0.91 | * | 0.84 |
| (VCC_AR2) It is entertaining | 0.97 | 47.43 | 0.93 |
| (VCC_AR3) It is enjoyable | 0.95 | 28.84 | 0.90 |
| (VCC_AR4) It is interesting | 0.84 | 14.19 | 0.71 |
| (VCC_AR5) It is exciting | 0.79 | 25.87 | 0.62 |
| <i>User value co-creation (VCC) (CR = 0.84; AVE = 0.51)</i> | | | |
| VCC → <i>Meaningfulness</i> | 0.75 | * | 0.56 |
| VCC → <i>Collaboration</i> | 0.74 | 13.94 | 0.55 |
| VCC → <i>Contribution</i> | 0.75 | 12.04 | 0.56 |
| VCC → <i>Recognition</i> | 0.61 | 13.89 | 0.37 |
| VCC → <i>Affective response</i> | 0.72 | 12.84 | 0.52 |

Note: (*) Parameter fixed at 1 to provide scale to the model

Table 4.
Second-order CFA
results (VCC)

Given that the proposed scales had adequate psychometric properties, an indicator variable was calculated for each of the constructs as the mean of the scores of the different items on the scale in question. These indicator variables were then used in a mediated moderation analysis to estimate the model in [Figure 1](#) and test the hypotheses.

4.2 Segmentation of tourist typology

Following the methodology proposed by [Palacio and McCool \(1997\)](#), we identified different typologies of ecotourists, based on the 18-item scale proposed by these authors. First, an exploratory factor analysis was carried out with normalized varimax rotation, which revealed five factors ([Appendix](#)). These factors can be identified with:

- (1) enjoying a healthy lifestyle;
- (2) sharing experiences with friends and family;
- (3) escaping from routine;
- (4) learning and developing skills; and
- (5) keeping fit.

Next, based on the factor scores, a K-means cluster analysis was carried out to enable the sample to be grouped into four types of ecotourists according to the average score achieved for each of the five factors (Table 6). The four types were as follows:

- (1) *Observers*. Their primary interest is to relax, experience peace and quiet and enjoy nature. These tourists enjoy the sounds and smells of the natural environment and are interested in observing and learning about it. They also like to keep in good shape and maintain a healthy lifestyle.
- (2) *Explorers*. These tourists travel to natural environments because they want to get away from their everyday surroundings. They have a strong desire to learn from nature and better understand their natural environment. They also want to share recreational experiences with family and/or friends.

| Constructs | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
|---------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| (1) Perceived usefulness | 0.68 | | | | | | |
| (2) User participation behavior | 0.36 | 0.75 | | | | | |
| (3) Meaningfulness | 0.43 | 0.42 | 0.89 | | | | |
| (4) Collaboration | 0.42 | 0.42 | 0.55 | 0.87 | | | |
| (5) Contribution | 0.43 | 0.42 | 0.56 | 0.55 | 0.87 | | |
| (6) Recognition | 0.35 | 0.34 | 0.45 | 0.45 | 0.46 | 0.83 | |
| (7) Affective response | 0.62 | 0.41 | 0.54 | 0.53 | 0.54 | 0.44 | 0.89 |

Table 5. Discriminant validity

Notes: Diagonal elements in bold are the square root of the average variance extracted (AVE) between the constructs and their indicators. Off-diagonal elements are correlations between the constructs

Table 6. Type of ecotourist in Naturalista platform by sociodemographic characteristics

| Sociodemographic characteristics | Observers | Explorers | Creatives | Naturalists |
|-----------------------------------------|-----------|-----------|-----------|-------------|
| <i>Gender</i> | | | | |
| Male | 44 | 40 | 134 | 77 |
| Female | 35 | 11 | 52 | 26 |
| Does not answer | — | — | — | 1 |
| <i>Frequency of platform use</i> | | | | |
| Several times a day | 37 | 27 | 62 | 39 |
| Several times a week | 10 | 1 | 11 | 4 |
| Once a week | 14 | 9 | 54 | 36 |
| Less than once a week | 16 | 9 | 41 | 19 |
| Less than once a month | 2 | 5 | 18 | 6 |
| <i>Age of respondents (average age)</i> | | | | |
| Years | 34.6 | 43.76 | 39.05 | 35.19 |
| Total cases | 79 | 51 | 186 | 104 |

- (3) *Creatives*. These tourists travel to natural environments to get to know them and learn from them. They are also interested in developing their creative skills and abilities – for instance, photography or video-making.
- (4) *Naturalists*. Their principal desire is to travel to natural environments to “get away from it all” and escape from routine. They are keen to take care of their health and keep fit, and they, too, enjoy photography and video-making.

We used the variable “ecotourism typology” (with four categories) as the moderating variable “W” in our mediated moderation analysis, described next.

4.3 Hypothesis-testing

To test the hypotheses, a mediation, moderation and conditional analysis using PROCESS software (Hayes, 2018) was performed. This is a widely recommended procedure for testing hypotheses regarding the effect of a variable “X” (in this case, perceived platform usefulness) on a variable “Y” (VCC), mediated by a variable “M” (user participation behavior) and moderated by a variable “W” (ecotourist typology) (Hayes, 2018) [2]. As the moderating variable “W” is a multi-categorical variable with four values, PROCESS performs a pre-coding task, subdividing it, in turn, into three moderators: W1, W2 and W3. W1 compares Typology 1 (Observers) with 2 (Explorers); W2 compares Typology 1 with 3 (Creatives); and W3 compares Typology 1 with 4 (Naturalists).

Table 7 shows the results for the antecedent relationships of user participation behavior. Perceived platform usefulness was found to exert a positive and significant effect on user participation behavior ($\beta_{\text{perceived platform usefulness} \rightarrow \text{user participation behavior}}$: 0.280; CI: 0.046–0.514) ($p < 0.05$), as proposed in *H2*. No interaction effect was observed between perceived platform usefulness and ecotourist typology on this variable ($p > 0.10$).

Table 8 shows the results when the dependent variable is VCC. As predicted in *H1*, perceived platform usefulness was found to exert a positive and significant effect on VCC ($\beta_{\text{perceived platform usefulness} \rightarrow \text{VCC}}$: 0.148; CI: 0.007–0.289) ($p < 0.05$). Likewise, user participation behavior had a positive and significant effect on VCC ($\beta_{\text{user participation behavior} \rightarrow \text{VCC}}$: 0.224; CI: 0.111–0.338) ($p < 0.05$). *H3* is thus confirmed. It can also be observed that ecotourist typology (moderator W3) has a positive and significant interaction effect on the relationship between perceived platform usefulness and VCC ($\beta_{\text{perceived platform usefulness} \times \text{ecotourist typology (4)} \rightarrow \text{VCC}}$: 0.314; CI: 0.058–0.570) ($p < 0.05$). Figure 2, which graphically represents this interaction effect, shows that, when the platform’s usefulness is perceived to be high, there are hardly any differences between the four types of ecotourists, whereas,

| Effect | Coeff. | SE | t-value | p-value | 95%CI | |
|---------------------------------------------|--------|-------|---------|---------|--------|-------|
| Constant | 0.123 | 0.160 | 0.767 | 0.444 | –0.192 | 0.437 |
| Usefulness (X) | 0.280 | 0.119 | 2.353 | 0.019 | 0.046 | 0.514 |
| W1 | –0.157 | 0.218 | –0.724 | 0.470 | –0.585 | 0.270 |
| W2 | 0.022 | 0.199 | 0.110 | 0.912 | –0.369 | 0.413 |
| W3 | –0.288 | 0.280 | –1.028 | 0.305 | –0.837 | 0.262 |
| X × W1 | –0.002 | 0.157 | –0.015 | 0.988 | –0.310 | 0.305 |
| X × W2 | –0.002 | 0.145 | –0.011 | 0.991 | –0.286 | 0.283 |
| X × W3 | 0.249 | 0.181 | 1.379 | 0.169 | –0.106 | 0.605 |
| R^2 : 0.34; SE: 2.17; F: 9.49; p : 0.00 | | | | | | |

Note: * $p < 0.05$; 95% CI does not contain 0

Table 7.
Results of
moderation
mediation analysis;
outcome variable:
user participation
behavior

when perceptions of usefulness are low, differences are observed, being significant among the observers group.

The software identified the conditional direct and indirect effects of usefulness on VCC via participation, taking into account the different types of ecotourists (Table 9). The results show that the direct effect of perceived platform usefulness on VCC is positive and significant (CI does not include 0), regardless of ecotourist type, albeit this effect is lesser in the case of Observer ecotourists (β : 0.148) and particularly high in the case of Naturalist ecotourists (β : 0.463). The indirect effect of X on Y via the mediator M (user participation

Table 8.
Results of
moderation
mediation analysis;
outcome variable:
VCC

| Effect | Coeff. | SE | t-value | p-value | 95%CI | |
|-------------------|--------|-------|---------|---------|--------|--------|
| Constant | 5.898 | 0.095 | 61.899 | 0.000 | 5.710 | 6.085 |
| Usefulness (X) | 0.148 | 0.072 | 2.068 | 0.039 | 0.007 | 0.289 |
| Participation (M) | 0.224 | 0.058 | 3.880 | 0.000 | 0.111 | 0.338 |
| W1 | 0.027 | 0.114 | 0.239 | 0.811 | -0.196 | 0.251 |
| W2 | -0.337 | 0.121 | -2.784 | 0.006 | -0.576 | -0.099 |
| W3 | -0.514 | 0.147 | -3.504 | 0.001 | -0.803 | -0.226 |
| X × W1 | 0.077 | 0.082 | 0.940 | 0.348 | -0.084 | 0.237 |
| X × W2 | 0.094 | 0.090 | 1.041 | 0.298 | -0.083 | 0.271 |
| X × W3 | 0.314 | 0.130 | 2.415 | 0.016 | 0.058 | 0.570 |
| M × W1 | -0.093 | 0.067 | -1.393 | 0.165 | -0.224 | 0.038 |
| M × W2 | -0.010 | 0.079 | -0.124 | 0.901 | -0.164 | 0.145 |
| M × W3 | 0.086 | 0.101 | 0.854 | 0.393 | -0.112 | 0.284 |

R^2 : 0.68; SE: 0.63; F: 29.12; p : 0.00

Notes: * $p < 0.05$; 95% CI does not contain 0

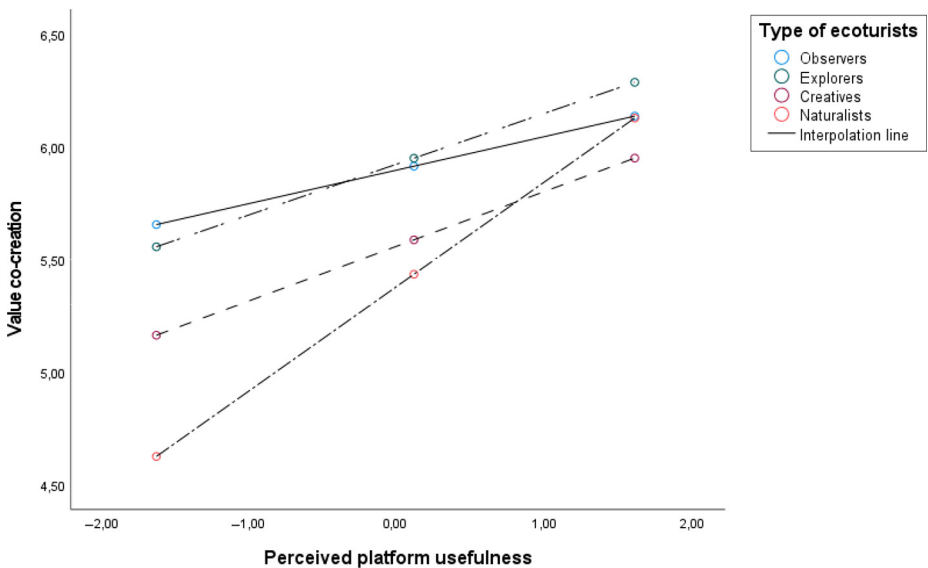


Figure 2.
Interaction effect of
perceived platform
usefulness on VCC by
type of ecotourist

behavior) is also significant for all types of ecotourists but, once again, is higher among Naturalist ecotourists.

5. Discussion of the results

The findings of this study provided strong support for the proposed theoretical model. Perceived platform usefulness exerts a major influence on the generation of VCC among users – a finding that is in line with previous studies (Koh *et al.*, 2007): when community members perceive a platform and its content to be useful, they tend to view and analyze its content more often. Perceived platform usefulness also positively influences the participation behavior of users: when they consider a VCC platform to be useful, they take more initiative to actively participate in it (Cheung and To, 2016). This suggests that, in turn, they will co-create with greater intensity, and that participation can therefore be considered an important psychological construct in VCC.

Based on the scale developed by Busser and Shulga (2018), the findings of our research demonstrate the multidimensionality of VCC as a second-order construct with five dimensions: meaningfulness, collaboration, contribution, recognition and affective response. Of these five, we found that the dimensions that contribute the most to the formation of the VCC construct among ecotourists were affective response and meaningfulness; and the dimension that contributed the least was recognition. Therefore, it is important for digital ecotourism platforms to actively encourage and recognize the commitment and vital collaborative work that ecotourists contribute every day, as their behavior toward these platforms is largely voluntary and not driven by external incentives (Wang *et al.*, 2012).

Through a segmentation process, we identified four types of ecotourists (Observers, Explorers, Creatives and Naturalists), who present different behaviors in their respective interactions with the platform and, therefore, in the way they co-create value on it.

The platform's users have different motivations but, primarily, they seek to:

- enjoy a healthy lifestyle;
- share experiences with friends and family;
- escape from routine;
- learn and develop skills; and
- keep fit – all of which are basic characteristics of ecotourists (Lorenzo-Romero *et al.*, 2019).

Conditional direct effects

| Type of ecotourist | Effect | SE | <i>t</i> -value | <i>p</i> -value | 95% CI | |
|--------------------|--------|-------|-----------------|-----------------|--------|-------|
| Observers | 0.148 | 0.072 | 2.068 | 0.039 | 0.007 | 0.289 |
| Explorers | 0.225 | 0.039 | 5.817 | 0.000 | 0.149 | 0.301 |
| Creatives | 0.242 | 0.055 | 4.439 | 0.000 | 0.135 | 0.349 |
| Naturalists | 0.463 | 0.109 | 4.258 | 0.000 | 0.249 | 0.676 |

Conditional indirect effects

| Type of ecotourist | Effect | BootSE | <i>p</i> -value | 95% CI |
|--------------------|--------|--------|-----------------|--------|
| Observers | 0.063 | 0.033 | 0.007 | 0.137 |
| Explorers | 0.036 | 0.017 | 0.007 | 0.074 |
| Creatives | 0.060 | 0.023 | 0.019 | 0.110 |
| Naturalists | 0.164 | 0.062 | 0.062 | 0.303 |

Table 9.
Direct and indirect
conditional effects
of X on Y

They tend to fall into two age ranges of 21–30 years old (34.5%) and 31–40 years old (24.3%), suggesting that this is an adult and young people's market.

In line with [Palacio and McCool \(1997\)](#), who found that “ecotourists” and “nature escapists” tended to participate in a wider variety of ecotourism activities, in our study, we found that Naturalists are the most likely of the four typologies to participate in the VCC process on digital ecotourism platforms (especially compared to Observers). Naturalists primarily have a positive and significant moderating effect on the relationship between perceived platform usefulness and VCC. They are usually young users (approximately 35 years old, on average), take good care of their health and like to keep fit and enjoy learning about nature, but they are also immersed in ICTs. They are also more environmentally aware than the other three typologies and want their vacations to be sustainable, both ecologically and socioculturally ([Butzmann and Job, 2017](#)).

6. Conclusions

This study considered three fundamental concepts

- (1) Ecotourism, which has been shown to have the capacity to achieve sustainable results in both practical terms and also on the level of knowledge and learning. Here, tourists actively seek more sustainable products or services to fulfill their needs, even if these involve higher costs.
- (2) VCC, the success of which depends on the participation of the actors ([Agrawal and Rahman, 2017](#)). VCC is characterized by the integration and interaction of the resources of each actor – in line with their expectations, needs and capacities – to derive benefits ([McColl-Kennedy et al., 2012](#); [Vargo and Lusch, 2004](#)).
- (3) Digital platforms, which generate interactions and facilitate the combination of skills, abilities and knowledge that support VCC practices ([Luo et al., 2015](#)). The blend of VCC and digital platforms plays an important role in empowering consumers ([Tussyadiah and Zach, 2013](#)).

All three concepts were embodied in the Naturalista platform. By studying this specific website, we were able to corroborate our theoretical model, which proposes that the VCC construct is multidimensional. Co-creation would not happen without the support of a series of antecedents, such as perceived platform usefulness and user participation, both of which, as demonstrated in this study, are highly practical when it comes to managing services or products, if not crucial.

By conducting this study, we have demonstrated that ecotourists are active participants in VCC on digital platforms, thanks to the usefulness they perceive them to have – in this case, for scientific purposes in the observation of plant and animal species. Furthermore, the role played by ecotourist typology in these constructs is fundamental when deciding how to address each segment, as ecotourists participate in different ways and certainly do not share the same perception of the platform's usefulness in the VCC process. The co-creation of value with ecotourists is an effective way for firms, institutions and stakeholders to acquire knowledge and learning.

The evidence gathered from this study suggests that the challenge for the managers of these digital ecotourism platforms is to identify, train and motivate ecotourists with the necessary skills and characteristics, to turn them into co-creators. With the proposed segmentation, the study provides knowledge with which to identify these ecotourists and generate greater engagement with them.

7. Implications

The results of this study offer some interesting theoretical and practical implications, enabling us to better understand the process of VCC formation in ecotourism digital platforms and confirming the direct and significant effect of perceived platform usefulness and user participation behavior on VCC. Another interesting contribution derived from this research is that it sheds light on the theoretical debate surrounding the dimensionality of the VCC construct. The results show that VCC is a multidimensional construct consisting of five dimensions that correspond to different personal characteristics of the tourist, in line with those proposed by [Busser and Shulga \(2018\)](#).

Digital ecotourism platforms enable a multi-stakeholder blending of resources, knowledge and skills, resulting in sustainable learning and management of the multiple relationships involved in the VCC process. These platforms contribute to improving sustainability and protecting biodiversity, as their users are continually reporting any changes they identify in the flora and fauna of natural environments. This constitutes an action that is directly relevant to SDGs 14 and 15, relating to the conservation and sustainable use of oceans, seas and other marine resources, as well as sustainable management of forests, combating desertification and biodiversity loss.

This study has shown the co-creation behavior of users on these digital ecotourism platforms (in line with different perceptions of platform usefulness and their participation). By participating, users undertake activities that help in the conservation of marine and terrestrial ecosystems and in raising public awareness of the issues involved.

Segmenting the users of such nature-related digital platforms – into Observers, Explorers, Creatives or Naturalists, for example – is therefore of particular interest to government institutions, tour operators and companies involved in sustainable tourism, to identify those segments that provide valuable information and facilitate sustainable development. To improve the participation of ecotourists in such platforms (and, thus, their contribution to environmental conservation), the managers of digital ecotourism platforms must take into account that ecotourists do not constitute a single, homogeneous group ([Taczanowska et al., 2019](#)), nor do they have the same preferences or pursue the same goals when taking part in ecotourism activities. This means that the four different profiles of ecotourism platform users are of particular interest when planning the “what, where, and how” of promoting a digital ecotourism platform and adapting strategies to the specific characteristics of each group ([Carrascosa-López et al., 2021](#)).

Drawing on these profiles and results, the administrators of digital ecotourism platforms could focus their marketing efforts accordingly and attract new users with campaigns directed at each profile. The primary candidate for this more targeted profiling is the Naturalist segment, as these users present specific characteristics that distinguish them from other ecotourists in terms of VCC. These characteristics focus on their high level of motivation for being out in nature and escaping from routine, with similar segments having also been identified in other studies ([Carrascosa-López et al., 2021](#); [Palacio and McCool, 1997](#); [Taczanowska et al., 2019](#)).

8. Limitations and future research directions

Like many other studies, the present research is subject to a number of limitations. First, the findings correspond to the users of the Naturalista platform, which focuses on Mexican biodiversity in particular. Hence, they should be interpreted with caution when generalizing about ecotourism platforms and digital communities more widely. Furthermore, cultural differences between countries may also have affected the results.

As noted by Fennell and Nowaczek (2003) in their study of ecotourist behavior in a cross-cultural context, not only do ecotourists constitute a heterogeneous market but ecotourism profiles differ significantly within and between countries. Future studies should therefore endeavor to confirm these results in other cultural settings in which the Naturalista Network operates, such as Canada, Australia, Portugal, Argentina and Colombia, among other countries.

Future research could also examine how gender may play a moderating role in the relationships discussed here, or how the behaviors of the different types of users, such as active vs “lurker” participants (Chung *et al.*, 2010), may influence VCC. In addition, it could be interesting for future studies to validate other variables that have been found by other authors to be key antecedents of VCC, such as gamification (Sigala, 2015b) or experienced enjoyment (Füller *et al.*, 2009).

While there are few other ecotourism platforms where other studies of this type could be carried out, the present study offers information for future platforms that may want to venture into this field.

Notes

- 1 The website’s “Help” page demonstrates some of the characteristics of the Naturalista platform: www.naturalista.mx/pages/ayuda [Spanish].
- 2 The indirect effect of X on Y via the mediator M quantifies the estimated difference in Y resulting from a change of one unit in X (perceived platform usefulness) through a sequence of causal steps in which X affects M and Y, and M also affects Y. Furthermore, the effect of X on Y is said to be moderated by W (interaction effect) if the size or sign of the effect of X on Y varies according to W. If the effect of X on Y is moderated by W, then X and W interact (Hayes and Rockwood, 2017).

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| Items | Factor1 | Factor2 | Factor3 | Factor4 | Factor5 |
|---------------------------------------------------------------|---------|---------|---------|---------|---------|
| I usually travel to natural environments ... | | | | | |
| (TE01) ... for the solitude | -0.03 | -0.04 | 0.79 | 0.10 | 0.14 |
| (TE02) ... to relax my mind | 0.66 | 0.17 | 0.48 | -0.05 | 0.20 |
| (TE03) ... get away from other people | 0.17 | 0.04 | 0.83 | 0.08 | -0.06 |
| (TE04) ... experience the tranquility | 0.70 | 0.20 | 0.45 | -0.06 | 0.13 |
| (TE05) ... be in a natural setting | 0.81 | 0.14 | 0.06 | 0.13 | 0.12 |
| (TE06) ... observe the scenic beauty | 0.79 | 0.12 | 0.00 | 0.18 | 0.10 |
| (TE07) ... enjoy the noise and smell of nature | 0.77 | 0.09 | 0.02 | 0.26 | 0.21 |
| (TE08) ... understand the natural world better | 0.62 | -0.01 | -0.08 | 0.64 | 0.10 |
| (TE09) ... learn more about nature | 0.64 | 0.00 | -0.12 | 0.62 | 0.08 |
| (TE010) ... for the adventure | 0.49 | 0.21 | 0.04 | 0.22 | 0.44 |
| (TE011) ... help keep me in shape | 0.20 | 0.18 | 0.05 | 0.17 | 0.90 |
| (TE012) ... improve my physical health | 0.29 | 0.16 | 0.07 | 0.16 | 0.85 |
| (TE013) ... develop my skills and ability | 0.15 | 0.19 | 0.11 | 0.70 | 0.25 |
| (TE014) ... I could do something creative such as photography | 0.16 | 0.21 | 0.14 | 0.73 | 0.10 |
| (TE015) ... I think it would be a challenge | -0.06 | 0.32 | 0.33 | 0.46 | 0.44 |
| (TE016) ... I could do things with my companion | 0.13 | 0.91 | 0.03 | 0.14 | 0.18 |
| (TE017) ... I could be with friends | 0.11 | 0.92 | 0.04 | 0.11 | 0.16 |
| (TE018) ... to be with others who enjoy the same | 0.21 | 0.83 | 0.00 | 0.17 | 0.11 |

Table A1.
Exploratory factor
analysis for type of
ecotourist

Source: Adapted from [Palacio and McCool \(1997\)](#)

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