



## Legacies of an international multi-sport event: association with negative legacy

*Legados de un evento internacional multideportivo: asociación con el legado negativo*

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### Resumen

**Introducción:** este artículo analiza la asociación de los diferentes tipos de legado con el legado negativo generado por los Juegos Panamericanos Junior Cali 2021.

**Objetivo:** comprender las relaciones entre las distintas dimensiones del legado (socioeconómico, imagen internacional de la ciudad anfitriona, deportivo y ambiental) y el posible legado negativo que los eventos internacionales multideportivos pueden generar en las ciudades anfitrionas.

**Metodología:** se realizó una encuesta a 666 participantes de los Juegos Panamericanos Junior Cali 2021, los datos fueron analizados mediante un modelo de ecuaciones estructurales para identificar las relaciones entre los diferentes tipos de legado.

**Resultados:** los resultados muestran que los legados socioeconómico y deportivo presentan asociaciones positivas y estadísticamente significativas con el legado negativo, lo que indica que, pese a considerarse beneficiosos, pueden generar efectos adversos. Por el contrario, el legado relacionado con la imagen internacional de la ciudad se asocia negativamente con el legado negativo, sugiriendo que una mejor percepción externa puede mitigar impactos locales desfavorables. Además, no se encontró una relación estadísticamente significativa entre el legado ambiental y el legado negativo.

**Discusión:** este estudio aporta a la investigación sobre legado al mostrar que los resultados positivos generados por los eventos deportivos pueden coexistir con, o incluso intensificar, las percepciones negativas en las ciudades anfitrionas.

**Conclusión:** se concluye que los legados socioeconómico y deportivo no siempre son percibidos de manera positiva; el legado asociado con la imagen internacional de la ciudad cumple un papel mitigador, y el legado ambiental no genera un impacto perceptible sobre el legado negativo.

### Palabras clave

Efectos negativos; eventos deportivos; legado; modelado de ecuaciones estructurales.

### Abstract

**Introduction:** this article analyzes the association between the different types of legacy and the negative legacy generated by the Cali 2021 Junior Pan American Games.

**Objective:** understand the relationships between the different dimensions of legacy (socioeconomic, international image of the host city, sports legacy, and environmental) and the potential negative legacy that international multi-sport events can generate in host cities.

**Methodology:** a survey was conducted to 666 participants of the Cali 2021 Junior Pan American Games, and the data were analyzed using a structural equation model to identify the relationships among the different types of legacy.

**Results:** the results show that both the socioeconomic and sports legacies have positive and statistically significant associations with the negative legacy, indicating that although they are often considered beneficial, they may also produce adverse effects. In contrast, the legacy related to the city's international image is negatively associated with the negative legacy, suggesting that a stronger external perception can mitigate unfavorable local impacts. Additionally, no statistically significant relationship was found between the environmental legacy and the negative legacy.

**Discussion:** this study advances legacy research by demonstrating that the positive outcomes generated by sport events can coexist with, or even intensify, negative perceptions in host cities.

**Conclusions:** the study concludes that the socioeconomic and sports legacies are not always perceived positively, the legacy of the city's international image plays a mitigating role, and the environmental legacy does not generate a perceptible impact in relation to the negative legacy.

### Keywords

Legacy; negative effects; sports events; structural equation modeling.

## Introduction

International multi-sport events, such as the European and Pan American Games, have emerged as significant development drivers for host cities and countries (Espinal-Ruiz et al., 2021). This has sparked the interest of governments, organizing committees, policymakers, and other stakeholders in forging meaningful legacies through international multi-sport events (Thomson et al., 2013). The legacy of such events encompasses both planned and unplanned effects, which can be both tangible and intangible, positive and negative, and which persist beyond the conclusion of the event (Gratton & Preuss, 2008; Preuss, 2007, 2018; Scheu & Preuss, 2018). Chalip (2006) highlights that legacies emerge when stakeholders actively leverage events to secure long-term benefits. Girginov & Hills (2008) stress their role in fostering sustainable participation and organizational growth. Cashman (2003) describes legacy as both tangible and intangible inheritances, from infrastructure to cultural memory, that can be positive or negative. For Leopkey & Parent (2017), legacy is shaped by governance networks and evolves into sustainable outcomes over time (Zhao & Yu, 2025). Grix et al., (2017) argue that legacy also encompasses soft power, whereby states leverage mega-events to enhance international reputation, diplomacy, and nation branding.

International multi-sport events are often associated with several positive legacies, including the creation of employment opportunities and increased tourism (Aguado et al., 2017; Daniels & Norman, 2003; Ferreira et al., 2018), community engagement and social cohesion (Santos, 2019; Hoyos et al., 2025), increased sports participation, improved sports infrastructure, talent development (Attwell et al., 2019), sustainability practices and environmental protection (Carbonell-García et al., 2023), intercultural appreciation (Sebata, 2016), strengthening of governance structures, public policy development, and international relations (Horne, 2018). Barcelona 1992 is widely regarded as one of the most emblematic examples of Olympic legacy, showcasing how a mega-event can drive long-term urban, social, and economic transformation. The Games catalyzed a profound urban renewal that redefined the city's global image and positioned Barcelona as a leading tourist and cultural destination (Aragón-Pérez, 2019; Baroghi & Ribeiro, 2024).

A substantial body of research supports the positive legacy of international multi-sport events. However, some studies have raised concerns regarding the capacity of these events to generate positive and sustainable legacies (Byers et al., 2020; Koenigstorfer et al., 2019). Among the adverse legacies associated with such events are increased pollution and resource depletion (Zhang et al., 2020), increased greenhouse gas emissions (Wicker, 2019), a notable lack of sustainable practices (Golob et al., 2015), and the imposition of substantial financial burdens on the cities or countries that host these events, which may result in exorbitant costs and enduring debt (Flyvbjerg et al., 2020; Nair, 2021). Moreover, these events can trigger the displacement of communities within urban areas (Preuss, 2011), create challenges related to overcrowding and congestion, and lead to increased prices for goods and services (Csobán & Serra, 2014).

The literature on different legacies and their association with the negative legacy of international multi-sport events remains inconclusive. This uncertainty can be attributed to an insufficiently clear definition of "legacy" (Swart et al., 2011), the diverse temporal frameworks used for legacy assessment (Cleland et al., 2019), the multifaceted nature of the legacy of international multi-sport events (Thomson et al., 2013), methodological shortcomings in research designs (Kokolakakis et al., 2019), and the discrepancies between policy rhetoric and measurable outcomes (Annear et al., 2019). In order to address these gaps, the present study seeks to establish a comprehensive connection between the different legacies that can be attributed to an international multi-sport event and the negative legacy that these can generate in the distinctive context of the inaugural Junior Pan American Games, which were held in Cali, Colombia in late 2021. This research aims to understand the relationships between the different dimensions of legacy (the socioeconomic legacy, the international image legacy of the host city, the sports legacy, and the environmental legacy) and the potential negative legacy that international multi-sport events can generate in host territories.

## Literature review and hypothesis formulation

Evidence indicates that the organization of international multi-sport events can impact a nation's economy, although these effects may vary (Idrees et al., 2021). Such events have the potential to create a

socioeconomic legacy for the host city by stimulating economic benefits, promoting tourism, and expanding trade and employment opportunities (Sunarti et al., 2025; Surahman et al., 2025; Giulianotti et al., 2015). However, some studies suggest that the perceived socioeconomic legacy of international multi-sport events may be overstated, given the tendency to exaggerate the induced effects on local economies (Du & Zhang, 2021). Nevertheless, international multi-sport events still contribute significantly to the socioeconomic legacy. While the organization of international multi-sport events offers significant potential for economic regeneration, it also presents challenges in reliably assessing their contributions to the host city (Kim, 2020). These events can have positive and negative impacts (Duan et al., 2020). Negative externalities associated with such events include the forced relocation of communities, financial losses to local businesses, and various social costs (Jones, 2008). In addition, international multi-sport events can exacerbate imbalances between public and private sector revenues (Lintumäki et al., 2020), potentially leading to financial deficits and substantial economic expenditures (Njoroge et al., 2017).

International multi-sport events can negatively impact host communities by imposing economic burdens such as increased local taxes due to the construction of facilities, price inflation, and mismanagement of public funds (Adelowo, 2022; Ranjan, 2016). In addition, the disparity in sports development between rural and urban areas and the high cost of using new facilities can further exacerbate the negative legacy of international multi-sport events (Wang & Theodoraki, 2007). Individuals may positively associate the socioeconomic legacy of an international multi-sport event with the negative legacy of the event. For instance, while the event may lead to significant socioeconomic development in the city, it may also lead to increased prices for goods and services and increased congestion issues. Consequently, the prosperity and growth generated by the event could be accompanied by significant challenges for the local population. Therefore, a first hypothesis is proposed:

H1. The socioeconomic legacy is positively related to the negative legacy of an international multi-sport event.

An international multi-sport event could display a positive or negative international image of the host city (Hayday et al., 2016). The residual effects of this image can have lasting implications for the host city and the nation at large (Thomson et al., 2021). Flyvbjerg (2014) suggests that most international multi-sport events since the 1970s have generated some level of controversy. The international image of the host city of an international multi-sport event could be negative if issues such as mismanagement of public funds, corruption, and lack of transparency in decision-making processes are observed (Grix, 2013). In addition, the considerable financial resources allocated to these events often become an arena for political contestation, affecting governance frameworks and public trust (Horne, 2018) and posing significant risks to the international reputation of the host city (Könecke & Nooij, 2022). The international image legacy of the host city of international multi-sport events can even extend to critical human rights considerations, where these events can either promote positive human rights practices or contribute to their erosion (Adams & Piekarz, 2015).

A positive international image of the city may indicate effective management in the organization of the international multi-sport event. This perception can help reduce public concerns about negative legacies associated with the event. For instance, if people perceive that the organizers (including politicians, the state, and private companies) performed well in organizing the event, they are more likely to trust that these same organizers are committed to mitigating negative outcomes, such as price inflation and increased congestion in the city. Therefore, a second hypothesis is proposed:

H2. The international image legacy of the host city is negatively related to the negative legacy of an international multi-sport event.

International multi-sport events have the potential to establish a sports legacy by promoting increased participation in sports within the community (Dickson et al., 2020; Orchard & Orchard, 2016). They can also encourage more significant support from various stakeholders, including government entities and private companies, for sports organizations (Nordhagen, 2021; Espinal-Ruiz et al., 2023; Chávez-Hernández et al., 2025) and lead to developing more sports facilities in the city (Hodgetts & Duncan, 2015). However, the construction of new sports facilities can raise concerns among the public about potential negative impacts, such as underutilization, increased maintenance costs, and the risk of facilities becoming abandoned, commonly referred to as “white elephants” (Azzali, 2019; Mitrofanova et al., 2015; Orr

& Jarvis, 2018). In addition, financial support for sports organizations from stakeholders such as government and private companies may be viewed by residents as a burden that they will ultimately have to bear through taxes or increased prices for goods and services. This perception could exacerbate negative views of the legacy of such events. Therefore, a third hypothesis is proposed:

H3. The sports legacy is positively related to the negative legacy of an international multi-sport event.

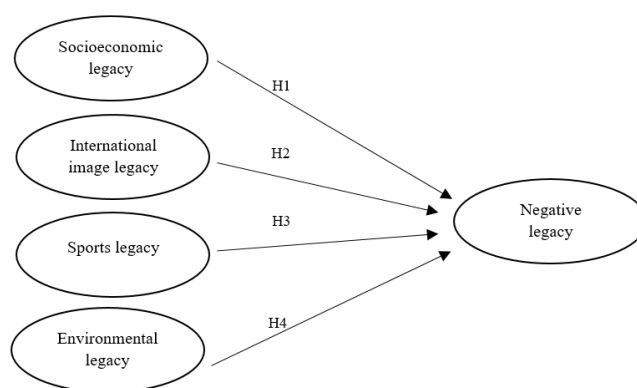
Economic evaluations often overshadow environmental criteria for international multi-sport events. This oversight can lead to a reduced emphasis on sustainability and inadequate consideration of long-term ecological impacts (Cleland et al., 2019). Inadequate planning and execution of international multi-sport events can result in a negative environmental legacy for the host city (Carbonell-Garcia et al., 2023), including increased waste generation, higher energy consumption, and elevated carbon emissions (Orchard & Orchard, 2016; Wicker, 2019). A negative environmental legacy affects local communities through increased pollution, disorganized urban development, a larger ecological footprint, destruction of wildlife habitat, and depletion of natural resources. These impacts result from the construction and operation of event infrastructure, leading to lasting negative environmental consequences (Graeff et al., 2021; Samuel & Stubbs, 2012).

The environmental legacy of international multi-sport events can extend beyond the duration of the events, significantly influencing adjacent areas and ecosystems (Teare & Taks, 2021). Insufficient incorporation of environmental protection measures into the planning and execution of these events can also lead to adverse effects on cultural heritage and historical sites if not properly managed (Lin & Lu, 2020). While there is a compelling need to establish a positive environmental legacy from an international multi-sport event, some individuals may perceive this potential improvement as a financial burden that residents will ultimately bear through elevated taxes or increased prices for goods and services. Such perceptions could promote a negative legacy associated with the event. Therefore, a fourth and final hypothesis is proposed:

H4. The environmental legacy is positively related to the negative legacy of an international multi-sport event.

Figure 1 presents the resulting proposed conceptual model, which establishes a link between the legacy dimensions of international multi-sport events and the negative legacy that can result from these events.

Figure 1. Proposed conceptual model.



Source: The authors.

## Method

Cali is frequently recognized as the sports capital of America (Aces Europa, 2019). Historically, the city has hosted numerous major international sporting events, cultivating a favorable perception among its inhabitants regarding the sustainable legacy these events confer on urban development (Espinal-Ruiz et al., 2021). Consequently, public policy directed at sports development in Cali seeks to harmonize the planning of sporting events with broader goals for territorial development (District Council of Santiago

de Cali, 2022). The city hosted the inaugural Junior Pan American Games (JPAG), which took place from November 25 to December 5, 2021. The first version of any international multi-sport event creates a distinctive study context, as the organizers and the different audiences often experience uncertainty regarding the potential legacy of such events. The first version of the JPAG involved the participation of over 3,500 athletes aged 14 to 22 from 41 countries across the Americas, competing in 27 different sports disciplines. The event drew an audience of over 300.000 spectators and generated an estimated economic impact of US\$216 million. A survey of the city's residents revealed that 53% of respondents perceived the event as contributing to revenue generation for the municipality, while 56% acknowledged an enhancement in civic pride and a sense of belonging within the community (CIEC, 2022).

### Participants

The participant composition of the JPAG Cali-2021 legacy study reveals a strong predominance of local residents (68,2%), reflecting the centrality of community perceptions in assessing long-term impacts. By contrast, international (2,5%) and national tourists (6,5%) were less represented, which may limit insights into the external visibility and touristic legacy of the event. Athletes (5%) and event staff (7,5%) provided perspectives closely tied to organizational and experiential dimensions, while the inclusion of other stakeholders (10,4%) broadened the scope to governance, business, and institutional actors. Table 1 shows the characteristics of the sample.

The study used a survey technique based on a structured questionnaire, employing convenience sampling. This sampling method was chosen because structural equation modeling (SEM) does not require probability sampling (Henseler et al., 2015). Surveys were conducted using a structured questionnaire designed on a digital platform, which was disseminated in person at the sports venues during the international multi-sport event. All participants were attendees of the sports competitions and were approached with comprehensive information about the study's aims. In the end, a total of 666 fully completed questionnaires were obtained. Throughout the data collection process, participants were informed of the anonymous nature of their responses and were advised that there were no right or wrong answers, encouraging them to respond as honestly as possible (Malhotra et al., 2017).

Table 1. Sample characteristics

Characteristics	Frequencies	Percentage
<i>Gender</i>		
Female	342	51,4
Male	321	48,2
Other	3	0,5
<i>Age (years)</i>		
Up to 25	360	54,0
26-35	119	17,9
36-45	79	11,9
46-55	56	8,4
Over 55	52	7,8
<i>Education level</i>		
Secondary education	203	30,5
Undergraduate studies	363	54,5
Graduate studies	100	15,0
<i>Country of origin</i>		
Colombia	586	88,0
Other countries	80	12,0

Source: The authors.

### Procedure

The present study aimed to empirically examine a conceptual model that links the different legacies associated with the 2021 JPAG held in Cali, Colombia, to the negative legacy generated by this international multi-sport event. The survey instrument consisted of 24 items designed to assess different dimensions of legacies associated with international multi-sport events. A five-point Likert scale was adapted from the relevant scientific literature to evaluate the constructs used in this research. Participants indicated their level of agreement or disagreement with each statement using the following scale: 1, indicating "strongly disagree," and 5, indicating "strongly agree".





The socioeconomic legacy was measured using a 9-item scale adapted from Calabuig et al., (2014), Parra et al., (2016), and Kaplanidou (2012). The sport legacy was measured using a 4-item scale derived from the study by Calabuig et al., (2014) and Año et al., (2014). The negative legacy was measured using a 5-item scale adapted from Ma et al., (2011) and Calabuig et al., (2014). The environmental legacy was measured using a 3-item scale adapted from Calabuig et al., (2014) and Karadakis and Kaplanidou (2012). Finally, the international image legacy of the host city was measured using a 4-item scale adapted from the works of Liu et al., (2014), Karadakis and Kaplanidou (2012), and Calabuig et al., (2014). The entire questionnaire was administered in Spanish and included variables describing the sociodemographic characteristics of the sample, such as sex, age, education level, and country of origin.

### Data analysis

The analysis adopted a two-stage process to develop and evaluate the model. In the first stage, the measurement model was developed using confirmatory factor analysis (CFA). In the second stage, the hypothesized relationships were evaluated using structural equation modeling (SEM). Confirmatory factor analysis (CFA) was performed using AMOS statistical software to measure the unidimensionality of the constructs. During the model fitting process, the factor loadings associated with each construct included in the questionnaire were reviewed. Factor loadings below 0,6 were then discarded. Following the recommendations of Bagozzi and Heatherton (1994), the items “The Cali 2021 Junior Pan American Games provided opportunities for workforce training and improved business skills in the city”, and “The Cali 2021 Junior Pan American Games will bring great benefits to the neighborhoods in the area where the event is held” were removed from the socioeconomic legacy construct. In addition, the item “Citizens had the opportunity to participate in the organization of the Cali 2021 Junior Pan American Games” was removed from the sport legacy construct. Finally, two items were removed from the negative legacy construct: “The image and reputation of the city will be affected by the disuse of certain facilities and infrastructure built to celebrate the Cali 2021 Junior Pan American Games”, and “Since the Cali 2021 Junior Pan American Games, the city has experienced increases in taxes, assets, patrimony, and capital”.

## Results

The first Junior Pan American Games held in Cali in 2021 brought together 3.500 athletes from 41 countries across the Americas, with Brazil (59 gold medals), Colombia (48), and the United States (47) leading the medal standings. The event attracted an estimated 302.874 spectators, including 9.185 international tourists (30%), 39.609 domestic tourists (13,1%), and 254.080 local residents (83,9%). Among attendees, 51,5% identified as male, 46,1% as female, and 2,5% as another gender, with average ages of 35,6 years for residents, 38 for domestic tourists, and 37 for international visitors. In economic terms, spectator spending of USD 9,6 million generated an induced demand of USD 57,7 million, while organizational expenditures of USD 28 million produced an induced demand of USD 159 million. Overall, the total induced economic impact reached USD 216.8 million (CIEC, 2022).

These descriptive results provide a contextual foundation for understanding the scope and economic relevance of the event, which in turn informed the subsequent measurement and validation of the constructs employed in the structural model. Table 2 shows the factor loadings and Cronbach's alphas, all exceeding 0,7 for the five constructs used. The model evaluation demonstrates an overall satisfactory fit to the data, meeting the conventional thresholds established in the SEM literature (Hair et al., 1994).

Table 2. Constructs and items of the questionnaire

Constructs and Items of the questionnaire	Standardized factor loadings	Cronbach's alpha
SOCIOECONOMIC LEGACY, adapted from Calabuig et al., (2014), Parra et al., (2016), and Kaplanidou (2012).		0,856
The Cali 2021 Junior Pan American Games generated significant economic benefits for the city.	0,688	
The Cali 2021 Junior Pan American Games increased tourism during the event.	0,681	
The Cali 2021 Junior Pan American Games stimulated local trade and business.	0,754	
The Cali 2021 Junior Pan American Games provided opportunities for workforce training and improved business skills in the city.	Item removed	
The Cali 2021 Junior Pan American Games increased investment opportunities in the city.	0,612	
The Cali 2021 Junior Pan American Games increased opportunities for services and goods in the city.	0,669	



The Cali 2021 Junior Pan American Games improved the infrastructure and public spaces in the surrounding area.	0,773	
The Cali 2021 Junior Pan American Games increased residents' civic pride and sense of belonging.	0,738	
The Cali 2021 Junior Pan American Games improved social integration within the community.	0,813	
The Cali 2021 Junior Pan American Games will bring great benefits to the neighborhoods in the area where the event is held	Item removed	
SPORT LEGACY, adapted from Calabuig et al., (2014) and Año et al., (2014).		0,912
The Cali 2021 Junior Pan American Games Cali 2021 increased interest in sports activities throughout the city.	0,835	
The Cali 2021 Junior Pan American Games promoted volunteerism and sports activities in the city.	0,702	
The Cali 2021 Junior Pan American Games contributed to a notable increase in recreational and sports activities in the city.	0,763	
Citizens had the opportunity to participate in the organization of the Cali 2021 Junior Pan American Games.	Item removed	
NEGATIVE LEGACY, adapted from Ma et al., (2011) and Calabuig et al., (2014).		0,758
Since the celebration of the Cali 2021 Junior Pan American Games, the city has experienced increased traffic and mobility issues.	0,635	
Since the celebration of the Cali 2021 Junior Pan American Games, there has been an increased demand on the city's resources.	0,604	
Since the celebration of the Cali 2021 Junior Pan American Games, there has been a concerning increase in the misuse of certain facilities and infrastructure built for the event.	Item removed	
Since the celebration of the Cali 2021 Junior Pan American Games, there has been an increase in social injustice and inequality in the city.	0,638	
Since the Cali 2021 Junior Pan American Games, the city has experienced increases in taxes, assets, patrimony, and capital.	Item removed	
ENVIRONMENTAL LEGACY, adapted from Calabuig et al., (2014) and Karadakis & Kaplanidou (2012).		0,856
Since the celebration of the Cali 2021 Junior Pan American Games, the city's environmental issues have increased (waste management, water quality, and soil degradation, among others).	0,839	
Since the celebration of the Cali 2021 Junior Pan American Games, there have been growing concerns regarding the preservation of the city's natural heritage.	0,897	
Since the celebration of the Cali 2021 Junior Pan American Games, there have been positive efforts to promote environmental education and highlight the importance of the city's biodiversity.	0,785	
INTERNATIONAL IMAGE LEGACY OF THE HOST CITY, adapted from Liu et al., (2014), Karadakis & Kaplanidou (2012) and Calabuig et al., (2014).		0,872
The Cali 2021 Junior Pan American Games enhanced the city's global image.	0,832	
The Cali 2021 Junior Pan American Games established a distinct identity for the city, reflecting its respect and hospitality to international visitors.	0,809	
The Cali 2021 Junior Pan American Games positioned Cali as a viable tourist destination.	0,852	
The Cali 2021 Junior Pan American Games demonstrated the city's ability to effectively host and organize large-scale events.	0,737	

Source: The authors.

The results of discriminant and convergent validity are presented in Table 3. Regarding discriminant validity, the average variance extracted (AVE) for each construct was compared to the squared correlations between pairs of constructs. The data in Table 3 indicate that the AVE values for all constructs exceeded the squared correlations between the respective pairs of constructs, thus supporting the discriminant validity of the measures used. Regarding convergent validity, all Composite Reliability (CR) values were more significant than the threshold of 0,7, and the AVE values for all constructs exceeded the minimum criterion of 0,5. In addition, the results of the confirmatory factor analysis (CFA) measurement model showed an acceptable fit, as evidenced by the following statistics:  $\chi^2$  (160 df) = 596.852, RMSEA = 0,064, NFI = 0,924, IFI = 0,943, TLI = 0,925, and CFI = 0,943 (Hair et al., 1994).

Table 3. CFA, discriminant, and content validity

	CR	AVE	MSV	MaxR (H)	Environmental legacy	Socioeconomic legacy	International image legacy of the host city	Sports Legacy	Negative legacy
Environmental legacy	0,862	0,678	0,412	0,884	0,823				
Socioeconomic legacy	0,860	0,506	0,475	0,861	0,467	0,711			
International image legacy of the host city	0,906	0,660	0,613	0,910	0,555	0,689	0,812		
Sports legacy	0,875	0,637	0,613	0,883	0,642	0,614	0,783	0,798	
Negative legacy	0,722	0,571	0,131	0,777	0,295	0,291	0,206	0,362	0,755

Source: The authors.



The structural model fit was acceptable [ $\chi^2(160df) = 596.852$ , RMSEA = 0,064, NFI = 0,924, IFI = 0,943, TLI = 0,925, CFI = 0,943] (Hair et al., 1994). The results indicate that the model has an  $R^2$  of 17,7%. Table 4 shows that the socioeconomic legacy is positively associated with the negative legacy ( $\beta = 0,387$ , p-value < 0,001), supporting Hypothesis 1. Conversely, the international image legacy of the host city is negatively associated with the negative legacy ( $\beta = -0,583$ , p-value = 0,004), supporting Hypothesis 2. Furthermore, the sports legacy is positively associated with the negative legacy ( $\beta = 0,621$ , p-value < 0,001), supporting Hypothesis 3. The results do not show a statistically significant association between the environmental legacy and the negative legacy (p-value > 0,05), meaning that Hypothesis 4 is not supported.

Table 4. Structural model

Hypothesis		Estimate	S.E.	C.R.	P. value	Result
Negative L.	<--- Socioeconomic legacy	,387	,134	2,897	,004	Supported
Negative L.	<--- International image legacy of the host city	-,583	,166	-3,516	***	Supported
Negative L.	<--- Sports Legacy	,621	,139	4,473	***	Supported
Negative L.	<--- Environmental legacy	,127	,072	1,761	,078	Not Supported

Source: The authors.

The findings provide robust evidence for the validity and reliability of the measurement model, with both convergent and discriminant validity fully supported. The structural model demonstrated an acceptable fit across multiple indices, confirming the appropriateness of the hypothesized relationships. Importantly, the results highlight that socioeconomic and sports legacies are positively and significantly associated with negative legacies, whereas the international image legacy exerts a significant negative association, thereby mitigating detrimental effects. Conversely, the absence of a significant link between environmental legacy and negative legacy suggests that environmental outcomes may operate through alternative pathways not captured within the present model. Taken together, these findings underscore the complex and multidimensional nature of event legacies, emphasizing the need for policy interventions and strategic planning that balance positive and negative outcomes to ensure sustainable benefits for host city.

## Discussion

This study analyzes the association between the different legacies of an international multi-sport event and the potential negative legacy that may emerge in distinctive contexts, such as the inaugural Junior Pan American Games. The results provide an insightful perspective on the relationships among the various dimensions of legacy and the negative legacy that an international multi-sport event can generate.

The finding of a duality, a positive association between socioeconomic legacy and a negative legacy, confirms that economic benefits are not uniformly perceived favorably. Although the event generated a significant economic impact (USD 216.8 million) and infrastructure improvements, these advances were accompanied by negative externalities such as increased cost of living, urban congestion, and strain on public services. This result is consistent with previous studies, such as those by Giulianotti et al., (2015), which document how sporting events can exacerbate existing inequalities and generate economic burdens for local residents. In the context of Cali, a city with pre-existing structural challenges, the sudden surge in demand during the event appears to have intensified these tensions, suggesting that macroeconomic benefits do not necessarily translate into microeconomic improvements for the local population.

The finding that the socioeconomic legacy is positively associated with the negative legacy, while seemingly paradoxical, is consistent with the multifaceted nature of the legacies of international multi-sport events. Socioeconomic benefits, such as increased tourism and job creation, can coexist with negative aspects, such as rising prices for local goods and services and increased urban congestion. The study by Aguado et al. (2017) on the 2013 World Games in Cali supports this view, revealing that long-term challenges persist despite the initial socioeconomic benefits.

The results also showed a negative association between the international image legacy of the host city and the negative legacy. This suggests that effective management of a host city's international image





during the organization of an international multi-sport event can significantly mitigate the negative legacy perceived by individuals. Therefore, a positive international image of the host city resulting from such an event can mitigate its potential negative impacts.

The finding that the sports legacy is positively associated with the negative legacy underscores the challenges inherent in organizing international multi-sport events. The fact that sporting legacy was positively associated with negative legacy reveals an important paradox: the more that is invested in sports infrastructure and promotion, the greater the public concern can become about its sustainability. The construction of new facilities, while essential, can result in underutilization and onerous maintenance costs, a phenomenon commonly referred to as “white elephants,” as extensively documented in the academic literature (Azzali, 2019; Mitrofanova et al., 2015). In addition, inadequate planning for the post-event use of these facilities, as evidenced by the case of the Toronto 2015 Pan American Games (Orr & Jarvis, 2018), can increase public perceptions of a negative legacy.

The finding that the environmental legacy is not associated with the negative legacy suggests that initiatives aimed at minimizing environmental impacts may not significantly affect public perceptions of the negative legacy associated with international multi-sport events. This observation is consistent with the critique offered by Orchard and Orchard (2016), which highlights the need for more robust evidence to support the positive environmental legacy of these events. This could be explained by several factors: first, environmental initiatives may be less visible or considered secondary to immediate socioeconomic concerns; second, there may be widespread skepticism about the authenticity of environmental commitments at large-scale events; and third, environmental impacts may manifest themselves over longer periods than those considered in this study. It also highlights the need for a more comprehensive integration of sustainable practices throughout all phases of the planning and execution of these events. Furthermore, the lack of significance could reflect a gap between the intended environmental objectives of large-scale events and their actual implementation, as host cities may emphasize infrastructural or symbolic initiatives without ensuring long-term ecological accountability.

## Conclusions

This study provides valuable insights into the complex relationship between the different legacy dimensions and the negative legacy associated with the Cali 2021 Junior Pan American Games. The results emphasize the importance of adopting a holistic approach when planning and executing international multi-sport events. It is critical to consider each legacy dimension generated by such events, the potential connections between these dimensions, and the negative legacy that can result from international multi-sport events.

Although the socioeconomic and sporting legacies are positive for the residents of the host city, the results suggest that when organizing an international multi-sport event, it is necessary to communicate to the population that these two legacies will not generate negative legacy effects, such as increased prices for goods and services or congestion issues. Organizers should prioritize the mitigation of these negative impacts and communicate their efforts to the community. This research also shows that the international image legacy of the host city is negatively associated with the negative legacy. Therefore, it is critical to emphasize building or enhancing the international image of the host city during the planning and communication processes of international multi-sport events. Regarding the environmental legacy, the absence of a significant association with negative legacies suggests that its impact may be indirect, long-term, or mediated by contextual factors not addressed in the current model. This highlights the need for future studies to adopt broader and longitudinal perspectives to better capture environmental outcomes.

The substantial involvement of different stakeholders in the planning and communication of international multi-sport events, along with effective strategic planning aimed at developing the international image of the host city and ensuring the sustainable use of new facilities after the event, and the generation of new approaches to socioeconomic development and sustainability, could be crucial in mitigating the negative legacy of this type of event as perceived by individuals. These results underscore the multidimensional and complex nature of event legacies, highlighting that not all legacy domains influence outcomes in the same way. The evidence calls for a more balanced and strategic approach to legacy

management, where host cities and policymakers carefully design interventions to amplify positive effects while minimizing negative consequences, thereby ensuring sustainable benefits from large-scale sporting events.

Altogether, these results challenge the simplistic notion that “positive” legacies necessarily reduce negative perceptions. Conversely, they suggest that certain positive legacies can coexist or even exacerbate negative perceptions, depending on how they are managed, communicated and contextualized. The evidence supports a more nuanced approach to sport event legacy, where managing trade-offs (scarce resources) and trade-offs between different legacy dimensions becomes a strategic priority.

Decision makers and further research could explore new strategies and approaches to address the different legacies of international multi-sport events. The unique context of the first Pan American Youth Games in Cali offers valuable insights for legacy theory. The predominance of local participants (68,2%) in the sample reinforces the validity of the reported perceptions, but also limits their generalizability to contexts with a greater influx of international tourists. The explanatory model ( $R^2 = 17,7\%$ ) suggests that, although the dimensions considered capture important aspects of the phenomenon, there are other factors or variables not measured and to be considered in future research (e.g., attitude towards the event, attitude towards the city, image of the government in office, image of the event organizers or international organizations and specific socioeconomic and sociodemographic variables) that influence the perception of a negative legacy.

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