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Sustainable Tourism in Public Marketplaces: Resident Perceptions of Transportation Issues in a Latent Class Analysis

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ABSTRACT

Public markets represent urban places capable of contributing to local economies but also spaces in which tourism sustainability can be compromised by visitor flows. This study explored heterogeneity in resident perceptions of tourism sustainability at the Mercato di Luino, a historic market in Northern Italy, with particular attention to the role of transportation-related issues. Using a sample of 742 residents and market users, we applied latent class analysis to identify distinct groups based on their perceptions of the socio-cultural, economic, and environmental dimensions of the shopping space sustainability. A distinctive feature of the study is the comparison of models in the absence and presence of transportation-related characteristics. Besides finding that residents can be classified into three latent classes segmented in terms of sustainability perceptions, the inclusion of transport-based predictors has strikingly altered class membership probabilities. The results showed that mobility issues experienced in market days can play a crucial role in shaping resident attitudes toward tourism sustainability in public open-air marketplaces, with implications for urban and tourism planning.

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1. Introduction

In the modern tourism domain, the interaction between tourists and resident populations extends beyond economic transactions to encompass complex social, economic, and environmental dimensions (United Nations, 2020). This multidimensional interaction has acquired increasing relevance in the debate on tourism sustainability, where the well-being of local communities is widely recognized as a fundamental element of a truly sustainable tourism development model (UNWTO, 2018). While the positive impacts of tourism are typically linked to economic benefits, such as employment, infrastructural investments, and the revitalization of urban areas, several negative externalities may include social costs related to pressure on fragile sites and undesired sociocultural effects, as well as critical environmental issues including air pollution, noise pollution,

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and consequences of road traffic (Meleddu, 2013; Sharma & Dyer, 2009; Šegota et al., 2024).

Although the United Nations 2030 Agenda for Sustainable Development has emphasized the critical importance of sustainable cities and communities under Goal 11, it is still important to stress that urban environments must serve both residents and visitors equitably. Moreover, as Goal 11 talks about more efficient transport and reduced air pollution, this duality triggers the necessity of better understanding how transportation systems influence resident perceptions of tourism sustainability. Among various types of urban environments, limited attention has been so far devoted to the role of public (open-air) markets in understanding sustainability and transportation-related issues at the local level, even though those spaces are unique urban spaces that integrate different stakeholders, i.e. institutions, vendors, tourists, and residents, to promote local economies (Schappo & van Melik, 2017; Watson, 2009). Notably, following the triple bottom line approach of sustainability (Elkington, 1998), public markets display positive impacts on sustainability through multiple dimensions, i.e. economic sustainability through the restructuring of local economies and support for small-scale entrepreneurship; social sustainability through *community ethos* and strengthening of social bonds; and environmental sustainability through the promotion of ecological awareness and valorization of local products (Morales, 2009; Spitzer & Baum, 1995; Visconti et al., 2014). Yet negative externalities correlated with public market activities and often due to transportation choices are clearly observable by residents and users, especially in the case of markets attractive for tourists, making such spaces ideal contexts also for studying transport-related sustainability issues (Janssens & Sezer, 2013; Morales, 2011).

Acknowledging that public markets are relevant case studies where residents, tourists, and transportation issues are present, this study addresses two interconnected research questions. First, we investigate what perspectives residents hold about the tourism-driven sustainability of public markets and the possibility to segment different groups of local community users based on perceived sustainability dimensions, including socio-cultural, economic, and environmental domains. Second, we examine how resident perspectives might be inherently influenced by transport-related issues and whether having information on transport choices and issues might improve the understanding of resident perceptions. In order to adequately capture the interplay between tourism impact on public markets and transport implications, as empirical context for this research, we take into consideration the Mercato di Luino, a historic open-air public market in the North-West of Italy that represents an excellence of the Lombardy Region territory for residents but also a tourist attraction for foreign visitors. In particular, following other similar case studies (e.g. see Visconti et al., 2014), the Mercato di Luino's long history and its significance as a commercial and tourist destination, combined with the fact that Luino is a medium-small town where congestion and flow-related issues are easily recognizable, provides an ideal ground for exploring tourism sustainability and transportation issues from residents' perspectives that are highly localized in time and place (Almeida García et al., 2015).

The remainder of the paper is organized as follows. Section 2 reviews the relevant literature. Section 3 illustrates the methodology and the study context together with data collection. Section 4 displays and discusses the study results, and Section 5 concludes the paper with policy implications.

2. Literature review

2.1. Residents' perceptions on tourism sustainability

Beyond the seminal paper by Budowski (1976) on tourism and the environment, in the last forty years, the relationship between tourism development and local communities has been widely studied, highlighting both positive and negative consequences across various fields (Ap, 1992; Johnson et al., 1994). Early conceptual frameworks, such as Butler's (1980) Tourism Area Life Cycle (TALC) model, have suggested that resident attitudes evolve as destinations progress through different phases of tourism development, from initial enthusiasm to possible conflict when negative impacts seem to exceed benefits. In fact, as argued in Cooper et al. (2005), while positive effects are often of an economic type, many harms involve socio-cultural and environmental domains, such as ecological degradation and cultural disruption. Other studies explored residents' perceptions of the impact of tourism on emotional solidarity (Seo et al., 2021), quality of life and happiness (Godovykh et al., 2023), and place attachment and attitude (Rivera et al., 2016). Also, different approaches have recognized that residents' points of view are heterogeneous rather than uniform, with community segments holding unlike views based on their individual circumstances, values, and relationships with tourism (Lindberg & Johnson, 1997).

From a theoretical perspective, most of the research on residents' attitudes about tourism has been based on the social exchange theory (SET) models by Perdue et al. (1990) and Ap (1992), suggesting that individuals assess the costs and benefits of tourism relative to their personal condition and develop attitudes based on the "perceived" balance of exchange, while later research emphasized the importance of subjective well-being and resident happiness as outcomes of tourism development (Nawijn & Mitas, 2012; Gursoy et al., 2002). This perspective has shifted attention from objective indicators of tourism impacts to residents' perceptions of how tourism might impact their lives, where tourism development and residents' well-being are raised by economic opportunities and community facilities, but this relationship is mediated by residents' engagement in tourism activities (Huh & Vogt, 2008; Uysal et al., 2012; Jurowski et al., 1997). While SET has become the most influential theoretical framework in tourism resident perception research, yet scholars have argued that early applications oversimplified the theory by focusing narrowly on costs and benefits while neglecting core constructs, such as trust between exchange actors (Nunkoo & Ramkissoon, 2011). Building on that, Rasoolimanesh et al. (2015) developed a revised SET framework integrating multiple factors influencing resident perceptions, including economic gain, community involvement in planning and management processes, community attachment, and environmental attitudes, with the main finding that community engagement in decision-making tends to empower residents. Notably, Gursoy et al. (2019) argued that residents distinguish between tourism's collective benefits to the community and personal benefits, stressing that family, community, and regional levels are underexplored. Recently, Šegota et al. (2024) conducted a literature review which suggested that future research should clearly distinguish between individual- and community-level effects, as well as residents' attitudes. More recent contributions have further emphasized the importance of examining residents' perceptions within a broader sustainability

governance framework, in which community stakeholders evaluate the impacts of tourism and the effectiveness of sustainability initiatives and policy responses (Andereck et al., 2025). This perspective highlights that residents assess tourism not merely in terms of economic costs and benefits, but through a multidimensional lens that incorporates environmental management, mobility systems, and long-term destination resilience. In particular, mobility-related pressures and climate-sensitive transport dynamics have increasingly been recognized as integral components of destination sustainability (Cavallaro et al., 2021). Indeed, starting from the need for multidimensional frameworks including considerations of socio-cultural, economic, and environmental sustainability (Elkington, 1998), the work by Lee and Jan (2019) emphasized that tourism sustainability has to encompass those dimensions from a community-based perspective for which, whereas individual characteristics are useful to profile residents, instead costs and benefits of tourism activity should be evaluated on a collective basis. Specifically, socio-cultural sustainability includes the maintenance and improvement of community well-being, social cohesion, and cultural identity (Cottrell et al., 2013; Rivera et al., 2016). Conversely, negative social impacts include crowding of public spaces, loss of cultural authenticity, conflicts between residents and tourists over the use of common resources, and alteration of daily routines (Dogan, 1989; Herrero et al., 2022). Economic sustainability refers to the capacity of tourism activities to generate durable economic benefits for local communities while maintaining long-term financial vitality. Positive impacts include employment and shopping opportunities and promoting local economies, while dependence on tourism revenues and drawbacks due to competition with external operators must be balanced (Nguyen et al., 2024). Finally, environmental sustainability tackles the ecological consequences of tourism activities, including consumption of natural resources, pollution in various forms (atmospheric, acoustic, water), and impacts on natural and built environments (Fennell, 2000; Lee & Jan, 2015). Although research has examined how residents perceive tourism development in their communities, it is thus recognizable that most of the theoretical frameworks have underscored the complexity of localized resident-tourism exchange relationships from a community perspective, especially from socio-cultural, economic and environmental dimensions.

2.2. Public open-air markets as tourist spaces

In general, public markets represent distinctive urban consumption spaces that function simultaneously as commercial centers, social meeting places, and increasingly prominent tourist attractions (Watson, 2009). The evolution of public marketplaces into tourism destinations reflects both the process of urban tourism development and the growing significance of experiential consumption in contemporary travel patterns (Morales, 2009). Understanding public markets within the tourism sustainability framework therefore requires examining their dual role as spaces serving resident communities and tourists, as well as the complex dynamics emerging from this shared usage (Snepenger et al., 2003). In urbanized contexts, the tourism dynamics have substantially altered how cities manage public spaces, shifting from sightseeing to what has been termed *life-seeing*, where tourists seek authentic local experiences within residential neighborhoods and everyday spaces (Ashworth & Page, 2011). This transformation has led to the emergence of a new urban tourism, characterized by tourists' desire to temporarily embed

themselves within local communities and experience destinations beyond conventional attractions. Within this domain, public markets have gained prominence as consumption spaces that offer tourists perceived authenticity and opportunities for cultural immersion while simultaneously serving resident populations' daily needs (Royo-Vela, 2009). Unlike purpose-built tourist facilities, markets indeed maintain their primary role as commercial venues while simultaneously becoming tourist attractions, and this twin feature creates unique dynamics where residents, vendors, and tourists negotiate shared space and potentially compete for access (Snepenger et al., 2003). More, the connection of public markets to local food systems, traditional commerce, and community life aligns with modern tourism demand patterns that privilege experiential and cultural tourism over standardized offerings (Crouch & Ritchie, 1999). Notably, public markets can extend tourist stays, distribute visitor spending more widely through local economies, and support small-scale entrepreneurship (Visconti et al., 2014), where the selling of local products supports regional production systems as well (Spitzer & Baum, 1995). However, research on resident perceptions has also documented concerns about overcrowding, changed product mix favoring tourist-oriented goods over everyday necessities, and price inflation associated with tourism development (Dyer et al., 2007; Fredline & Faulkner, 2000; Wang & Pfister, 2008; McGehee & Andereck, 2004). Not surprisingly, the spatial organization of tourism in public markets generates sustainability challenges. Public marketplaces typically concentrate large numbers of people in confined urban spaces during specific time periods, creating peaks in demand for transportation, parking, and urban services (Janssens & Sezer, 2013), with environmental impacts that extend beyond the immediate market area to affect surrounding neighborhoods (Lorde et al., 2011). Moreover, social dynamics within touristified public markets reflect broader tensions in urban tourism development, as social interactions might be altered, changing such shopping spaces from primarily community-oriented gathering places into more commercial, tourist-oriented venues (Schappo & van Melik, 2017). This shift may reduce opportunities for the social bonding and community cohesion (that public markets have likely historically facilitated), while simultaneously creating new forms of intercultural contact between tourists and residents (Andereck & Nyaupane, 2011). Therefore, the balance between public markets as *community spaces* versus public markets as *tourist attractions* represents a central tension in sustainable market management (Watson, 2009), and while market touristification may be less common than in other urban contexts such as historic centers (due to the stable presence of local users), the potential for public marketplaces to undergo similar transformations raises important sustainability questions, mainly if the ultimate goal is to maintain public markets as genuinely multi-functional urban spaces (Nunkoo & Ramkissoon, 2011).

2.3. Transportation and tourism sustainability

Another strand of literature covered in this research is that which relates tourism and transportation choices. In general, excluding the travel mode to reach destinations, while transport infrastructure enables tourism by providing intra-destination access, at the same time, it generates substantial environmental and social impacts that directly affect local communities and contribute to sustainability challenges (Prideaux, 2000). Hence, the interplay between transportation and tourism sustainability requires studying

multiple dimensions including broader accessibility, environmental impacts, social equity, and quality of life implications for destination residents (Weaver, 2007). Nonetheless, the expansion of tourism activities created significant transportation challenges at destinations, particularly regarding congestion and shared use of transport infrastructure by residents and visitors (Bergantino et al., 2023; Maltese et al., 2025), which can limit tourism development even in destinations with well-known natural or cultural attractions (Crouch & Ritchie, 1999). Transport-related impacts represent visible negative externalities of tourism development from residents' perspectives, and traffic congestion generated by tourist vehicles interferes with residents' daily mobility, extending commute times, complicating access to services, and creating frustration that can fundamentally shape attitudes toward tourism development (Dyer et al., 2007; Ko & Stewart, 2002). Beyond congestion and modal choice, the quality of public transport services constitutes an additional dimension influencing how residents experience tourism-related mobility pressures. Service reliability, frequency, stop configuration, passenger information systems, comfort, and safety have been identified as key operational indicators shaping user perceptions of public transport performance (Cordera et al., 2024; Nocera, 2010; Rodríguez et al., 2025). In contexts characterized by tourism peaks, deficiencies in these quality dimensions may amplify perceived negative externalities, even when overall transport supply is formally adequate. These impacts may disproportionately affect certain resident groups, particularly those who are dependent on private vehicles or those living in areas experiencing the highest tourism traffic volumes (Wang & Pfister, 2008). Equity dimensions emerge as tourism transportation impacts may be distributed unequally across communities, with some neighborhoods bearing major burdens over benefits (Andereck & Nyaupane, 2011). For instance, Saenz-de-Miera and Rosselló (2012) examined traffic congestion in Mallorca (Spain), pinpointing tourism as a key determinant of traffic congestion and revealing that tourist pressure strongly explains variations in traffic intensity across different road types, with seasonal fluctuations affecting local transportation networks. In this domain, the potential conflict between residents and tourists over shared transport services has emerged as a central concern. Bursa et al. (2022) investigated transport mode choice among tourists in Austrian destinations, finding that tourist traffic (which is more sensitive to travel times) coinciding with daily commutes leads to substantial disturbances for local communities. Regional studies have also explored residents' responses to tourism-related transport impacts. Curtale et al. (2024) adopted a stated-preference approach to investigate southern Switzerland's natural areas residents' and visitors' reactions to the hypothetical interventions to reduce the share of car users, where increased traffic congestion, lower air quality, and worsening of the destination's image perception are key negative externalities affecting destinations' appeal. As for the role of public transportation, Miravet et al. (2021) studied public transportation use among tourists in Mediterranean cities, demonstrating that the transportation mode chosen for reaching destinations decisively influences intra-destination mobility choices. Their findings suggested that promoting sustainable transport requires tailored strategies, as residents and tourists display different mobility behaviors and information needs. Concerning active mobility modes and tourism sustainability, Nilsson (2019) examined bicycle tourism development in Greater Copenhagen, establishing that bicycle tourism cannot be viewed separately from residents' everyday cycling practices, where the local biking culture and infrastructure developed primarily for residents

may enable urban bike tourism to flourish. Recent research has expanded the understanding of cross-modal dynamics as well. Zhou et al. (2024) examined urban travel mode choices among tourists in Chinese coastal cities, identifying heavy reliance on car travel as a significant contributor to environmental pollution and traffic congestion, while Zamparini et al. (2022) explored whether tourists' sustainable mobility habits transfer from home to destination contexts, demonstrating that individuals who adopt sustainable transport at home are more likely to use environmentally friendly modes at tourist destinations, with a direct impact on residents. Clearly, destinations offering well-integrated multimodal transportation systems can facilitate tourist mobility while potentially mitigating some negative impacts of tourism-related traffic (Le-Klähn et al., 2014). However, tourism development often occurs in areas where local transportation infrastructure was designed primarily to serve resident populations, creating capacity constraints and conflicts between resident and tourist transportation needs (Thompson, 2004). As far as transportation issues linked to residents' and visitors' coexistence, Italian destinations are elective examples of sustainability challenges. Crotti et al. (2023) explored the interplay between bicycle tourism and public transportation in Italian cities, finding that bike tourists' destination choices are positively influenced by available services and cycling infrastructure while being negatively affected by road traffic. Choi et al. (2025) analysed Venice's overtourism crisis, displaying how congested transport systems and high living costs have driven residents away from the historic center, revealing that Venice inhabitants declined due to tourism pressure, with transportation infrastructure struggling to accommodate residents and annual visitors. Maltese et al. (2025) explored multimodality intentions among domestic tourists considering visits to Rome. Surveying over 1,900 potential Italian tourists, their ordered probit models revealed that transport mode choice toward Rome, information availability, and tourists' age significantly influence willingness to use multiple transport modes at the destination, finding that reducing private motorized mobility through multimodal transport options can alleviate negative externalities while improving destination sustainability and attractiveness, suggesting the need for localized and integrated policies. Overall, the literature shows that tourism-generated transportation pressure on residents creates multiple challenges requiring integrated policy responses that balance visitor accessibility with resident well-being and urban environmental sustainability.

3. Methodology, study context and data

3.1. Methodology

This study adopts a segmentation-oriented analytical framework to investigate heterogeneity in residents' sustainability perceptions and to assess the role of transportation-related factors in shaping class membership. To do so, we followed the methodological approach based on Latent Class Analysis (LCA), which identifies unobserved subgroups within a population according to systematic patterns in observed responses (Magidson & Vermunt, 2004; Song & Shim, 2021). Compared to traditional clustering approaches such as K-means, LCA indeed enables the simultaneous estimation of classification and prediction of latent classes within a maximum likelihood framework (Weller et al., 2020). Overall, the choice of LCA, rather than exploratory or confirmatory factor analysis,

is directly linked to the objective of the study. While factor-analytic approaches are variable-centered techniques aimed at identifying latent constructs and modeling relationships among them under an assumption of population homogeneity, LCA explicitly allows for population heterogeneity and seeks to uncover discrete latent segments characterized by distinct response patterns (Collins & Lanza, 2010). This methodological perspective is thus consistent with the theoretical premise that residents cannot be treated as a homogeneous group when evaluating tourism sustainability.

The analytical strategy is structured into two interconnected components. First, a measurement model is estimated in order to define latent classes based on residents' evaluations of socio-cultural, economic, and environmental sustainability dimensions, operationalized through the indicators reported in Table 1. Second, a structural model is specified in which observable individual characteristics and mobility-related variables, presented in Table 2, are included as covariates to explain class membership probabilities. This dual specification allows the assessment of whether transportation-related variables modify the latent segmentation structure and influence the allocation of individuals across classes. The model estimation is conducted through maximum likelihood procedures, where competing specifications with different numbers of latent classes are compared using standard information criteria, including the Akaike Information Criterion and the Bayesian Information Criterion, which are widely employed in LCA model selection (e.g. Nylund et al., 2007). A distinctive feature of the empirical strategy adopted in this study is the comparison between two nested specifications. Model 1 includes sustainability indicators and socio-demographic covariates only, whereas Model 2 extends the structural component by incorporating transportation-related covariates. This comparative design enables an explicit evaluation of whether the inclusion of mobility-related information improves explanatory power and alters the distribution of class membership probabilities.

3.2. The context of the Mercato di Luino

The empirical application of the methodological framework described above is conducted in the context of the Mercato di Luino (onward, MdL). The MdL represents one of the most important historic markets in Europe and constitutes a particularly relevant case study for understanding the dynamics between tourism, sustainability, and transportation in a public open-air marketplace (see also Snaith & Haley, 1999). Located in Luino, a characteristic town in the province of Varese on the shores of Lake Maggiore, the MdL's origins date back to 1543, when Emperor Charles V of Habsburg granted the Borromeo family the privilege of organizing a weekly market in Luino. In the post-World War II period, proximity to Switzerland represented a further prerequisite for MdL's growth, and this international

Table 1. Residents' perceptions of sustainability dimensions of the MdL: descriptive statistics.

Sustainability dimensions	Likert scale evaluation (1 = Strongly disagree; 10 = Strongly agree)	Mean (SD)
Socio-cultural	Promotes cultural exchange between residents and tourists (<i>SOC_1</i>)	3.19 (3.36)
	Provides benefits to local cultural identity (<i>SOC_2</i>)	4.76 (3.93)
Economic	Creates commercial opportunities for residents and tourists (<i>ECO_1</i>)	8.15 (2.12)
	Promotes local economic development (<i>ECO_2</i>)	4.91 (2.84)
Environmental	Enhances the respect for the urban environment by locals and tourists (<i>ENV_1</i>)	5.78 (2.75)
	Increases environmental awareness through local products (<i>ENV_2</i>)	5.62 (2.48)

Table 2. Prediction estimates for latent class membership (N = 742).

Structural modeling variables (covariates)	Model 1 (w/out transportation)			Model 2 (with transportation)		
	Class 1 (Coef.)	Class 2 (Coef.)	Class 3 (Coef.)	Class 1 (Coef.)	Class 2 (Coef.)	Class 3 (Coef.)
Age 0: < 40 (329; 44.3%); 1: ≥ 40 (413; 55.7%)	Base	-1.02 (.96)	.04 (.34)	Base	.72*** (.48)	.89** (.32)
Gender 0: Male (222; 29.9%); 1: Female (520; 70.1%)	Base	1.41** (.94)	.23 (.26)	Base	.90 (.51)	.06 (.34)
Education 0: ≤ High school (554; 74.7%); 1: > High school (188; 25.3%)	Base	1.07 (.67)	.10 (.28)	Base	.09 (.54)	.10 (.36)
Household size 0: ≤ 3 people (261; 35.2%); 1: > 3 people (481; 64.8%)	Base	-.59 (.65)	-.07 (.25)	Base	.36 (.51)	-.05 (.30)
Personal market frequency 0: Rarely (280; 37.7%); 1: Often (462; 62.3%)	Base	-2.22 (1.36)	.30 (.29)	Base	-.65 (.53)	-.07 (.36)
Family/friends frequency 0: No (324; 43.7%); 1: Yes (418; 56.3%)	Base	-2.27 (2.37)	.10 (.28)	Base	-1.40** (.60)	-.36 (.34)
Transport-related covariates						
Transportation mode to reach MdL 0: Car/LPT (339; 45.7%); 1: Walk/Bike (403; 54.3%)	N/A	N/A	N/A	Base	.34 (.44)	.15*** (.29)
Tourism-driven transport issues related to MdL 0: No (426; 57.4%); 1: Yes (316; 42.6%)	N/A	N/A	N/A	Base	1.69** (.62)	-1.89** (.46)

Note: *, **, and *** indicate statistical significance respectively at 10%, 5%, and 1%.

dimension has been maintained and strengthened over time, making MdL a persistent tourist location and meeting point between diverse cultures. From the 1960s onwards, the spatial evolution of the MdL has involved progressive expansion within the municipal perimeter, with various areas near the shores of Lake Maggiore affected since the 1990s (Figure 1). During the tourist season, the MdL attracts over 30,000 visitors, with summer

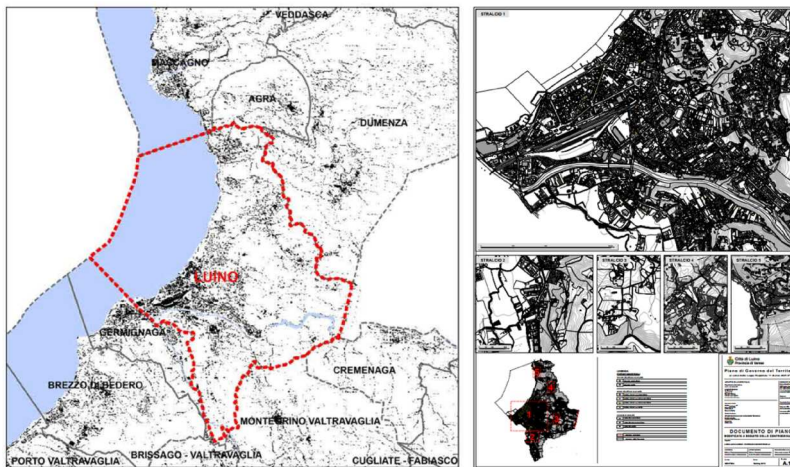


Figure 1. Map of Luino and within-town localization of the *Mercato di Luino* from the 1990s.

peaks reaching approximately 6,000 arrivals every Wednesday, primarily from Switzerland, but also from Germany and other European countries. This flow generates significant economic impact not only for street vendors but also for the entire local economy (De Carlo et al., 2024). However, this concentration of visitors also produces critical issues, particularly in terms of transportation and mobility management. On market days, the local road network, already constrained by the geographical configuration of the lakeside territory, experiences significant congestion. These mobility pressures make the MdL a particularly suitable context for examining how transportation-related issues influence residents' perceptions of tourism sustainability at destination level.

3.3. Data collection and descriptive statistics

This study used data collected through an online survey administered to residents and regular users of the MdL in 2024, focusing on tourism impacts and sustainability (Lee & Jan, 2019; Nunkoo & So, 2016). The questionnaire included three sections. The first section collected information on sociodemographic characteristics (age, gender, residence location, education, household size, personal and network-based market use patterns) to consider differences in MdL access and perception of its impacts on residential areas. The second section focused on transport-related characteristics and perceptions. Respondents were asked about their primary mode of transportation to reach the market (i.e. car, local public transport, walking, bicycle) and any difficulties in moving around the MdL due to tourism flow. The third section finally included statements related to market sustainability dimensions, measured on 10-point Likert scales (1 = Strongly disagree; 10 = Strongly agree), relying on both methodological and context-based considerations. The adoption of a 10-point response format was motivated by both methodological and contextual considerations. From a measurement perspective, scales with a larger number of response categories tend to enhance variability, reliability, and discriminatory power, thereby improving the capacity to detect meaningful differences in individual attitudes (Dawes, 2008; Preston & Colman, 2000). Moreover, a greater response granularity contributes to better probabilistic differentiation among latent classes, such as class membership. From a contextual point of view, we acknowledged that familiar response formats contribute to response quality and reduce measurement error (Krosnick & Presser, 2010). In the Italian context, 1–10 rating systems are commonly used in educational and public settings, which make the format more intuitive for respondents. The statements were developed to operationalize the dimensions of socio-cultural, economic, and environmental sustainability, following Lee and Jan (2019) and, in general, the community-based approach to sustainability (Table 1).¹

But who are MdL residents and users? The analysed sample consisted of 742 respondents, of whom 592 (79.8%) were residents of Luino (*in-town* users) and 150 (20.2%) were in surrounding hamlets and municipalities (*out-of-town* users). This distribution represented a reasonable picture of MdL and its primary catchment area, with most users coming from the town itself, but with substantial use by residents of nearby areas. The sample included 222 males (29.9%) and 520 females (70.1%), indicating higher market use among women, consistent with patterns observed in other studies where women are often primary purchasers in such shopping spaces (e.g. Snepenger et al., 2003; Watson, 2009). As indicated in Table 2, for sociodemographic information, the age distribution showed 329 respondents (44.3%)

under 40 years old and 413 respondents (55.7%) aged 40 or older, while educational level varied, with 554 respondents (74.7%) having a high school education or less, and 188 respondents (25.3%) having post-secondary education. Household size showed 261 respondents (35.2%) living in households of three or fewer people, and 481 respondents (64.8%) living in larger households of four or more people. Regarding different market attendance patterns, 280 respondents (37.7%) declared that they visited the market rarely (on average, less than once per month), while 462 respondents (62.3%) visited it often (at least once or twice per month). Use patterns by their social network (defined by family members or friends who attended the market) showed that 324 respondents (43.7%) had no family members or friends with regular market attendance, while 418 respondents (56.3%) declared that other family members or friends regularly attended the market. Notably, transportation-related characteristics revealed interesting patterns of access to the MdL. For habitual transport modes, 339 respondents (45.7%) declared using the private car or local public transport (LPT) to reach the market, while 403 respondents (54.3%) tended to walk or use a bicycle, somehow mirroring the dual distribution of users' residence location between *out-of-town* and *in-town* types. When asked whether tourism flow related to MdL activities caused movement problems, 426 respondents (57.4%) did not declare negative externalities, while 316 respondents (42.6%) declared that they experienced issues every market day, indicating a relatively strong perception of transportation-related trouble linked to MdL.

As depicted in [Table 1](#), for socio-cultural sustainability, two items concerned cultural exchange between tourists and residents (labeled as *SOC_1*) and benefits to local cultural identity (*SOC_2*). In line with the literature on social and cultural impacts of tourism, this dimension is generally underscored as the opportunity for interactions between tourists and residents largely depends on the residents' ability to recognize their effect on cultural preservation (Lee & Jan, 2019; Uysal et al., 2012). As for economic sustainability, it was measured through items addressing purchasing opportunities for locals and tourists (*ECO_1*) and promotion of local business opportunities (*ECO_2*). Not surprisingly, whereas the promotion of local products did not receive high average scores, mainly due to the limited perception of authenticity and territorial source of food products (see Visconti et al., 2014), the MdL ability to enable commercial opportunities is strongly recognized as shown in other studies (Diedrich & García-Buades, 2009). Concerning environmental sustainability, it was assessed through items on respect for the urban environment when hosting locals and tourists (*ENV_1*) and the market's contribution to sustainability awareness through its products (*ENV_2*). In general, residents have a medium-high perception of MdL as a shopping space promoting ecological awareness, mostly because local institutions' efforts to manage market activities have been overall successful (see Kim et al., 2013 for discussion on the role of municipalities in tourism experiences).

4. Results and discussion

4.1. LCA analysis of the MdL case study

The first step of the LCA analysis implies the determination of the number of latent classes with the best fit with sampled data. Following the model selection strategy outlined in Section 3.1, the Akaike Information Criterion (AIC) and Bayesian Information Criterion

(BIC) are used to assess the relative fit with different numbers of latent classes, considering that a lower value suggests a better model fit (Nylund et al., 2007). For each model (i.e. including the full set of indicators and socio-demographic covariates, but distinguishing between specifications without and with transport-related covariates), we compared class sizes from 2 to 5 and then evaluated the related fit measures. Starting from 3 classes, since with both the increase and decrease in the number of classes, the values of AIC and BIC displayed higher scores, we decided to accept the 3-class model, which had the lowest AIC (5,595.413) and BIC (5,742.913) for the model without transport-related covariates (Model 1) and for the model including transport-related covariates (Model 2), i.e. AIC = 6,537.9 and BIC = 6,699.3 and provided easily interpretable latent classes.

As mentioned above, the latent class model developed in this study included both covariate and indicator variables. The former category was used to predict the probability of an individual belonging to a latent class through the estimation of a *structural* model, while the latter category was used to define latent classes by estimating a *measurement* model.

In Table 2, the socio-demographic covariates that have an impact on the belonging to a specific class are shown, relative to the first class (baseline) for each model. Ageing above 40 years is a significant factor for belonging to the second and third classes only for Model 2 (with transport-related covariates), while being female is a significant predictor for inclusion in the second class for Model 1 (without transport-related covariates). Whereas other socio-demographic covariates (i.e. education, household size, personal market frequency) are not significant factors, having family members or friends habitually going to the MdL predicts belonging to the second class in Model 2. Interestingly, the transport mode is a significant predictor only for Class 3, while transport issues predict both Class 2 and Class 3 membership. This crucial result suggests that additional information on transportation issues enriches the model analysis and can affect latent class profiles, as explained in the next section.

4.2. Comparison of LCA models: what is the role of transport-related issues?

A distinctive feature of our study is the comparison between two LCA models. Recalling that Model 1 included only socio-demographic covariates, while Model 2 added two transportation-related variables, this comparative approach allowed us to empirically assess whether and how the inclusion of transportation information improves our understanding of residents' sustainability perceptions. In general, if the inclusion of transportation variables produces substantial changes in the class membership, this would provide evidence that transportation issues generated by tourism activities at the MdL are important dimensions of sustainability perceptions that should not be overlooked. In this perspective, transport-related issues should not be interpreted exclusively as traffic congestion phenomena. They may also reflect broader concerns regarding the quality of public transport services, including reliability, frequency, accessibility of stops and user comfort. Previous research has shown that operational and infrastructural characteristics of public transport systems significantly affect perceived service quality and overall user satisfaction (Nocera, 2010; Rodríguez et al., 2025). Therefore, improving public transport quality may mitigate negative sustainability perceptions even in contexts experiencing high visitor inflows.

A preliminary assessment of the difference in average sustainability scores between models without and with transport-related covariates is depicted in [Figure 2](#). Overall, lower average scores displayed by residents who faced transport issues in Luino on market days (right box) in almost all sustainability items would tend to drag down the probability of belonging to latent classes including people with a strong perception of MdL's sustainability. Conversely, the sustainability perceptions of residents who reach MdL by walk/bike (left box) seem to be generally more positive, suggesting that modal shifts can ameliorate community perceptions.

The class-conditional membership probabilities for the indicator variables and latent marginal probabilities for each class are summarized in [Table 3](#). First, it is important to notice that Model 1 (which does not include transport-related issues) has identified three distinct groups with notably different sizes and characteristics, as described below.

Class 1 (Medium-sustainability residents)—This group, representing about half the sample (48%), showed moderate sustainability perceptions with particular emphasis on socio-cultural dimensions. Approximately 38% of members of this group positively evaluated cultural exchange between tourists and residents, and 49% perceived benefits for local cultural identity. Evaluations were more moderate for economic and environmental dimensions, with percentages ranging from 17% to 35% of positive evaluations. This pattern suggested that these citizens appreciated the market's role as a place of meeting and cultural exchange, while being more cautious in recognizing economic or environmental benefits.

Class 2 (Low-sustainability residents)—This minority group (13%) demonstrated the lowest sustainability perceptions across all dimensions. Only 24% positively evaluated cultural exchange, and even lower percentages (from 2% to 18%) gave positive evaluations on other dimensions. Particularly low were environmental evaluations, with only 2% perceiving respect for the urban environment and 5% recognizing contributions to sustainability awareness. Overall, this group appeared generally skeptical about market benefits and particularly concerned about environmental impacts.

Class 3 (High-sustainability residents)—This relevant group (39%) represented the most enthusiastic market users, with positive evaluations across all sustainability

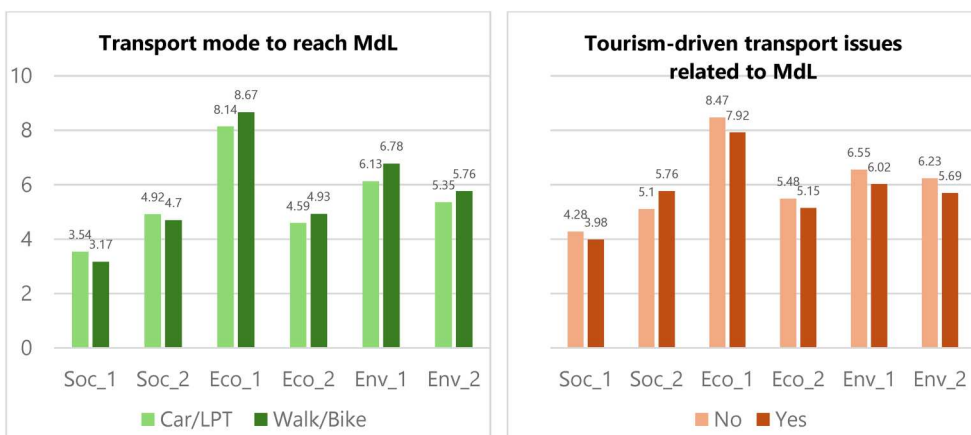


Figure 2. Sustainability scores of transport-related covariates (average values).

Table 3. Class-conditional membership and latent marginal probabilities for indicator variables (N = 742).

Measurement modeling variables (indicators)	Model 1 (w/out transport)			Model 2 (with transport)		
	Class 1	Class 2	Class 3	Class 1	Class 2	Class 3
Cultural exchange between locals & tourists (<i>SOC_1</i>)	.38	.24	.68	.57	.18	.67
Benefits to local cultural identity (<i>SOC_2</i>)	.49	.13	.58	.59	.29	.54
Commercial opportunities for locals & tourists (<i>ECO_1</i>)	.21	.15	.60	.31	.16	.64
Local economic development (<i>ECO_2</i>)	.26	.18	.74	.47	.14	.71
Respect for the city environment by locals & tourists (<i>ENV_1</i>)	.35	.02	.67	.49	.18	.63
Environmental awareness through local products (<i>ENV_2</i>)	.17	.05	.73	.20	.09	.92
Latent marginal probabilities	.48	.13	.39	.40	.29	.31

dimensions. From 58% to 74% of members of this group gave positive evaluations, with particularly high scores on promoting local business opportunities (74%) and environmental respect (67% and 73%). These residents perceived the market as a positive trigger for overall community sustainability through economic, social, and environmental benefits.

Yet, analyzing characteristics that predicted group membership in Model 1 and 2, as in section 4.1, the inclusion of transportation-related elements in Model 2 led to very different class features emerging.

Both transport-related covariates had striking effects. First, transportation mode influenced group membership as follows. Users who reached the MdL by walking or biking had increased probabilities of belonging to Class 3, relative to car or LPT users. Second, transport issues increase the probability of belonging to Class 2 and decrease the probability of belonging to Class 3, relative to Class 1. In line with other studies in which traffic congestion when driving a car is a potential source of disappointment, stress, and adverse support for public events involving tourism (e.g. Curtale et al., 2024), these findings suggest that car use by residents/users was associated with more negative sustainability perceptions of the MdL activities. Interestingly, and consistent with our research hypothesis, the inclusion of transportation-related variables in Model 2 consequently produced substantial changes in the latent class structure, as explained as follows:

Class 1 (Medium-sustainability residents)—In Model 2 specification, this group is slightly less populated (40%) and raises its emphasis on socio-cultural dimensions, with 57% and 59% positively evaluating these aspects, while evaluations on other dimensions stay moderate, from 20% to 49%.

Class 2 (Low-sustainability residents)—Adding transport-related issues, this class of citizens generally maintains low evaluations about MdL sustainability (from 9% to 29%) but now represents a much larger proportion of the population (29% vs. 13%), suggesting that when transportation factors were considered, a relatively larger group of residents with problematic sustainability perceptions emerged.

Class 3 (High-sustainability residents)—Despite these citizens continuing to show high evaluations across all sustainability dimensions (from 54% to 92%), with a peak on the MdL's contribution to environmental awareness via selling local products, yet in Model 2 specification this class represents only 31% of the sample, compared to 39% in Model 1.

5. Conclusions and policy implications

Focusing on public open-air marketplaces as both tourism points of attraction and shopping places where locals and visitors share road infrastructure and public spaces, this study examined resident perceptions of tourism sustainability of a case-study market in the North of Italy, with particular attention to the role of transportation issues. In general, the results provided evidence that transport-related factors play a key role in shaping how residents evaluate market sustainability across social, economic, and environmental dimensions.

5.1. Key findings

The first research question of the paper asked whether residents could be segmented into distinct groups based on their sustainability perceptions of the local public market. Following a latent class approach, the analysis identified three distinguishable groups: medium-supportive residents with an emphasis on sociocultural benefits; low-supportive residents who are mostly concerned about environmental issues; and high-supportive residents who perceive benefits across all dimensions. In general, this heterogeneity confirms that, even regarding the perception of a historical tourism attraction such as the MdL for Luino's inhabitants and nearby populations, residents cannot be considered a monolithic block but rather as segments with distinctive sustainability-based perspectives. This segmentation perspective also contributes to the literature by moving beyond aggregate evaluations of sustainability and highlighting that different resident groups may weigh socio-cultural, economic, and environmental dimensions differently. In line with recent research on community-based sustainability assessment (e.g. Andereck et al., 2025; Lee & Jan, 2019), our findings suggest that sustainability perceptions are context-sensitive and influenced by the interaction between tourism dynamics and local mobility conditions. Building on this explorative latent-class analysis, the second research question examined whether including transportation factors might improve the analysis of residents' perceptions. The results clearly showed how the inclusion of transportation-related variables can change the classes distribution and provide richer insights into the characteristics of resident groups. As stressed in other studies on public markets (Morales, 2011, 2009; Snepenger et al., 2003; Visconti et al., 2014; Watson, 2009), those shopping spaces concentrate large numbers of people in limited urban spaces during specific time periods, creating visible and directly experienced transportation impacts. In the case of the MdL, the lake-side geography of Luino and the market catchment areas limit road access options, accruing congestion on market days and making sustainability perceptions inherently affected by transportation issues.

5.2. Policy implications

Despite having considered a specific public marketplace, where impacts are localized in time and place (Almeida García et al., 2015), the findings of this case study have significant practical implications for the management of the MdL, but more broadly, also for other public markets facing similar challenges. Overall, the segmentation of residents/users

into three distinct groups suggests taking into consideration differentiated strategies encompassing the role of transportation aspects. For residents with medium-sustainability perception (Class 1, 40%), who constitute the largest group, strategies should reinforce the social and cultural benefits of the market as a way to foster intercultural exchanges (Schappo & van Melik, 2017). Yet, since many members of this group recognize transportation problems, effective and visible interventions to mitigate these problems, i.e. improvements to LPT service and more facilities for cyclists and pedestrians, could shift some members toward more positive perceptions. Residents with low-sustainability perception (Class 2, 29%) obviously present the greatest challenge for the municipality, as they include many car and/or LPT users who might experience traffic delays and parking difficulties. Therefore, investments in transportation solutions aimed at reducing congestion and pollution could at the same time address their environmental concerns and improve their direct MdL experience. Finally, residents with high-sustainability perception (Class 3, 31%) are natural allies in promoting market sustainability, thus engaging them in participatory processes to develop sustainable mobility solutions could create demonstration and imitation effects for other residents. From a specific transportation policy perspective, several directions have emerged from the study. First, promoting and facilitating non-car access to the MdL is crucial. Finding that users with non-motorized modes have more positive perceptions suggests that modal shift strategies could improve not only environmental sustainability but also community perceptions. Second, for those using car or LPT, addressing congestion and parking difficulties is essential to both reduce negative impacts and preserve community support. Finally, showing that transportation improvements can enhance the visiting experience at the MdL can shift perceptions among residents who do not have full sustainability-based support for market activities.

5.3 Limitations and future research

Given the specificity of this case study, the analysis acknowledges limitations. The cross-sectional design precludes clear-cut causal inferences about relationships between transportation factors and sustainability perceptions. In future research, longitudinal data tracking residents before and after specific transportation interventions would provide stronger evidence of causality. Moreover, the study focused on a single public open-air market in a specific geographical context, clearly limiting the generalizability of our findings. Therefore, comparative studies across similar public markets with different transport features would improve the segmentation of residents' sustainability perceptions.

Note

1. The full questionnaire is available in the Appendix.

Author contributions

CRedit: **Daniele Crotti**: Conceptualization, Formal analysis, Investigation, Methodology, Writing – original draft, Writing – review & editing; **Jurgena Myftiu**: Data curation, Investigation, Methodology, Validation, Writing – original draft, Writing – review & editing.

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Appendix: survey sections

Section 1: sociodemographic characteristics

1. What is your age?
 - a) 18–25
 - b) 26–30
 - c) 31–40
 - d) 41–50
 - e) 51–60
 - f) Over 60
2. What is your gender?
 - a) Male
 - b) Female
3. Where do you live?
 - a) In the town of Luino
 - b) In the surrounding hamlets or municipalities
4. What is your highest level of education?
 - a) Primary school (licenza elementare)
 - b) Lower secondary school (licenza media)
 - c) Upper secondary school (diploma di scuola superiore)
 - d) Bachelor's degree (laurea triennale)
 - e) Master's degree (laurea magistrale)
 - f) Post-graduate qualification (master, dottorato, specializzazione)
5. How many people live in your household, including yourself?
 - a) 3 or fewer
 - b) 4 or more
6. On average, how often do you personally visit the Mercato di Luino?
 - a) Rarely (on average, less than once per month)
 - b) Often (at least once or twice per month)
7. Do any of your family members or close friends regularly attend the Mercato di Luino?
 - a) No
 - b) Yes

Section 2: transport-related characteristics and perceptions

8. What is the mode of transportation you most frequently use to reach the Mercato di Luino?
 - a) Private car or local public transport (LPT)
 - b) Walking or bicycle
9. Do you experience difficulties in moving around Luino due to tourism flow on market days?
 - a) No
 - b) Yes

Section 3: perceptions of market sustainability

Please indicate your level of agreement with each of the following statements about the Mercato di Luino, on a scale from 1 (Strongly disagree) to 10 (Strongly agree).

Socio-cultural sustainability:

10. The Mercato di Luino promotes cultural exchange between residents and tourists.
11. The Mercato di Luino provides benefits to local cultural identity.

Economic sustainability:

12. The Mercato di Luino creates commercial opportunities for residents and tourists.
13. The Mercato di Luino promotes local economic development.

Environmental sustainability:

14. The Mercato di Luino enhances respect for the urban environment by locals and tourists.
15. The Mercato di Luino increases environmental awareness through local products.