

Tourists' quality assessment and use and bequest value of pedestrians' walkways: case-studies of Paiva river (Arouca) and Mondego (Guarda) in Portugal

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Abstract

This paper presents the conclusions of an exploratory study conducted by an Associated Research Laboratory which aimed to fill a gap in research by empirically assessing the quality and economic value of the recreational cultural ecosystem services generated by two walkways/boardwalks in Portugal (MRW-Mondego River and PRW-Paiva River). A questionnaire applied to visitors at the entrances/exits of those linear walkways obtained 301 (MRW) and 188 (PRW) responses. In both case-studies, visitors rated high scores for walkways' attributes and the overall satisfaction, which is positively correlated with willing to pay for a ticket to access the walkway (MRW- 4,56 euros and PRW- 6,31 euros respectively). The willingness to give a donation for the conservation or maintenance expenses of the walkways (MRW=7,56 euros; PRW=8,22 euros). This study also conducted a K-means cluster analysis only for Mondego RW sub-sample, that identified four different clusters: Cluster 1- (N=8) *Older and heavy spenders*, a small segment of male visitors that spend a high amount of money during the more than two days they stay in the region; Cluster 2- (N=35) *Women heavy donators*, composed mainly by women with high purchase power who are willing to donate an higher amount for the conservation of the walkway; Cluster 3- (N=62)- *Average visitor* whose members have a profile showing characteristics similar to the mean scores of the sample; and Cluster 4- (N=189) *Younger women low spenders*, that plan their journey avoiding all the consumption moments and spending the lowest amount as possible (about 24 euros); Based on the proposed theoretical framework and on the claims shared by visitors on the survey, this paper provides some recommendations for public decision-makers.

Keywords: Walkways; Boardwalks; Cultural Ecosystem Services; Contingent Valuation; Willingness to pay for a ticket; Paiva River (Portugal); Mondego River (Portugal)

1- Introduction

Hiking tourism becomes a popular wellness travel trend across the world (Lee et al., 2018; Rodrigues, Kastenholz & Rodrigues, 2010). Close to 59 million people in the United States participated in hiking activities at least once in 2021, which represents a growth of 80.4% comparing to 2010 (Statista, 2023a). In the same year in Germany, 6,55 million people hike once a month (Statista, 2023b), while hiking is a popular activity in France, as 64% of the French people planned to go hiking during their 2020 summer vacation, and is the most practiced sport in the country.

Hiking tourism refers to “a vacation or holiday related outdoor activity that consists of shorter or longer walks in natural and cultural landscapes, and often in rural areas” (Nordbo, Engilbertsson, & Vale, 2014, p. 383). As a common term in the English language, hiking can be interchangeably used with walking, trekking, rambling, strolling, and bushwalking (Nordbo, Engilbertsson, & Vale, 2014).

In recent years, we have witnessed the construction of walkways or boardwalks aiming to leverage the attractiveness of nature-based tourism destinations. A boardwalk (alternatively board walk, boarded path, or promenade) is an elevated footpath, walkway, or causeway built with wooden planks that enables pedestrians to cross wet, fragile, or marshy land. According to Thompson et al. (2016, p. 736), “boardwalks, tracks and viewing platforms built in designated scenic areas can also be regarded as part of the naturescape”.

One example is the “Caminito del Rey”, a walkway measuring just 7.7 km long which traverses the gorge known as the Desfiladero de los Gaitanes in the province of Malaga (Costa del Sol), which has become an important tourist attraction in this region, with over 300,000 visitors a year since it was restored in 2015 (Gómez-Martín, 2019).

This paper presents the conclusions of an exploratory study of an Associated Research Laboratory in Portugal, which aimed to fill a gap in research by empirically assessing the local impact and economic value of the recreational cultural ecosystem services (CES) generated by these infrastructures (Kim et al., 2015; Lee et al., 2018). There are very few papers addressing the role of the wooden pedestrian walkways as drivers for nature-based tourism and local economic development of rural communities usually located in remote and mountain areas.

Therefore, the first research question is:

RQ1-What is the perceived quality of walkways attributes made by different stakeholders, namely the nature-based tourists/ hikers that are attracted by those destinations?

Cheng et al. (2019), Halkos, Leonti and Sardianou (2020), among others, made a compilation of the valuation methods of ecosystem services, in particular, the assessment of use and non-use value of recreational CES provided by nature-based tourism experiences, using the contingent valuation method (CVM) based on the willingness to pay (WTP) for using an infrastructure. Therefore, the second research question emerges: RQ2-What is the economic impact of the walkways for the hiking-based-tourism destinations? Does it justify the investment on the boardwalk construction and other infrastructures?

The construction of walkways and other support infrastructures, such as car parks, access roads or restaurants have always some impact in the landscape. In the third research question this study will assess:

RQ3-What are the advantages versus disadvantages of walkways in terms of environmental sustainability, landscape aesthetics or social implications for local populations?

2- Literature Review

This section provides the state-of-art of all theories and studies that aim to explain why individuals are motivated to walk in the nature (section 2.1), and what is the role of walkways as a facilitator in the access to nature sanctuaries. The section 2.2 discuss the benefits that landscape and the natural environment can provide to tourists. It is also imperative to assess other endogenous and exogenous factors that facilitate or inhibit the economic benefits for other stakeholders such as the local communities, the tourism operators, commercial and industrial firms and potential investors. Therefore, the section 2.2 briefly analyses the available methodologies that measure the tourist satisfaction, and proposes a holistic framework that theoretical supports the assessment tool used in the methodology section, while section 2.3 is dedicated to economic valuation methods of the use and non-use value of the walkways.

2.1- Nature-based-tourism (NBT), Eco-tourism, hiking and the role of walkways

Based on the definition proposed by Fredman, Wall-Reinius, and Lundberg (2009, p. 23)- “nature-based-tourism (NBT) includes people's activities when they visit natural areas

outside of their usual surroundings”. Hiking or walking is one of those activities that attract people to the trails’ destinations.

According to Solnit’s (2001), *wanderlust* summarizes the major philosophical, aesthetic and ethical currents historically associated with the activity of walking. For Wylie (2005), who makes an ethnographic narrative of the walking experience in interaction with the landscape, there is no such thing as ‘walking-in-itself’, no certain physical motion which is, as it were, elementary, universal and pure. There are only varieties of walking, whether these be discursive registers (pilgrimage, courtship, therapy, exercise, protest), or particular modes of engagement (strolling, hiking, promenading, pacing, herding, guiding, marching or nordic walking (Zurawik, 2020)). Moreover, according to Wylie (2005, p.237), solitary walking “emerges from romantic discourses of the self and nature in which a commonly male subject undergoes rhapsodic or epiphanic experiences in the vicinity of a nature explicitly framed by the precepts of sublime aesthetics, a nature at once fearful, awesome and transformative”.

Previous studies have investigated antecedents and motivations of hiking tourism (Collins-Kreiner & Kliot, 2016; Kim et al., 2015; Lee et al., 2018; Nordbo, Engilbertsson, & Vale, 2014; Saunders, Laing & Weiler, 2013; Tsaour, Yen & Hsao, 2013; Zurawick, 2020), hiking trail conditions (Olafsdottir & Runnstrom, 2013), and ecological features of hiking trails (Santarém, Silva, & Santos, 2015). Furthermore, Bichler & Peters (2020) confirmed that hiking is a low risk high immersion activity fueled by Soft Adventure Motivation (SAM) factors and such as relaxation, socializing and discovery.

As a long-term consequence, hiking activities can have therapeutic benefits helping people reduce stress, improve sleep quality, enhance mental health and ultimately promote quality of life (Hansmann, Hug, & Seelanda, 2007; Lee et al., 2018) and psychological/ subjective well-being (Kim et al., 2015; Zurawik, 2020).

Lee et al. (2018) adopted a multidimensional approach of value perceptions in order to assess hiking benefits: a) *Ecological value* refers to the value created by consuming environmentally friendly products or services (Koller, Floh, & Zauner, 2011) and it explains the functional attribute of hiking tourism because it is a nature-based (e.g., trails and forest) activity; b) *Emotional value* explains whether a destination influences tourists' feelings, affective responses (Williams & Soutar, 2009) or subjective meanings of experience in a natural setting such as enjoyment, excitement, and relaxation (Chhetri et al., 2004); c) *Novelty value*- Novelty seeking is highly associated with individuals' innate

personality traits that explain their tendencies to try a new thing in each situation (Kastenholz & Rodrigues, 2007; Midgley & Dowling, 1978).

Several attempts were made to characterize the hiking tourist motivational segments. Komossa et al. (2018) mapped the landscapes' outdoor recreation potential throughout the EU based on the different landscape preferences of five archetypical outdoor recreation user groups: convenience recreationist (8,6 Km), day-tripper (150 Km or 180 minutes), education recreationist (150 Km or 180 minutes), nature trekker and spiritual recreationist (200 km or 240 minutes).

This paper will assume that the preference for walkways is linked to the first three segments according to the length of trails and landscape preferences reported by Komossa et al. (2018). Nevertheless, the nature trekker is attracted by landscapes showing a high degree of wilderness and remoteness, and often walkways provide an access to those nature sanctuaries. Furthermore, according to Ito (2021) culture influences the ideal affect. Westerners value high-arousal positive affect- (e.g. excitement) while East-Asians value more low-arousal (e.g. relaxing). In the same study, Ito (2021) confirmed that Westerners prefer to walk on trails rather than walkways. Besides culture, the motivation for hiking can be moderated by Racialised Outdoor Leisure Identity as claimed by Martin, Adams and Stein (2023).

The construction of walkways rises a new dilemma: what should be the priority? Attract more people, allowing visitors to have access to new nature-based experiences or keep people away from protected areas, because as Cole (2004) claimed, hiking is one of the causes of vegetation loss. The intersection between NBT and ecological consciousness led to a new tourism segment- *ecotourism* whose definitions emphasize the minimization of negative impacts on the environment, the generation and fair distribution of financial benefits, and the participation and empowerment of local people (Fennell, 2001, 2021; Scheyvens, 1999; Thompson, 2022)

Trelohan, François-Lecompte and Gentric (2022) who studied the balance between tourism development and nature protection, found four different clusters regarding this issue: 1) the hardliners, who expect both development and protection; 2) the pleasure-seekers who prioritize the tourism development; 3) the protectors who prioritize the environmental protection; and 4) the wilderness champions who claim for less human intervention either for tourism or protection.

The trade-off between experience, accessibility and risk and crowd management are concerns addressed by Fossgard and Fredman (2019), who conceptualized a framework

that suggests six dimensions to describe the nexus between tourism, outdoor recreational activities, and nature areas: 1) adapting to guests' needs; 2) access to resources; 3) experience facilitation; 4) risk management; 5) crowding management; and 6) connections to place.

These findings are aligned with the study of [Giddy and Webb \(2018\)](#), who assessed the motivations of adventure tourists, using a push and pull factor approach, demonstrated that the environment not only plays an important role in attracting adventure tourists towards specific destinations, but that they also seek out interactions with nature. Human bonding with recreational spaces awakes environmental, social, psychological and cultural factors that construct meanings of people-place interactions ([Stedman, 2002](#); [Lund, 2012](#)). For [Bott, Cantrill, and Myers \(2003\)](#) or [Brown and Raymond \(2007\)](#) among others, recreationalists search for aesthetic and natural environments and use special and unique settings and landscapes that can satisfy their leisure and bonding needs.

2.2- Walkways quality and satisfaction assessment

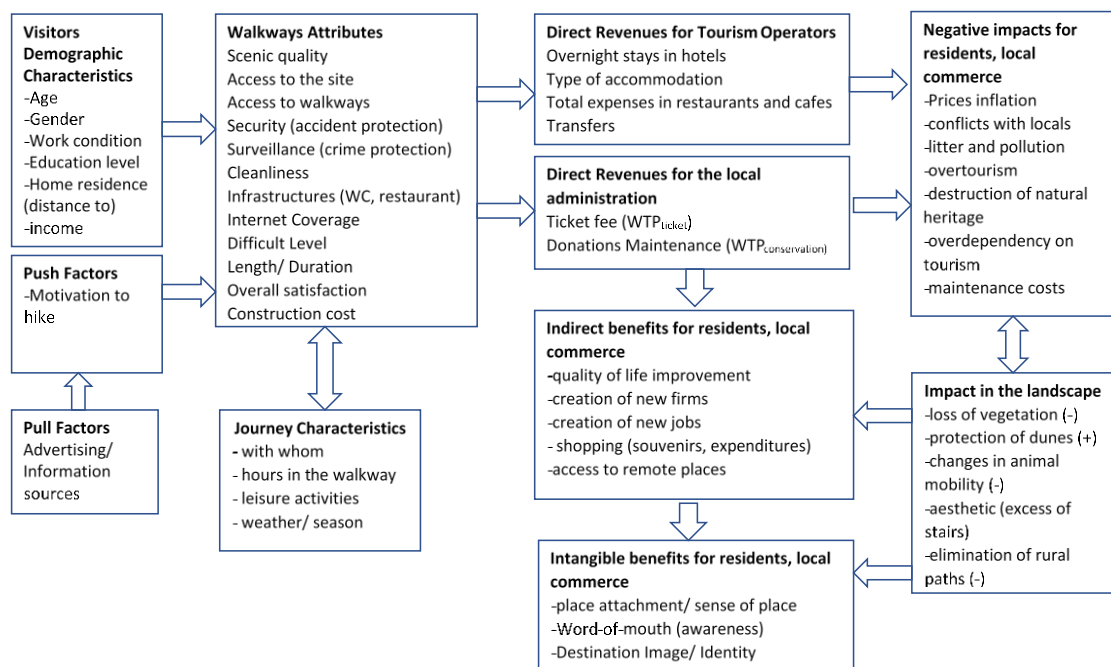
After the identification of motivators, emerges the need to measure and quantify the quality of walkways attributes, and ultimately measure the tourist satisfaction after walking in the walkways. For example, [Noraffendi and Rahman \(2020\)](#) developed a framework aiming to measure satisfaction with a walkway. These authors added two new dimensions (safety and amenities) to the three dimensions proposed by [Mansouri and Ujang \(2016\)](#) for assessing the construct of “walkability” which is defined as the level of pedestrian or walking-friendliness in a certain place: accessibility, connectivity and continuity. For example, [Lee et al. \(2023\)](#) found that the “wooden deck” surface was classified as a “satisfier” for 69% of pedestrians.

Alternatively, [Abbey \(2005\)](#) and [McGuff \(2011\)](#), for instance, suggested several criteria or ideal characteristics for a boardwalk, namely the “5Cs”, that is, connected, conspicuous, convivial, comfortable and convenient for making walking user friendly. [Bellizzi, Eboli, and Forciniti \(2019\)](#) also stressed the importance of the degree of interaction or integration with other modes of transportation (bicycles or electric scooters).

The economic impact evaluation of tourism attractions is a research topic that always deserved attention from researchers as pointed out by the systematic literature review of [Comerio and Strozzi \(2019\)](#) or [Liu, Kim and Song \(2022\)](#), namely the studies for the

evaluation of thematic parks (Li et al., 2021), the methods focused on residents' quality of life perspective (Olya, 2023; Ramkissoon, 2023), on tourism as leverage factor of regional development (Calero & Turner, 2020) or assessing the impacts resulting from changes in tourism initiatives (Roodbari & Olya, 2024). Inspired in traditional methods based in revenues/expenditure analysis described in Tyrrell and Johnston (2001) and Klijs et al. (2012), this paper suggests a holistic framework acknowledging all factors that determine the tangible and intangible impacts of the walkways on regional economy, tourism development and residents daily-life (see Figure 1).

Figure 1- Theoretical Framework of the impact of Walkways on regional economic and social development



Thus, the next section, discusses all the benefits provided by walking on walkways and the surrounding landscape through the lens of the notion of cultural ecosystem services.

2.3- Cultural Ecosystem Services generated by walkways and their economic evaluation methods

Landscapes provide several types of *Cultural Ecosystem Services* (CES), defined by Langemeyer, Calcagni and Baró (2018, p.542) as “non-material and intangible benefits

arising from multi-dimensional human-nature relationships”, such as recreational leisure, aesthetic scenery beauty, cultural heritage, place identity, spiritual enrichment, cognitive development and learning, according to CICES 5.1 classification method of Haines-Young and Potschin (2018).

The construction of walkways usually provides access to places that were inaccessible before the construction, allowing the safe fruition of landscapes, thus contributing to a better experience according to the evaluation of visitors/hikers (Moyle et al., 2017) or even to a better physiological and psychological restoration (Deng et al., 2020).

Furthermore, various case-studies reported in the literature (Cengiz et al., 2022; Thompson, 2022) in several geographic contexts (coastal areas, riversides, mangrove forests or mountain areas) pointed out the role of walkways in facilitating the access to several CES categories: a) recreational – providing accessibility for tourists (Thompson, 2022); b) social (interaction with local residents and other tourists) (Bott, Cantrill, & Myers, 2003; Brown & Raymond, 2007); c) aesthetic value (scenic beauty of the landscape); d) economic development; e) environmental/ sustainable development of rural landscapes, through the mitigation of climate changes, contribution to public awareness of the vulnerability of dune habitats, limiting the free movement of tourists on the fragile vegetation of the dunes (Muñoz-Vallés & Cambrollé, 2014; Prisco, Acosta & Stanisci, 2021); f) sense of place (Fossgard & Fredman, 2019);

Furthermore, the economic valuation of CES is a research topic well explored by landscape researchers. Chakraborty et al. (2020), Chan et al. (2011), Cheng et al. (2019) among others made a compilation of the valuation methods of cultural ecosystem services, in particular, the assessment of use and non-use value of recreational CES. The assessment of use and non-use value of recreational CES provided by nature-based tourism experiences, using the stated preference method of contingent valuation (CVM) measuring the willingness to pay (WTP) was adopted by several studies (Benoliel et al., 2021; Bockarjova, Botzen & Koetse, 2020; Chu et al., 2020; Ferreira & Marques, 2015; Hwang et al., 2020; Mota, 2019)

On the other hand, several studies assessed the willingness to pay an amount for the conservation of public infrastructure that can provide an estimation of its non-use value (Abdeta, Ayana & Bekele, 2023, Schuhmann et al., 2019). The CVM relies on the stated intentions of individuals’ willingness-to-pay (WTP) for recreation resources or activities, contingent on hypothetical changes in the quantity or quality of environmental amenity (Lee & Han, 2002).

A CVM survey provides information concerning WTP distribution for a proposed public good. The theoretical background of the method is composed by the structure of the utility function and econometric theory. The cumulative distribution function of WTP, G_C , and the corresponding probability density function, g_C , depend on the survey design. In the case of an open-ended method the individuals are asked to state their maximum WTP directly, A , the probability that an individual's WTP is equal to A , is (Hoyos & Mariel, 2010):

$$\Pr\{WTP = A\} = 1 - g_C(A); \quad (\text{eq.1})$$

WTP distribution can be calculated through two approaches. In the open-ended questions format linear regression is assumed with some covariates (Z_y) and a normally distributed random term (ε), so that WTP is also normally distributed:

$$WTP = \mu_{WTP} + \varepsilon = Z_y + \varepsilon \quad (\text{eq.2})$$

3- Methodology/Approach

This paper is part of an exploratory study conducted by a group of researchers of an Associated Laboratory in Portugal. The methodology of this paper comprises three steps: 1) Selection of case studies; 2) Exploratory interviews to relevant stakeholders of region (local administration, tourism operators, restaurants, local shopkeepers and residents), this part of the study is fully described in other paper (Authors; 2023); 3) Questionnaire applied to walkaways visitors.

3.1- Selection of case studies

According to Carvalho (2021) in Portugal there is more than sixty walkways. This paper is focused in two case-studies of walkways in Portugal (please see the geographical location in Figure 2 and some photos taken by authors in Figure 3): 1) "Passadiços do Paiva" (Arouca) that is in eighth year of its lifecycle (mature stage) and 2) "Passadiços do Mondego" (Guarda) this is in the first year after the opening (launching stage of the lifecycle).

3.1.1- Paiva River Walkway (PRW)

Paiva walkways opened in 2015, and are located on the left bank of the Paiva River, in Arouca municipality in Portugal that obtained a co-funding from Portuguese government

(ON.2 and QREN) and from EU European Development Fund to pay the 1,85 million euros of the construction of this infrastructure. The distance that links with “hard” difficult level two small villages (Areeinho¹ and Espiunca) in 2h30 is 8,7 km (linear). The walkway provides a “walk "untouched", surrounded by unique beauty of landscapes, in an authentic natural sanctuary along the brave waters’ downhill, quartz crystals and endangered species in Europe” (<http://www.passadicospaiva.pt/>).

Figure 2- Location of the selected walkways: Mondego Walkway and Paiva Walkway.



This walkway is located in Arouca Geopark² which is recognized as Geological Heritage of Humanity by UNESCO and it is also in the protection zone of Rede Natura. Tourists have to book online and pay an entry 2 euros per person in order to access to the walkway. In the Paiva walkways trail, there is another touristic attraction, one of the longest pedestrian suspension bridges in the world, the 516 Arouca Bridge, an iconic infrastructure consisting of railings and steel cables, with a span of 516 meters, 1.20 meters wide and 175 meters high above Paiva River. The access to the bridge must be booked in advance in slots of 30 minutes starting 6h30 a.m. and it has an extra cost of 10 euros. This case-study was already investigated by several authors who collected data from tourists’ surveys in order to measure the push and pull factors, the motivators and satisfaction of visiting PWR (Bernardo, 2018; Liberato et al., 2019) and the economic and environmental impact (Gonçalves, Guerra & Figueiredo, 2023; Mota, 2019; Pacheco et al., 2019; Rocha et al., 2017) and the leverage for local tourism development (Duarte

¹ GPS Coordinates: 40°59'34.67"N 8°12'41.19"W

² https://www.facebook.com/aroucageopark/?locale=pt_PT

et al., 2018). In this IN2PAST project, the researchers team conducted exploratory interviews with the most relevant stakeholders (Arouca municipality, Arouca Geopark, ADRIMAG³ and tourism operators) in order to complement the analysis of the statistics of visitors' entries and other secondary data collected from public administration sources.

Figure 3- Photos of Paiva and Mondego walkways. Source: Authors photos.

Paiva Walkways (Arouca, Portugal)



Mondego Walkways (Guarda, Portugal)



According to ticket sales data provided by Arouca municipality in 2019 (before COVID-19), PRW received the record of 207192 visitors twice more than in 2022 (95174 visitors). In the opening year (2016) it received a demand of 192351 visitors with some seasonality, as the high season is from May to September. The available public statistics confirm the importance of this walkway, as the numbers of hotel guests who stayed in Arouca increased 43% from 2015 to 2016. Moreover, the Paiva walkway seems to also inspire local entrepreneurship, as it contributed to the emergence of 150 new firms in the tourism

³ <https://www.adrimag.com.pt/>

sector. Finally, from 2016 to 2019, the PRW received the “World Travel Award (WTA)”, and recently on 2023, WTA for the category of Best European Attraction for Adventure Tourism.

3.1.2- Mondego River Walkway (MRW)

Mondego walkways (<https://www.passadicosdomondego.pt/>) opened on November 2022, and are located on the banks of the Mondego River, in Guarda municipality. The construction of this walkway costed about 4 million euros that were 85% co-funded by the program Centro 2020 of EU European Development Fund.

The linear path with “average” difficult level has 12 km (6,5 in wooden planks) with cumulative slope of +600 meters and 5h of duration. It starts in the Caldeirão dam⁴ or in Soeiro village and ends in the village of Videmonte⁵. In order to access to the walkway tourists (older than 12 years old) also have to book online and pay 1 euro for one of 2000 entries available in each day.

3.2 – Questionnaire applied to visitors

Based on the methodologies described in the literature review (sections 2.2 and 2.3), in order to measure the economic impact for the local communities of the walkways this study developed a questionnaire with four sections. In the first section, respondents were invited to share some individual demographic data and assess their geographic origin (nationality and residence municipality). The second section collected information about a set of variables that describe the visitor journey and his/her motivations: “How many people are you walking with?”, “Was the walkways the only reason that influenced the decision to travel to the region?”, “What was the main information source?”.

In the third section, respondents were invited to evaluate the visit to the walkways and estimate: the total expense in accommodation, restaurant and travelling, the hours they spent in the walkway, the number of nights they will stay in the region nearby and the type of accommodation. Based on the measures propose by **Noraffendi and Rahman (2020)** and **Mansouri and Ujang (2016)**, the questionnaire measured the quality of the walkway in terms of scenic quality, accessibility, security, cleanliness, infrastructures and

⁴ GPS Coordinates 40°31'52.66" N 7°19'34.51" O

⁵ GPS Coordinates 40°30'32.74" N 7°23'27.45" O

internet coverage. Adapting some measures of Bernardo (2018), Cengiz et al. (2022), Mota (2019), respondents also rated the overall satisfaction, intention to recommend the visit and shared in an open question all the advantages/disadvantages of the walkways to different stakeholders (residents, economic activity and tourism).

In the last section, using the contingent valuation method adopted by several authors (Mota, 2019; Pacheco et al., 2019) respondents were invited to state, in an open-ended question, the “maximum amount (in euros) that is willing to pay for a ticket to get access to the walkway” (WTP_{ticket}), and the “maximum amount (in euros) that is willing to donate for the conservation of the walkway” ($WTP_{\text{conservation}}$) that provides the data for the calculation of use value and non-use value of the walkways respectively.

The open-ended question according to Sajise et al. (2021) have several advantages: straightforward, simple to deal with in terms of statistical techniques (simple descriptive statistics can be enough, such as sample means and medians; not prone to anchoring or starting point bias, very informative as maximum, WTP can be identified for each respondent. However, the same authors pointed out some limitations: respondents may avoid to respond leading to large nonresponse rates, protest answers, zero answers, and outliers (i.e., unrealistically high amounts), and generally too unreliable responses; difficult to use effectively in valuing public goods because respondents want to know what others in the community are going to pay before they give an answer.

The questionnaire was applied by recruited interviewers that received instructions about how to approach respondents, usually at the ending points of the walkways or while the visitors were resting from walking. The questionnaires were filled either by paper-and-pencil method or in online google form by interviewers or in self-administered way by respondents who could read the survey QR code in their smartphones.

3.3- Sample

Table 1 presents the socio-demographic characteristics of 301 respondents at MRW and 188 respondents at PRW. The majority of respondents are male (more than 52%) and the average age is 38,7 years old. The majority of respondents (MRW-90%; PRW-84%) of have the Portuguese nationality. The dominant nationality among foreign visitors is the Spanish one (MRW-4,9%; PRW-9,6%). The composition of the sample in terms of type employment and education level is similar for both sub-samples as 60% are employed workers and 54,5% (MWR) and 67,6% (PWR) have a university graduation. Regarding

the journey of the visitor, Table 1 also shows that the majority walks with family or friends and walking the walkway was the main reason to travel (MWR-52,8%; PWR-49,5%).

Table 1- Socio-demographic individual data, reason to travel and type of accommodation.

	Mondego river (MRW)(Guarda)		Paiva river (PRW) (Arouca)	
	N	%	N	%
Female	144	47,8	85	45,2
Male	157	52,2	103	54,8
Total	301	100,0	188	100,0
Age (M, SD)	38,7 (13,33)		38,7 (14,9)	
	N	%	N	%
Student	42	14,0	41	21,8
Unemployed	9	3,0	1	0,5
Retired	11	3,7	6	3,2
Employed worker	182	60,5	113	60,1
Independent worker	36	12,0	16	8,5
Entrepreneur	21	7,0	10	5,3
Other (Military)			1	0,5
	N	%	N	%
Not Reply			1	0,5
Up to 4th Grade	6	2,0	4	2,1
from 5th to 9th grade	23	7,6	13	6,9
from 10th to 12th grade	62	20,6	30	16,0
Professional course	46	15,3	13	6,9
Undergraduate / Postgraduate	164	54,5	127	67,6
	N	%	N	%
I walk alone	5	1,7	4	2,1
with family	154	51,2	103	54,8
with friends	114	37,9	59	31,4
with an excursion group	28	9,3	22	11,7
One of the reasons that made me decide to take this trip to this region was to visit the boardwalk...	N	%	N	%
Yes, it was the only reason	159	52,8	93	49,5
Yes, it was the most important reason	72	23,9	69	36,7
Yes, but it was not the most important reason	52	17,3	19	10,1
No, I visited by mere chance	18	6,0	7	3,7
Type of Accomodation	N	%	N	%
Hostel	3	1,0		
Local Accommodation (e.g. AirBNB, rural tourism)	52	17,3	55	29,3
Caravan	9	3,0	5	2,7
Friends' home	32	10,6	8	4,3
Hotel **	2	0,7	1	0,5
Hotel ***	15	5,0	5	2,7
Hotel ****	17	5,6	2	1,1
Hotel *****	4	1,3		
I did not stay overnight	151	50,2	109	58,0
Resident	16	5,3	3	1,6

Using the google maps tool, this paper made analysis of the car distances from the home residence and the walkways location. Table 2 shows that in PRW sub-sample the majority of visitors live less than 100 km (Zone 1 and Zone 2), while for MRW the majority of respondents live more than 100 km (Zone 3 and Zone 4).

The major source of information that motivated the travel to walkway destination is the recommendation/word-of-mouth from family and friends (MWR-18%; PWR- 33%)

followed by internet (MWR-13,4%; PWR- 20,7%) and social media digital advertising (MWR-10,2%) or advertising (TV, radio, press and outdoors) (PWR- 14,4%).

Table 2- Home residence (origin) of visitors.

Zone	Mondego Walkway				Paiva Walkway		
	Distance (Km)	Examples of cities	N	%	Examples of cities	N	%
1	0-50 km	Guarda, Covilhã	61	21,6%	Arouca, O.Azemeis	22	11,7%
2	51-100 km	Viseu, Castelo Branco	51	18,0%	Porto, Guimarães	78	41,5%
3	101-200 km	Aveiro, Porto	80	28,3%	Braga, Barcelos	28	14,9%
4	201-500 km	Lisboa, Leiria	79	27,9%	Lisboa, C.Rainha	45	23,9%
5	>501 km	Portimão, Faro	9	3,2%	Faro, Cuidad Real	11	5,9%
6	other transports	Açores, Paris	3	1,1%	Açores, UK	4	2,1%
			283	100,0%		188	100,0%

4 – Discussion of results

Table 3 presents the perceptions of visitors and their ratings about the walkways' characteristics and their overall quality. In both cases, all attributes obtained very positive evaluations (above 6 in a 10 points scale). The scenic quality of the landscape obtained the highest rating (above 9 points), while the quality of internet coverage and the support infrastructures (restaurants and nearby accommodation) received less favorable ratings, signaling the issues that deserve more attention from the public decision-makers. The quantitative ratings were confirmed by positive versus negative aspects pointed out by visitor in an open question (see *Table 4* and *Table 5*).

Furthermore, visitors also agree that the walkway is a strong factor of attraction for local tourism, generate benefits for the local population in terms of quality of life and creation of new jobs. Nevertheless, the influence of the walkway as an attraction factor for new residents is not so relevant. More than 40% of PRW and more than 50% MRW visitors stated they (strongly) agree (9-10 points) that the walkways cause impact in the landscape. Regarding the negative externalities caused by these infrastructures, considering the scale (1-no negative impact to 10-very negative impact), respondents agree, for both cases, that there is some negative impact in the prices of goods and services and in the levels of pollution and litter.

In order to assess the economic income generated by the walkways, visitors estimated the total expense (restaurants, accommodation, etc.) per capita with a similar amount of 97-98 euros for both walkways (see *Table 6*) in a journey that includes more than four hours

walking. 44,5% of visitors in Mondego walkway stayed at least one night often in AirBnB or rural tourism while only 40,4% of PRW visitors stayed overnight in the region.

In both cases, Table 6 also shows that the overall satisfaction and the intention to recommend the walkway to friends (WOM) is very high (above 8 points). And according to the significant positive Spearman correlation coefficients (see Table 7 and Table 8) the high levels of satisfaction may explain why (on average) visitors are willing to pay for a ticket to access the walkway (use value WTP) of 4,56 euros (MRW) and 6,31 euros (PRW) respectively. Both amounts are higher than the current fee prices (MRW- 1 euro; PRW- 2 euros). These amounts are aligned with the ticket prices estimated in previous studies, for natural parks in Spain and Greece, as reported by **Halkos, Leonti and Sardanou (2020)**.

Table 3- Visitor's evaluation of the walkway quality dimensions, the positive/negative impacts for local tourism, residents' quality of life and landscape.

	Mondego (N=301)		Paiva (N=188)	
	Mean	SD	Mean	SD
Scenic Quality	9,05	0,997	9,26	1,089
Access to the site (roads, signs, etc)	7,91	1,752	7,66	2,079
Security (accident protection, first aid)	7,45	2,165	7,59	2,052
Security (surveillance, protection against crime)	6,93	2,417	7,42	2,249
Level of cleanliness and garbage collection	7,89	1,957	8,69	1,629
Infrastructures (toilet, car park)	7,28	1,997	7,13	2,169
Infrastructures (restaurants and nearby accommodation)	6,68	2,129	7,12	2,073
Quality of internet coverage	6,14	2,764	7,16	2,196
Economic benefits for the region	8,50	1,387	8,80	1,380
Benefits for the quality of life of local populations	7,82	1,800	8,23	1,614
As a factor of attraction for local tourism	8,79	1,241	9,19	1,173
As a factor of attraction to settle residence in this municipality	6,74	2,321	6,60	2,455
As a factor in the creation of new jobs	7,05	1,981	7,44	2,089
Impact on the landscape	8,05	1,979	7,52	2,457
NEGATIVE IMPACTS				
As a factor that generates an increase in the prices of goods and services	4,88	2,367	4,97	2,45
As a factor that generates conflicts between local populations and visitors	3,71	2,423	3,56	2,456
As a factor of destruction of the natural, cultural and/or landscape heritage	3,82	2,494	3,66	2,443
As a factor for increasing the region's dependence on tourism	4,55	2,535	4,77	2,558
As a source of pollution and garbage	4,70	2,501	4,43	2,606

On the other hand, the willingness to give a donation for the conservation or maintenance expenses of the walkways (MRW=7,56 euros; PRW=8,22 euros) which is an estimation of the non-use value is also significantly correlated with the satisfaction. More than 90% of respondents (MRW=92,4%; PRW=91,4%) stated that the cost of (or investment in) the walkway construction (MRW= 4 ME; PRW=1,85 ME) is justified.

Table 4- Positive aspects mentioned by visitors.

Mondego RW	N	%	Paiva RW	N	%
Don't reply	139	49,1	Don't reply	51	27,1
Landscape beauty	75	26,5	Landscape beauty	79	42
Walking in the nature	38	13,4	Walking in the nature	34	18,1
Walkway construction quality	5	1,8	Opportunity to access a remote place	7	3,7
Tranquility/ Peace	3	1,1	Tranquility/ Peace	5	2,7
Fresh Air	2	0,7	Cleanliness	2	1,1
Tourism development driver	2	0,7	Suspending Bridge 516	2	1,1
Suspending Bridge	2	0,7	Tourism development driver	2	1,1
Safety	2	0,7	Social Interaction with other people	1	0,5
Water cascade	2	0,7	Retention of residents/ Avoid desertification	1	0,5
Sport/ physical activity (hiking)	1	0,4	Leisure activity with family and friends	1	0,5
Social Interaction with other people	1	0,4	Shadow	1	0,5
Leisure activity with family and friends	1	0,4	Good for Instagram tourism	1	0,5
Easiness to access	1	0,4	New jobs creation driver	1	0,5

The analysis of the correlation matrix (see Table 7 and Table 8) also shows that older visitors (who have more income) spend more expenses than younger respondents, and only for PRW case they stay more time in the region and stated higher amounts of WTP. As expected the amount of total expenses is positively correlated with the number of nights visitors stay in the region. But there are contradictory findings regarding the correlation between the hours spent in the walkway and the satisfaction, as it is positively correlated with the WTP_{ticket} for MRW, but negatively correlated for PRW.

Table 5- Negative aspects mentioned by visitors.

	N	%		N	%
Don't reply	185	65,4	Don't reply	105	55,9
Support infrastructures (WC, bar, food zones, water drinkers, rest zones, litter bins)	36	36,7	Support infrastructures (WC, bar, food zones, water, rest zones, litter bins)	17	9
Garbage/ river pollution	12	12,2	Stairs/ Difficulty of the trail	10	5,3
Stairs/ Difficulty of the trail	9	9,2	Accessibility/ lack of parking zones	9	4,8
Lack of boardwalk in some part of the trail (clay existent path)	6	6,1	Excess of people in the walkway and river beach	8	4,3
Visual impact	5	5,1	Maintenance/ Conservation	7	3,7
Difficult access (children)	5	5,1	Environmental impact	6	3,2
Lack of safety/ criminal security	4	4,1	Walkway Safety (protection, slippery floor)	5	2,7
Environmental impact	4	4,1	Lack of shadow	3	1,6
Heat/no shadows	3	3,1	Garbage/ river pollution	3	1,6
Transports	3	3,1	Lack of civic education	2	1,1
Asphalt in some zones	1	1,0	Opening hours timetable	2	1,1
Lack of signs and information	1	1,0	Lack of signs and information	2	1,1
Lack of bridges	1	1,0	Lack of souvenirs/ merchandising	2	1,1

Table 6- Visitor's estimation of total expense, hours in the walkway, overall satisfaction, WOM, and WTP for a ticket (use value) and WTP for conservation (non-use value).

	Mondego Walkway			Paiva Walkway		
	N	M	SD	N	M	SD
Total expense (accommodation, restaurant, etc.)	295	97,10	125,616	165	98,73	109,851
How many hours did you spent in the walkway?	299	4,09	3,280	188	5,166	4,1765
How many nights did / will you sleep in the region?	301	0,81	1,119	187	0,57	0,789
After visiting this walkway, what is your overall evaluation?	301	8,31	2,164	188	8,93	1,228
I would recommend this walkway to friends	301	8,89	1,731	188	9,21	1,295
Maximum amount (in euros) that you would be willing to pay for a fee/ticket	285	4,56	12,396	178	6,31	6,071
Maximum amount (in euros) that you would be willing to donate to the conservation of this infrastructure	293	7,56	14,156	167	8,22	17,992

Table 7- Spearman correlation coefficients between, respondents age, total expense, hours in the walkway, overall satisfaction, WOM, and WTP for a ticket (use value) and WTP for conservation (non-use value) for Mondego Walkway sub-sample.

	1.2	3.1	3.2	3.3	3.7	4.2	4.3	4.4	4.5
1.2- Participants age	1,000	,198**							
3.1- Estimation of total expenses during the trip?		1,000	,200**	,658**	-,305**			,168**	,238**
3.2- How many hours did you spent in the walkway?			1,000	,142*		,138*		,134*	
3.3- How many nights did you stay in the region?				1,000				,149*	,193**
3.7- How many times did walk in this walkway?					1,000			-,173**	-,169**
4.2- what is your overall evaluation?						1,000	,676**	,174**	,197**
4.3- Would you recommend this walkway to friends?							1,000	,169**	,201**
4.4- Maximum amount (in euros) that you would be willing to pay for a fee/ticket								1,000	,440**
4.5- Maximum amount (in euros) that you would be willing to donate to the conservation									1,000

This study also conducted a K-means cluster analysis only for Mondego RW sub-sample, that identified four different clusters with significant differences in a set of variables according to the ANOVA of Table 9: Cluster 1- (N=8) *Older and heavy spenders* is a small segment of male visitors that spend a high amount of money during the more than two days they stay in the region; Cluster 2- (N=35) *Women heavy donators* is composed mainly by women with high purchase power who are willing to donate an higher amount for the conservation of the walkway; Cluster 3- (N=62)- *Average visitor* whose members have a profile showing characteristics similar to the mean scores of the sample (see Table

10); and Cluster 4- (N=189) *Younger women low spenders*, that include younger visitors, mostly women, that plan their journey avoiding all the consumption moments and spending the lowest amount as possible (about 24 euros).

Table 8 Spearman correlation coefficients between, respondents age, total expense, hours in the walkway, overall satisfaction, WOM, and WTP for a ticket (use value) and WTP for conservation (non-use value) for Paiva Walkway sub-sample.

	1.2	3.1	3.2	3.3	3.7	4.2	4.3	4.4	4.5
1.2- Participants age	1,000	,410**		,297**				,325**	,282**
3.1- Estimation of total expenses during the trip?		1,000		,647**				,412**	,296**
3.2- How many hours did you spent in the walkway?			1,000	,146*		-,165*			
3.3- How many nights did you stay in the region?				1,000				,378**	,205**
3.7- How many times did walk in this walkway?					1,000				
4.2- what is your overall evaluation?						1,000	,767**	,153*	,223**
4.3- Would you recommend this walkway to friends?							1,000		,192*
4.4- Maximum amount (in euros) that you would be willing to pay for a fee/ticket								1,000	,507**
4.5- Maximum amount (in euros) that you would be willing to donate to the conservation									1,000

Table 9- ANOVA considering the variables used in the Cluster Analysis: age, total expense, hours in the walkway, number of nights, number of visits and easiness to access Mondego Walkway.

	Cluster		Error		Z	Sig.
	Mean Squar	df	Mean Square	df		
1.2- Age	1025,631	3	170,103	290	6,029	,001
3.1- Estimation of total expenses during the trip?	1432287,216	3	1147,718	290	1247,943	,000
3.2- How many hours did you spent in the walkway?	8,829	3	2,008	290	4,398	,005
3.3- How many nights did you stay in the region?	38,425	3	,872	290	44,078	,000
3.7- How many times did walk in this walkway?	5,134	3	1,443	290	3,558	,015
4.1.2- Easiness of access to the site (roads, signs, etc)	12,838	3	2,945	290	4,359	,005

A comparative analysis between the outdoor recreation archetypes suggested by Komossa et al. (2018) and the clusters identified in this paper, stresses that the members of Cluster 4 can be designated as *convenience recreationists* while the members of Cluster 1 and 2 have the same characteristics of the *day-trippers*. Based on Trelohan, François-Lecompte and Gentric (2022) segmentation, this found that cluster 4 perceived higher economic benefits and less negative impact in the landscape (as *pleasure seekers*) while clusters 1

and 2 have similar characteristics of *hardliners* who expect both protection and development.

Table 10- Clusters characteristics of Mondego Walkway visitors.

		Cluster 1	Cluster 2	Cluster 3	Cluster 4	Total
		Older, heavy spenders,	Women heavy donators	Average visitor	Younger Women low spenders	
	N	8	35	62	189	294
Age	M	52,63	44,14	39,32	37,12	38,84
	SD	12,106	13,417	14,260	12,586	13,374
Sex (M=1; F=2)	M	1,00	1,48	1,51	1,47	1,47
	SD	0,000	0,507	0,503	0,500	0,500
Total Expense	M	543,75	309,43	142,42	24,52	97,43
	SD	82,104	50,231	43,596	21,128	125,702
Hours	M	5,38	4,04	4,00	3,69	3,84
	SD	1,768	1,545	1,565	1,325	1,441
Nights	M	2,50	1,86	1,35	0,38	0,82
	SD	0,756	0,944	0,925	0,941	1,121
Nr visits	M	0,625	0,800	0,903	1,315	1,148
	SD	0,5175	0,4058	0,3488	1,4651	1,2168
Easiness to access	M	6,38	7,37	7,84	8,13	7,93
	SD	2,925	2,250	1,661	1,553	1,745
Overall satisfaction	M	8,38	8,23	8,42	8,26	8,29
	SD	1,302	2,030	1,946	2,314	2,179
Impact in the landscape	M	6,63	7,71	7,81	8,27	8,06
	SD	2,446	2,122	2,007	1,878	1,970
WTP ticket	M	3,00	4,66	3,87	4,80	4,56
	SD	1,914	4,131	3,116	15,188	12,478
WTP conservation	M	8,25	10,54	9,16	5,78	7,13
	SD	6,341	14,322	15,405	11,848	12,951

5- Conclusions

In 2015, the municipality of Arouca decided to invest 1,85 million euros in boardwalk along the river Paiva, in order to improve the access to the banks of a river that was often use for nautical radical sports like rafting. Since then, this pioneer project was replicated in Portugal by other municipalities, including Guarda, that recently open in 2022 another walkway along the Mondego river banks, after spending about 4 million euros. In order to moderate the demand of visitors, in both cases, visitors have to pay a ticket. This is the point of departure for the IN2PAST research project that aimed to assess the socio-economic implications for all region stakeholders (residents, tourism operators, business entrepreneurs and visitors). This paper focused in the assessment of visitors' opinions

about the benefits (also designated as recreational cultural ecosystem services) provided by this type of infrastructures.

The first conclusion is that respondents agree that the investments made by public administration are justified. For both case-studies, visitors made a positive evaluation of quality of the walkways' features and rated a very high satisfaction score. The scenic beauty of the landscape, the interaction with nature, and walking in places that before the walkways were inaccessible were pointed out as the best positive benefits capture in this experience. During the journey most of the visitors took photos/selfies, ate or drank something in the cafes or took a bath in the river beach. Ultimately, hiking in connection with nature is an experience that enhances the psychological/subjective well-being (Kim et al., 2015; Zurawik, 2020).

Visitors acknowledge some negative environmental and aesthetic impacts of these wood infrastructures on the landscape/ecosystem, as claimed by Trelohan, François-Lecomte and Gentric (2022). However, visitors also stated that the benefits overcome the costs, because walkways allow people to have access to remote places and viewpoints, mitigating the changes in the former ecosystem dynamics.

Thirdly, the survey confirmed that, according to visitors' perceptions, the journey in the walkways comprises moments of consumption (more than 97 euros per capita) that consequently, generate economic benefits, new jobs, thus improving the residents' quality of life, the attraction of new residents and the retention of young inhabitants.

However, there are some negative externalities as well, such as the increase of: 1) prices of goods and services; 2) dependence on tourism; and 3) air and water pollution.

Based on the theoretical analysis of the disadvantages of walkways, on the claims shared by visitors on the survey, this paper provides some recommendations for public decision-makers. These recommendations are also aligned with Fossgard and Fredman's (2019) framework:

a) For example, in order to satisfy visitor needs, improve the access to resources, and facilitate the experience, (although PRW is in the eighth year of its lifecycle), municipalities should reinvest the direct revenues of the walkways in order to increase the number of support infrastructures such as car parking, WCs, water drinkers, rest zones and litter collectors. There is an increasing demand of foreign visitors so all the information must be translated in other languages. Mondego RW has only one year of existence, so the transfer system that transports visitors to the entries from the car parking,

or from the villages is not fully developed, which is an opportunity for new business that create jobs to local residents.

b) Furthermore, regarding the dimension of risk management, in linear walkways like these (with few accesses) it is important to have a rescue plan in case of a medical emergency. Because these walkways are built in forest zones, municipalities must also have a warning system and ready-to-use resources to evacuate visitors in case of forest fire, in particular in the hot temperatures season. PRW has already suffered two fires that destroyed part of the walkways, fortunately without human casualties.

c) On the other hand, acknowledging Fossgard and Fredman's (2019) advices about crowd management, it is imperative to keep the moderation of demand through the access taxation. The assessment of use value revealed that visitors are willing to pay 3,56 (MRW) and 4,31 (PRW) euros more than the current the ticket prices, which represents a high consumer surplus. An eventual increase of the ticket price is possible but it should follow the implementation of all the suggested improvements.

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