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Tourism expenditure and tourism intra-destination mobility

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Summary

Introduction

Tourism is a constantly evolving sector that has always offered important development opportunities for countries' economies. In this sense, the tourist offer has been characterized by the constant need to remain competitive and, overall, to be able to offer products that are always in line with market requests. As a result of this continuous and exponential development, tourism is now accessible to all. While taking a holiday used to be very expensive in terms of time and money, today's last-minute and low-cost offers allow almost everyone to take at least one holiday once a year. For this reason, knowing all the elements that characterize the tourism market is a requirement that must be supported by a deep knowledge of how tourists move in space and time. The movement of tourists in fact, in terms of destination management and policies applied to it, is an extremely important aspect.

Over time, one of the main goals for researchers has been defining factors influencing tourist behaviour (for instance, Fletcher et al., 2017; Cohen et al., 2014; Mohammadi and Mohamed, 2011; Swarbrooke and Horner, 2007). In general, the definition of behaviors is not straightforward and presents several conceptual and, above all, methodological problems, because defining the behavior of individuals implies defining certain character and psychological traits. Indeed, behavior is the set of different attitudes and motivations that drive the subject to make a particular choice rather than another. Furthermore, under the same environmental, climatic, and social conditions, two individuals can potentially make two different choices because their motivations and attitudes are different.

A similar framework is made in consumer theory, but in the economic-financial sphere, it takes on different connotations. In microeconomics, the consumer is seen as a rational individual who uses the resources available with the objective of maximizing utility. In addition, in classical consumer theory, utility maximization occurs through the consideration of a budget constraint that is dictated primarily by the price of goods and disposable income. In the economics of tourism, similar considerations are made by the tourist, who, however, has a constraint on their income and leisure time. The basic idea is that the tourist consumes the tourist product (the holiday) following these constraints, which are, however, subject to further limitations dictated by the fact that the tourist is not only a consumer, and that the tourist product is going to consume is meaningful to the extent that it is made for and during the vacation trip.

Smith (2013, pp.582-595), defines the term "generic product" as a "conceptual commodity produced by an industry" Smith (2013, pp.582-595). Referring to agriculture for example, the products are food and fiber, for the automotive industry it is transport Smith (2013, pp.582-595). According to Smith (2013, pp.582-595), in the case of tourism, the function of the generic product is the facilitation of travel and activity by individuals away from their usual environment". This means that a product is considered tourism when it is consumed on the occasion of travel, alternatively, it could potentially be the consumption of traditional goods and services (case in point: consumption of food and drink).

The need of studying tourism expenditure is relevant because despite the existing literature it is still unclear what drives a tourist to make certain consumption choices why and how. The underlying research goal of this thesis is to understand the dynamics, factors, and motivations that characterize and drive the economic behavior of tourists in local destinations (for instance, Olya and Mehran, 2017; David-Negre et al., 2018; Rossellò-Nadal and HE, 2019; Gòmez-Déniz et al., 2020).

Further, one more issue is considered:

1. Is there a relationship between tourism, consumption, and mobility? Is it a clear relationship or does it need further explanation, to show more complex dynamics/trends?

This study focuses on tourism expenditure that is destination-related, i.e., it regarding the visit that the tourist consumes on a given travel occasion and as such is circumscribed by certain space-time coordinates. For this reason, it is also necessary to deal with the movement of tourists and how they carry out typical activities within an urban area, e.g. eating and drinking, shopping, and paying for museums and other tourist attractions tickets.

Studies on tourist mobility have only in recent years become more consistent until the last decade (for instance, Beeco et al., 2013; Hallo et al., 2012; Shoval et al., 2011), little attention was paid to intra-destination mobility, due to the high specificity of the studies, which require substantial use of resources, in terms of money and human capital.

Therefore, studies on tourist flows, with respect to origin-destination travel, are just included in the literature, because the amount of data collected by individual countries in this regard is substantial. Although capturing the tourist within the destination is not easy, over the course

of stable time the focal points where it is possible to intercept the tourist have become more and more evident, and this has favored an increasingly wide collection of data.

On the other hand, that is the intra-destination mobility, the question is different: the territorial unit can be extremely large (a country) or extremely small (a seaside resort): in both cases, intercepting the tourist throughout his visit has always been a challenge that researchers have tried to face. Another relevant issue comes with the locating the tourist is understanding what kind of tourist you are detecting: there are different types of tourists and each of them needs a different marketing strategy. For example, market segmentation is a good strategy to study the spatial behavior of visitors.

At first stage, the travel diary was used to track the spatial behavior of the visitors: the limitations of this tool are clear, including memory bias, excessive subjectivity of experience and non-homogeneity of data collection. For this reason, data collection techniques have been refined over time to the point of becoming extremely standardized and homogeneous, anywhere in the world.

The most widely used tool is certainly the questionnaire, which thanks to its brevity succeeds in defining not only the socio-demographic profile of the tourist but also succeeds in capturing other extremely relevant aspects that come into play when discussing spatial and economic behavior, including satisfaction and motivation to visit. However, questionnaires alone fail to capture the tourist's itinerary, in terms of geographical coordinates, and with this method, essential information is lost on how the visit went, how the tourist moved, and for how long (Bauder, 2015; Andrienko et al., 2011).

For this reason, GPS tools, which were previously used only in the military and strategic spheres, have now become part of the logic of understanding the tourism market because they have enabled researchers and market strategists to understand how tourists move through space and time (Huang and Wu, 2012; Birenboim et al., 2013; Birenboim et al., 2015; Lai et al., 2007; Hallo et al., 2012).

GPS instruments have expanded rapidly, dictated by several factors (as will become clear in the following pages) including their evolution on a global scale. The information collected through these tools is aggregated with the traditional ones and in this way relevance is given not only to the information that determines the trip itself (i.e., the information prior to the trip that led the tourist to choose a particular location at a particular time with certain activities) but ,in fact, emphasis is given to everything that is the place of destination and how the

tourist moves, i.e., the decision-making process that traces the itinerary of the individual to understand the movement of the collective (Huang, 2020; Dend and Andrada, 2020; Su et al., 2020; Barros et al., 2020; Sugimoto and Suzuki, 2019; Li et al., 2019; Kang et al., 2018; Yun et al., 2018; Korpilo et al., 2017; Zheng et al., 2017; Chhetri et al. 2015; Grinberger et al., 2014).

The present thesis here, focuses on the application of the GPS tool to a particular tourist segment: cruise passengers. Studying cruise passengers is an important point in literature research because the industry represented by this segment is the most relevant in terms of economic impact for countries. A last, but non least point is that the cruise passenger can be considered an excursionist because the passenger arrives at the destination and stays in that location only for a certain period (8-12 hours generally). And, for this reason, tracing the visit of the cruise passenger is easier than tracing the visit of a tourist who may spend the night in the chosen destination, and would thus not allow GPS instrument to be capable of tracking a precise itinerary but would obtain data that could not be used in terms of aggregation.

Instead, with cruise passengers it is easy to consider this segment as unitary and homogeneous: all started from the same starting point (disembarkation point) and all return to the same point. In this way, the study is extremely controlled, and it is possible to evaluate the effects of the cruise ship phenomenon on the destination for political decisions, such as the organization of the point of interest, tourist attraction, and locating the shops around the right itinerary beaten by cruise passengers.

This work is divided into four chapters: Two chapters (Chapter first and chapter third, respectively) provide a theoretical framework where one of them deals with tourism expenditure and the other with mobility. Two other chapters are empirical ones, there are two case studies (called "essays" here) on spending and mobility.

Chapter one and chapter three can be considered the chapters that define the research context, set out the objectives, and what the literature has so far achieved. Chapters one and three are therefore the chapters that form the framework for the entire paper.

Chapters two and four can be considered the practical applications of the frameworks described in the chapters: chapter two aims to highlight the concept of tourism expenditure and the methodological problems connected in the context of cruise tourism, while chapter four involved the case study corresponding to tourism mobility and above all, the use and

limits of GPS as well as the relationship between expenditure at the destination and spatial movement at the destination.

The first chapter has the objective of defining tourist spending, and in order to do this the tourist market is considered in the first part, with supply and demand, while the second deals with methodology, statistics, and measurements related to spending. It also discusses with the variables that are the object of study in models that aim to study tourist spending in destinations.

The second chapter presents two works that focus on expenditures: the first is is a thematic review of the possible relationship between nationality (country of origin) and tourist expenditures at the destinations (Sciortino et al., 2022a[1]):

Sciortino C., & De Cantis S., (2022) Can Nationality Explain Economic Tourist Behaviour? AThematic Review. Journal of Tourism and Hospitality Management, Jan. Feb. 2022, Vol. 10, No. 1, 18-23.

The second article is a collection of works on the expenditures of cruise passengers in destinations, in which the survey techniques and data collection are reviewed (Sciortino et al., 2022b[2]):

Sciortino, C., De Cantis, S., Ferrante, M., & Gyimóthy, S. (2020). Cruise passengers' expenditure at destinations: Review of survey techniques and data collection. In SIS 2020 (pp. 1442- 1447). Pearson.

The third chapter has a similar structure to the first, a theoretical and conceptual framework on tourist mobility, where the first part defines the concept of tourist movement and movement patterns and then continues with the different types of tourist mobility. In the second part, great attention is given to tools for capturing tourist movement, with strong emphasis on GPS tools. In this sense, the data obtained from these tools and the possible variables of mobility obtained in this regard are discussed.

[1] Co-authors' individual contributions: Caterina Sciortino- Project administration, Resources, Methodology, Writing, Original Draft and Editing; Stefano De Cantis- Reviewing and Supervision

[2] Co-authors' individual contributions: Caterina Sciortino - Conceptualisation, Resources, Methodology, Stefano De Cantis – Supervision and Reviewing; Mauro Ferrante- Writing, Original draft and editing; Szilvia Gyimothy- Supervision and Reviewing

The fourth chapter is dedicated to the work conducted to evaluate the possible relationship between consumption and mobility of cruise passengers in a specific destination, i.e. Copenhagen (Sciortino et al., 2022b)[3].

Sciortino C., De Cantis S., Ferrante M., & Gyimothy S. (2022). Tracking cruise passengers' consumption: an analysis of the relationships between onshore mobility and expenditure. Annals of Tourism Research Empirical Insights Journal

In this chapter, after an introduction to the topic, the work carried out in the destination is included with the objective to unify the two theoretical frameworks described in Chapters 1 and 3.

In terms of impact, the following doctoral thesis contributes to the existing literature and the international tourism scenario in three ways:

- **Theoretical contribution:** several issues from the literature are addressed and some questions related to the concept of spending in the destination are updated and related to the theory of the consumer-tourist, in terms of factors influencing economic behavior or in terms of mobility to the destination and application of GPS tools with a discussion of strengths and drawbacks characterising this approach.

- **Marketing contribution:** using GPS tools at the destination enriches the scarce existing literature in terms of knowledge of cruise passengers' spending at the destination, evaluating the Spatio-temporal consumption behavior.

- **Methodological contribution:** the survey techniques are reviewed and some assumptions regarding data collection in the field of tourism are questioned, evaluating the advantages and limitations of questionnaires that are widely used in tourism literature and proposing new tools which can capture tourist behaviour. The combination of GPS tools and questionnaire-based survey and finally, stop locations analysis are the most important innovation in terms of methods.

In terms of scope, the main objectives of this doctoral thesis can be summarized in three points:

1. To establish whether there is a link between the mobility and the expenditure factors of cruise passengers in local destination, during their visit.

2. To find out whether the methodologies of data collection and analysis are sufficient to detect tourist behavior and whether they can be improved.
3. To evaluate whether GPS tools are to assess the movement of tourists in the destination and determine on a qualitative level whether existing studies have managed to achieve a good explanation of tourist behaviour.

In terms of the research objectives, questions, and hypotheses of the following thesis, these have been summarized in Table 1. The theoretical frameworks had more general objectives, which were to present tourism expenditure and tourism mobility from a theoretical and contextual point of view. Table 1 deals with the collection of papers presented in the doctoral thesis and why these papers were included to support the theoretical frameworks.

Table 1: Research aims, questions and hypotheses of this dissertation

Research Aim	Research Question	Assumptions
RA1: To Define whether tourists' socio-demographic profiles have an influence on tourism expenditure	**RQ1:** is it possible to establish whether nationality determines different levels of spending among tourists?	Different tourists' nationalities correspond to different levels of expenditure
RA2: Provide a review of cruise studies in terms of expenditure, with a special focus on survey techniques	**RQ2:** are the investigation techniques presented in the review sufficient to define of cruise passengers' behavior?	The studies conducted so far are homogenous, and the techniques of investigation used to reflect the behavior of the cruise passengers are standardized
RA3: To describe the cruise passenger's visit in local destination (Copenhagen)	**RQ3:** is there a relationship between mobility behavior and economic behavior of the cruise passengers in the destination?	Starting from the data obtained through GPS and from those obtained through questionnaires it is possible to determine that the economic and mobility of cruise passengers have a relationship in terms of pattern behaviour.
RA4: To Characterize and	**RQ4:** Is it possible to	There are nerve points to

measure the stop locations of cruise passengers at the destination	manage the tourist destination starting from the the stop locations analysis?	which policymakers should pay attention because tourists stop in those areas where they spend time and money. It is possible define that a long stop into a point of interest is a possible reason of buying.

This work actively contributes to the existing literature on the following research areas:

- Tourism expenditure at the destination
- Use of GPS to monitor cruise passengers during their visit
- Relationship between spatial and economic behavior at the destination.

A final contribution of the work is to be able to offer a qualitative overview of the studies carried out using GPS in the tourism scenario.

Chapter 1: Defining Tourism Expenditure

This chapter aims to clarify the concept of tourism expenditure. More specifically, dealing with tourist spending, concepts such as visitor spending, consumer theory applied to tourism, and more generally, the idea of tourist demand will be considered. After an initial revision of the terminology related to tourism demand, several goals and applications of the concept of tourism expenditure are considered, putting more emphasis on expenses for day visits and overnight stays. The second part of chapter one deals with tourism expenditure from a methodological point of view, considering all the methods and statistical models to assess the economic behavior of tourists within the destination during their stay. In addition, information is provided on data collection, with the multiple techniques that have been adopted over time, highlighting merits and shortcomings of each.

1.1 Definition of tourism

Tourism is a remarkably complex phenomenon involving more than one field and one subject, so that it has a multidimensional connotation. Given the extraordinary importance of tourism, it seems natural to adopt an economic lexicon and deal with tourism in terms of supply and demand, as specified by Baggio (2019, pp.255-269). Tourism has a twofold connotation:

1. Collective: involves modes of use, integration between cultures, the economic impact on income produced, employment, and productive structure.
2. Individual: more oriented towards concepts such as choice, motivation, time, lifestyles, and spending.

There are several definitions of tourism concerning the discipline that deals with it and its characteristics. The complexity of this definition is dictated by the "tourism" phenomenon and is therefore described through various reports that enable us to understand its real meaning. Many factors come into play here, too: attitudes, perception, travel motivation, and image (the set of assumptions and impressions about the destination).

Cohen et al. (2014) define the tourist in seven dimensions:

1. Temporariness.
2. Voluntariness.
3. Circularity of displacement (a closed circuit, returning from whence it came);
4. Temporal dimension.
5. Non-recurrence of the route.
6. Non-instrumentality of the objectives.
7. Desire for novelty and change.

Cohen et al. (2014) define the tourist as: "*One who travels voluntarily and for a limited period, motivated by the expectation of pleasure derived from conditions of novelty and change experienced in a relatively long and non-recurring round trip itinerary"* (Cohen et al., 2014).

As already defined by Cohen et al. (2014), tourism is a multidisciplinary activity that has to do with many and different economic activities that intersect with each other with the aim of defining the tourist factor.

Therefore, there are three elements characterizing tourism phenomenon: space, time, and motivation (Parisi, 2017, pp. 3-4).

It is the author's opinion that these three dimensions alone do not delineate the tourist phenomenon and what the tourist represents, rather the different combinations of the three elements mentioned above determine different types of tourism and different types of tourists.

In terms of space, it is possible to define four primary types of tourism, which are:

- Domestic tourism: that which is carried out within a given country by the country's residents.
- Inbound tourism: i.e., non-residents coming from abroad
- Outbound tourism: carried out abroad by residents of a country
- Transit tourism: i.e., tourism represented by those crossing one country to reach another.

Tourism carried out by residents (both inbound and outbound) can be defined national tourism. If, on the other hand, one considers trips made within the country (both by residents and non-residents), one can speak about domestic tourism.

As regards the classification related to motivation, there are leisure motives and professional reasons. Moreover, when we talk about motivation, we can also refer to different types of tourism, e.g., religious trips, wellness trips, trips dedicated to particular events (e.g., festivals, exhibitions or sporting events).

Finally, about duration, it is possible to speak of excursionists (if the visit lasts less than 24 hours without an overnight stay) and tourist visitors (for more than 24 hours with at least one overnight stay) (Parisi, 2017, pp.6-7).

In the scenario of the tourism system, there are several players: tourists, businesses, the political-administrative system, and the local population (Parisi, 2017, pp. 3-4). The tourist is the principal agent of the tourist market. The tourist market is, like other markets, given by the combination of tourism supply and demand which find balance in the intersection of the quantity bought and sold of the tourist good. In other words, the encounter between tourism businesses and tourists determines the tourism market.

Another aspect to be taken into account in the tourism system is the relationship established between local residents and tourists, in terms of management of shared spaces and utilities and also in terms of coexistence.

A fair degree of integration between tourists and local residents makes the destination a sustainable one. On the contrary, if the coexistence does not work and the destination is too small for these two entities, it is difficult in the long run to allow tourism to flourish freely so that government action is needed to avoid such distortions for the local and the tourism marketing managers.

To define tourism market, the general criteria used to identify the production sectors are not enough. According to the traditional economic theory, an enterprise uses a production function, and this is highly dependent on production factors (land, labor, capital and technology) and the cost of remunerating them. Usually, companies are part of an industry and, more generally, of a sector. For tourism companies the linearity of this concept is lessened because in this industry there is an important intersection between different actors, who interact with each other, and the different degrees of interaction determine different products and services. Therefore, since there is no single industry producing goods and services for tourism, other defining criteria are needed. As in other markets, buyers and sellers determine the supply and demand for tourism goods and services. The products and services differ and are adapted to the consumer. The latter must be segmented and classified into various groups. Therefore, there are different types of tourism and tourists. The tourism market also represents all enterprises selling goods and services related to the travel and tourism sector. This economic category also represents the sector related to leisure, business, study, and other sorts of trips. Following the Industrial Revolution, the tourism market began to develop in the 19th century, enabling workers to travel for leisure, social and cultural reasons.

1.1.1 Tourism demand

The tourist demand is the set of goods and services requested by those who want to carry out a specific touristic activity. The people who require this type of goods stay in a place other than their usual residence for 24 hours and 365 days (Magliulo, 2007 pp.30-31). Therefore, the heterogeneous character creates the demand for tourist services and the nature of plurality, generates the need for tourism (examples of tourism services are catering, reception, transport, and intermediary services).

Another definition made by Candela and Figini (2003, pp. 157-158) about tourism demand refers to three levels of analysis:

I. Microeconomic level: goods and services required for the several components of the tourist products.
II. Mesa economic level: quantity demanded according to presences, for spatial aggregations and different tourists.
III. Macroeconomic level: total value of goods and services in each period and a particular place (tourist destination).

There are several disciplines involved in the analysis of tourism demand. In general, the most relevant ones are geography and economics. Considering geographical perspective, tourist demand represents the total number of people who travel or wish to use tourist facilities and services in places other than their usual residence or business of work (Fletcher et al., 2017, pp. 24-26).

The analysis of tourism demand in economic terms focuses on the determinants, i.e., factors that affect the individual willingness to pay and the ability to pay (Fletcher et al., 2017, p.29). Generally, the demand for travel-related goods and services can be expressed by the following function:

$$q^i = f^i(P_t, P_1, \dots\dots, P_m, y^i, z^i) \quad (1)$$

where

$q^i =$ is a quantity measure and is a functionally f^i related to the following components:

$P_t =$ price of tourist product.

$P_1, \dots\dots, P_m =$ prices of other goods and services that influenced the tourist's budget.

$y^i =$ individual income.

$z^i =$ sociological and demographical factors that influenced the individual's demand.

From equation (1) the demand for tourism depends not only on the relative price of tourist goods and services but also on other exogenous variables that contribute to changing demand levels.

Income (or wealth) is an exogenous variable that influences the demand for tourism: tourism is usually considered as a comfort good, which means that the elasticity[4] of order with respect to income is very high (greater than 1).

Another variable that comes into play in the market dynamics is the price of other goods: transport services, for example, are complementary to hotel services, so if the cost of transport increases, the cost of hotel accommodation decreases.

The currency exchange rate is the third variable that comes into play when dealing with tourist demand: an American going on holiday to Europe must calculate the average price for the holiday and convert it from euros to dollars. The real exchange rate (C_r) is calculated from the nominal exchange rate (C_n), the price of domestic tourist goods (P_d), and the price of foreign tourist goods (P_f):

$$(C_r) = \frac{(C_n \cdot P_d)}{P_f} \tag{2}$$

The last two variables are the preferences and expectations of tourism consumers and the nature of the tourism product (e.g., beach tourism in summer, ski tourism in winter). It is also possible to specify equation (1), considering several variables defined above as constants (ceteris paribus). Equation (1) becomes:

$$q^i = f^i(P_t, ceteris\ paribus)$$

$$= f^i(P_t) \tag{3}$$

From the individual's point of view, tourist demand is nothing more than a mechanism underlying the consumption process that induces the tourist to demand a good or service of tourist nature.

1.1.2 Tourism supply

To meet the demand for tourism, businesses must offer tourism goods and services. The combination of these goods and services determines the tourism supply.

The production along the supply chain of the tourism sector can be summarized in the following goods and services (Magliulo, 2007):

[4] Elasticity is the ratio between the percentage change in quantity and the percentage change in price/income. In the case of price, we refer to types of goods such as complementary, substitutes; in the case of income, the difference is between primary goods, secondary goods (i.e., necessities and commodities) and income.

- Intermediaries of tourist services and packages ("tour operators" and travel agencies in general);

- Transport services (the air, rail, and tourism companies involved in this);

- Accommodation establishments (hotels and non-hotel establishments);

- Catering services (all enterprises engaged in "food and beverage" at various levels;

-Other (cruise industry, for instance, companies involved in the organization of cultural, social, sporting, recreation, shopping and other events).

The tourist supply is composite because it comprises a set of goods and services that end up as a product. It is also not transferable because it is particular and unique and cannot be replaced by other products. Finally, the tourist offer tends to be rigid because it is unlikely to change over time. The tourism supply chain is characterized by various businesses that interact, creating products in conjunction.

Following the scheme proposed by the WTO in the General Guidelines for Developing the Tourism Satellite Account (TSA, 2000), starting from the four primary characteristic groups of tourism, i.e., food and drink, transport, and culture/entertainment/recreation, it is possible to combine these with a matrix that describes the interaction between the various businesses in the chain:

Table 1.1: Interactions between tourism industries and tourism products

Principal tourism products	**Main tourism industries**			
	Hotels and similar	Food and Beverages	Transportation	Entertainment and recreation
Hotels and similar	x	X	x	x
Food and Beverages	x	X	x	x
Transportation	x	X	x	x
Entertainment and recreation	x	X	x	x

Source: WTO (2000)

For instance, hotels mainly provide accommodation services (i.e., lodging). Still, they also offer catering services within their accommodation; they often offer transport services such as shuttles. Finally, they may also need to provide services to entertain their guests inside.

The tourism product resulting from the interaction between the various businesses in the tourism chain is described by a series of distinctive characteristics summarized in Table 1.2.

Table 1.2: Characteristics of tourism products

Characteristics	Description
Experience good	The product is unique because it is requested by the individual tourist (or group) at a given moment in time for a specific location chosen
Not transferable	Holidays are closely linked to the environment and the territory, so they cannot be "displaced."
Not storable	Once the trip has been organized, it is not a good that can be stored but must be consumed in the manner established when the trip is organized.

Source: own elaboration

Taking into consideration the IHIP characteristics (intangibility, heterogeneity, inseparability and perishability) which after the 1980s were widely observed (Moeller, 2010; Edgett and Parkinson, 1993; Zeithaml et al., 1985), it is also possible to consider the tourist product in this scheme for the following reasons:

- The tourist product is intangible because it is an experiential product
- it is inseparable because it cannot be transferred
- it is perishable because it must be consumed from the moment it is planned and once organized it cannot be stored
- it is heterogeneous because it is tailor-made for each individual and each tourist product is different from itself.

There are two types of tourism products at the macro level: primary (i.e., primary resources and attractions) and secondary (accommodation, transport, commerce, tourism). Both macro products are consisting micro products which, when combined, generate the holiday (Van der Borg, 2009, pp.2-10). Van der Borg (2009) defines the primary tourism product as *"all those resources that become the tourist's and excursionist's reason for traveling. We should remember that tourists generally choose their destinations based on the primary product and not on the basis of the secondary product[...] the primary product is stable, difficult to influence and unique (little modifiable); it has the characteristics of uniqueness, non-reproducibility (they are scarce resources) and non-salability (they are often public resources)"* (Van der Borg, 2009, pp.2-10)

The author (Van der Borg, 2009, pp.2-10) also defines the secondary product as the set of services that allows primary resources to be flexible (restaurants, hotels, shops...) and

furthermore *"their quality depends partly on the primary resources; therefore, in general, the tourism offer can only be modified in terms of the secondary product through, for example, targeted investments: it is possible to increase the number of hotels or restaurants, but it is not possible to increase the number of lakes or mountains"* (Van der Borg, 2009, pp.2-10).

Swarbrooke and Horner (2021) provide a further detailed description of the tourism product. According to the authors, talking about the tourism product is necessary to understand the complex decision-making behavior of tourists. In the meantime, the tourism product is defined as complex and multi-layered (Swarbrooke and Horner, 2021) because it has both tangible (food and beds) and non-tangible elements (such as supplies or tour packages). Moreover, it is a product experience because the tourist does not buy a single defined product, but it is an overall experience characterized by several intersect developments. Furthermore, the tourism product is highly dependent on the tourist's attitude: the quality and overall experience are measured through the tourists' impressions, and if these are optimistic, others will further purchase the products; vice versa, they will lose their acquired quality. Finally, external events strongly characterize the tourist experience, such as weather conditions, pandemics, or epidemics. For example, a beach holiday is ruined by sudden storms, disruptions, and forced quarantines due to COVID-19 are good examples of external factors characterizing the tourist experience.

Considering the studies conducted on tourism demand, these are generally divided into macroeconomic and microeconomic (Wang and Davidson, 2010, pp. 507-508). Macroeconomic studies refer to aggregate demand, notably time series, polled/panel, and cross-sectional. Microeconomic studies, on the other hand, refer to three main groups (Wang and Davidson, 2010, pp.509-510):

1) Optimal choice in tourism demand: they deal with tourists who choose under certain conditions and are influenced by various aspects (in particular, this group concerns the tourist decision-making process).

2) Factors that affect individual tourist expenditures.

3) Modelling tourism prices.

This dissertation focuses on the second group of studies in the microeconomic category because it is essential to distinguish different typologies of behavior because tourist spending

includes a multi-layered world characterized by different meanings that concern the context of the expenditure.

Moreover, another important reason for the focusing on microeconomics category is that few studies have been conducted on this subject. Those that exist are studies done on an ad-hoc basis, unlike the other two groups of studies that can consider existing data or data simulations to define research objectives. For this reason, further studies are needed to actively contribute to the knowledge of tourism behavior at an economic level.

1.2 A short review on tourism consumer behavior theory

To consider the tourist as someone who buys a good or service to satisfy a need is to consider the tourist as another consumer. In this brief overview the consumer theory applied to tourism is going to be discussed, with reference to the concept of tourism consumption as any other type of consumption that has specific features that make it unique.

Consumer behavior is a relevant aspect of planning marketing activities to support the sale of products, be they commercial products of any kind or specifically tourist products (Swarbrooke and Horner, 2021) In addition, there are different approaches that deal with studying consumer behavior from different perspectives, for example:

-psychology tries to identify which mental processes drive a person to buy and how;

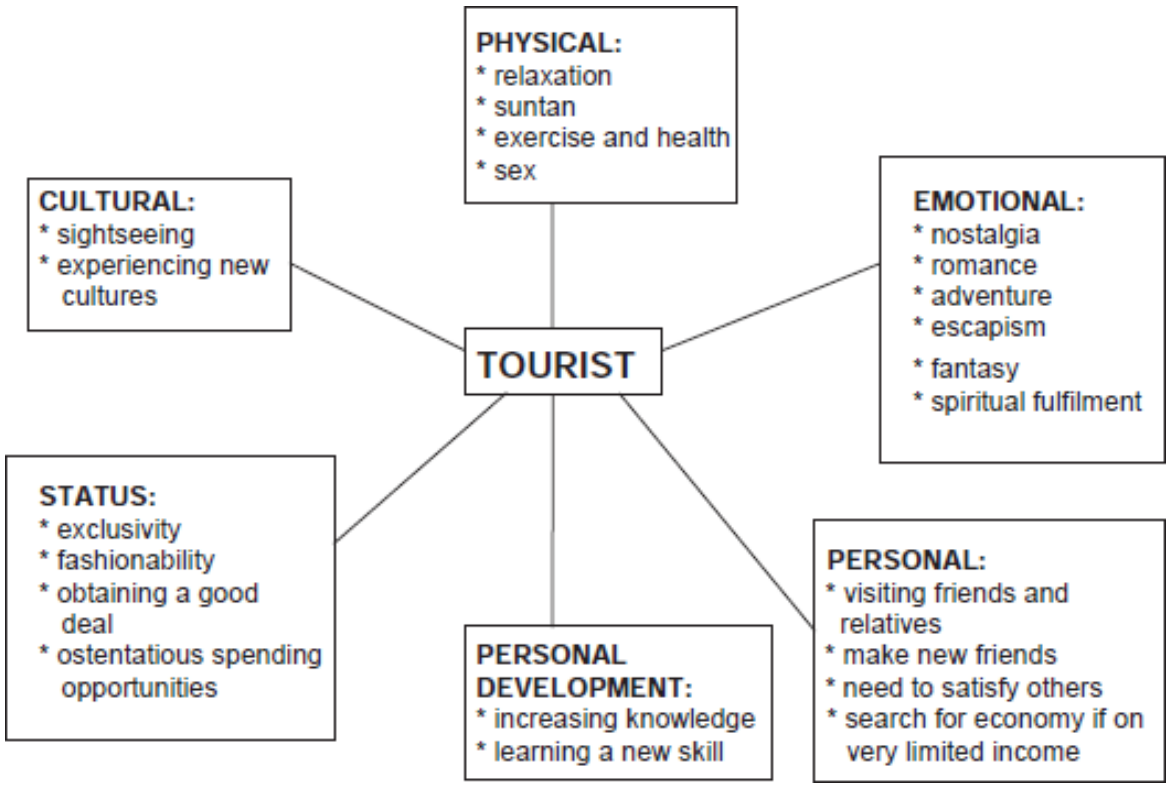
- sociology, for example, has the task of assessing how culture and cultural styles in general influence different purchasing decisions and how consumption is also a variable that depends strongly on society and its institutions.

As Mohammadi and Mohamed (2011, pp.151-152) reported, consumer behavior has been a long-term issue in the academic literature. The first definitions of consumer behavior appeared as early as the 1980s., for instance Moutinho (1897) refers to consumer behavior as the process of knowing and analyzing information related to the decision to buy and evaluate products and services in general.

I. Who is essential in deciding to buy?
II. How do consumers buy?
III. Which are the criteria behind buying choice?
IV. Where do they buy?
I. When do they buy?

Tourism consumer theory deals with the factors influencing tourists to buy a particular product. To do this, the elements are divided into motivators (i.e., those that drive the tourist to buy that product) and determinants (that determine the extent to which the tourist can purchase the desired effect) (Swarbrooke and Horner, 2021). Motivating factors motivate a person to take a holiday and encourage a person to choose a particular holiday (concerning place and time) (Swarbrooke and Horner, 2021). Figure 1.1 shows the most relevant groups of motivating factors. In literature, the most appropriate and widely accepted distinction of these factors is made of push factors and pull factors.

Figure 1.1: Factors influencing tourist consumption by groups



Source: Swarbrooke and Horner, 2021

Despite this exhaustive classification, the ways to catalog the different motivators for choosing a holiday are varied, and these depend on the point of view from which they are observed.

Bearing in mind, for example, the current emergency caused by COVID-19, it is clear how the reasons behind a vacation assert to a different sphere: health security. Tourists also decide a travel choice according to the restrictions imposed by governments, the number of infections from COVID-19, and how much the government is inclined towards tourism at that

precise moment. In this sense, the marketing advertising campaigns sponsoring the destinations significantly affect tourist flows.

Subsequently, the literature review by Cohen et al. (2014) notes several key concepts in tourism consumer behavior research. In particular, the authors classified key dimensions on the subject, which are decision-making, values, motivations, self-concept and personality, expectations, attitudes, perceptions, satisfaction, trust, and loyalty (Tab.1.3). The idea is dividing the conceptual dimensions into some categories, to have a good descriptive of the different dimensions in terms of tourism consumer behavior research.

Table 1.3: Conceptual dimensions of tourism consumer behavior research

Conceptual dimensions	Description
Decision-making	In marketing policy management
Values	Enduring belief regards personal and social preferences
Motivations	Need and wants of the person
Self-concept and personality	Quality of human behaviour and responses to the stimuli
Expectations	Desires or wants of consumers
Attitudes	Degree of favorability and not on a specific object
Perceptions	The consumer expects what he perceives
Satisfaction	Evaluation or judgement on a given consumption
Trust and loyalty	The relationship established with the customer

Source: Cohen (2014)

It is possible, based on Cohen's pioneering model, to present a further classification of conceptual dimensions relating to research into tourist consumer behavior. One could think of the first six dimensions as the pre-consumption dimensions and the last two as the post-consumption dimensions. Therefore, it is possible to apply a funnel model to the tourist consumer's purchase, where the purchase (which is a proxy for consumption) is determined by using the antecedents + consequences.

Fletcher et al. (2017, pp. 52-53) identify three main stages of consumer behavior theory development:

1. The early empiricist phase: between the 1930s and the (late) 1940s, characterized by commercial research regarding effects on distribution, advertising, and promotion strategies. In this phase the only focus is on buying behaviour.

2. The motivational research phase: in the 1950s, the research focused on Freudian and drive-related concepts. In this phase there is the analysis of the predictors of the buying procedure.
3. The formative phase: The ’60s was the time of the “grand models”, the most influential theories so far. After that time there was a desire for searching models that could reflect the tourist behavior. The title of the example, in 1976 Wahab et al., proposes a linear model for decision making in tourism. And again, in 1982 Mathieson and Wall proposed a model to explain the five stages: travel desire, information gathering, travel decision, travel preparation and experiences, travel satisfaction and evaluation.

Consumer behavior is a discussed issue in the marketing sectors and tourism disciplines. In addition, models of consumer behavior linked to purchasing behavior also help to understand tourism demand (Fletcher et al., 2017, p.52). There are three main reasons behind the importance of understanding consumer behavior:

a. To improve the outcomes of the decision-making process of marketing managers.
b. To forecast future tourist behavior.
c. To develop new tourism in line with the world changes.

The tourist purchase decision is compared to other products and services, but it is unique and different when compared to other consumers, for three main reasons:

1) It is an investment that does not have a tangible rate return.

2) The purchase is a result of savings along time.

3) The vacation will invest with no expectation of return.

Fratu (2011, pp.119-120) does another classification made by tourism consumer behavior literature: the author divides the influenced factors for tourist consumer behavior into three sections: personal, social, and situational. Individual factors are also psychological factors and all those variables that affect the consumer 'directly.’ Social factors (culture first and foremost) also include the family’s moral, traditional, religious, and other values. Situational factors include, for example, the state of mind, the time, the physical and social ambiance (Fratu, 2011, pp.119-120).

Tourist travel decisions at the individual level are studied in the literature from several perspectives (Mohammadi and Mohamed, 2011). The terms 'tourist behavior' and 'travel behavior' refer to tourism-related to consumer behavior research areas (Cohen et al., 2014).

Several models have been developed to explain consumer behavior in tourism (Swarbrooke and Horner, 2007), but despite this, empirical research is only well advanced in recent years.

What characterizes this type of behavior is the presence of the purchase of a holiday, which is the most important event in an individual's working year and, above all, is one of the most significant expenses in monetary terms (Swarbrooke and Horner, 2007).

Therefore, the motives and determinants that characterize and convey the consumer's choice to take a specific type of holiday are diverse and can be influenced by the context in which they are determined and the world in which they are born (Swarbrooke and Horner, 2007).

Considering the tourist as a consumer is necessary but insufficient to define economic consumer behavior. The described product (as defined in the section dedicated to the tourist differences because it possesses characteristics specific to the tourist sector, such as the abstract tourism product. If the consumer/tourist decides to buy a cruise travel package, the package is not touchable, and it is exhausted the moment it is consumed. Moreover, the tourist product is generally unique (although in the last 20 years travel has also become increasingly standardized).

1.3 Tourism expenditure and their economic impact

In the previous pages, we have dealt with tourist consumption from several points of view. Tourist expenditure is included in tourist consumption in a different sense. WTO classifies tourist expenditure from the composition's point of view: there is a specific tourist expenditure when the expenses are strictly related to the stay; on the contrary, all the costs that are not strictly related to the visit and that the tourist makes are considered ordinary.

In the tourism industry, one of the most important indicators required to quantify tourist demand is the amount of visitor consumption expenditure (VCE). The official definition, which is also used and recommended by the Tourism Satellite Accounts, is as follows: "VCE means the total consumption expenditure made by a visitor or on behalf of a visitor for and during his or her travel and stays at the destination." This indicator is the primary component of tourism demand. Moreover, WTO defines a visitor as" any person traveling to a place other than that of his/her usual environment for less than 12 months and whose main purpose

of the trip is other than the exercise of an activity remunerated from within the place visited" (WTO, 2005). Tourism activity is, therefore, mainly consumption. Tourism consumption means all the goods and services used by tourists. Vaccaro (pp.93-97; 2011) considers seven specifications of consumption:

1) Concerning the location:

1.1 Consumption by tourists: wherever incurred (in the country of origin, in transit, in the place visited);

1.2 Consumption by visitors: In places, people stay and visit.

2) About the economic nature of the products:

2.1 Market products: provided by private operators and tourism enterprises (e.g., payment for a hotel room;

2.2 General services: public operators (e.g., means of transport, postal services, etc.)

2.3 Collective services: provided by public authorities without direct payment (e.g., tourist assistance, civil services, etc.).

3) Goods and services consumed: there can be either specific consumption (which would not have been performed without the occasion of the trip, such as accommodation) or ordinary consumption (which is achieved regardless of the experience of the journey, such as the purchase of the newspaper or drinks and food);

4) Concerning the origin of the products consumed local products or imported goods;

5) By location: i.e., domestic, band foreign consumption

Tourist expenditure can therefore be understood as the total amount of tourist consumption and represents the total consumption expenditure made by tourists and on behalf of tourists. This means that the expression Tourism Expenditure (TE) also means various consumer goods and services that require a series of specifications and classifications to be well understood. Table 1 shows these classifications, set out by Vaccaro (2011), p.99)

Table 1.4: Classifications of tourism expenditure

Classification	Description
According to time	before the trip/stay
	during the trip
	during the stay
	after returning
About place	at the place of residence
	in the place visited
Based on origin/destination	by residents, the expenditure made within
	by residents, the expenditure made outside
	by non-residents, performed in the destination
Depending on the type of financing	charged to households
	charged to by enterprises
	charged to by public administrations
According to payment instruments	cash
	credit cards
	other
Products' typology	transport (national and international, public and private)
	accommodation
	food
	use of leisure time
	…

Source: adapted by the authors (from Vaccaro, 2011, p.99)

Another definition for TE made by Eurostat may be helpful to understand its multifaceted nature. Tourism expenditure is defined as "total consumption expenditure made by a visitor or on behalf of visitor, for and during his/her trip hand stay at destination" (Eurostat, 1998). The expression TE incorporates a wide variety of concepts, for instance: spending for consumer goods and services related to travel, leisure, and accommodation, purchasing durable goods for personal use, souvenirs, and similar.

According to the ONT, TE is defined as: 'Total expenditure on goods and services incurred by a traveller, or on behalf of a traveller, in connection with the traveller's stay abroad. It also includes the expenses of individuals who are not considered travellers, namely: (a) seasonal and border workers and (b) those who go abroad for study or health treatment even if the study or treatment stays last more than one year. Transport costs for travel within the country

visited are included, while international transport costs are excluded."(Tourism Glossary, ONT).

It is possible to determine three different contexts from TE, according to Frechtling (2006): the occasion (i.e., all those situations/events that attract tourists, such as festivals or sports games), the location (geographical area or site of interest/tourist attraction) and finally the time frame (past if it is an event that has passed and we are taking stock of what has happened, or future when there is a forecast of an event that is still to come).

Tourist spending is understood as the tourist's expenditure during the visit, which is only one consumption component because of travel. In general, however, tourists who spend their money generate an economic impact on the destination on several levels. In general, tourism affects country's economy (of a destination/tourist location) in terms of expenditures on infrastructure, investments, and tourist arrivals, which combine to produce effects on the destination (Brown, 1998). There are three types of effects: direct, indirect and induced.

Direct effects are given by: Value of tourism expenditure - Value of imports needed to provide that good/service (Fletcher et al., 2017, p.154). For example, if the number of tourists increases, the number of overnight stays increases; consequently, the businesses (in this case, hotels and accommodation services) will receive an increase in bookings as a direct effect. Hotels alone cannot satisfy all the tourist demand, which requires other sectors not directly related to the tourism sphere. In this case, we speak of indirect effects, such as the increase or decrease in bookings which induces changes in jobs, monetary management by banks, catering services, use of services of general interest (such as energy and water use. Finally, the interaction between direct and indirect expenditure generates income within the locality in the form of wages, rents, interest, etc... Which are the induced effects.

1.4 Measuring tourism expenditure

There are many different investigations carried out to assess the economic impact in terms of tourism expenditure, and the extent of such studies depends on the type of data available. For this reason, a distinction should be made between surveys carried out at a national level (dealing with official bodies that monitor incoming and outgoing tourist flows to quantify the tourism phenomenon) and local surveys (carried out ad hoc, with the objective of monitoring visitor expenditure in a particular destination/area).

Lin et al. (2015, pp.100-101) stated that two main types of survey data establish tourist expenditure: tourist behavior and structural household surveys.

Establishing the economic impact of tourism has been one of the main goals for governments in terms of planning and managing tourist destinations. A first step in estimating the economic impact of tourism is, as Henderson (1975) says, to assess visitor spending because: "it is the spending behavior of tourists that triggers the chain of events that introduces an economic impact on a host community" (Henderson, 1975).

As mentioned by Pearce (1981), a first-time visitor-spending survey appeared fragmented. This, over time, has created many undefined methodological cases and a variety of methodologies designed to bring with them several problems, sometimes considered, and often ignored (Pearce, 1981).

For this reason, i.e., to have a clear idea about visitor spending, WTO (2000) defines six methods of estimating visitor expenditure:

1) Existing data: before collecting data, it is necessary to assess and analyse what exists.

2) Household surveys: are defined as the most efficient and suitable tool, but the time between the travel activity and the reporting activity affects the quality of the data due to recall bias (Frechtling, 2006).

3) Visitor surveys: ad hoc organized data covering different geographical areas and collection and estimation methods.

4) Tourism establishment surveys: e.g., in terms of transport (plane, bus, etc...) but this case, the phenomenon is not estimated in its entirety because some of the most relevant expenses are not taken into account;

5) Central bank data: these are reliable data at a national level, helpful in assessing the expenditure of foreigners and their economic transactions.

6) Expenditure models: without interviewing visitors, they try to capture the main aspects of their expenditure.

Once the different methods to capture the phenomenon of visitor spending have been established, propaedeutic to measuring visitor expenditure is quantifying this phenomenon in terms of numbers. One of the prerequisites for a reasonable cost estimate is good information (Stynes, 1999). Any study on spending must define what information has been used and how (Stynes, 1999).

Assessing the total number of visitors in a particular geographical area is a frequent estimate that is made. In particular, the number is estimated from the mode of transport and the type of accommodation used (Pearce, 1981). There are counts at entry and exit points about transport surveys to calculate the total population of visitors. An accurate record of this is easily obtained when most arrivals and departures are by scheduled public transport (air, train, bus); in other cases, the measurement is less accurate (e.g., border arrivals). For example, local and regional studies estimate the number of visitors with appearances by car, which results in a less accurate count (Pearce, 1981).

Counts made according to accommodation records determine a second important source of data, which establishes a further dimension of the visitor population (Pearce, 1981). Unfortunately, no documents are available for all types of accommodation. A more informal accommodation sector (camping, caravanning, second homes, staying with friends or relatives, etc.) falls short of official statistics. Another less common way of estimating the number of visitors is through attractions (for example, automatic counts at the entrance of the attraction or ticket sales).

The challenges for survey methodology in terms of spending, it is also considering two essential aspects of surveys: the collection method of the data and the sampling technique. As defined by Groves et al. (2011), a survey is "a systematic method of collecting information from (a sample of) entities to construct quantitative descriptors of the attributes of the wider population of which the entities are members. The word 'systematic' is deliberate and significantly distinguishes surveys from other ways of collecting information" (Groves et al., 2011). Survey methodology is the study of survey methods. It is intended to assess the sources of error in surveys and determine the numbers produced by surveys as accurately as possible. The total expenditure is calculated by multiplying the average spending per visitor times the number of visitors (Stynes, 1999).

The tourist/visitor is asked to list their expenses in survey methods. Generally, interviews are conducted face-to-face or through a questionnaire sent by post, online, or telephone. The advantages and disadvantages of these procedures are clear in the literature and have been widely discussed. In table 1.5, all methods with pros and cons are listed, from the quick guide to survey research written by Jones et al. (2013, pp.5-7).

Table 1.5: Survey methods for data collection pros and cons

Methods	Pros	Cons
Face-to-face	Higher response rates, visual aids, complex questions	Expensive, time inefficient
Telephone	Larger radius than personal, less expensive	No visual aids, difficult to develop rapport
Postal	Larger target and lower response rates	Non-response, time for compilation
Electronic	Quick response, quick data collection	Non-response

Source: Jones et al. (2013, pp. 5-7)

Sampling questions must answer several questions:

- Who is being interviewed?

- Where is being interviewed?

- When is being interviewed?

When interviewing, usually only one person is interviewed, but in most cases, tourist trips are carried out in pairs or in groups, which causes a lot of problems in the estimation.

In addition, figuring out where (and when) to interview subjects is another methodological problem, because depending on the interview point, the tourist may not have completed the visit and, potentially, may not have spent any money so far.

Sampling methods are varied and determining which is the most appropriate depends on several factors, which Pearce (1981, 240-241) summarises as follows: "The size, configuration and internal diversity of the study area, and the extent to which other visitor population data can be used, data on the visitor population can be used as a control" (Pearce, 1981, 240-241). Stynes (1999) defined that sampling procedures should be designed to produce a representative sample of the visitor population. Sampling errors generally depend on the size of the sample population and the amount of internal variance in expenditure. In tourism studies, the unit of analysis is defined according to the chosen study objective: in this sense, the period of coverage and the reference space/territory must be specified. (Stynes, 1999).

These data types tend to have high variances, and to fill this, much larger sample sizes are needed. As Groves et al. (2011) defined as with all the other survey errors, there are two

types of sampling error: sampling bias and sampling variance. Sampling bias arises when some members of the sampling frame are given no chance (or reduced chance) of selection. In such a design, every possible set of choices excludes them systematically. To the extent that they have distinctive values on the survey statistics, they will depart from the corresponding ones on the frame population. Sampling variance arises because; given the design for the sample, by chance, many different sets of frame elements could be drawn (Groves et al., 2011). For example, the segmenting technique reduces the variance significantly. For example, identifying high and low spenders provides insight into the most profitable visitors to the destination (Pearce, 1981).

Data collection methods are several, and all have their merits and drawbacks. Cannon and Ford (2002) list the oldest forms of data collection: intercepting visitors, travelogue, mail-back, and call back. Blocking visitors is undoubtedly the best solution because face-to-face allows a higher propensity to respond on the part of respondents. Moreover, this is one of the best methods from the point of view of the quality of the information obtained. Once the respondent is unclear about a question, the interviewer can clarify any doubts with direct contact.

The most significant disadvantage is cost because nerve centres are needed to intercept all incoming visitors, blocking the most important number of incoming tourists. Therefore, in the case of a single country, for example, the points of interest will be the borders (airports, ports, railway stations, motorway outlets). In contrast, from the point of view of a single destination, it would seem more straightforward to intercept visitors because the area is limited to a single territory, which is certainly smaller in scale, but this is not the case. Even in the case of local studies, multiple visitors escape because the entrances to a single destination are numerous and often escape the careful eye of the interviewer.

The questionnaire is undoubtedly the most widely used tool for data collection: it is simple, clear, and concise, allows the researcher contact with the respondent, and enables the telling of a variety of information. There are different types of questionnaires proposed by agencies and international bodies. They are all supposedly identical because the purpose is the same: to obtain information on the expenditure made by visitors at the destination.

Looking at existing literature, it is possible to determine how the academic world deals with this issue, in particular, if keywords such as *"visitor* spending" OR "tourism* expenditure" OR "tourist spending" AND "questionnaire"* are searched for, the results are not numerous,

because the data collection aspect and the problems concerning the questionnaire have been analysed only superficially and never in depth.

In fact, in macro-economic studies of a national scale, academics have limited themselves exclusively to analysing existing data without questioning the quality of the information provided by the questionnaires themselves.

On the other hand, from micro-economic studies (i.e., from the point of view of the particular area/destination), questionnaires are often not available as they are conducted ad-hoc. Although the two types of studies refer to different territorial contexts, most of the questionnaires from the point of view of research on spending behavior are similar. Starting from the past, Stynes (1999) defines an example of a questionnaire (Figure 1.2).

Figure 1.2: An example of a questionnaire to investigate tourism expenditure

Spending category	**Spending in local area (by your party)**
Lodging	
Hotels, motels, cabins, B&B	_____
Campground fees	_____
Food and Beverages	
Restaurants and bars	_____
Groceries	_____
Transportation	
Gas and Oil (auto, RV, boat etc)	_____
Other auto expenses (repairs, parking, tolls, etc)	_____
Airfares, Rail, Bus, Taxi, Car rental…	_____
Other expenses	
Recreation and Entertainment fees	_____
Sporting goods	_____
Clothing	_____
Other goods (film, books…)	_____
Other services (haircuts, etc)	_____

Source: Stynes (1999)

While considering a questionnaire structure from the 1990s, the scheme of the categories has not changed in practice over the years. In fact, looking at other surveys and questionnaires, it would seem that the system has remained more or less the same.

Once data on tourist spending has been collected, it is necessary to analyse it. This second phase of statistical surveys has been revolutionized and refined over time. A widely used strategy in estimating visitor expenditure is segmentation strategies: using distinct subgroups of visitors gives more clarity to the survey. There are two segmentation strategies:

1) A priori: the target population is divided into subgroups according to particular criteria that is followed in the interviews;

2) A posteriori: once the sample from the population has been interviewed, it is segmented according to the answers obtained which determine similarities between groups.

Furthermore, segmentation, which is typical for markets and has to do with marketing strategies, allows the tourist destination to understand which aspects to spend more time and money on than the tourist activities that come out of the survey.

From the point of view of macro surveys (at a national level in the borders), there are several segments most commonly used: residents vs. visitors, excursionists vs. tourists for more than one day, or segmentation according to the type of accommodation chosen. On the other hand, segmentation is a prerequisite to identify the most effective marketing strategies for microanalysis (at the local level, with ad hoc surveys).

The nature of spending is going to be considered a further aspect in the analysis. There are different ways of understanding visitor spending, and this depends on how the questions in the questionnaire are asked. In particular, it is possible to define additional criteria around which expenditure can be reasoned:

1) Concerning time: the expenditure can concern the day spent, the whole holiday, the expenses made for the journey, during, and return to the destination.

2) Concerning the dimension: the expenditure can concern the individual or the travel group. Once the size has been established, it is then possible to determine to how many people the declared expenditure is attributable.

Unlike macro surveys, however, in the case of local surveys, it is possible to dig deeper because there is a higher level of precision in constructing the tourist profile from the point of view of spending/economic behavior. This is because in this type of survey, dealing with a smaller number of tourists/visitors, the level of detail is higher. As emphasized by Wang and

Davidson (2010, pp. 519-520), Microeconomic models have three main advantages over macroeconomic models:

I) They do not deviate excessively from the theoretical economic consumer model.

II) They allow for controlling participation bias related to aggregated data, for instance.

III) The diversity between consumers is recognized instead of aggregate studies that ignore it.

As defined by Gòmez-Déniz et al. (2020, pp.438-439), empirical research has focused more on data at the micro-level; only few have analyzed expenditure at the macro level. In addition, micro econometric tourism demand modelling can be helpful to understand the determinants of destinations choice (Rossellò-Nadal and HE, 2019).

Following the review by Wang and Davidson (2010), the issues concerning tourist expenditure surveys are sample size and modelling methods.

The sample size depends on the number of questionnaires completed by tourists and the type of sampling used. On the modelling hand, the methods depend on what the researchers want to analyse. Generally, the most used methods are multiple linear regressions because they have the main advantage of collecting the effects on tourism expenditure of several independent variables separately. (Wang and Davidson, 2010).

Having dealt with the measurement of tourism expenditure in its various phases and meanings, a final reflection is given to the quality of the data collected and subsequently analysed. In this sense, the UNWTO proposes a list of issues that have to do with data quality:

1. Quality starts with the countries: an efficient and regular national statistical data collection system is essential to obtain good quality data on arrivals, profiles, and activities of external visitors.
2. There must be a clear distinction between domestic and international visitors and between reasons for visiting.
3. Most supply-side data come from hotels, but this does not cover all visitor activities.
4. Coordination between public and private bodies can facilitate an efficient data collection system.

What therefore makes the difference in assessing the tourism phenomenon in a destination/country/region is the quality of the data collected and the analysis of the data. The

interpretation of the data is a further stage of the survey that has its weight in evaluating the phenomena, but this requires data that is congruent with the objective set.

The methodological aspect is often set aside when approaching socio-economic phenomena: research is often more result-oriented than process-oriented. However, the researcher needs to pay attention to every part of the investigation and note its strengths and weaknesses so that the initial objective of the study and the quality of the data remains intact.

1.4.1 Factors that affect tourism expenditure at destination

In the literature, many models are used to understand the several factors that affect tourism expenditure (for instance, Olya and Mehran, 2017; David-Negre et al., 2018; Rossellò-Nadal and HE, 2019; Gòmez-Déniz et al., 2020).

Olya and Mehran (2017) contribute to the existing literature by proposing a fresh analytical approach, using complexity theory to assess outbound tourist expenditures, finding that the model succeeds in predicting future outcomes and noting asymmetric relationships between tourist expenditures and its antecedents.

David-Negre et al. (2018) identify tourists' spending patterns from their leisure activities using the Social Network Analysis (SNA) methodology. They use bipartite practices, placing tourists with the activities carried out. A network is bipartite when the set of vertices that compose it can be divided into two separate subsets, so that the links do not connect two nodes of the same set together.

Rossellò-Nadal and HE (2019) investigate the relationship between tourist arrivals and tourist expenditure, using a general standard theoretical model, i.e, Ordinary Least Squares regression (OLS) to study the determinants of tourist demand in a particular destination. This relationship is also investigated using elasticities in the regression models adopted by the authors. The authors find differences in the measures of tourism demand when the elasticities are calculated.

Gòmez-Déniz et al. (2020) calculate two measures: the tourist budget share with a fractional regression and the difference in growth rates between expenditure in the country of origin and thatin the land of destination. The authors' results show how this type of regression leads the relevant variables in the model compared to the classic linear regression model.

The dependent variables most commonly used in the literature are as it follows (Wang and Davidson, 2010): Expenditure per person (per day), Total travel expenditure, Total travel

party expenditure, Party expenditure per day, pre-paid expenditure in the country of origin, Expenditure in the destination.

As far as the independent variables are concerned, these are divided into economic, social, and psychological. In addition, the authors suggest including destination and travel-related variables (Wang and Davidson, 2020). Gòmez-Déniz et al. (2020, pp.438-439), in their review, collect the main factors affecting expenditure: socio-economic status, age, nationality, work, length of stay, type of accommodation used, income, travel company, kind of trip. The following table has comprehensively grouped all possible factors that may influence tourist spending:

Table 1.6: Categories of variables that may affect tourism expenditure

Category	Description
Economic variables	Financial and non-financial assets (income, price, nutritional status, etc.…)
Socio-demographic characteristics	Gender, age, marital status, occupational status, educational level, number of family components, and so on
Trip-related variables	Party size, length of stay, accommodation choice, repeat and first-time visitors, transport means, etc.…
Psychological aspects and treats	Attitudes, opinions, lifestyles, experiences, perceptions, and so on

Source: own elaboration

Brida and Scuderi pose an econometric approach to the problem in their systematic review conducted in 2013: the authors present a comprehensive review of the work performed on analysing tourism expenditure from a purely econometric point of view. They have only considered regression models because, as already stated in this paper, these are the ones most widely used in the literature to explain tourist spending. According to the authors, econometric models offer an analytical approach and techniques that describe tourist spending (Brida and Scuderi, 2013). It has already been discussed that OLS estimates are the most widely used in the context of linear regressions. Moreover, as stated by the authors, these techniques are the most popular when one has many variables, and the researcher wants to adopt a criterion to select the regressors that will be part of the model (Brida and Scuderi, 2013). The authors consider expenditure as a zero-censored variable. In OLS models, expenditure often undergoes a logarithmic transformation, and expenditure levels are calculated in terms of elasticity.

Another systematic review in the literature is the one conducted by Mudarra-Fernández et al. in 2019. The authors use the type of tourists as a feature of the literature review, assessing which factors influence tourist expenditure. As the acquisition of goods and services takes place in different places, the authors highlight the classification of three types of expenditure (already anticipated in this paper):

1) Expenditure at the origin: before travel and preparatory to travel;

2) Expenditure at the destination: during the stay in the place visited;

3) Total expenditure: the sum of the first two.

In addition, information on the variables influencing tourism expenditure is also derived from three primary sources: scientific publications, secondary sources, and search engines (Mudarra-Fernández et al., 2019).

The authors also divide the socioeconomic, travel-related, destination-related, and psychological variables. The difference with the previous classifications is that the authors also argue that these variables influence different types of tourism. The authors' tourism types are cultural, sport, rural, cruise, gastronomic, sun and nature, and MICE (Meeting, Incentive, Conferencing, and Exhibition).

As regards the first group of variables, educational level and nationality influence total expenditure in all tourism categories, except for cruise and rural tourism. Age is a variable studied in all types of tourism and is correlated with price.

The group of variables relating to travel refers first to accommodation: this variable is studied for all types of tourism, except cruise tourism since it is included in "daily tourism." The other variables relating to travel, such as packages, places visited, type of payment, have not received much attention in the literature.

Variables included in the destination category, such as image, attendance, distance, are factors that have appeared in the literature sporadically. Nevertheless, the authors found a correlation between these and each type of tourism.

Psychological variables, first and foremost personality, have had little relevance in the literature. Another variable that falls into this category is travel motivation, directly linked to total expenditure. The same applies to satisfaction.

The relationship between the latter and the economic behavior of tourists is also studied in the literature frequently (Disegna and Osti, 2016; D'Urso et al., 2020). The topic of customer satisfaction is a recurring theme in the literature, especially in management, tourism, and hospitality (Disegna and Osti, 2016). In Disegna and Osti (2016), a study analyses the influence of satisfaction in expenditure categories. The authors mean transport, accommodation, food and drink, shopping, and other services by categories.

In general, the study results suggest that satisfaction is a predictor of expenditure, to a greater or lesser extent. It has a negative influence (for instance, on transportation, because probably the more satisfied you are, the less you look for other places to visit). Similar results in work conducted by D'Urso et al. (2020) show that it is possible to quantify satisfaction as an explanatory variable of expenditure levels from Fuzzy Double-Hurdle models[5].

Final remarks

The main objectives of this chapter has been to define tourist spending in its various aspects and characteristics. To do this, it was decided to devote the first part of the chapter to the tourism market, the concept of tourism supply and demand and how these have to do with the concept of spending.

A great deal of attention has been paid to the tourism product, which differs from other products that are traded in the markets: on the other hand, the tourism market is different from others because it has its own characteristics that distinguish it. A previous revision of definitions related to tourism demand, the various theories supporting consumer/tourist behavior were also considered. The second part of the first chapter dealt with tourist spending from a methodological point of view, considering a series of methods and the main statistical models aimed at evaluating the economic behavior of tourists in the destination during their stay. In addition, information is provided on data collection, with the multiple techniques that have been adopted over time, highlighting the merits and shortcomings of each.

[5] For more details about applied methodology please see D'Urso et al., 2020.

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Chapter 2: Essays on Tourism expenditure

The following chapter contains two introductory essays on tourism expenditure: the relationship with sociodemographic variables and the expenditure of cruise passengers. The first one concerns the relationship between nationality and tourist expenditure, while the second one deals with cruise passengers as a specific segment in evaluating expenditure. The sociodemographic profile of individuals in general and tourists, in particular, is the identity card in understanding people's intrinsic nature, concerning their attitudes and characteristics and their preferences cultural background. It has already been discussed in the previous chapter that many variables can influence the spending behavior. Here, the focus is on the category of sociodemographic variables to introduce the final focus on the relationship between expenditure and nationality. Assessing the relationship between different variables is part of bivariate and multivariate statistics. It is essential to understand what kind of relationship one is looking for in analyzing and modeling these functional and non-functional relationship. The main difference lies in assessing a priori whether Y (dependent/response variable) depends on X (explanatory variable). The cause-effect relationship is, in fact, one of the most sought-after relationships. It assumes that the sociodemographic variables are the influencing/explanatory variables and that expenditure is the response variable.

As for this first essay, the idea is to understand if the nationality of the tourists influences the spending behavior and to do so, a thematic review has been carried out, showing that the different results contained in the literature suggest that there is indeed a link between the two variables, all things being equal (*ceteris paribus*). Moreover, cruise tourism has been extensively analysed in the literature, so it was decided to include it separately, giving it autonomy from the tourism sector in general.

In particular, the condition of cruise passengers can be compared to that of excursionists because cruise passengers only spend a few hours in a destination, and this could be a double-edged sword for the destination, which has to host for a short period people who are neither tourists nor residents. In order to assess the precise nature of this tourism segment, it was decided to study how to cruise passenger expenditure in destinations is discussed in the literature, starting with a review of the survey techniques: data collection, questionnaires, and results achieved.

2.1 Tourism expenditure and socio-demographic characteristics

Sociodemographic characteristics are factors that define individuals, groups, and population in general. The term sociodemographic refers to the social and demographic characteristics that characterize the members of a group.

Asking questions within the questionnaire, about different sociodemographic aspects provides a clearer picture of the profile of the respondents. Thanks to such questions, it is possible to understand whether the sample has the desired characteristics. In addition, these questions form the basis of the various classifications and targets proposed. Sociodemographic data include age, education, religion, occupation, marital status, income levels, cultural background, and origin.

Age is mainly used in consumer theory because age groups strongly influence purchasing decisions. Even purchasing decisions from a tourist point of view can be influenced; for example, it is found that cruise tourism is, for the most part, a type of tourism experienced by retirees. The questionnaire for this reason, it is advisable to indicate how to answer accepted by age groups.

The level of education is a variable that can influence different choices in the purchase, but this also has to do with the degree of information that an individual has that may or may not depend on it. The level of education usually correlates with the type of job and income. For this reason, a possible targeting of tourists based on the reason for the study could also promote the understanding of the level of expenditure.

The marital status is interesting when there is the evaluation of travel habits; for example, from the spending perspective, it could explain certain behaviors related to spending levels.

The cultural background influences certain purchases, which depend on the geographical-physical distances. Nationality is an essential factor in determining this evaluation

Finally, gender is a spirit with different identities and is a sensitive topic; therefore, we can keep in mind how to ask this question in the questionnaires.

The study of possible links between sociodemographic variables and tourist spending began as early as the 20th century. In 2004, for example, a study by Peerapatdit argued that it was necessary, from a theoretical point of view, to increase the body of literature to give a more holistic picture of the relationship between travel expenditure and independent variables. The variables considered in Peerapatdit's (2004) study are the household income that historically

influences consumers' purchasing decisions. If we think about microeconomic theories and, in particular, the theory of optimal consumer choice, we realize that the budget constraint to which the consumer is subjected is mainly constrained by disposable income. Consumers' utility functions define their preferences and attitudes; the availability of money always dictates the choice of consumption. Income is the most critical determinant of tourist demand in general and tourist spending in particular (Peerapatdit, 2004).

A study conducted in 2019 by Mudarra-Fernández et al. further confirms that income is the sociodemographic variable that most influences tourist consumption choices because it is directly correlated with the tourist's choices and the destination decided (Mudarra-Fernandez et al., 2019).

Another variable considered by the author in the determinants of expenditure is age; in particular, this relationship is vital for groups of subjects sharing the same age group (Peerapatdit, 2004). For example, a group of young people will make consumption decisions consistent with their age group and live the tourist experience according to what is closest to their preference, which usually goes hand in hand with age.

The author also explores the possible relationship between gender and spending. There are no significant results in the literature showing statistically significant differences between female and male spending behavior (Peerapatdit, 2004). As the author defines, it cannot be considered a variable to segment the market (Peerapatdit, 2004).

This theoretical framework makes it clear how different sociodemographic characteristics may have to do with different spending behavior. As defined by Hung et al. (2012), studying how it is possible to segment the market through tourism expenditure to define who spends a lot from who spends little in terms of sociodemographic factors, allows allows the establishment consistent results that could benefit policy-makers in the economic policy decisions of destinations. As further stated by Amir et al. (2017), studies that profile tourists in sociodemographic terms succeed in determining and managing different tourist profiles, and this contributes to local destinations in managing businesses and activities (Amir et al., 2017)

Krejić et al. (2016) also confirm the claim that there is a significant relationship between sociodemographic factors and tourist expenditure in their study of Hungarian tourists in the village of Skorenovac (in the municipal Kovin in Banat). The variables considered were age, level of education, and gender, and the results of the study suggested that the primary

hypothesis that sociodemographic variables influence tourist consumption could be confirmed (Krejić et al., 2016). For example, the authors showed that high levels of education correspond to high levels of expenditure and that women spend more than men do (Krejić et al., 2016).

A factor not widely discussed in the literature but worth investigating is the tourists' nationality/country of origin. The following section deals with this sociodemographic variable by showing the current literature results.

First paper: Can Nationality Explain Economic Tourist Behaviour? A Thematic Review

From Knowledge to Wisdom

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Can Nationality Explain Economic Tourist Behaviour? A Thematic Review

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Numerous studies focus on the determinants of choices regarding tourism consumption utilizing several methods, different data sources, with diverse results. And the notion of considering nationality as an influential factor in tourism expenditure has been considered very often in the literature. This work examines this relationship between nationality and tourism expenditure by means of a thematic review approach. The results suggest the critical role played by nationality in understanding the determinants of tourism expenditure.

Keywords: tourism expenditure, spending patterns, country of origin, residence

Introduction

Tourist behaviour has been debated in the literature relating to many aspects, from many perspectives, and utilising different techniques and methods (Farahani & Mohamed, 2013). Several studies have focused on tourism spending patterns and tourist behaviour, providing an idea of how the market could be segmented in assisting policymakers and a given destination (Soteriades & Arvanitis, 2006).

Thus, the analysis of factors affecting the economic behaviour of tourists is a frequent issue in scientific debate, with tourist expenditure being the main effect and measure of economic behaviour. There are several classifications regarding the key factors relating to tourist behaviour. Moreover, Hudson's classification (2008) of tourist behaviour is composed of eight critical factors: motivation, culture, age, gender, social class, lifestyle, life cycle stage, and reference groups.

Of the aforementioned factors, the role of nationality as an influential factor in expenditure behaviour has been specifically investigated in the literature. The country of origin and country of residence, or nationality are similar expressions used in several studies (Thrane & Farstad, 2012a). And, since the 1990s, many studies in the literature have been dedicated to analysing and understanding how the country of origin/nationality can play a specific role in tourist choices.

However, nationality reveals different results depending on the available data, destinations, and travel typologies. Some authors have considered nationality as an important and significant factor in the differences in spending behaviour, but not sufficient to enhance our understanding of tourists' spending levels (Flognfeldt, 1999; Pizam & Sussmann, 1995). With reference to the literature review conducted by Soteriades and Arvanitis (2006), there can be said to be two categories of factors in the literature: sociodemographic and travel related

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(Soteriades & Arvanitis, 2006). Nationality, as an explanatory factor for economic behaviour, is considered a sociodemographic factor.

This study will focus on tourist nationality, a related component of which is the notion of tourist distance, which has long been debated in the literature (Ahn & McKercher, 2018; Xue & Zhang, 2020). The concept of distance applied to tourism has been summarized by Ahn and McKercher (2018) from four points of view: physical, psychic, social, and cultural. Some studies in the scientific literature are dedicated to cross-cultural research, and their aim is to measure and understand consumer behaviour and marketing studies. The cultural characteristics of a given group are determining factors, which can explain, albeit in part, consumers' behaviour and their significant differences (Özdemir & Yolal, 2017). As defined by Özdemir and Yolal, a specific culture associated with nationality is one of the most frequent approaches to studies regarding consumer behaviour in the literature. The importance of cultural background (i.e., national identity) in tourist behaviour has also been studied directly and indirectly in the literature (Pizam & Sussmann, 1995). Finally, the relationship between cultures in general and tourism (particularly the cultural differences between tourists) has been widely debated in the literature (Pizam & Sussmann, 1995; Özdemir & Yolal, 2017). Bearing in mind the comments, the aim of this paper is to understand if nationality can be considered an important and determinant factor regarding levels of tourism expenditure. A thematic review of the more important studies, which have been conducted in assessing the relationship between tourism expenditure and nationality, will be undertaken in accomplishing this aim.

Methodology

As described by Kim, Bai, Kim, and Chon (2018), a thematic review can be qualitative or quantitative. In the study outlined in this paper, a qualitative, thematic approach was deployed with the specific aim of integrating and comparing different findings, as gleaned from the relevant literature. The Scopus search engine was used to collect articles of interest. A step-by-step procedure was adopted for this study: The first stage was a paper collection, according to the research protocol described below (Table 1). The latter commenced with a combining of relevant keywords, through synonyms and different links, and a combining of various keywords. Thereafter, the papers were read in their entirety, to arrive at 19 articles for further study. Finally, a precise subset of 11 papers was selected for consideration. Details regarding the search protocol are reported in Table 1.

Table 1

Search Protocol

Keywords and exclusions steps	N
TITLE-ABS-KEY ((tourism OR tourists OR tourist) AND (expenditure OR spending OR money OR economic behaviour) AND (nationality OR country of origin OR country of residence OR nationalities))	90
AND (EXCLUDE (SUBJAREA, "MEDI", "ENVI", "ARTS", "COMP", "ENGI", "AGRI", "EART", "MATE", "MATH"))	69
After reading and screening of abstracts	44
After reading the articles	19
Final paper set, according to quantitative research approach (sample survey, use of several regression models, including nationality as a regressor)	11

The Scopus database allows users to enter advanced search queries through operators and field codes. It was evident that the constraints placed on the search protocol produced a relatively low number of articles.

However, the selected set, which was sufficiently representative and corresponding to the purpose of this article and the thematic review approach, was retained. The main criteria for the exclusion of articles are defined in Table 1, in particular: Subject areas not related to the tourism sector and socio-economic disciplines were excluded; papers were also excluded; and finally, journals not dealing with these topics were excluded. As for the inclusion criteria, the main ones included reading the keywords and authors' abstracts, and finally, all those papers were included that presented: extensive survey, use of several regression models, including nationality as a regressor.

Result and Discussion

Some authors have observed no relationship between economic and tourist behaviour, and nationality (Archer & Flatcher, 1996; Sampol, 1996). The analysis conducted by Archer and Flatcher in 1996 in the Seychelles revealed that the differences in economic impact between the various tourists in terms of country of origin were not significant. Flognfeldt (1999) has demonstrated that the tourist market segmentation, which is based on nationality, is of some utility to the researcher in this field. In the opinion of the authors of this study, country of origin can be used as a discriminating factor with other related factors. Moreover, the relationship between country of origin and tourism expenditure can be considered as a function of the length of stay. Indeed, De Menezes and Moniz (2011) have found differences regarding the length of stay, which also affect tourist spending. Similar results have also been obtained by Wicker (2012), who considers nationality as a driver of tourist spending. The papers selected for this study, with reference to the authors, year of publication, Destination country, and sample size, are detailed in Table 2 below. All the selected studies show the significance of nationality, albeit in a diverse and limited way. In Table 3, they were taken into consideration in the statistical information of the articles: regression model used, main covariates[1], and response variable.

Table 2

Paper's Description for Authors, Publication Year, Destination, and Sample size

ID	Authors	Destination	N
1	So and Morrison (2004)	Taiwan	1,429
2	Brida and Risso (2010)	Costa Rica	893
3	Anderson (2010)	Spain	843
4	Thrane and Farstad (2012)	Norway	2,895
5	Thrane and Farstad (2012)	Norway	4,286
6	Brida et al. (2013)	Colombia	1,361
7	Sung et al. (2015)	Taiwan	249
8	Marrocu et al. (2015)	Italy	1,445
9	Marksel et al. (2016)	Slovenia	357
10	Gargano and Grasso (2016)	Italy	5,500
11	Mortazavi and Cialani (2017)	Italy	7,330

[1] I: income; G: gender; A: age; O: occupational status; P: previous visits; H: hours away from the ship; N: nationality; L: length of stay; ACC: accommodation; SIZE: group size; M: marital status; T: transport; PL: place visited; SAT: satisfaction; EXP: expenditure; EXPDAY: exp. per day; MOT: motivation; ED: educational level.

Table 3

Information About the Papers Selected for Regression Model, Main Covariates, and Response Variables

ID	Regression model	Main covariates	Response variable
1	GLM	I, G, A, O, P	Total expenditure
2	Cross-sectional	A, H, N, I, EXP	Total expenditure
3	OLS	G, A, I, L, ACC, SIZE	Average daily expenditure
4	OLS	N, A, PL, SAT, P, EXPDAY	Length of stay
5	OLS	MOT, L, PL, SIZE, A, T	Group and per person expenditure
6	Logit and Tobit	A, H, N, I, EXP	Average daily and category expenditure
7	Factor and cluster analysis	G, A, ED, M, N, I, EXP	Motivation for trip
8	Quantile, linear models	SIZE, L, ACC, T	Average daily and category expenditure
9	Categorial data analysis	G, A, N, L, PL, SAT, MOT	Expenditure
10	LM, concomitant finite mixture	G, O, L, PL, SAT	Total expenditure
11	OLS	A, G, SIZE, T, EXP	Length of stay

The articles selected, over the 2004-2017 period, have different sample sizes. Regarding the tourist destination involved in the study, many of them can be found scattered throughout Europe (Italy and Spain for instance). About the statistical information obtained from the thematic review, the three main pieces of information obtained, namely the regression model used, the covariates present in the study, and the response variable used, allowed the construction of Table 3.

Most of the studies use generic OLS models, the most popular covariates being income, age, use of the transport, and gender. The most frequent response variable in the models is total expenditure, followed by average daily expenditure and expenditure by category. A popular response variable is the length of stay, i.e., the time spent by the tourist in the tourist destination. This variable is particularly used in models because some authors have observed that, given the same conditions and geographical distances, some nationalities tend to stay longer or shorter in certain tourist places (for example, the length of stay of Japanese in Italy is greater than that of Chinese). As for the summary of the results, Table 4 lists the main results grouped in five different sections:

- The significant relationship between nationality and tourist expenditure.
- Different nationality for different length of stay.
- Different levels of income determine different level of expenditure.
- Nationality can be used for market segmentation.
- Cruise passengers expenditure is a specific tourist segment for different nationalities.

Table 4

Principal Results by Thematic Review

ID	Role of nationality
[1]-[11]	All analysed papers show a significant but general relationship between nationality and tourist expenditure. However, different authors have explained this correlation by considering different intervening variables.
[4]; [11]	Length of stay: Different nationalities are correlated with different length of stay. Consequently, the total expenditure level differs among tourists.
[1]; [3]; [8]	Income level: There are differences in mean expenditure among different nationalities. For instance, tourists from the USA (characterized by a higher level of income) tend to spend more than other nationalities.
[6]; [7]	Nationality is used as a segmentation criterion (ceteris paribus).
[2]; [5]; [7]; [9]; [10]	Nationality is analysed with reference to specific tourist segments, including, for example, the economic behaviour of cruise passengers.

Conclusions

Tourism promotion strategies at the local, regional, and national levels require apposite strategies at the level of market segmentation. Some segmentation analyses focus on demographics, the motivation for a particular visit, and the country of origin. This work has focused on the latter factor because it is the authors' opinion that tourist behaviour in general and economic specifically is differentiated in the various tourist segments, which in turn are based on nationality (Baum & Mudambi, 1996). In conclusion, final remarks are warranted. Many of the papers herein reviewed demonstrate a significant relationship between tourist expenditure (a dependent variable) and a set of variables, which can be variously termed, but which can be included in the same category (regressors): country of origin, nationality, country/place of residence, distance traveled, and first language of the tourists. However, despite the identified statistical association, the reasons accounting for this relationship are manifold. When discussing the relationship between nationality and tourism economic behaviour, various specifications should be considered: (a) the exact definition of the response variable (total expenditure vs. total expenditure per day, per capita, per group, or per person per day; overall total expenditure vs. expenditure on specific items, such as shopping, food and beverages, transportation, entertainment, etc.). All these possible response variables are related in different ways to the nationality of the tourist and related concepts; (b) nationality, country of origin, and distance traveled could all play a different role in explaining the relationship with tourist expenditure. This role could describe indicators for cultural distance (social, religious, racial, ethnic habits), economic distance (in terms of purchasing power, cost of living, income, etc.), and geographical distance (in terms of intention to return, traveling costs, ease to travel, etc.); (c) consequently, several variables and those having a differing effect could play a moderating or intervening role in the relationship between nationality and tourist economic behaviour. If appropriately controlled and/or used with other variables, these variables could enhance our understanding of tourist behaviour (Pizam & Sussmann, 1995, p. 905) in terms of: length of stay, level of income, trip motivation/purpose, previous travel experiences, etc. Thus, the authors of this study hold that many variables can markedly influence the relationship between tourist expenditure and tourist behaviour. Furthermore, these same authors are also convinced that a meta-analysis could support the existing literature by applying meta-regression techniques, as applied to the topic of tourist behaviour, in understanding to what extent nationality is a significant variable across the various studies regarding this topic.

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2.2 Cruise tourism and its economic impact

Cruise tourism is an essential part of the whole sector, which to date, together with traditional tourism, has seen an ever-increasing in number of passengers, workforce, cargo capacity, and the number of ships. Amato (2015) confirmed that the cruise sector is among the most active in tourism industry.

Cruise tourism is a composite product, which is different from the traditional holiday because everything is done on a ship: however, it is possible to visit different tourist destinations in a brief period. Indeed, as stated by Kester (2002), the cruise ship "serves as a floating hotel, offering an attractive, convenient and hassle-free way to visit various destinations without having to change accommodation" (Kester, 2002, p.337).

Usually, cruises have a short duration (3 to 7 days), but there are cruises with a longer duration characterized by much more essential routes in terms of geographical distances. The importance and economic impact of the cruise industry is now a crucial aspect to consider in tourism statistics.

Considering the work conducted in 2015 by Amato, it is possible to recreate the most critical stages in the evolution of cruise tourism. It is thought that the origins of the industry can be traced back to 1835 with advertisements promoting travel to the Shetland Islands (Amato, 2015, p.2). Instead, David (2016) writes that the first actual transatlantic cruise which reached New York from England dates back to 1840. In the early 20th century, transatlantic liners were used for migration and the transport of goods. The main objective of these ships was to reach the destination as quickly as possible, and therefore the internal organization was aimed at this goal (Amato, 2015, p.3). However, the first luxury ship coincided with 1912, the White Star Line.

In contrast, the Titanic and Olympics far surpassed the other transatlantic liners (David, 2016). However, from the 1950s onwards, sea transport was challenged by air transport, which began to take hold internationally. The first passenger jet took off from London bound for New York in 1928, causing a sharp decline in the popularity of the transatlantic cruise. Indeed, air travel was faster and had found greater fame than cruises (David, 2016).

In the 1960s, the need to assert themselves led airlines to reshape their organizations and schemes in order to offer a new product to the market: at the expense of speed in reaching the destination, a new business based on the choice of travel itinerary and the places to visit took on importance (Amato, 2015, p.2).

In this context, cruise ships are born, with the characteristic of being a "Multidestination" tourist product, which includes a series of stops in intermediate ports that make up the itinerary (Amato, 2015, p.2). In 1965, the Oceanic was built in Italy and was the first cruise ship for Home Lines. Instead, the port of Miami is the first port for the American cruise market, followed by two other Norwegian companies (the Royal Caribbean Cruise Line- RCCL and the Royal Viking Line- RVL) (Amato, 2015, p.3). In the 1970s, several transformations took place in the cruise industry to determine its success today. These years saw the birth of Fun Ships, ships designed to entertain tourists (Amato, 2015, p.3). For example, organizing excursions and guided tours to the various countries and places determined in the itinerary and activities on board the ship (Amato, 2015, p.3).

In the 1980s, demand and supply for cruises grew exponentially, thanks to a larger catchment area enabled by a considerable reduction in fares (Amato, 2015, p.3): it was in these years that cruising was no longer seen as a luxury trip or niche tourism. The 1990s also saw a shift of the industry to new locations worldwide, such as the Mediterranean and Asia (Amato, 2015, p.4).

Today there are three competing markets in the cruise industry:

1) The first is the American market; where the cruise product was born, and it is quite advanced

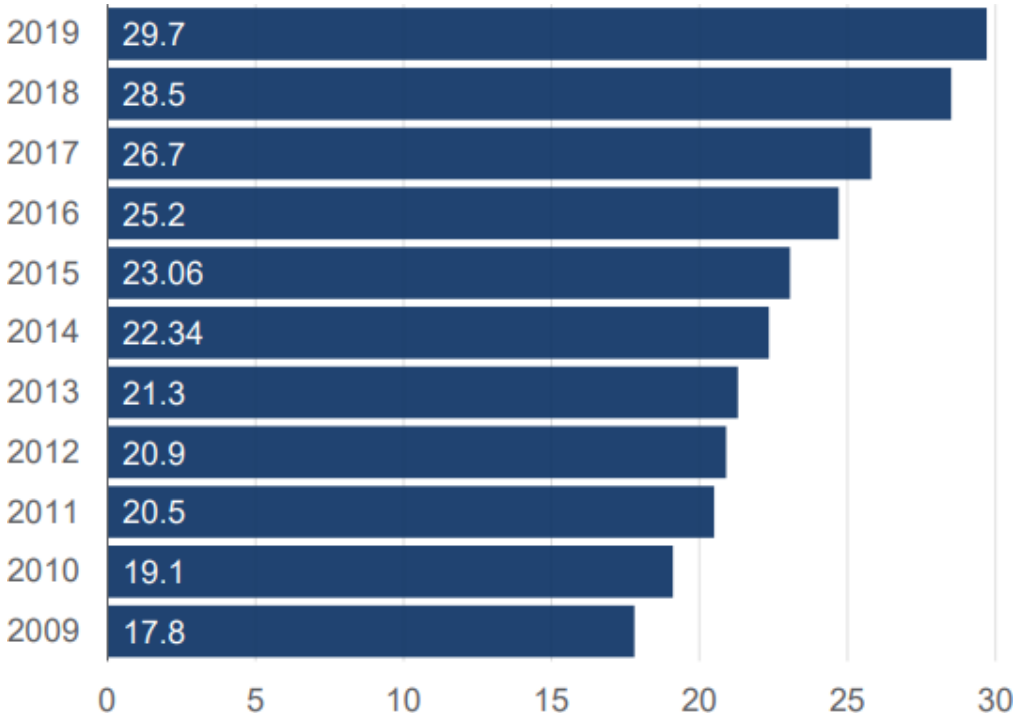
2) The European/Mediterranean market is in a development phase.

3) The Asian market is in an introduction/take-off phase.

Each year CLIA (Cruise Lines International Association) publishes a comprehensive report on the performance of the cruise industry worldwide.

As far as the demand for cruise tourism is concerned, this has increased over time and has changed because it has become more differentiated over time and has affected the tourist offer.

Figure 2.1: CLIA Global Ocean Cruise Passengers, 2009-2019 (Millions)



Source: CLIA Releases 2020 State of the Cruise Industry Outlook Report

The data presented in the figure show an impressive increase in the number of users for the time series 2009-2019. Cruise-oriented tourist flows have increased exponentially, pushing cruise lines to adopt more and more user-friendly solutions for an increasingly large catchment area. Today, cruise demand has changed over time and has become increasingly heterogeneous because the segments of tourists interested in a cruise are multiple because the needs to be satisfied are different (relaxation, cultural reasons, and others). Regarding the segmentation of the cruise market, several studies to support it has been made. Amato (2015, pp.10-11) defines the qualitative criteria of demand by meeting several criteria:

1) Motivation: there are several reasons for choosing a cruise. The reasons differ from each other (some choose the ship to have everything at hand; others choose the cruise to visit more sites of cultural/ tourist interest).

2) Knowledge of the geographic origin of the customers: a more remarkable acquaintance of the customer supports the construction of a differentiated cruise offer.

3) Duration and timing of the cruise: The available budget plays a crucial role in the choice.

4) Value for money: the propensity to spend by customers.

Tourism supply is constantly evolving and is strongly influenced by changes in demand. Being many the segments of tourists involved in the cruise industry, the standardization of the products is not always feasible, supports Amato (2015, p. 12). The packages available are many, and almost all travel agencies (cruise operators) offer the same packages to different people.

From a primary product configuration point of view, however, the cruise supply is influenced by several elements, which are:

- Value for money
- Itineraries and excursions
- Duration
- Time available onboard and ashore
- Entertainment services

The intersection of supply and demand achieves equilibrium in the cruise market due to the product brought in. Like general case of tourism products, the cruise product is also purchased under certain conditions mentioned above: for example, the high heterogeneity of these products has been discussed, but in recent decades they have become increasingly standardized thanks to the proposals of travel agencies, which no longer offer customized packages but rather homogeneous ones to allow an increasingly wide circle of people to have the possibility of purchasing a cruise.

There is an increasing growth in cruise passengers. As Horner and Swarbrooke (2021) state, the first distinctive feature of the cruise market compared to other markets is its exponential growth. Cruise Passenger is defined as "a sea passenger making a sea journey on a cruise ship. This does not include day-trip passengers" (European Union, 2009). According to the UNWTO Recommendations on Tourism Statistics for destinations visited, "cruise passengers are considered a specific category of international day visitors." According to Kester (2002) also," Since they do not strictly spend the night in collective or private accommodation in the visited country, they do not fall into the category of tourists (overnight guests) from a statistical point of view. The situation is generally more complicated by base ports because cruise participants can stay overnight at the hotel before or after the trip and must therefore be counted as tourists. In addition, in most cases, some passengers will not be international

visitors, but they will come from the domestic market. "(Kester, 2002, p.347) Considering the growth in the number of cruise passengers (Table 2.2) is possible to see the increasing and exponential trend in the number of cruise passengers.

Table 2.1: Number of cruise passengers (1970-2019)

Year	Number of passengers
1970	500,000
1980	1,400,000
1990	3,800,000
2000	7,200,000
2010	18,400,000
2019-estimate	30,000,000

Source: Swarbrooke, 2020

Considering the time series between 1970-2019, every ten years, they have more than doubled to 30,000,000 units in 2019. In terms of the country of origin of passengers, the majority (as of 2018) are from North America (49.9%), followed by Europe (25.1%), Asia-Pacific (20%), and finally, South America and others (5%).

The economic impact of the cruise industry is undoubtedly significant, especially in terms of job creation (1,166,000 jobs as of 2019), wages and salaries ($50.53 billion as of 2019), and finally as total output worldwide ($154.5 billion as of 2019) (CLIA, 2021). Assessing the economic impact of cruise tourism is not easy, as many industries and territories are involved. As stated by Amato (2015, pp.20-21), looking only at the traffic in the ports and the final purchase demand by the cruise lines, it would seem that it is reductive to consider only these two types of companies and there is a risk that the total impact is underestimated.

According to Amato (2015, pp.20-21, in order to have a general idea of the economic impact of cruise tourism, it is necessary to study the occupational level as well, and in this, there is the support of some associations and companies that shed light on the relations between cruise production and the territorial systems involved. Furthermore, the economic contribution must also be studied concerning the category of port: homeport or port of call (Brida and Zapata, 2010). A homeport is a destination from which the ship starts and ends.

The port of call is the one that refers to the intermediate stops (Brida and Zapata, 2010). Usually, cruise passengers stay in the port of call for less than 10 hours (Brida and Zapata, 2010): during this period, they can carry out excursions, guided tours organized by cruise operators or independently. They can also stay aboard the ship if they are not interested in visiting the destination that the port of call offers. In homeports, the economic impact must consider several segments: transportation, hotels and resorts, restaurants, attractions, and others (Brida and Zapata, 2010).

According to studies by Pallis et al. (2022), "A cruise passenger spends six to seven times more in a home port than in a port of call." Moreover, with the modernization of ships, passengers tend to spend more onboard than on land. Nevertheless, assessing the economic impact at home ports is essential. A 2020 study in Barcelona (Spain) showed the benefits of the cruise industry on the destination by assessing the average cruise passenger expenditure (Pallis et al., 2022).

There are many studies on cruise passengers' spending all over the world. In recent years, they have increased and refined thanks to new survey techniques that have better-captured cruise passengers' behavior in the destination. On the other hand, the lack of literature, even in the case of cruise passengers, is also represented by less attention for the methodology behind the surveys, the construction of the questionnaire, the methods of survey, and data collection in general. The following is a short paper aimed to review some of the work conducted in the literature on cruise passengers, focusing on survey techniques, questionnaire construction, and data collection.

Second paper: Cruise passengers' expenditure at destinations: Review of survey techniques and data collection

Book of Shor1 Paperz
SIS 2020

Edi1orz: Alezzio Pollice, Nicola Salva1i and Francezco Schirripa Spagnolo

Cruise passengers' expenditure at destinations: Review of survey techniques and data collection

La spesa dei crocieristi nelle destinazioni: Revisione delle tecniche di indagine e raccolta dati

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Abstract Spending by cruise passengers constitutes an important contribution to the economy of destinations. The issues related to the analysis of the expenditure have been widely debated for many years both in the scientific literature and in the common political debate. Despite 20 years of empirical research on this topic, not consolidated quantification methods exist to inform the debate. This work offers a brief review of the principal research on cruise tourist spending. It analyses the main characteristics of the surveys, reviews the different methods and techniques employed as well as assesses the main results. The article concludes with a discussion of the studies conducted and identifies future research directions.
Abstract *La spesa dei crocieristi costituisce un importante contributo all'economia delle destinazioni. Le questioni relative all'analisi della spesa sono state ampiamente dibattute per molti anni sia nella letteratura scientifica che nel dibattito politico comune. Nonostante 20 anni di ricerca empirica su questo argomento, non esistono metodi di quantificazione consolidati per informare il dibattito. Questo lavoro offre una breve rassegna delle principali ricerche sulla spesa dei crocieristi. Analizzerà le principali caratteristiche delle indagini, esaminerà i diversi metodi e tecniche impiegati e valuterà i principali risultati. L'articolo si conclude con una discussione degli studi condotti e identifica le direzioni di ricerca future.*

Key words: Cruise passengers' expenditure; Data collection methods of expenditure; Survey techniques; Sampling scheme

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1 Introduction

The cruise industry experienced important development in recent years, both in terms of expansion and diversification of the sector and of market volume. Over the last twenty-years, cruise tourism represents one of the fastest growing sectors in tourist field [12].

This work contributes to understanding how cruise passengers' expenses were analysed, from a methodological point of view. This is done by mean of a revision of the survey techniques for collecting information on cruise passengers' expenditure at their destination, implemented in various studies that emerged from the literature on this topic. In particular, this paper aims at critically assessing and improving the tools of data collection on cruise passengers spending and addresses one of the most relevant research questions in this area of study: *How is cruise passengers´ expenditure defined, operationalised and measured in tourism research literature?* In order to consider the most relevant articles dealing with an analysis of the spending behaviour of cruise passengers, the following selection criteria have been applied: studies that deal exclusively with cruise tourism and its economic impact; studies which primary aim was to analyse spending behaviour through interviews with cruise passengers; studies that used questionnaire as empirical data collection method. A better knowledge of the way in which cruise passengers' expenditure can be surveyed in practice represents a crucial step in order to determine the economic impact of the cruise sector in terms of costs and benefits [1].

2 Sampling scheme and Questionnaires

A review of relevant literature from the past two decades (1998-2018) were performed, mainly based on the assessment of three macro-themes (Table 1). The first theme addresses questions related with the definition and operationalization of tourist expenditure; the second one analyses issues in data collection procedures. The third theme focuses on the analysis of questionnaires and related survey techniques.

Table 1: Articles included in the review, by authors, year of publication and journal.

#	Authors	**Year**	**Journal**
1	Henthorne T.L.	2000	J. of Travel Research
2	Marušić Z. et al.	2009	Tourism Mar. Environ.
3	Brida J.G. & Risso W.A.	2010	Tourism Analysis
4	Brida J.G. et al.	2012	Tourism Economics
5	Larsen S. et al.	2013	Tour. Manag. Perspect.
6	Parola F. et al.	2014	Res. Transp. Bus. Manag.
7	Brida J.G. et al.	2015	Current Issues in Tourism
8	Marksel M. et al.	2016	Tourism Economics
9	Gargano R. & Grasso F.	2016	J. of International Studies
10	De Cantis S. et al.	2016	Tourism Management
11	Domènech A. et al.	2019	Tour. Plan. Dev.
12	Pino J.F.B. & Tovar B.	2019	Tourism Economics

2.1 Defining cruise tourist expenditure

Cruise passengers differ from tourists. Due to the time spent at the destination (from 2-4 to 8-10 hours) they could be considered as same-day travellers. During the stay period, their expenditure is characterized by a high degree of variability which depends, among other things, from the differences between two main categories of cruise passengers: Guided visitors, i.e. those who buy (almost always on board) a tour package (which usually includes entrance to museums and attractions, tour guide services, transportation costs, etc.) and the independent visitors: i.e. those who decide to visit the destination without buying any package, generally with no pre-defined itinerary. According to the UNWTO “visitor expenditure” is defined “as the total consumption expenditure made by a visitor or on behalf of a visitor for and during his/her trip and stay at destination” [13, p.85]. Similarly, we can define the expenditure of an independent cruise tourist at the destination as the total consumption expenditure made by the visitor or on behalf of the visitor during his/her visit at the destination, during the time spent for the visit. We can identify category-specific expenditure as "the total amount spent for one specific category of consumption good": food and beverage, transportation, shopping and souvenirs, etc. It is clear that the concept of cruise tourist consumption expenditure includes a wide variety of items, from the purchase of consumption goods and services related with their visit at the destination to the purchase of small durable goods for personal use and of souvenirs and gifts for family and friends. However, it is not easy to operationalize this definition, due to several issues. One of these issues is related to the size of the group size to which the total expenditure is referred to. Type and amount of expenditure greatly varies according to group composition, also by considering that some types of expenditure may not comprise all the people of the group, and due to the presence of scale economies in the degree of expenditure, which makes an estimate of “per-capita” expenditure difficult to determine.

2.2 Data collection procedure

Data collection is a crucial stage in empirical research. In the context under analysis temporal and spatial dimension must be clearly defined, especially in the implementation of sampling procedure, as a fundamental stage of the research design. The selection of units to be included in the sample is one of the most delicate procedures under the methodological perspective. In the considered research, the sampling procedures used are manifold, for instance, some have endeavored to use rotation samplings [7], others general random sampling [9], while some others opted for a stratified procedure (Table 2). Another aspect to consider is the interview time: it is possible to divide the research into two macro areas: "Cross-sectional analysis" and "Time series analysis". The first can be considered as a "snapshot" of a certain phenomenon in which the time dimension is not considered. Studies of this type have a clear advantage of greater simplicity and prompt availability of results compared to longitudinal analysis. Other problems in data collection includes: the time span, the choice of the unit under analysis, which represents critical elements.

A second relevant issue is related to the spatial dimension. In the majority of studies considered, the places considered are the ports, the cruise ships and the cities of destination. In the majority of cases the units are interviewed at the end of the visit to the city and just before they return on board in the ship [2,9,12].

Table 2: Sampling scheme, sample size, and target population.

#	*N*	Sampling scheme	Crew Members	Tourists
1	1500	Random pattern	No	No
2	1592	Stratified random	Yes	No
3	1121	Not specified	No	No
4	1361	Convenience random	No	No
5	8371	Not specified	No	Yes
6	127	Accidental sampling	No	No
7	3348	Stratified sampling	Yes	No
8	357	Random sampling	Yes	No
9	5500	Stratified sampling	Yes	No
10	278	Stratified random with selection criteria	No	No
11	161	Random sampling	No	No
12	12578	Two-step stratified	No	No

In table 3, information on study location and on survey period for the papers considered in the review are reported. The most significant problems in data collection are caused by the fact that some cruise passengers remain on board the ship, and this may causes problems in terms of sampling, since the size of the population became unknown. Moreover, some others may decide to come back to the ship for a break, and performing a second visit afterwards, causing issues in the implementation of probabilistic sampling scheme.

Table 3: Study location and survey period.

#	**Study Location**	**Survey period**
1	Ocho Rios, Jamaica	Five years (1993-1997)
2	Croatia	Four months (Jun-Sept 2006)
3	Costa Rica	One-Year (2008)
4	Cartagena de Indias, Colombia	Two Months (Oct-Nov 2009)
5	Bergen, Norway	Summers (2010-2012)
6	West Mediterrean	Spring season (2013)
7	Uruguay	2009-2010 season
8	Port of Koper, Slovenia	One month (Sept 2013)
9	Port of Messina, Italy	Eight-months (March-Oct 2014)
10	Port of Palermo, Italy	April (2014)
11	Tarragona, Catalonia	Three months (Aug-Oct 2017)
12	Canary Islands	Six cruise seasons (2001-2015)

2.3 The questionnaire

The most common survey tool for collecting data on cruise passengers' spending is via questionnaire. The use of questionnaires to evaluate the spending behaviour of

cruise passengers has been a step forward compared to the self-compiled diary and over time, survey techniques and questionnaire building have improved. In the literature examined, the questionnaires are generally divided into sections and each section is dedicated to the collection of information on factors that are likely to affect the spending level at destination, such as psychological, socio-demographic or contextual factors. For example, some surveys include activities carried out and post-consumption items, such as satisfaction [11], others include motivation items at the beginning of the visit [1], while some scholars consider the number of visits to other destination during the same trip, or the number of cruise trips made in the past [2]. Spending is typically measured across standard expenditure categories (food and drinks, tours, souvenirs, transport and others). Only few and more recent publications consider the spatiotemporal characteristics of the visit, such as average time spent in port, the distance travelled or list of places visited [4,5]

As regard the spatio-temporal choice, most of the early studies collected data at one point of time, while others [4,5] divides the data collection into an opening and a closing stage, allowing the interview to take place at separate moments in time (disembarkation vs. embarkation).

3 Main results and conclusion

The empirical results of the various studies conducted offer a certain degree of homogeneity for some factors, uneven for others. Research has shown that as time elapses, money spent in port is increased [7] and there is also a high probability of returning to the destination [1]. Propensity to return is also positively correlated with high satisfaction levels [1], and higher average age of visitors. Repeat visitation affected the overall spending of cruise passengers positively: it was observed that those who had already visited the place, spent significantly more than the so-called “first-time visitors” [6]. An important component that has been deepened by various researchers is the word-of-mouth [10]. The empirical evidence has shown that the opinion of others, the opinion that people have and perceive from the destination, is an important factor. As far as gender is concerned, there is no empirical evidence on significant differences between the two sexes, although some studies have shown that female cruise passengers spend more on average than men [9]. Age differences does not have a great impact in the categories of expenditure [9], instead it presents evidence in terms of total expenditure [5]. Spending by cruise passengers is also associated with the number of visitors: if they are part of a large group, they are likely to spend more money [3]. The size of the group is in fact an important factor, which many consider when it comes to cruise spending, because it has a significant impact on total expenditure. Another socio-demographic aspect considered is nationality, although the results seems to be conflicting. Many authors have shown that the nationality of the cruise passengers does not make significant differences in expenditure [1], others have shown that there are significant differences between expenditure levels among different nationalities [6,9]. Another highly influential factor in cruise passengers' spending is the duration of the visit as well as the distance travelled onshore: those who stay for short periods and/or near the port area

spend less at the destination and spend more money on board [8]. This issue has been deeply investigated, especially through comparison with tourists in general [3], by showing that cruise passengers tend to spend less than tourists.

Research related to the spending of cruise passengers has undergone an extraordinary evolution, accompanied by the development of the cruise sector. Each research, having different populations and samplings, different places and methods, offered a broad investigation of the topic. This work aimed at collating various studies conducted on this topic, placing particular attention to the implementation of survey techniques and of the underlining research hypotheses. The evaluation of the extent to which cruise passengers' spending can be measured and analysed can contribute to the development of policies for cruise tourism management.

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Chapter 3: Understanding tourist mobility intra-destination

People's mobility is a collective phenomenon involving tourism. Mobility can be defined as all the movements that people make within the territory. For this reason, tourism statistics are concerned with studying the phenomenon of mobility in all its forms: both at the theoretical/conceptual level and the analytical/quantitative level. It is possible to distinguish two main types of tourist movements: inter-destination movements and intra-destination movements. This chapter is focused on the second type because the main objective is to define a general theoretical framework able to provide an understanding of tourist mobility, the spatial behavior of tourists about the characteristics of destinations and the attractions within. To do this, mobility is studied, from both a statistical and economic point of view, and a general and sociological point of view. After defining the concept of tourist movement, the relative treatment of movement patterns will be studied in the literature and the main categories of factors influencing these movements are also defined.

Consequently, studying old and new tools, that have made it possible to identify the phenomenon of tourism mobility, is the core of this chapter. This is followed by a very specific discussion on the methodological aspects (methods of collecting and analysing tourist mobility data) and the more practical aspects in terms of the advantages and disadvantages of traditional data collection tools and new generation movement tracking tools (GPS first and foremost) and their limitations. Special attention will be paid to GPS tools with merits, flaws, technicalities, and future directions of these new technologies. The focus on GPS instruments also includes possible measurements applied in the field of tourism with an analytical treatment of the devices and the path from the delivery of the device to the loading of the data and the subsequent data matrix generated.

A final section is devoted entirely to the tourist studies conducted with GPS tracking. Factors influencing intra-destination movement for the tourist, in terms of managing the visit and in terms of choice and other consideration about the specific studies, are also included in this last section. The variables involved in the choice of movement pattern are analysed in several studies categories. Conclusions and future research issues are also included at the end of the chapter.

3.1 Tourist mobility: an introduction

Mobility is a social phenomenon and as such has been the subject of analysis in the sociology of tourism (Mascheroni, 2007). The travel experience was born from the concept of tourist mobility (whether physical or virtual) and for this reason, to measure the competitiveness and attractiveness of a destination, it is necessary to consider mobility as an essential element (Oliveri et al., 2012). Mobility in this context is considered a conceptual category for the analysis of competitiveness from the perspective of the transportation system (Oliveri et al., 2012). When looking at the "facilities" system, the measurement of mobility and tourist travel within the destination is facilitated if these systems are monitored.

As defined by Vaccaro (2007, pp-75-76), tourism is a phenomenon that concerns the mobility of people in general, and as such, on the one hand, it has characteristics that are typical of all mobility phenomena, and on the other hand, it takes on special and connotations that are typical of the tourist phenomenon. To assess mobility, it is necessary to evaluate five aspects of movement: scope, nature, voluntariness, purpose, and duration (Vaccaro, 2007, p.75). Table 2.1 defines the five aspects listed above.

Table 3.1: Five aspects of the movement

Aspects	Description
Field of movement (scope)	People can move within their either environment or outdoors.
Nature of movement	The move may be temporary or permanent. In the first case, the person intends to return to the place of departure, in the second case there is a presumption of willingness to change the place of establishment.
Voluntariness of movement	Whether or not the person decides the displacement. An example of an involuntary displacement could be the prison
Displacement function	Functions of consumption, income generation in the place of destination, and other functions of a geopolitical or similar nature.
Displacement duration	When the movement lasts more than one year it is called migratory, those of less than 24 hours are called excursions; those between one day and one year are called tourism.

Source: Vaccaro (2007)

According to Vaccaro (2007), four types of mobility of persons can be identified:

1. Internal mobility: all movements made by subjects within the usual place, for example, a visit to a local museum.

2. Migratory mobility: all movements made outside the usual location to generate/produce income.

3. Other mobility: with purposes of a special nature (e.g., military, and diplomatic missions.

4. Tourist mobility: voluntary and temporary movements of no more than one year but not less than one day, outside the usual location for consumption purposes

As noted by Ferrante and Vaccina (2010, pp. 9-20) the study of tourism mobility within the destination has been little explored in the literature in the past, despite the enormous importance of this aspect in destination management. Taking into consideration the review of work conducted by Shoval and Ahan (2016), it was possible to identify how in the last decade, work conducted on the topic of tracking technologies in tourism studies has seen an increasing growth. They divided the studies into three generations: the first on the methodological aspects and potential tracking data; the second more practical with the use of this data to explore issues not yet considered; and finally, the third on tourist evaluation and consumer behavior (Shoval and Ahan, 2016).

3.2 Tourist movement and their patterns

Tourist movement is studied by the geography of tourism, because mobility occurs in the territory and tourist flows determine "increasingly complex geographies" (Spinelli et al., 2012, pp.211-220). As defined by Kumar et al. (2021) the study of tourist movements helps to understand the travel behavior and travel habits in the destination. In addition, studying the movement of travellers is important in destination management, because the policymaker can get an idea of the movement patterns within the territory (Kumar et al., 2021). In the first decade of mobility studies, we see studies of a descriptive-heuristic nature, the main objective of which is to provide basic concepts, propositions to support the literature.

As defined by the comprehensive work on the concept of movement by Andrienko et al. (2011), movement data, including the dimensions of space, time, and objects, provide a wealth of information that is often not easy to use. Movement data are Spatio-temporal data that are developed in a geographical dimension with additional multidimensional attributes (Andrienko et al., 2011). There are three basic sets of movement: Space (S), Time (T), and

Objects (O) (both physical and abstract entities) (Andrienko et al., 2011). From there, in the analysis of movements, it is possible to distinguish three different units of analysis:

- focus on objects and therefore in terms of space and time, with the relationships between locations, times, and other objects;
- focus on space in terms of time and objects; and
- focus on time in terms of objects and space (Andrienko et al., 2011).

As defined first by Donaire and Gali (2008), now by Mckercher et al. (2019), destinations possess three types of space, which are geographical, mental, and social. The behavior of the tourist derives from the space-time combination of movements and as such, is certainly influenced by the three spaces. Geographical space is the shape of the destination, with roads, connections, and nodes. The mental space is instead the one connected to the destination image, so it has to do with motivation. Social space, on the other hand, is that which is constructed independently of the tourist: prescribed itineraries, movement patterns, are nothing more than social constructs. (Mckercher et al., 2019).

It is possible to distinguish two main types of tourist movements: inter-destination movements and intra-destination movements. The first type refers to a global level because the tourist moves from the region of origin to the region of destination (or, between regions of destination) (Lau and McKercher, 2009). The second type of movement refers to a local level, characterized by movement within a single destination (Lau and McKercher, 2009). The factors that most influence tourist movement are classified into three categories (Cromption and Mcklay, 1997):

- "Push" Factors: Human characteristics, travel party size, motivation, personality

- Pull" factors: physical factors including the configuration of the destination (attractors factors)

- "Time" factors: length of stay, duration, and so on.

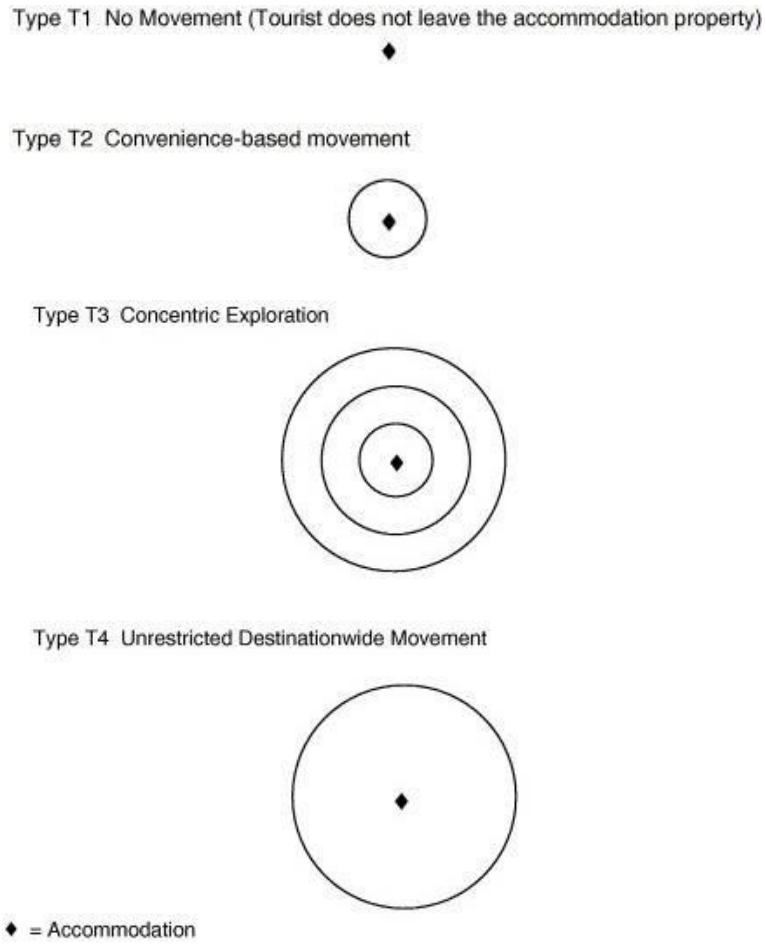
Following the issue related to the mobility measurement, the authors (Lew and McKercher, 1999) highlighted with their work the challenges behind understanding the intra-destination movement patterns of tourists. According to the authors, understanding how and why tourists move in space and time and what influences their movements is of vital importance for infrastructure and transport management and destination management in general (Lew and McKercher, 1999). Two characteristics influence intra-destination movements:

1) Specific characteristics of the destination: such as the type of accommodation, attractive locations, and transport accessibility. This first category can be considered as a pull factor

2) Tourist characteristics: time budgets, motivation, and level of knowledge about the destination. This second one, instead, Push factor.

In general, the geometry of these movements is divided into two models: linear and territorial. Linear models are those that reflect the itinerary travelled (Lew and McKercher, 1999), while spatial models reflect the geographical distance. Figure 3.1 represents the four territorial movements of tourist behavior in the destination.

Figure 3.1: Territorial Movements

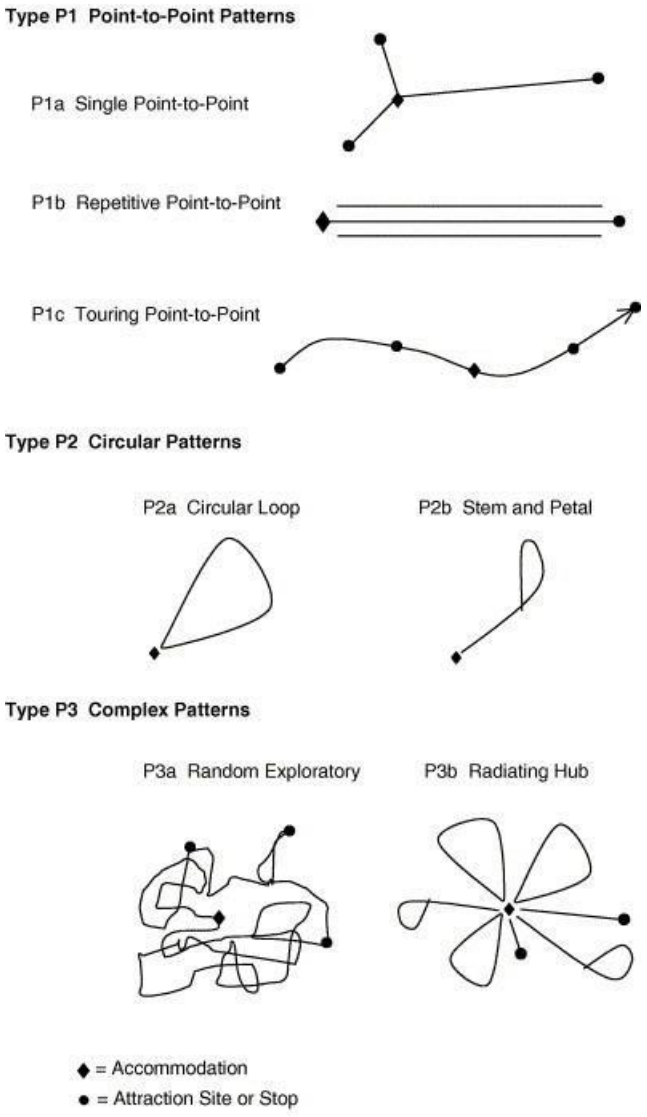


Source: Lew and McKercher. (1999) in "Modelling Tourist Movements: A Local Destination Analysis", pp.414-415

The first movement (T1) is called "No Movement" because there are tourists who do not cross the boundaries of the accommodation, e.g., in the case of All-inclusive resorts it is typical. The second movement (T2) called Convenience-based movement is the situation

where an attraction is visited near the accommodation, e.g., in cases of business trips where the time budget is limited. The third (T3) is called Concentric Exploration because it is the situation where the tourist does not know what to do and there is uncertainty about the places to visit. The last one (T4) is the Unrestricted destination wide movement which is the case where there is high information and knowledge of the destination, e.g., repeated visitors. The second type of model is the linear model and is represented in its three configurations in Figure 3.3.

Figure 3.2: Linear models



Source: Lew and McKercher. (1999) in "Modelling Tourist Movements: A Local Destination Analysis", pp.414-415

The first pattern (P1) follows the same route to and from the place of accommodation. The second pattern (P2) follows different routes to the accommodation. The third one (P3) is a mix of P1 and P2. The movement patterns described refer to specific patterns. However, movement patterns are strongly influenced by space syntax: movement in a city is different from movement inside a museum, a park, or a specific tourist attraction. This means that in the study of movements it is necessary to consider the place that is being considered, both physically and geographically. One of the main advantages of these models is the possibility to have an a priori theory behind the tourist movement: being a conceptual/theoretical model the main advantage is to allow a quick application of the tourist movement. The main disadvantage is to consider movement patterns a priori is a limitation for the study of spatial behaviour: tourists are not habitual and as such, they perform actions which can change during the course of time.

3.3 Theoretical aspects

The concept of "spatial visitor behavior" is defined by Bauder (2015) as the connection between location-based tourist actions (i.e., actual tourist behavior) and the spatial structure of the movement pattern that is created from these activities (Bauder, 2015). Thus, mobility is a consequence of this connection because of the relationship that exists between location and tourist activity works (Bauder, 2015). Considering the work of Shoval and Isaacson (2009), it is possible to assess the theoretical aspects of tourists' spatial behavior. The authors (Shoval and Isaacson, p.11-12, 2009) point out that studying tourist mobility is a difficult task from a twofold perspective: generally, in the onsite survey, it is difficult to identify the tourist; it is difficult to locate them because the entry and exit points from a territory/tourist location are not defined (Shoval and Isaacson, p.12-13, 2009). In addition, the figure of the tourist is different from others, because the tourist moves and behaves differently from a resident, in terms of visiting the destination. Therefore, the visit is conditioned by the condition of the subject as a tourist, and the movement he/she makes also depends on whether or not he/she knows the destination and how long he/she will stay there.

Studies on the Spatio-temporal activities of visitors, in general, are descriptive and are tailored to the individual case study (Shoval and Isaacson, p.12-13, 2009). Considering the literature review carried out by the authors (Shoval and Isaacson, 2009), it is possible to define 7 categories of studies, which differ from each other in terms of research objectives and the type of data analysis used.

Table 3.2: Categories of studies conducted on tourist movement

Category	Research aims
Descriptive analysis of tourist movement and time allocation	Temporal and spatial patterns of tourists
Explanatory and predictive factors for tourist's temporal and spatial behaviour patterns	Discover the uncover factors that can explain temporal and spatial behaviour patterns
Creation of typologies	Distinguish groups of tourists
Understanding tourists' decision-making choices	Motives and factors that affect decision-making choices
Spatial cognition /abilities exploration	Improve knowledge about human spatial abilities
Movements patterns and flow	Repeat movement patterns
Destination consumption	Spatial consumption of the location

Source: Shoval, N., & Isaacson, M. (2009)

Looking at Table 3.2 it is therefore possible to see which categories are studied in relation to the movement of tourists. In recent years, however, interest in this topic has grown and new categories of studies have emerged:

- Studies that have dealt with dispersion analysis (e.g., Hardy et al., 2020): the dispersion of tourists through a destination is a recurring theme in the current literature, especially in terms of destination organisation and management. Despite the importance of tourist dispersion in the destination, it is not a well-studied topic and is limited in terms of conceptualisation and research methods (Hardy et al., 2020).

- Studies that have been concerned with understanding the nature of space (e.g. McKercher et al., 2019): according to the authors (McKercher et al., 2019), there are three types of space on which tourists see their particular behaviour:

1) Geographic: the distribution of nodes of attractions and the network of roads influences behaviour because it determines trajectories;

2) Mental: built on a series of markers that create a precise image of the destination

3) Social: unconsciously or consciously, tourists have social constructs that determine socially accepted routes derived from the background.

The combination of these three spaces determines tourist behaviour in the destination (McKercher et al., 2019).

- Studies have combined traditional surveys (with questionnaires) and geo-location tools (GPS). For example, the study by De Cantis et al. (2016) combines these two tools to analyse the behaviour of cruise passengers in Palermo, Italy. And again, McKercher et al. (2019), examine the movement patterns of different subjects visiting a historical city (Tasmania, Australia). The authors combine traditional visitor interviews with customised tourism tracking applications (McKercher et al., 2019).

3.4 Methodological Aspects

Research methodology is a long-standing discipline that has sought to clarify the methods behind which certain phenomena can be investigated. Tourism is also involved and, given the extremely multidisciplinary nature of the tourism sciences, the more exquisitely methodological aspects are also addressed in this text, with the aim of clarifying the limits and priorities.

After introducing and stating the theoretical aspects of spatial behaviour, the authors (Shoval and Isaacson, 2008) focus on the methodological aspects. The methodological aspect considered by the authors is the data collection (Shoval and Isaacson, 2008). As for the first one, two techniques can be distinguished: direct observation and non-observational techniques.

Table 3.3: Direct observation and non-observation techniques: a comparison

Techniques	Methods
Observational	1. Participant-Observer (the observer personally accompanies the individual under examination (much used in anthropology) 2. non-participatory observation (follow the individual at a distance by recording activities over space and time) 3. Remote observation (a more economical method, e.g. with cameras placed in strategic locations) 4. Aggregative video tracking (video cameras or closed-circuit television) 5. Cellular data
Non-Observational	1. Time-space budgets (is the most commonly used, such as dairy). The natural extension of this method is the new tracking technologies (such as GPS).

Source: Shoval and Isaacson, 2009

It is possible to define two main data sources analysing the mobility of tourists/visitors:

1) Traditional sources: such as mobility surveys, direct observations

2) Localisation technologies: mobile phones, Bluetooth, GPS, smartcards, other technologies.

Following the scheme proposed by Muñoz-Mazón (2019) the tools for tracking the movement of tourists are several. The scheme proposed by the authors is summarized here in Tab. 2.4, to highlight the differences and describe their advantages and disadvantages. Traditional ones up to those today that rely on advanced technology tools such as GPS, GIS, etc.

Table 3.4: Tools for tracking the movement of tourists

Tool	Brief description
Interviews and Surveys	Traditional tools are characterized by a high response rate (in interview case). The researchers can verify the information obtained by visitors and, in the case of the survey can be done at home.
Direct Observation	The traditional tool used to study tourists. High cost in terms of time and number of researchers, high level of errors due to human interpretation
Video Surveillance	The traditional tools used to study tourists, also in this case, high level of errors due to human interpretation.
Tourist Card	Instruments used by DMOs (Destination Management Organizations) to improve the experience of tourists, to increase the consumption of products and services, and to direct destinations towards better management of tourism resources.
GIS and GPS	Technological tools, GIS (Geographic Information System) and GPS (Global Position System).
Mobile Networks	This is information generated from the use of devices and cell phones that are often combined with GIS applications.
Bluetooth	The biggest advantage is that even low-performance cell phones have Bluetooth

Social Networks	The information is available on the internet through the tweets of the users with geographical location.
Travel Stories	The main advantage is that in this way, you do not invade the privacy of the tourist and you can reconstruct the path of the visitor in the specific area visited. Voluntarily, tourists write about their trip, through diaries and reports. The advantage is that there are no errors from observation, but the immediate problem is the loss of information due to memory.
NFC (Near Field Communication)	This is another modern tool that uses the QR code, for example with tourist cards.
Alge System	These are sensors placed in the participants' ankles to get the combination of the subject's physical movement. Substantial data loss is possible because the sensors are not like GPS sensors.

Source: Muñoz-Mazón, 2019

Recent years have seen a gap between advanced tracking technologies and research methods in the tourism area (Hardy and Aryal, 2019). For example, there are many studies regarding the behavior of cruise passengers in transit, but there are limited studies regarding the final departure from a cruise ship (Hardy et al., 2021). To fill this gap, the authors use Tourism tracer app-based technology to collect both GPS and survey data for many days at a time (Hardy et al., 2021).

As stated by Wolf et al. (2001) studies using GPS in those years were beginning to gain momentum combined with traditional surveys and in the space of a few years have taken the field in an overbearing manner, eliminating, among many things, travelogues for example (Wolf et al., 2001). While it is one of the most effective methods due to the physical observation by the researcher, it is a method that has suffered much criticism due to its invasiveness and ethical issues (Hardy and Aryal, 2019).

3.5 Global Positioning System (GPS)

Before carrying out analyses and evaluations on the movement of tourists in general, and on mobility within the destination, another point is carrying out a deep and detailed assessment

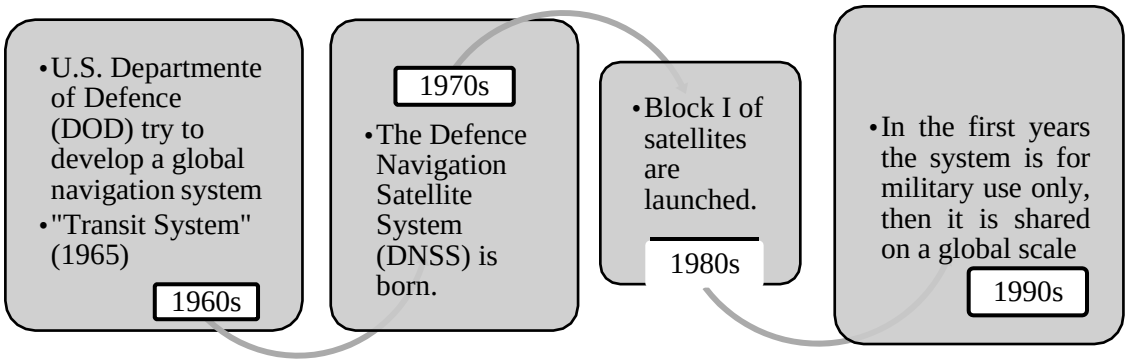
of the territory, monitoring and evaluating the most salient aspects concerning tourist products and services.

GPS is a global navigation satellite system (GNSS) that determines position the so-called 'geopositioning' (van der Spek et al., 2009). As stated by Shoval and Isaacson (2009), GPS navigation systems are part of everyone's daily life today. GPS produces a precise position and reference in time and space and is used in several technologies, first the transceivers of mobile phones (Shoval and Isaacson, 2009). Since the 1990s, the development of GPS and cell phone networks has allowed the increasing development of a variety of tracking technologies that can be used as spatial data collection tools (Shoval, 2007).

It is possible to trace the history of GPS development (see fig. 2.3) starting in the 1960s with the intention of the U.S. Department of Defence (DOD) to create a global navigation system. During those same years, several attempts and projects were channelled into the goal of creating a navigation system that would give high positional accuracy (Shoval and Isaacson, 2009). The first attempt of experimental satellites program was the 'transit system' used by submarines carrying Polaris nuclear missiles in 1965 (Shoval and Isaacson, 2009).

In the 1970s, the DOD decided to consolidate the various navigation satellite concepts by merging the individual branches of the military department into a comprehensive DOD system: the Defence Navigation Satellite System (DNSS). In the same years, the department set about implementing a full-scale satellite navigation system and created a prototype of the satellites (Shoval and Isaacson, 2009). Finally, in the 1980s, 11 satellites (Block I satellites called) were launched (Shoval and Isaacson, 2009). The Russian GPS (Glonass) is currently in orbit and the European one is being planned. However, the most commonly used navigation system is NAVSTAR (Navigation System with Timing and Ranging) of the U.S. Department of Defence (Shoval and Isaacson, 2009). Even in the 1990s, although functional, the system is for military use only and is denied for civilian use. It was not until 2000 that the system became usable for commercial applications and individual use (Shoval and Isaacson, 2009).

Figure 3.3: Historical of GPS development



Source: Author's production (in Shoval and Isaacson, 2009)

3.5.1 Operations and research opportunities of GPS technology

The possible uses of advanced data collection methods, from sales geographies to measuring the vitality of city centers may be subject to several issues that need to be addressed (Shoval, 2007). In particular, the distribution of devices may be complicated and finally, there may be ethical and moral issues, especially when dealing with sensitive privacy issues (Shoval, 2007).

GPS contains three separate operational segments:

1) Space segment (SS): These satellites orbit the earth. SS, therefore, consists of the satellites that orbit the earth and emit electromagnetic signals to obtain locations. Originally, there were 24 satellites on six orbital planes; now new satellites have been added (Shoval and Isaacson, 2009).

2) Control Segment (CS): Centers located this control on the ground. CS has two functions: the first is to maintain the orbit patterns and keep the position of each satellite; the second function is to synchronize the atomic clocks (Shoval and Isaacson, 2009).

3) User Segment (US): consisting of all the receivers used by people to obtain positions (Shoval and Isaacson, 2009).

As stated by Hallo et al. (2012) while they are baseline data, locations, travel routes, and time spent at the destination are the most relevant data when it comes to recreational activities.

The onerousness of traditional data collection methods on spatial and temporal use burdens both interviewers and respondents (Hallo et al., 2012). This is because these methods required respondents to plot their travel routes on maps and record the duration of the trip. This is also time-consuming and not just resource-intensive. Finally, computationally using and analyzing this data is not straightforward.

Shoval and Isaacson (2009) address the potential sources of errors in the calculation of positions by GPS.

Table 3.5: Potential source of error in GPS positions

Potential sources of error	Description
Atmospheric interferences	Humidity, changing conditions in the ionosphere, different altitudes of satellites, affect the speed of the signal.
Multi-path errors	In the dense urban areas (hard surfaces with buildings) the signal bounces off (and indoors)
Indirect exposure	The receiver needs direct exposure to the sky, e.g., building roofs are a common obstruction to this.
Time passed from the last ephemeris calculation	Ephemeris data (which are data of several variable astronomical quantities, such as magnitude, orbital parameters, coordinates) in this case calculate the location of the satellites; they are transmitted every 30 seconds but are calculated every two hours. This time gap is a degradation of GPS accuracy.
Intentional degradation of the GPS signal	By the US government in the 2000s, it was not until 2007 that Bush agreed to end the procurement of GPS satellites, which can degrade the accuracy of civilian signals.
Dense vegetation or rough terrain	They hinder the signal that is getting poorer (Hallo et al. 2005; Lai et al. 2007; Stopher and Greaves 2007).

Source: adapted by the author

Taking into account methods in order to better analyse the tourist behavior, a 2011 study by Pettersson and Zillinger compares GPS device and questionnaire in terms of strengths and weaknesses. The strengths highlighted by the authors are as follows: GPS devices provide detailed information and are easy to handle and manage, while questionnaires provide a full understanding of the tourism experience (Pettersson and Zillinger, 2011). From the disadvantages point of view, GPS need to be recharged, while questionnaires take time and

require a researcher/assistant to evaluate the correct compilation (Pettersson and Zillinger, 2011).

There has been a change in GPS accuracy levels (from 3 to 10 meters, approximately) (Hallo et al., 2012). This improvement has also been accompanied by an increase in the number of GPS receivers that are now used in multiple aspects of daily life, such as transportation, monitoring, and travel (Hallo et al., 2012). Over time, fortunately, the signal has improved, the battery life has increased and the price has decreased dramatically. In tourism research, methodological challenges concerning the use of modern tracking technologies are still debated.

Ferrante et al. (2016) presented a general framework to GPS data analysis, on the study of cruise passengers' mobility in destinations as an initial reference. Therefore, it is possible to summarize the most important analysis stage using GPS technology: pre-processing of information, mapping, extraction, and synthesis of relevant information (such as average and variability), merging with questionnaire-based information (or other data collection tool), analysis of the results, modelling and reporting (Ferrante et al., 2016).

Before analysing GPS data, a set of pre-processing operations is required, e.g., calculation of local time and date, latitude and longitude corrections and cumulative recorded time intervals (Abruzzo et al., 2020). Therefore, data cleaning and validation are operations concerning the pre-processing phase. GPSs normally record a position (a couple of coordinates) every 10 seconds, resulting in thousands of data points per statistical unit (Ferrante et al., 2016). For this reason, the presence of errors, outliers, measurement errors and random point generations are the most common problems at this preliminary stage. A crucial step in this is the identification of anomalies in the data (outliers) and missing data due to e.g., loss of signal or interference (Abruzzo et al., 2020). Outliers can potentially occur initially when the device is switched on, or when it switches from sleep mode to working mode. In general, however, signal loss is due to buildings, wooded areas, etc. (Abruzzo et al., 2020).

Regard the mapping phase, visualizing tracking data in a way that uses software with geographical information systems (Ferrante et al., 2016). Studying the movement of tourists requires the evaluation of both spatial and temporal information (Kumar et al., 2021) and it is for this reason that GIS technologies with the help of GPS are important in the evaluation of such movements. Given that the movement of tourists has always been studied using various methods, modern tracking technologies allow for the management of a mass of data that

would otherwise be lost, or at least, handled in an inefficient manner (Kumar et al., 2021). GIS is a system that integrates software and hardware to collect, hold, manage, analyse, and represent geographical records (Kumar et al., 2021). GIS technology uses spatial and geographic data (including, on the one hand, longitude, and latitude, on the other hand, it uses spatial reference including, for example, postal codes and addresses) (Kumar et al., 2021). Fajuyigbe et al. (2007) define the Geographical Information System (GIS) as a 'high-tech map'. Unlike maps, however, GIS can flexibly extract a range of information, allowing the data obtained to be analyzed, modelled and so on (Fajuyigbe et al., 2007). The main components of GIS are three:

1) Hardware: includes all the equipment needed to support the activities (from data collection to analysis).

2) Software: essential for creating, editing, and analysing data

3) Data: spatial data, which are part of the geo-database and refer to places on earth, then there are the attribute data, which are secondary data that contain characteristics and information, related to the spatial data.

Another important step in analysing GPS data is to identify other information on travel modes and motivation (Ferrante et al., 2016): this is usually possible through surveys using questionnaires or travel diaries. As defined by Abruzzo et al. (2020) during this phase the most common operation is to identify the performance activity through the segmentation of trajectories, which are distinguished, for example, by a series of variables that can determine the most relevant information for constructing patterns of tourist movement (Abruzzo et al., 2020).

An essential aspect in the analysis of GPS data is the identification of stops: when studying tourists, it is advisable to check when they stop and for how long, to get an idea of how the visit is proceeding and what types of activities are being conducted by visitors. The stop is characterised by consecutive GPS data points within a "predefined and distance threshold" (Abruzzo et al., p.5, 2020). However, as stated by Abruzzo et al. (2020) it is important when identifying stops, to consider, above all the context of the study, the research objective, and the assumptions regarding the context. The characterisation of stops is strongly dependent on the research object, since for example in the case of tourism, catering activities, cultural sites and leisure centres are more relevant, whereas in other research fields these activities are not relevant.

Following the discussion of Ferrante et al. (2016), it is possible, at this point, to identify the main indexes in the analysis of GPS tracking data: total duration of the tour, total length of the tour, maximum distance from the point of origin, average distance from the origin, average speed and finally, 90th percentile of the speed. Indexes are described in table 3.6.

Table 3.6: Main indexes for GPS tracking data

Index	Name	Formula	Description
1	total duration of the tour	$Dur = \sum_{t=1}^{T} Int_t$	The time interval between t and $t+1$
2	total length of the tour	$L = \sum_{t=1}^{T} SLD_{t,t+1}$	Straight line distance between consecutive pairs of coordinates in t and $t+1$
3	Maximum distance from the point of origin	$Dmax_i = \max_t(D_{i;t_0,t})$	For example, in the case of cruise passengers it was the port (Ferrante et al., 2016)
4	average distance from the origin	$\bar{D} = \frac{\sum_{t=1}^{T} D_{t_0,t} * Int_t}{Dur}$	
5	average speed	$\bar{V} = \frac{\sum_{t=1}^{T} V_{t,t+1} * Int_t}{Dur} = \frac{L}{Dur}$	The ratio of tour length to total duration
6	90th percentile of the speed	$90^{th}V_{t*} : \frac{\sum_{t=1}^{T} Int_t}{Dur} \geq 90\%$	

Source: Ferrante, M., De Cantis, S., & Shoval, N. (2018). A general framework for collecting and analysing the tracking data of cruise passengers at the destination. Current Issues in Tourism, 21(12), 1426-1451

With modern technologies, the data processing phase using GIS allows to track the movement of tourists and get an overview of behaviour trends, evaluating their differences and similarities (Hardy and Aryal, 2019).

The use of GPS has increased over the years, and this has been accompanied by a growing interest from the scientific community to explore and apply these new generation tools (van der Spek et al., 2009). Another factor that has enabled the increase in the use and fame of GPS instruments is that these devices are now compact, small, with a certain amount of battery life and can store a large amount of data with geographical coordinates (Abruzzo et al., 2020). Transport science is undoubtedly the most investigated field of research when it comes to GPS (van der Spek et al., 2009).

Table 3.7: The most investigated fields or tourist research with GPS

Categories	Studies
Applied study on cruise passengers	De Cantis et al. (2016)
	Domenech et al. (2020)
Comparison perspective with other methods	Arrowsmith et al. (2005)
	Shoval and Isaacson (2007)
Pros and Cons of GPS technologies	Edward et al. (2010)
	Lai et al. (2007)
	Pettersson and Zillinger, (2011)
Data processing scheme of GPS	Van der Spek (2009)
	Ferrante et al. (2016)
Visual Analysis	McKercher and Zoltan (2014)
	D'Antonio et al. (2010)
	Beeco et al. (2013)
	Beeco et al. (2014)

Source: Ferrante, M., De Cantis, S., & Shoval, N. (2018). A general framework for collecting and analysing the tracking data of cruise passengers at the destination. Current Issues in Tourism, 21(12), 1426-1451

Two-thirds of the studies reviewed by the authors use GPS tools: the accessibility of the tool in terms of cost, space, and time is arguably the most important factor (Shoval and Ahas, 2016). Some studies focus on geographic areas that are limited in size, such as small towns, theme parks, zoos, and nature parks (Huang and Wu, 2012; Birenboim et al., 2013; Birenboim et al., 2015; Lai et al., 2007; Hallo et al., 2012).

Other studies, however, focus on large spaces such as cities (Calabrese and Ratti, 2006; McKercher et al., 2012) and have successfully used GPS devices.

Taking into consideration the systematic literature review conducted by Kumar et al. (2021), it is possible to identify scientific studies that have dealt with the behavior of tourist movement in destinations using modern technologies (GIS, GPS).

Considering the literature review conducted by Kumar et al. (2021), it is possible to identify some scientific studies (from 2014 to 2020) that dealt with tourist movement behavior in destinations using modern technologies (GIS, GPS). Some of the authors considered by Kumar et al. (2021) used GPS Technologies and GIS to investigate tourist behavior at destination[6] (Huang, 2020; Dend and Andrada, 2020; Su et al., 2020; Barros et al., 2020; Sugimoto and Suzuki, 2019; Li et al., 2019; Kang et al., 2018; Yun et al., 2018; Korpilo et

[6] For more details about other studies conducted on this topic, please see the Tab.3 in Kumar et al., 2021 "GIS in Tourism: A Review of Tourists' Movement Behavior"

al., 2017; Zheng et al., 2017; Chhetri et al. 2015; Grinberger et al., 2014). For instance, Huang (2020) use GPS devices to track the Spatio-temporal behavior of tourists in Hong Kong Ocean Park. Deng and Andrada (2020) investigate the spatial movements of tourists in Washington, DC using ArcGIS and log-linear regression models. Su et al. (2020) conducts a comparative study between tourists and residents in Hong Kong using Geotagged data and kernel density analysis. Barros et al. (2020) using Geotagged data from social websites Sugimoto and Suzuki (2019) use GPS loggers to analyze urban mobility of visitors in Tokyo. Yun et al. (2018) studying walking tourists in South Korea with GPS from smartphones. Kang et al. (2018) using social network analysis can define the spatial structure of the tourist in South Korea.

3.5.2 An overview of the GPS uses in tourism research

In this section, we take into account some of the most recent work conducted on the topic (that previous literature reviews have not considered), trying to highlight the most important points of these studies and to shed a light on the different uses of GPS, in terms of methods, locations, tourist segment and so on.

a) Land use patterns

Some authors use GPS tracking in conjunction with other survey and data collection methods (Beeco et al., 2014). In the study, the authors (Beeco et al., 2014) investigated how Recreation Suitability Mapping (RSM) and GPS visitor tracking (GVT) could work together as spatial models. For the study, they intercepted trail runners, mountain bikers, hikers, and others in the North Forest. The results suggest that combining both models allow for more robust results (Beeco et al., 2014).

b) Spatial decisions

Some authors have implemented studies aiming at the use of GIS and GPS data (Grinberger et al., 2014). The Hong Kong-centered study aimed to shed light on the behavior of tourists under the constraints of space and time (Grinberger et al., 2014). The results of the study suggest that GPS data describe well the behavior of tourists in terms of decisions made at individual level (Grinberger et al., 2014).

c) Qualify spatial consumption

Other studies use GPS data to track the movements of tourists and determine their essential distinguishing characteristics (Beeco et al., 2013). In particular, the study conducted by

Beeco et al. (2013) examines wandering tourists and planned tourists, with the aim of finding out whether the movement patterns between them are different in spatial terms and in terms of non-spatial characteristics. However, the results of the study with GPS tracks suggest that there are no differences between the two groups and there is no significant effect of travel style (Beeco et al., 2013).

d) Assess the impact of spatial movement

Other studies have analyzed precise segments of tourists, such as cruise passengers (De Cantis et al., 2016; Domènech et al., 2020) or market segments of tourists in historical towns (Mckercher et al., 2019) or in a national park (Hardy and Aryal, 2019).

In the study made by De Cantis et al. (2016), the authors used GPS technologies on the one hand, questionnaire-based interviews on the other, to segment cruise passengers visiting Palermo, Italy. Thus, the objective was to determine what kind of Spatio-temporal activities cruise passengers did during their visit. The results of the study suggest that some non-spatial characteristics have to do with the different movement patterns of the cruise passengers (De Cantis et al., 2016).

e) Space sintax: landscape/movement correlations

Domènech et al. (2020) also studied the spatial-temporal behavior of cruise passengers, this time in Tarragona (Catalonia). The aim of the study was to monitor the visit to the city, and they used both GPS and questionnaire-based interviews. The results of this study suggest that points of interest and economic activities influence tourist behavior more than other variables. Again, the policy implication of using such tools in the study of tourism marketing is relevant (Domènech et al., 2020).

f) Descriptive studies

Mckercher's study also features two combined tools (traditional visitor survey and GPS tools) with the aim of capturing movement patterns in the city of Tasmania, Australia. The results of the study suggest the potential of such tools from the perspective of tourism marketing management (Mckercher et al., 2019).

g) Differentation/categorization based on movement

Some authors are also interested in movement patterns in specific locations, such as specific cities (Edwards and Griffin, 2013; Grinberger and Shoval, 2018) national and theme parks

(Hardy and Aryal, 2019; Huang et al., 2020) or resort (Debbage, 2011). The authors (Hardy and Aryal, 2019) base their studies in Tasmania (Australia) with the aim of filling gaps in the literature in terms of advanced technologies and methods of tourism research (Hardy and Aryal, 2019). The results of this study highlighted that there are distinct segments of tourists in terms of movement and how these integrated tools can be useful for authorities and to alleviate the phenomena of overtourism (Hardy and Aryal, 2019).

h) Space syntax-Predictive studies

The study of the tourist movement within cities is poorly analysed, because as the geographical size increases, so do the complexities of tracking movements (Edward and Griffin, 2013). The study conducted in Sydney and Melbourne in 2013 by Edwards and Griffin (2013) proposes a space-syntax approach with the aim of relating the urban complexity of cities and public transport modes to tourism activities.

The results of this study represent, for the authors (Edwards and Griffin, 2013), a diagnostic tool for policy makers, because they offer spatial maps with which the route of tourists has been traced. The work of Domenech et al. (2020) also considers Space Syntax related indicators, specifically:

- Connectivity: number of neighboring segments directly connected to a segment.

- Integration: accessibility of the segment

- Choice: which would be the frequency at which a segment is crossed

i) Mobility and factors that affect

The work conducted by Grinberger and Shoval (2018) suggests that the literature has not considered the relationship between spatiotemporal constraints and psychological, cognitive, social, and cultural factors. To fill this gap, the work conducted in Tel-Aviv and Jerusalem proposes a study of tracking and characterizing tourism activities through a smartphone application (Grinberger and Shoval, 2018).

For example, to understand the spatial behavior of tourists, assessing movement patterns has been used in the past as well, especially when dealing with small, geographically circumscribed locations (Debbage, 1991).

In fact, in these studies that did not use GPS before, more primitive tracking techniques that could capture how tourists moved through space were used, in this case at a resort in the

Bahamas, to assess possible market segmentation in terms of attraction and consumption preferences (Debbage, 1991).

j) Clustering/Categorization studies

The work conducted by Huang et al. (2020) also analyses the spatial behavior of tourists at a theme park in Hong Kong. The study implements clustering techniques with the aim of segmenting the spatial behavior into five different segments by path length, tour time, and area covered (Huang et al., 2020).

There is a body of literature that has devoted itself to assessing the different behavior that exists between First and Repeat visitors (Kempermann and Joh, 2004; van der Spek, 2009; McKercher et al., 2012; Espelt and Benito, 2018).

For example, Kempermann and Joh (2004) recorded significant differences between first-time theme park visitors in Netherlands. The hypothesis the authors wanted to prove was that first-time visitors spend more time visiting the park and choose more activities in terms of numbers. In contrast, repeat visitors choose only certain activities indicated as a route in the park. In 2009, van der Spek conducting a study on pedestrians in Norwich (UK), Rouen (France) and Koblenz (Germany) shows how the familiarity of places has an impact on visitors' behavior.

After the initial studies conducted, with the introduction of GPS the segmentation between first visit and repeat visit has continued to be investigated, e.g., McKercher et al. (2012) used GPS in Hong Kong to assess such differences: again, first-time visitors are like wandering aimlessly, repeat visitors instead focus on fewer places. Espelt and Benito (2018) investigate the difference of first-time visitors and repeat visitors in Girona (Spain) these authors use GPS as a data source for collection. The results of this study again suggest homogeneous behaviors among regulars, random among first timers (Espelt and Benito, 2018).

Some considerations

The main goal of this chapter has been to define the concept of intra-destination tourism mobility. To do so, a revision of the most important works have been carried out, with the aim of contributing to a better overview of the topic in the academic scenario.

In the first part of this work, it has been defined the concept of tourism movement in all its aspects, described how scholars have dealt with movement patterns and how models have been implemented.

Although there are two main types of tourist movement (inter-destination and intra-destination), the focus of the work is on the second type because the main objective of this chapter is to define a general theoretical framework that can provide an understanding of tourist mobility and the spatial behavior of tourists during their walking visit.

Therefore, we focus on pedestrian tourists and how the behavior implemented by these tourists can be differentiated following not only socio-demographic (typical of tourism-type studies) but also spatial characteristics. The central part of the work is instead dedicated to the methodological aspects of tracking tourist movement: we divide this section into data collection on the one hand, data analysis on the other.

In the section dedicated to data collection, the emphasis is placed on the different methods adopted over time by researchers with the aim of capturing the movement of tourists: traditional and observational tools such as travel diaries, on the one hand, advanced technologies on the other, first with Bluetooth, today with GPS. The paragraph on GPS instruments is the most detailed in the chapter, characterized by first general part of birth and evolution of these instruments, followed by a part in which the first studies conducted are described. Moreover, the analysis of GPS data is another important step in the topic because there are problems related to the instruments that need the careful eye of the researcher in terms of analysis and data processing. In fact, in this section, much attention is paid to the methodology dedicated to this process. The specific focus then shifts to tourism studies, with the first studies conducted through GPS and the variables that researchers have been able to extrapolate from these devices.

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Chapter 4: Essay on tourist mobility

The following chapter concludes the entire dissertation. In particular, the work presented here is the result of two years' work on data collected in Copenhagen, Denmark. The work aimed to explore the relationship between tourism expenditure and mobility through transit cruise passengers landing in the city in 2018-2019.

With the work presented here, there is the investigation of Spatio-temporal consumption behavior, the analysis and exploration of the stops made by cruise passengers, and the assessment of the different points of interest that have to do with these stops.

The scientific community's interest in the relationship between spending and mobility has only recently arisen and, above all, the use of GPS to track the movements of tourists in this respect is a new application.

In the literature, we have seen several attempts to track routes in different ways, but investigating through data collection made ad hoc for the single destination, making a proximity sampling starting from strategic points of arrival and departure of cruise ships, is a peculiarity only of several studies.

The idea of exploring the city of Copenhagen also stems from the need to make the organization of the city itself more efficient in terms of tourist and leisure services. The city has a sustainability agenda, efficient resource management, and CO2 emissions. For this reason, it is in the interest of policymakers to understand where it is possible to improve and make sustainable the short visits of cruise passengers arriving in Copenhagen as a port of call or home port.

Furthermore, the study presented here builds on a previous study carried out in the city of Palermo, Italy (De Cantis, S., Ferrante, M., Kahani, A., & Shoval, N. (2016). Cruise passengers' behavior at the destination: Investigation using GPS technology. Tourism Management, 52, 133-150.). The study by De Cantis et al. (2016) is taken as a starting point for questionnaire construction, sampling, and GPS technologies. The fundamental difference lies in the fact that the study by De Cantis et al. (2016) explores the spatial behavior of cruise passengers arriving in the city, the present study considers the possible relationship with the expenditure made during the visit.

The study carried out in Copenhagen, is also essential because it shows how different levels of expenditure correspond to highly differentiated profiles of cruise passengers: this means that in the classic segmentation of the tourism market, it is also necessary to consider not only the expenditure variable but to further differentiate it through different levels consistent with the destination being considered.

Another critical factor considered in this study is categorizing expenditure types and the care taken to understand any possible relationship between the individual expenditure category and the associated mobility behavior.

Not much attention has been paid to expenditure categories or only on a superficial level in the literature. Furthermore, the different variables constructed from the GPS instruments allowed a 360-degree understanding of the mobility behavior of the cruise passenger, including stopping behaviour.

The precision of the devices is almost accurate and through software with embedded GIS technology, we were able to track individual tracks and subsequently group them through different aggregation techniques. The study presented here also enriches the existing literature on tourist behavior in the destination and supports marketing and spatial planning strategies in choosing routes to be proposed to tourists once they arrive at their destination.

This work adds another essential piece to the explanation of spatio-temporal tourism consumption and explains why cruise passengers' behavior is different from the average tourist arriving at their destination.

Third paper: Tracking cruise passengers' consumption: An analysis of the relationships between onshore mobility and expenditure

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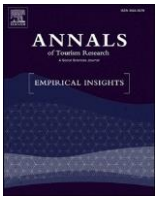

Tracking cruise passengers' consumption: An analysis of the relationships between onshore mobility and expenditure

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ABSTRACT

This paper analyzes the relationships between the spatial behaviour and destination expenditures of cruise tourists by integrating customer surveys and GPS tracking technology. Based on data collated in 2018 and 2019 in Copenhagen, cruise passenger expenditure was modelled via logistic regression, using socio-demographic characteristics and mobility-related variables. In order to map the spatial behaviour and the key characteristics of the itinerary followed, tracking data were synthesized into meaningful mobility variables. An analysis of stops was performed to identify locations with the potential highest expenditure density. The results indicated that spatial movement and, in particular, stop activities are relevant in explaining expenditure behaviour. The implications of the proposed methodology are discussed with regards to further research, and destination management.

1. Introduction

Prior to the COVID-19 pandemic, urban coastal destinations witnessed a rapid and unsustainable rise in cruise arrivals, with an excess of daily peaks in visitor volumes in already congested city centers. Indeed, many consider that cruise tourism often epitomizes overtourism, as reported by the media and in debates regarding the tourism pressures on local communities (Holland, Mazzarol, Soutar, Tapsall, & Elliott, 2021; Holtegaard-Kasler, 2019). Despite claims that cruise tourists constitute an affluent visitor segment, some critics argue that their negligible onshore expenditure during short term or transit visits does not offset the social and environmental costs of destinations hosting large vessels (Larsen, Wolff, Marnburg, & Øgaard, 2013). This asymmetric distribution of benefits and impacts, which is attributable to cruise tourism, poses a challenge to destination managers in assessing and managing short-term visitor flows.

Bearing in mind the aforementioned critical challenges of mass visitation, the COVID-19-related break in cruise tourism provides us with an opportunity to reflect on visitor management at port destinations. This requires a comprehensive view of visitor flows and the spatiotemporal consumption in port-of-calls, which will also include greater clarification regarding the determinants of cruise passenger spending at their destination. The scope of short-term (transit) destination consumption can be demonstrated in economic and geographical terms, whilst assessing onsite expenditure (monetary consumption) and spatiotemporal behaviour (consumption of destination space). However, these strands deriving from the literature have not yet been fully synthesized. Despite the availability of new tracking technologies and recent studies in Mediterranean cruise destinations (Casado-Díaz, Navarro-Ruiz, Nicolau, & Ivars-Baidal, 2021; Domènech, Gutiérrez, & Anton Clavé, 2020; Domènech, Gutiérrez, & Clavé, 2020), the relationships between tourist mobility and spending behaviour merits further attention. The overall objective of this article is, therefore, to analyze spending patterns in the urban destination space, and to explore the relationship between transit (<24 h) cruise passengers' onshore spending behaviour and mobility-related variables. Accordingly, the objectives of the research are threefold:

- to analyze cruise visitor expenditure as a function of mobility behaviour
- to characterize the spending propensity of cruise visitors and analyze its distribution in geographic space and
- to highlight variations in expenditure level, which are based on distinct mobility characteristics

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These objectives were formulated into three specific research questions (RQ):

- RQ 1. How do mobility characteristics (e.g., tour duration, tour length, stop activities) explain the scope and composition of visitor expenditure?
- RQ 2. How are mobility differences reflected in spending propensity and expenditure levels (high vs. low spenders)?
- RQ 3. Do socio-demographic characteristics explain the scope and components of visitor expenditure?

The paper is organized as follows: Section 2 discusses the existing literature relating to cruise passenger expenditure relating to tourist mobility and the linkage between spatial behaviour and expenditure. Section 3 presents the data and methods used for the analysis, illustrating the survey methodology and the main important information, which has been derived from GPS tracking data. Section 4 reports and discusses the results obtained from the city of Copenhagen. And Section 5 discusses the main implications of the study in concluding the paper.

2. Literature review

In order to explain cruise visitor consumption, this literature review has compiled publications from the past twenty years, whilst considering tourism consumption by addressing three main themes:

- cruise passenger expenditure (monetary consumption behaviour)
- tourism mobility (spatiotemporal behaviour and movement patterns) and
- spatiotemporal consumption (studies combining expenditure and mobility behaviour).

Each section below in the literature review identifies key focus areas, approaches and contributions, also highlighting uncharted research questions informing the design of this present study.

2.1. The onshore expenditure of cruise passengers

With the rapid growth of cruise tourism, the number of academic papers on this topic has increased significantly in the past twenty years. An extensive review of the literature (Papathanassis & Beckmann, 2011) has identified passenger expenditure studies as a key theme among several research interests. High environmental and social costs, which are associated with crowding in ports, have prompted researchers and destination managers to explore patterns of cruise passenger spending (Henthorpe, 2000). Based on evidence from different empirical contexts, scholars have begun to question shore visitors' contribution to local economies and tourism businesses during their brief time span (Andriotis & Agiomirgianakis, 2010; Brida, Bukstein, Garrido, & Tealde, 2012; Gouveia & Eusébio, 2019; Larsen et al., 2013; Penco & Di Vaio, 2014; Thurau, Seekamp, Carver, & Lee, 2015).

The initial studies conducted on cruise passenger expenditure were mainly descriptive and they focused on the general characteristics of expenditure (Brida & Zapata, 2010; Douglas & Douglas, 2004; Gabe, Lynch, & McConnon, 2003; Henthorpe, 2000); later publications attempted to define the key drivers of onshore spending actors. Researchers observed that contextual (time, weather) and individual factors (sociodemographic characteristics, previous experiences) determined variations in expenditure patterns. Henthorpe's study regarding passenger expenditure in the Caribbean (Henthorpe, 2000) demonstrated that the amount of time spent in port can have a substantial impact on the amount of money spent therein. In Adriatic and Mediterranean ports, namely Koper (Marksel, Tominc, & Božičnik, 2017) and Piraeus (Papadopoulou, Sambracos, & Xesfingi, 2017), the expenditure of cruise passengers was found to correlate with: gender, nationality, destination familiarity, age, and number of previous cruises.

The analysis of the literature relating to cruise passenger expenditure highlights a high degree of variability. The lowest values of average per-capita expenditure, of approximately 25–35€, have been reported for various Mediterranean (Casado-Díaz et al., 2021; Domènech & Gutiérrez, 2020; Domènech, Gutiérrez, & Anton Clavé, 2020), Scandinavian (Larsen & Wolff, 2016), and Latin American destinations (Brida et al., 2012; Brida, Lanzilotta, Moreno, & Santiñaque, 2018; Seidl, Guiliano, & Pratt, 2007). Other studies (Pino & Tovar, 2019) have reported slightly higher values (45 to 75€), whereas many visitors to Caribbean, North American and Australian ports can spend up to €200/visit (Dwyer & Forsyth, 1998). The following factors were found to be significant regarding socio-demographic determinants of passenger expenditure: *income* (Brida et al., 2012; Brida & Risso, 2010; Parola, Satta, Penco, & Persico, 2014), *age* (Brida et al., 2012, 2018; Brida, Bukstein, & Tealde, 2015; Casado-Díaz et al., 2021; Domènech, Gutiérrez, & Anton Clavé, 2020; Henthorpe, 2000; Parola et al., 2014; Papadopoulou et al., 2017; Gargano and Grasso, 2016), *passenger's educational level* (Parola et al., 2014), and *nationality* (Brida et al., 2012; Marksel et al., 2017; Parola et al., 2014). And, of the trip-related characteristics, *Length of stay* was found to be positively associated with expenditure levels (Brida & Risso, 2010; Brida et al., 2012; Casado-Díaz et al., 2021; Domènech, Gutiérrez, & Anton Clavé, 2020; Henthorpe, 2000; Parola et al., 2014; Gargano & Grasso, 2019).

Douglas and Douglas (2004) have analyzed categories relating to cruise passenger expenditure for two cruises visiting seven Pacific island ports of call. Their results demonstrated that age and weather determined variations in expenditure categories patterns for each port: older people displayed a greater propensity to seek out food and beverage options ashore, and purchase more duty-free perfume and alcoholic beverages. Moreover, all-inclusive cruise packages are designed in such a way so as to retain the largest share of wallet. This means that cruise tourists will spend significantly lower on other categories. For instance, as meals are included in the price of the cruise, cruise passengers tend to return to the ship for their meals (Gouveia & Eusébio, 2019). In addition, passengers often chose shore excursions offered by cruise companies (despite premium prices), owing to passenger unfamiliarity and convenience (Douglas & Douglas, 2004).

A comprehensive review of methodical approaches of onshore expenditures has revealed that the majority of studies are based on data collected, which have been collected from face-to-face interviews and surveys conducted with embarking passengers, and ad hoc questionnaires (Di Vaio, Lepore, & Varriale, 2018; Gargano & Grasso, 2016; Henthorpe, 2000; Gabe et al., 2003; Marksel et al., 2017; Parola et al., 2014). Pino and Tovar (2019) have found evidence of studies drawing on other types of data, for instance, credit card statements or other data sources (Brida & Risso, 2010; Brida, Bukstein and Tealde, 2015, Brida et al., 2015, Brida et al., 2018). Neither of these approaches are flawless, and, as other scholars have noted, particularly recall bias remains a fundamental weakness in the research rigour (Hardy, Birenboim, & Wells, 2020; Shoval & Isaacson, 2007).

2.2. Tourist mobility at a destination

The analysis and prediction of tourists' spatiotemporal movements and interactions in a destination is a challenging task from methodological and managerial (planner) perspectives (Hall, 2015; McKercher & Lew, 2004). Tourist movements can be considered as the set of spatial choices within the destination (Caldeira & Kastenholz, 2020; Lau & McKercher, 2006). The understanding of spatial behaviour of tourist activities in tourism studies was for long a purely conceptual endeavour. A limited number of works in the 1990s focused on the analysis and modelling of tourist routes and movement patterns (Oppermann, 1995). In the cruise context, Jaakson's observation study regarding the port of Zihuatanejo, Mexico (Jaakson, 2004) was the first to conceptualize onshore movement patterns. Based on qualitative and quantitative approaches, this study introduced the notion of the tourist bubble, noting

that the majority of cruise visitor spending occurs within a very limited geographical scope.

Owing to the rapid development of GPS-tracking technologies in recent decades, the number of empirical studies tracking tourist movements has increased rapidly (Caldeira & Kastenholz, 2020; Shoval & Ahas, 2016). Early contributions to this field were purely exploratory and they focused on understanding intra-destination mobility and factors influencing spatiotemporal choices. And, in these early days, the most widely used methods were simple, descriptive itinerary maps or travel diaries, in which planned destinations and stopovers were listed (McKercher & Lew, 2004). These methods produced heuristic typologies, resting on the assumption that distance and familiarity may be key factors in explaining variations in tourist flows. For instance, Lew and McKercher (2006) have proposed a crude territorial model of the patterns of tourist destination movement, differentiating between four types. These are: *zero movement*, *convenience based* (when the tourist remains in the proximity of their accommodation), *concentric exploration* (identified as a *confused tourist*, with insufficient information about the destination) and, finally, the *wide movement* (with useful knowledge about the destination (Lew & McKercher, 2006)).

While such models can offer various conceptual guidelines for the analysis of tourist itineraries at destinations, the applied methods are fraught with structural weaknesses, mapping inaccuracies and insignificant detail. For example, these approaches do not account for individual characteristics, despite the acknowledgement that socio-economic characteristics and lifestyle plays an important role in tourist choices and spatial behaviour. Whilst acknowledging the significance of spatial models, several studies have attempted to map the concentration of consumption activities around particular attraction sites (Zoltan & McKercher, 2015) and destination space (Xiao-Ting & Bi-Hu, 2012); however, they have to date failed to identify a universally explanatory model. These approaches are based on the assumption that patterns of tourist movement closely correlate with the location of attractions (identified as either *nodal*, *linear* or *area*), and crowd densities will follow the rule of distance decay (McKercher, 2018). However, the center-periphery dispersion theory has been refuted by Timothy & Boyd (2015) and Domènech, Gutiérrez, and Clavé (2020). These two groups of researchers have demonstrated more nuanced relationships between the characteristics of the built-up environment and the spatial behaviour of cruise passengers. Whilst the spatial syntax (configuration of street networks) explained the uneven distribution of visitors in the port of Tarragona, Domènech and his colleagues (2020b) observed that the visibility of areas frequented by tourists and ambient factors (e.g., shaded side of the streets) were major determinants of destination mobility.

More recently, Hardy and colleagues (Hardy et al., 2020; Hardy, Vorobjovas-Pinta, Wells, Grimmer, & Grimmer, 2021) have contributed to this research with an empirically substantiated model in explaining variations in tourist intensity and dispersal. They also introduced meaningful metrics to illustrate the dispersal of tourists in Euclidean space. With a bespoke mobile application, *The Tourism Tracker App*, they were able to follow and model: the movement patterns of wine tourists (Lewis, Hardy, Wells, & Kerslake, 2021), multi-day visitors (Hardy et al., 2020), and cruise tourists disembarking from the port of Sydney (Hardy et al., 2021). This latter study has also demonstrated significant differences in the dispersal patterns between passengers of local, domestic and international provenances. They observed that international passengers travel the shortest distances and primarily visit recreational, culture and nature spots.

2.3. Studies combining mobility and expenditure behaviour

Despite their limitations of scope, there are a few notable studies linking tourist movement and spending choices. For instance, an extensive observational study by Jaakson (2004) produced an inductive typology, in which variations in the patterns of cruise visitor spatial activity was depicted. Three groups dominated the study: each group remained in the tourist bubble at the port, however, demonstrating distinct consumption characteristics. As the following segments indicate, the *Shopping Browsers* and the *Café Crowd* looked for retailing vs. food & beverage experiences. The so-called *Pack* segment referred to passengers with limited or no spending power, and they remained close together as a group after disembarkment. Jaakson (2004) also identified a smaller group of individualistic *Explorers*, who wandered off the beaten track and beyond the tourist shopping zones. However, this heuristic typology was not corroborated by means of robust geolocational approaches.

Still later, McKercher and his colleagues initiated mixed method approaches (combining data streams from interviews, GPS-tracking, GIS analysis and/or diaries) with which to enhance the precision of locating expenditure estimates. McKercher and Lew (2004) studied the spatio-economic dispersion of tourism consumption by considering two aspects of tourist movement: *territoriality* and the *intensity of spending*. And McKercher, Hardy & Arial (2019) have identified major differences in movement patterns and duration among three visitor segments to a historic tourist shopping village in Tasmania.

In the past five years, Sicilian, Catalan and Tasmanian tourism researchers have made notable advances in analyzing the spatial determinants of cruise tourist expenditure. De Cantis, Ferrante, Kahani, and Shoval (2016) were the first to corroborate a multi-method approach, combining GPS-tracking and traditional survey methods in analyzing cruise passenger behaviour at their destination. Domènech, Gutiérrez, and Anton Clavé (2020) have applied a similar methodology to the analysis of cruise passenger behaviour, confirming the importance of the length of stay on passenger expenditure, as mentioned above. Their study also provided empirical evidence of the aforementioned *Explorer* patterns; it confirmed that respondents with the highest per capita spending visited fewer tourist sites, preferring to spend more time in areas with mixed (commercial and recreational) functions. Casado-Díaz et al. (2021) have identified that patterns of cruise visitor spatial mobility (regarding routes, stops frequency) and onshore choices (independent vs. group visit) are significant factors affecting destination spending levels. Based on a state-level study in Tasmania, Hardy et al. (2020) established three factors determining the spatial dispersion of tourists: length of stay, familiarity of destination and transport choices. They also drew attention to the role of gateways (entry/exit points) regarding consumption intensity. These studies suggest a considerable potential in identifying the association between *stop activity* and *expenditure behaviour*, calling for a robust method with which to derive and summarize stop locations from GPS tracking data.

3. Data and methods

3.1. Study site

The Danish capital Copenhagen is a popular port-of-call on Baltic Sea cruises, being located on the Oresound Strait, dividing Denmark and Sweden. It is the most populated city in Denmark but the host community of 794,128 inhabitants (2020) is dwarfed by the 10 million annual tourist arrivals. Prior to the pandemic, cruise tourism had seen an unprecedented boom in Copenhagen, which led to fierce public debates regarding overtourism in the 2017–2019 period. Critical voices complained of the problem of increasing congestion in the Inner City, and low consumption levels despite high visitor volumes. As Bent Lohman, chair of the Inner City Local Committee noted in the summer of 2019:

> *"On a busy summer day, 300 tourist buses travel around the Inner City. After all, the city is like a zoo where the buses pass through. [But] the tourists are not even here for a day. They don't spend a lot of money in the city, because it's typically just a lunch they eat here, and then they have to move on"* (Holtegaard-Kasler, 2019).

Copenhagen's congestion problems can be related to the its particular topographical features and tourist landscape. The city is built on a flat terrain along the waterfront, and all the main sights and attractions are concentrated in the city center, which borders on a medieval canal moat system. The most popular nodal tourist sights have been identified from two sources, listing the top attractions of the Danish capital (*VisitCopenhagen* and *TripAdvisor*). Fig. 1 below also depicts the main pedestrian streets. These linear attractions feature a high density of retail centers, restaurants, and tourist sights. And, from a tourist point of view, the concentration of shopping facilities and the high degree of walkability (main attractions and city center located in walking distance from the port) makes Copenhagen a very attractive and easily negotiable day trip destination. However, the sweet spot of tourist activities covers an area with a radius not exceeding 2–3 km, and the narrow medieval street plan may further increase perceptions of crowding.

The City of Copenhagen and Wonderful Copenhagen's cruise department, Copenhagen Cruise Network, have evinced great interest in testing GPS tracking technologies to map the consumption behaviour of short-term (transit) cruise tourists. And, in collaboration with tourism researchers from different universities, they have agreed to launch a larger data collection at the Langelinie pier, which hosts most transit calls during the summer season.

3.2. Data collection procedures

Data on cruise passenger onshore behaviour in Copenhagen was collected during early autumn 2018 and summer 2019. The two periods were selected according to the total number of cruise passengers, as made available by the Copenhagen port authority. Data collection was via an integrated approach of combining GPS technology with a traditional, questionnaire-based consumer survey. The present approach is similar to that proposed by Ferrante, De Cantis, and Shoval (2018), and adopted in other European contexts,: Palermo (De Cantis et al., 2016; Ferrante et al., 2018; Shoval, Kahani, De Cantis, & Ferrante, 2020), Dubrovnik (Ferrante et al., 2018); Tarragona (Domènech, Gutiérrez, & Anton Clavé, 2020; Domènech, Gutiérrez, & Clavé, 2020) and Valencia (Casado-Díaz et al., 2021; Navarro-Ruiz, Casado-Díaz, & Ivars-Baidal, 2020). The research team obtained a privileged position in proximity of the disembarkation point, which permitted the efficient management of interviews. Guests were asked to bring a GPS logger with them during their visit, in addition to completing two brief, assisted questionnaires when disembarking and when returning to the shop (these questionnaires can be located in Appendix A).

In adopting a pseudo-systematic approach, the research team selected approximately one in every 20 passengers. The questionnaires were administered through face-to-face interview, the aim of which was to collect socio-demographic information, in addition to other pre- and post-visit information, including: party size, previous visit to the destination, expenditure levels and categories (following Mak, Moncur, & Yonamine, 1977; Breen, Bull, & Walo, 2001; Frechtling, 2006). The collation of information relating to expenditure at the termination of the visit encourages a reduction in recall bias (Hardy et al., 2021; Rylander, Propst, & McMurtry, 1995); this also avoid the risks of influencing expenditure patterns, compared to other data recording processes, such as the use of a diary (Faulkner & Raybould, 1995). Excluding total expenditure, the respondents were also asked to recall spending according to the following six categories: *Expenses of an organized tour*; *Food and beverages*; *Ticket entry to museums and attractions*; *Transportation services*; *Shopping* and *Souvenirs*. The reported currencies were subsequently converted into euros.

Spatial tracking was conducted with the Conrad GT730FL GPS Data Logger, and the recording interval of coordinate points was set at every 10 s. This type of logger is a small device, which is worn around the neck, with the battery lasting for the duration of the visit at their destination. The logger was provided to every cruise interviewed passenger prior to administering the initial questionnaire. At the termination of the visit, every cruise passenger returned the GPS data logger and they completed the conclusive questionnaire.

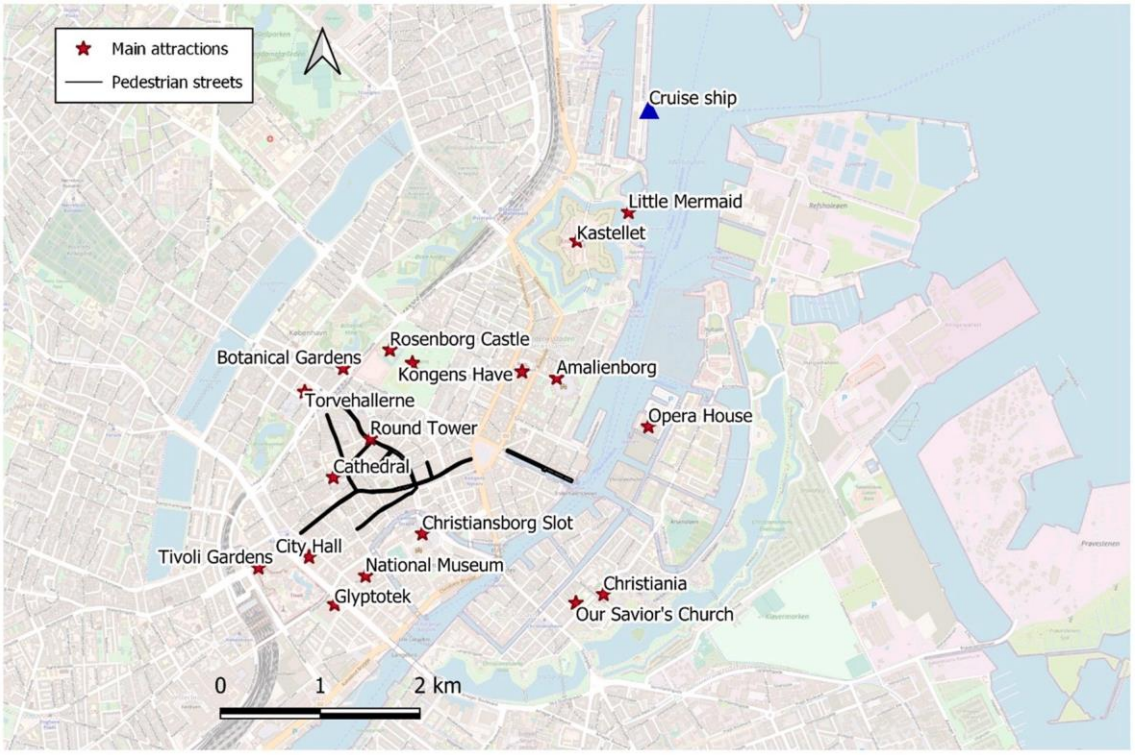

Fig. 1. Main attractions, pedestrian streets and cruise ship dock location in the city of Copenhagen (Base Map: OpenStreetMaps).

3.3. Methods

3.3.1. Processing GPS tracking data

The initial step in the analysis of GPS tracking data involves the pre-processing of the information, the aim of which is to reduce data anomalies (such as outlier observations and missing values), in addition to obtaining important information from the data through a procedure of reformatting (Abbruzzo, Ferrante, & De Cantis, 2021; Stopher, Fitz-Gerald, & Zhang, 2008). The authors of this paper have used an approach to outlier detection, which is based on *jumps in speed* and *signal loss*. Having observed systematic outlier observations after signal loss, these five subsequent points after signal loss were deleted from the series. Such a choice was determined by a visual inspection of individual tracking data and bearing in mind the time required by the GPS tracking device to realign the signal to the correct location. However, the specific model of device used, in addition to the frequency of the recording interval chosen, may have influenced the selection of this parameter. Jumps in speed were identified by comparing the original series with a smoothed series, the latter which was obtained by computing a centered, two-minute moving average of the coordinates. Those points which exceeded a threshold value of the distance between the smoothed and the original series were deleted from the analysis. Thereafter, these deleted points were replaced by a linear interpolation of the last and first valid data point, thus assuming a linear trajectory with a constant value of speed between the missing data points.

Having pre-processed the GPS tracking data and having derived information relating to the time interval, distance and speed between consecutive points, a set of six concise variables were computed for each cruise passenger (De Cantis et al., 2016). These included: *total length of tour* (in km, provided by the sum of distances between all the pairs of consecutive points), *total duration of tour* (in minutes), *maximum distance from the port location*, *maximum speed*, *average speed*, and *90th percentile of speed*. This latter indicator was used to determine whether the cruise passengers used a transportation mode or not. It was assumed that all cruise passengers, whose 90th percentile of speed exceeded 5 km/h, used a transportation mode (for at least 10% of the duration of their itinerary).

3.3.2. Definition of stop locations

The final step in the extraction of useful information from GPS tracking data involved the identification of stop locations, which may indicate important locations or points of interest for cruise passengers. Various approaches have been proposed for the identification of stops in GPS tracking data (Abbruzzo et al., 2021; Grinberger & Shoval, 2019). For example, Gong, Sato, Yamamoto, Miwa, and Morikawa (2015) have proposed a classification of methods according to five groups, namely: centroid-based methods, speed-based methods, duration-based methods, density-based methods, and hybrid methods. Each of the first four categories can be said to have various limitations, and these have been fully reviewed by Gong et al. (2015). The latter authors concluded that hybrid methods might improve the accuracy of stop identification by combining some of the criteria of the other methods (such as *speed* or *density*, and *duration*). Based on these considerations, the authors of this paper have used a hybrid method, based on *speed* and *duration* criteria. Specifically, this approach initially considers a smoothed series of data points for every *i*-th cruise passenger, based on a space-time centered moving average of 10 min, as follows:

$$(\tilde{x}_t, \tilde{y}_t) = \left(\frac{x_{t-300} + \sum_{k=1}^{590} x_{t-300+k} + x_{t+300}}{60}, \frac{y_{t-300} + \sum_{k=1}^{590} y_{t-300+k} + y_{t+300}}{60} \right)$$

in which it is assumed that every point is collected every 10 s. Nonetheless, the `proc. sql` function implemented in SAS® software, allows for irregular time intervals between point coordinates to be considered, by ensuring a constant time interval in the calculation of moving averages. This step permits 'noise points', which may determine small jumps in speed, to be averaged with other neighbourhood points, thereby ensuring a more stable measure of the speed variable. Having derived the smoothed series, and computing a new speed variable (based on averaged consecutive data points), a threshold of speed of 20 m per minutes (1.2 km/h) was set to identify a stop.

Consecutive time intervals, corresponding to values of speed below this threshold value, were aggregated, and a stop was defined when the duration of aggregate time intervals exceeded a threshold of 2 min. Conclusively, if two stops were observed at a time interval of a distance <5 min from each other, they were considered as a *single stop*. The stop coordinates were then fixed as the centroid of the data points pertaining to that stop.

In order to graphically illustrate how the proposed algorithm functions, two subsets of points pertaining to two cruise passengers are reported in Figs. 2a.1 and 2b.1. Both patterns suggest the presence of a stop where several points are concentrated. Having implemented the space-time moving averages, the proposed algorithm correctly identifies a stop, as displayed in Fig. 2a.2. However and in the case of the second sequence, the concentrated points were derived from two very different moments of the tour: a set of points was recorded at the beginning of the visit (shown in blue in Fig. 2b.2), and the other set of points refers to movements occurring at the end of the visit, as shown in red in Fig. 2b.2. Thus, it can be stated that any algorithm which does not consider the sequence of points in stop identification (e.g. DBSCAN algorithm) may incorrectly identify such situations as a *stop*.

Having identified all the stops made by cruise passengers during their visit at their destination, further information regarding stop activities could be obtained. This included: the *total number of stops*, the *total duration of stops*, and the *average duration of stops*. A binary variable was also added to indicate the *maximum stop duration*, assuming a value equal to 1 if a cruise passenger made a stop lasting for >40 min; if not, this value was 0.

3.3.3. Analysis of expenditure behaviour at the passenger destination

A two-step procedure was implemented to analyze cruise passenger expenditure behaviour at their destination, in relation to individual characteristics and spatial behaviour. The first step analyzed differences among spenders and non-spenders in order to explore the role of socio-demographic characteristics and mobility information. And the second step divided expenditure levels at the destination into two categories: *high* and *low* spenders (above and below €50 respectively, €50 representing the median value of expenditure among spenders). This permitted an analysis of the impact of socio-demographic characteristics and spatially-related information on the level of expenditure. The degree of association between socio-demographic characteristics and spatially-related information with expenditure propensity (spenders vs. non-spenders) and the level of expenditure (high vs. low Spenders) was first explored through the analysis of contingency tables and the Pearson's Chi-squared test of independence among categorical variables. Variables showing significant ($p < 0.05$) associations with expenditure were selected for their inclusion in a multiple regression model, which was subsequently implemented through binomial logistic regression. Specifically, two-logit models were estimated: the first considered a dichotomous variable according to spenders and non-spenders, as follows:

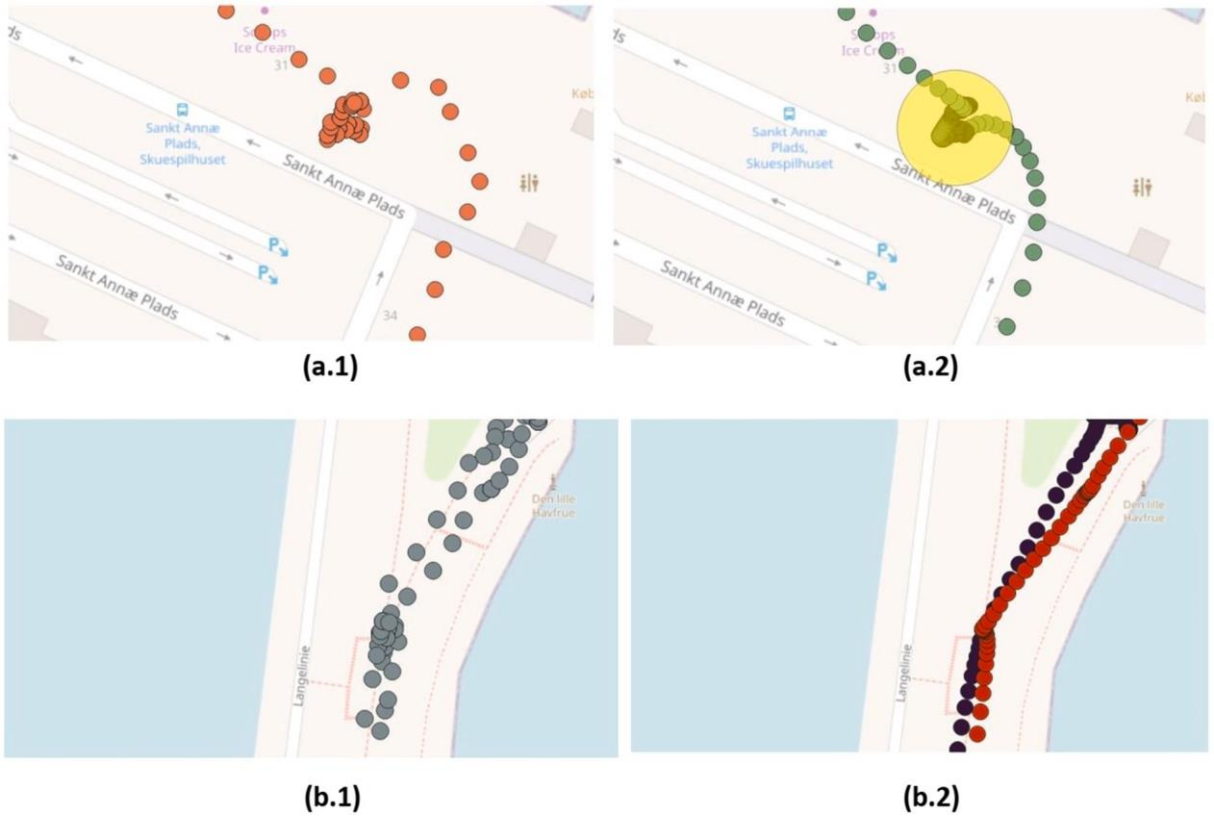

Fig. 2. Graphical illustration of stop identification algorithm (Base Map: OpenStreetMaps).
Figure a.1 and b.1 show a raw subset of tracks relating to two cruise passengers. Figure a.2 and b.2 are the same subset of points after the implementation of space-time moving averages. In the former, a stop is correctly identified, based on speed criterion; in the latter, no stops are identified since the points refer to two different periods of the visit: at the beginning (in blue) and at the end (in red).

$$log\frac{x_i}{1-x_i} = \beta_0 + \beta_1 PLAN_i + \beta_2 SIZE_i + \beta_3 TOURTIME_i + \beta_4 TOURLENGHT_i + \beta_5 MAXDIST_i + \\ + \beta_6 MAXSTOPDUR_i + \beta_7 TRANSPORT$$

where x_i represents the probability of being a spender, *PLAN* is a binary variable which indicates whether the passengers planned their excursion in advance, *SIZE* refers to party size, *TOURTIME* indicates the total time spent at the destination, *TOURLENGTH* represents the total length of tour, *MAXDIST* is the maximum distance from the port location, and *MAXSTOPDUR* indicates the maximum duration of the stop made by the considered cruise passenger. Departing from the inclusion of all these variables, the final model was estimated by implementing a forward selection criterion in order to identify the most parsimonious model.

Similarly, a second model - the level of expenditure (high vs. low) - was modelled, by considering only the sub-sample of cruise passengers who spent at the destination, as follows:

$$log\frac{x'_i}{1-x'_i} = \beta_0 + \beta_1 TOURTIME_i + \beta_2 MAXSTOPDUR_i + \beta_3 TRANSPORT_i$$

where x'_i represents the probability of being a *high-spender*, and *TOURTIME*, *MAXSTOPDUR* and *TRANSPORT* refer to the same variables, which have been defined above. None of the socio-demographic characteristics was included in this model, due to the absence of a significant association with expenditure level; a forward selection criterion was also implemented in this case. Finally, expenditure composition by category was analyzed, to accurately describe the characteristics of cruise passenger expenditure at their destination and to explore the main determinants of various expenditure categories. In this final step, visual projections of the stop patterns of spenders and non-spenders, and of the stop pattern of high vs. low spenders, was performed to highlight areas of the city in which stops are mainly concentrated, thereby demonstrating potential passenger expenditure.

4. Results

4.1. Data description

A total of 183 valid interviews was collected during the two survey periods, each containing a set of fully-completed questionnaires and valid GPS tracks. Based on the distribution and meaningfulness of variables, the number of value categories was reduced into binary sets. For example, when considering the frequencies of the *age* variable, respondents were divided into two categories, namely *18–65* and *66+*. The authors of this paper consider that this division makes practical sense as urban port destinations currently receive a steadily growing volume of senior visitors, and it is, therefore, appropriate to identify their specific needs and onshore behaviour. Similar dichotomous reductions were made in relation to the variables of *income*, *education*, *country of*

Table 1
Socio-demographic characteristics of cruise passengers, interviewed in the City of Copenhagen.

Variables	Categories	Freq.	%
First time visitor?	yes	103	43.70
	no	80	56.30
Age category	18–65	82	44.80
	66+	101	55.20
Country of residence	Europe (EU)	113	61.70
	non-Europe (non-EU)	70	38.30
Education (missing = 7)	secondary or lower	59	33.50
	tertiary/ +	117	66.50
Net annual income (missing = 7)	less than €40,000	70	39.80
	more than €40,001	106	60.20
Planned details for CPH visit	no	105	57.40
	yes	78	42.60
Purchased shore excursion	no	160	87.40
	yes	23	12.60
Planned visit attractions	no	77	42.10
	yes	106	57.90
Alone	no	175	96.20
(missing = 1)	yes	7	3.80
Spouse/partner	no	27	14.80
(missing = 1)	yes	155	85.20
Children/relatives	no	157	85.80
	yes	26	14.20
Friend(s)	no	156	85.20
	yes	27	14.80
Party size	1 or 2	141	77.00
	2+	42	23.00

residence, *party size* and *visiting history*. Table 1 illustrates the complete socio-demographic profile of the cruise respondents.

The descriptive statistics above revealed that more than half of the sample (55%) had already visited Copenhagen on at least one occasion. Approximately 55% of the sampled cruise passengers were 66+ years old and an estimated 60% was European. 65 + % of cruise passengers had a tertiary/+ level of education, whereas approximately 60% declared an annual income of €40,000+ . The majority of interviewed passengers (about 87%) had not purchased an excursion, unlike 13% of organized cruise passengers who had purchased an excursion. The party size composition comprised mainly one or two passengers (77%), with a spouse or partner (85%). 14% of the parties included children or friends.

Participants in the survey were requested to indicate the amount of money they had spent in the six expenditure categories. Summary statistics for total expenditure and by category are reported in Table 2 below. It shows that the average expenditure per capita is €56, with the median expenditure being considerably lower, that is, approximately €28. This difference can be attributed in terms of maximum expenditure to the share of non-spenders (22% of total passengers interviewed) and to the presence of various outliers. Nonetheless, the third quartile of total expenditure is approximately €75, which is in agreement with previous studies on Scandinavian countries (Larsen et al., 2013). Expenditure categories also resonate with Jaakson's (2004) observations of activities concentrating on shopping and café visits. The *Food and beverages* and *Shopping* categories displayed the highest concentration of expenditure, with about €18 and €19 of average expenditure (32% and about 35% of total expenditure) respectively. Expenditure for guided tours accounted for 12% of total expenses, being approximately €7 on average; spending on *Museum and attractions,* (an average of €5; 8.7%), and *Souvenirs* (€3.4; 6.5%) was even lower than the aforementioned categories. Only 5.9% of total expenses accounted for *Transportation services* (€3), which might be explained by the central location of Langelinie and the walkability of the city.

The exploratory analysis of the data determined the threshold value for the categorization of total expenditure levels, which was based on its median value among spenders. The final set of information was derived from GPS tracking data, and it permitted the summarizing of cruise passenger spatial mobility at their destination as other potential determinants for a deeper understanding of expenditure dynamics. Table 3 below reports the summary statistics for mobility-related variables.

Cruise passengers spent an average of about 4 h in Copenhagen, undertaking a tour of approximately 12 km in length; these passengers also remained in the vicinity of the port with 75% of them travelling less than about 3 km. This confirms a convenience-based (Lew and McKercher, 2006) mobility pattern, which also documented an average speed of 5 km/h and the absence of a high proportion (75%) of cruise passengers using any kind of transportation mode. Cruise passengers made stops accounting for about 1 h and 40 min on average during their tour, with an average duration of stop of about 20 min. Finally, the average number of stops (as deployed in this research) was 5.5, and every passenger stopped at least once (>2 min). Such stopping patterns are reminiscent of a grazing pattern, which was first described by Jaakson (2004) and characterized by slow speed and impulsive browsing in the urban landscape. As will be demonstrated below, this spatial activity can facilitate, but it does not necessarily stimulate, monetary expenditure.

4.2. Determinants of cruise passenger expenditure

In order to analyze the main determinants of cruise passenger expenditure, socio-demographic variables and spatial mobility characteristics were considered. Table 4 below details bivariate distributions of the variables under consideration for spenders and non-spenders. And, to evaluate the degree of association between these categorical variables and expenditure behaviour, the Pearson's Chi-squared test of independence was used. This analysis revealed little or no influence of socio-demographic characteristics (such as age, education, or income) on expenditure behaviour, and is anomalous with much of the aforementioned literature. Only *Party size* and *tour planning* (*Planned detail)* were slightly associated with expenditure. That is, those who planned the details of their visit in advance and those passengers in larger groups were more likely to spend money at their destination. A similar result was also observed in Brida et al. (2015) and Casado-Díaz et al. (2021).

RQ1. How do mobility characteristics (e.g., tour duration, tour length, stop activities) explain the scope and composition of visitor expenditure?

The results in Table 4 demonstrate that all the variables derived from cruise passenger spatial behaviour at their destination were significantly associated with expenditure. Specifically, respondents, who embarked

Table 2
Summary statistics of expenditure at destination by category, collected through a questionnaire-based survey of cruise passengers, interviewed in the city of Copenhagen (values in €).

Expenditure		Total	Tour	Food & Beverages	Museum & Attraction	Transport services	Shopping	Souvenirs
mean		56.19	6.80	18.12	4.91	3.29	19.42	3.64
median		28.00	0.00	12.00	0.00	0.00	0.00	0.00
St. Dev.		85.47	23.8	23.78	19.49	10.11	66.03	10.34
max		799.0	171.00	180.00	179	70	732	80.3
quantiles	25	5.20	0.00	0.00	0.00	0.00	0.00	0.00
	75	74.20	0.00	25	0.00	0.00	7.00	0.00
Expenditure composition		100%	12.11%	32.24%	8.74%	5.85%	34.57%	6.48%

Table 3
Concise information (per cruise passenger) on the itinerary undertaken, derived from GPS tracking data (n = 183) in the City of Copenhagen.

Variables	Mean	St. Dev.	Quartiles			Min	Max
			25	50	75		
Total duration of tour (hour)	4.18	1.66	2.92	4.13	5.47	0.63	8.00
Total length of tour (km)	12.32	9.26	7.59	10.91	15.09	1.36	99.99
Maximum distance from the port (km)	2.79	2.24	2.07	2.77	3.18	0.31	28.18
Total stop duration (hour)	1.68	1.07	0.81	1.54	2.32	0.04	4.98
Mean speed (km/h)	2.54	1.19	1.91	2.34	2.83	0.59	11.24
90° percentile of the speed (km/h)	5.30	3.47	3.90	4.30	4.77	1.62	33.42
Maximum duration of stop (minutes)	47.83	33.42	20.81	42.83	66.71	2.58	172.70
Average stop duration (minutes)	20.51	17.98	9.82	16.11	24.18	2.58	137.74
Average number of stops	5.49	2.56	4.00	5.00	7.00	1.00	15.00

on a longer tour (in terms of span and duration) and those who wandered further from the port, were more inclined to spend money. Those who stopped for 40 min at least once were likely to spend more when compared to those who stopped briefly. Similar observations were made for those using transport. Evidently, opportunities to spend money whilst travelling (e.g. bus sightseeing tours) were minimal, if not altogether absent.

RQ2. How are mobility differences reflected in spending propensity and expenditure levels (high vs. low spenders)?

Having ascertained an association between spatial mobility variables and expenditure propensity, the relationship between the same set of variables and the level of expenditure was analyzed. Table 5 below regards the bivariate distributions of spatial variables for low and high spenders (defined as those with a total expenditure below or above €50 respectively), together with a summary of the Pearson's Chi-squared test. Non-spenders were excluded from this analysis. An analysis of this data confirms that expenditure levels are equally associated with mobility behaviour, the only exception being the total tour length. As previously reported, (Brida & Risso, 2010; Brida et al., 2012; Casado-Díaz et al., 2021; Domènech, Gutiérrez, & Anton Clavé, 2020; Henthorpe, 2000; Parola et al., 2014; Gargano & Grasso, 2019), those passengers who spent >3.5 h at their destination tended to spend more than those who spent less time at their destination. These results are also consistent with earlier findings (Gouveia & Eusébio, 2019; Larsen et al., 2013), suggesting that shorter stays may indicate passengers returning to the ship for meals. This explorative, wider movement type of pattern of visitation (Jaakson, 2004; Lew & McKercher, 2006) was characterized by furthest maximum distance from the port and higher spending. Similar to the results reported in Table 4, also in this case a stop of at least 40 min is significantly associated with a higher level of expenditure, in addition to using any kind of transportation mode. In contrast, different expenditure levels were not explained by any of the socio-demographic characteristics under consideration.

RQ3. Do socio-demographic characteristics explain the scope and composition of visitor expenditure?

Table 4
Distribution of socio-demographic and trip-related characteristics, according to cruise passenger expenditure (yes/no) in the City of Copenhagen (row percentages), and summary of the Pearson's Chi-squared test of independence among categorical variables.

Variables	Categories	Spenders		Pearson Chi-Squared	
		No	Yes	Chi-squared	*p*-value
First time visitor?	no (*n* = 80)	27.5%	72.5%	2.123	0.145
	yes (n = 103)	18.4%	81.6%		
Age category	18–65 (*n* = 83)	19.3%	80.7%	0.854	0.355
	66-more (*n* = 100)	25.0%	75.0%		
Country of residence	EU (*n* = 113)	23.9%	76.1%	0.377	0.539
	non-EU (*n* = 70)	20.0%	80.0%		
Education	secondary or lower (*n* = 59)	28.8%	71.2%	3.245	0.072
	tertiary/+ (*n* = 117)	17.1%	82.9%		
Net annual income	less than €40,000 (n = 70)	24.3%	75.7%	0.745	0.388
	more than €40,000 (*n* = 106)	18.9%	81.1%		
Planned details	no (*n* = 105)	27.6%	72.4%	3.853	0.050
	yes (*n* = 78)	15.4%	84.6%		
Purchased excursion	no (*n* = 160)	24.4%	75.6%	2.844	0.092
	yes (*n* = 23)	8.7%	91.3%		
Party size	2 or less (*n* = 141)	28.4%	71.6%	12.572	0.000
	>2 (*n* = 42)	2.4%	97.6%		
Tour time	<3.5 h (*n* = 69)	43.5%	56.5%	28.295	0.000
	>3.5 h (*n* = 114)	9.6%	90.4%		
Tour length	<9.5 km (*n* = 72)	38.9%	61.1%	18.554	0.000
	>9.5 km (*n* = 111)	11.7%	88.3%		
Max distance from the port	<2.5 km (n = 72)	40.3%	59.7%	21.812	0.000
	>2.5 km (n = 111)	10.8%	89.2%		
Maximum stop duration	<40 min (*n* = 86)	43.0%	57.0%	39.677	0.000
	>40 min (*n* = 97)	4.1%	95.9%		
Use of any transportation mode	No (*n* = 147)	25.9%	74.1%	5.104	0.024
	Yes (*n* = 36)	8.3%	91.7%		

In order to answer the third research question, a regression modelling approach was adopted to quantify the combined effects of socio-demographic and mobility characteristics on expenditure behaviour. Tables 6 and 7 below present the results of the two estimated logit models: the former describes spenders/non-spenders, and the latter regards the level of expenditure (*high* vs. *low*). Variables demonstrating significant associations in bivariate analysis, with a p-value$\leq$0.05, were included in the model selection algorithm, and a forward selection criterion was used in identifying the most parsimonious model.

The results reported in Table 6 demonstrate that there is a higher probability of spending when the party size exceeds two people, they travel 2.5+km from the port with a maximum stop duration in excess of 40 min. These latter results can be considered as intriguing as there is a retail row, located on Langelinie quay, which targets disembarking cruise visitors. However, the retail units only offer standard souvenir items whilst more diverse and less tourist-targeted shopping opportunities are located beyond a radius of 3 km from the pier. The high values for the odds ratio indicate a substantial degree of association between these variables and expenditure propensity. In addition, the association among some of the spatial mobility variables determines the inclusion of only some of them in the final model.

Table 5
Distribution of socio-demographic and trip-related characteristics, according to cruise passenger expenditure level (low/high) in the City of Copenhagen (row percentages), and summary of the Pearson's Chi-squared test of independence among categorical variables.

Variables	Categories	Level of expenditure		Pearson Chi-Squared	
		Low	High	Chi-squared	*p*-value
First time visitor?	no (*n* = 58)	55.2%	44.8%	1.355	0.244
	yes (*n* = 84)	45.2%	54.8%		
Age category	18–45 (*n* = 67)	49.3%	50.7%	0.000	0.992
	66-more (*n* = 75)	49.3%	50.7%		
Country of residence	EU (n = 86)	54.7%	45.3%	2.502	0.114
	non-EU (*n* = 56)	41.1%	58.9%		
Education	secondary or lower (n = 42)	45.2%	54.8%	0.327	0.568
	tertiary/+ (n = 97)	50.5%	49.5%		
Net annual income	less than €40,000 (*n* = 53)	50.9%	49.1%	0.140	0.708
	more than €40,000 (n = 86)	47.7%	52.3%		
Planned details	no (*n* = 76)	48.7%	51.3%	0.024	0.876
Purchased	yes (*n* = 66)	50.0%	50.0%		
Spending group size	no (*n* = 121)	51.2%	48.8%	1.237	0.266
	yes (*n* = 21)	38.1%	61.9%	0.018	0.895
	2 or less (*n* = 115)	49.6%	50.4%		
	>2 (*n* = 27)	48.1%	51.9%		
Tour time	<3.5 h (*n* = 39)	64.1%	35.9%	4.716	0.030
	>3.5 h (*n* = 103)	43.7%	56.3%		
Tour length	<9.5 km (*n* = 44)	56.8%	43.2%	1.443	0.230
	>9.5 km (*n* = 98)	45.9%	54.1%		
Max distance from the port	<2.5 km (*n* = 43)	58.1%	41.9%	8.342	0.004
	>2.5 km (*n* = 99)	45.5%	54.5%		
Maximum stop duration	<40 min (*n* = 49)	63.3%	36.7%	5.841	0.016
	>40 min (*n* = 93)	41.9%	58.1%		
Use of any transportation mode	no (*n* = 109)	56.0%	44.0%	8.342	0.004
	yes (*n* = 33)	27.3%	72.7%		

Table 6
Results of the logit model relating to passenger expenditure propensity at their destination (spenders vs. non-spenders), according to socio-demographic and mobility-related variables (n = 183).

	Beta	Std. err.	Wald	p-value	Exp (Beta)
Party size = 2+	2.411	1.075	5.032	0.025	11.141
Max distance from the port = 2.5+ km	1.546	0.454	11.579	0.001	4.693
Maximum stop duration = 40+ minutes	2.843	0.583	23.794	0.000	17.166
Constant	−7.532	1.531	24.207	0.000	0.001

Hosmer and Lemeshow's goodness-of-fit test p-value = 0.908

By analyzing the results of the model in which the level of expenditure was used as a response variable (Table 7), the presence of a stop in excess of 40 min is also confirmed to be significantly associated with the level of expenditure. And the probability of spending more than €50 among those who made such a stop is >2.5 times higher than for those who made briefer stops. The other variable included in the final model is related to the use of any kind of transportation mode, which is also positively associated with the level of expenditure.

Table 7
Results of the logit model of passenger expenditure level (high vs. low expenditure) at their destination, according to socio-demographic and mobility-related variables (only for spenders n = 142).

	Beta	Std. err.	Wald	p-value	exp (Beta)
Use of any transportation mode = yes	1.308	0.450	8.436	0.004	3.698
Maximum stop duration = 40+ minutes	0.959	0.380	6.359	0.012	2.610
Constant	−1.376	0.436	9.946	0.002	0.253

Hosmer and Lemeshow's goodness-of-fit test p-value = 0.130

4.3. Cruise passenger expenditure by category

In concluding the analysis, the pattern of passenger expenditure composition was considered (Table 8). Being a first-time visitor in Copenhagen determines a higher propensity to spend more on guided tours and souvenirs; non-European cruise passengers are more likely to purchase a guided tour, compared to Europeans. Those passengers with a higher level of education are more likely to spend more on transportation services, whereas there appears to be a loose association between a planned visit and expenditure for museum and attractions (*p*-value = 0.053). Having performed an excursion is clearly associated with expenditure on guided tours, but also with expenditure for food and beverages.

Group size appears to be only significantly associated with expenditure on transportation, an assertion supported by the presence of children or senior citizens with special mobility needs; economies of scale could be attained with transport solutions, including the use of taxis. In contrast, age characteristics do not appear to be associated with any of the expenditure categories. By examining mobility-related variables, it can be stated that the time spent at destination is significantly associated with expenditure on food and beverages, but loosely associated with the expenditure on souvenirs. These results may indicate that those longer stops (>40 min) in the aforementioned analysis may be attributed to café and restaurant visits. Tour length and maximum distance from the port are associated with expenditure for transportation services. Finally, maximum stop duration is associated with expenditure on food and beverages and for museums and attractions. Higher speed levels, indicating the use of transportation (derived from the GPS tracking data), were also associated with expenditure on guided tours (e.g. canal boats or sightseeing buses), food and beverages and, of course, transportation services.

4.4. Analysis of cruise passenger stop locations in Copenhagen

A careful analysis of stop behaviour and stop locations highlighted the relevance of mobility characteristics on spending behaviour. Table 9 below summarizes the distribution of cruise passengers according to the number of stops and expenditure behaviour. The final column on the right confirms that all cruise passengers made at least one stop at their destination but only 8 (4.37%) cruise passengers made >9 stops (for a minimum of 2 min). The average number of stops for the whole sample exceeds five stops, with a standard deviation of approximately 2.6. And examining the distribution of the number of stops according to expenditure behaviour in Table 9, it appears that spenders have a higher propensity to make a stop, compared to non-spenders, with an average of 5.57 stops (compared to 4.56 for non-spenders). In addition, slight differences appear among spenders: the average number of stops is relatively higher for high spenders, compared to low spenders (5.78 and 5.36 respectively).

However, the number of stops per passenger may be influenced by

Table 8
Summary of the Pearson's Chi-squared test of independence of cruise passenger socio-demographic and trip-related characteristics by expenditure category.

Variables	Purchased guided tour?		Food and Beverages		Museum and Attractions		Transport		Shopping		Souvenirs	
	χ^2	*p*-value	χ^2	*p*-value	χ^2	*p*-value	χ^2	*p*-value	χ^2	*p*-value	χ^2	*p*-value
First time visitor?	7.977	**0.005**	0.035	0.851	0.125	0.724	0.075	0.784	0.085	0.771	5.144	**0.023**
Age category	2.466	0.116	0.873	0.350	0.946	0.331	0.023	0.879	1.866	0.172	0.362	0.547
Country of residence	6.383	**0.012**	0.000	0.985	0.150	0.699	0.104	0.747	0.286	0.593	1.016	0.314
Educational level	0.468	0.494	1.284	0.257	0.484	0.487	5.671	**0.017**	1.482	0.224	0.104	0.747
Net annual income	0.086	0.770	1.358	0.244	1.326	0.250	0.118	0.731	0.326	0.568	0.193	0.661
Planned trip?	0.681	0.409	0.705	0.401	3.744	***0.053***	0.028	0.868	0.171	0.680	0.499	0.480
Purchased excursion	25.613	**0.000**	8.335	**0.004**	0.187	0.665	0.057	0.812	0.960	0.327	0.876	0.349
Spending group size	1.665	0.197	0.506	0.477	0.179	0.672	4.517	**0.034**	0.234	0.629	0.576	0.448
Tour time	0.000	0.982	11.932	**0.001**	0.849	0.357	0.475	0.491	1.350	0.245	3.264	**0.071**
Tour length	0.168	0.682	0.022	0.883	1.712	0.191	4.093	**0.043**	0.977	0.323	2.534	0.111
Max. distance from the port	0.704	0.402	0.488	0.485	0.075	0.784	10.667	**0.001**	2.698	0.100	0.803	0.370
Max. stop duration	1.598	0.206	10.599	**0.001**	4.598	**0.032**	0.089	0.766	2.504	0.114	0.372	0.542
Use of any transportation mode	18.758	**0.000**	5.034	**0.025**	0.385	0.535	17.897	**0.000**	0.769	0.380	0.001	0.977

Table 9
Distribution of cruise passengers according to the number of stops made and expenditure behaviour.

Number of stops	Non-spenders	%	Spenders						Total	%
			Low	*%*	*High*	*%*	*Total*	*%*		
1	1	2.44	5	7.14	3	4.17	8	5.63	6	3.28
2	4	9.76	7	10.00	7	9.72	14	9.86	18	9.84
3	7	17.07	4	5.71	6	8.33	10	7.04	17	9.29
4	10	24.39	5	7.14	10	13.89	15	10.56	25	13.66
5	9	21.95	13	18.57	11	15.28	24	16.90	33	18.03
6	3	7.32	13	18.57	9	12.50	22	15.49	25	13.66
7	3	7.32	11	15.71	8	11.11	19	13.38	22	12.02
8	3	7.32	6	8.57	3	4.17	9	6.34	12	6.56
9	1	2.44	5	7.14	11	15.28	16	11.27	17	9.29
10–15	0	0.00	1	1.43	4	5.56	5	3.52	8	4.37
Total	41	100.00	70	100.00	72	100.00	142.00	100.00	183	100.00
Mean	4.56		5.36		5.78		5.57		5.49	
Std. dev.	1.87		2.35		2.98		2.69		2.56	

Table 10
Distribution of stops according to their duration by cruise passenger expenditure category.

Stop duration	Non-spenders	%	Spenders						Total	%
			Low	*%*	*High*	*%*	*Total*	*%*		
2–10	126	67.38	210	53.44	199	46.82	409	50.00	535	53.23
10–30	51	27.27	110	27.99	119	28.00	229	28.00	280	27.86
30–60	9	4.81	51	12.98	70	16.47	121	14.79	130	12.94
60–100	1	0.53	18	4.58	24	5.65	42	5.13	43	4.28
100–180	0	0.00	4	1.02	13	3.06	17	2.08	17	1.69
Total no. of stops	187	100.00	393	100.00	425	100.00	818	100.00	1005	100.00
Median	6.42		8.92		11.42		9.97		9.17	
Mean	9.97		17.84		22.47		20.24		18.33	
Std. Dev.	9.61		21.88		27.06		24.82		23.12	

the choice of algorithm used to identify the stops, in addition to tuning parameters (e.g., minimum stop duration, threshold speed value, etc.). On the other hand, stop duration may be a more reliable indicator, which is likely to be less influenced by the selected algorithm.

The distribution of the 1005 stops, which were made by the 183 interviewed cruise passengers, is reported in Table 10 below. Taking into consideration the whole sample, the average stop duration last for approximately 18 min. There were significant differences between spending and non-spending passengers, with the former displaying an average stop duration in excess of 20 min, compared to the latter, who did not exceed an average stop duration of 10 min. The average stop duration was also significantly higher for high-spending passengers, compared to low-spending passengers (22.47 vs. 17.84 respectively); similar differences may be observed between non-spenders and spenders. Only 33% of stops made by non-spenders lasted in excess of 10 min, compared to approximately 54% for high spenders. Only one non-spender stop lasted for >60 min (corresponding to 0.53% of the total number of stops made by non-spenders); approximately 7% of spender stops continued for more than one hour. These results suggest that it is possible to conceptually differentiate mooring vs. grazing behaviour, as characterized by specific stopping characteristics.

As a final step in the analysis of cruise passenger behaviour onshore, visual projections were created in order to capture the observed differences in stop activity and expenditure behaviour. Fig. 3a and b below illustrate the distribution of non-spending passenger and spending-passenger stops respectively; circular radii correspond to the duration of each. As confirmed by Table 10, non-spenders seem to move in more hectic patterns. None of non-spenders made stops lasting in excess of 100 min, and only one passenger made a stop of more than one hour. In terms of stop locations, non-spenders were concentrated around the Langelinie quay, visiting the free attractions in the proximity of the port: Amalienborg, Kastellet and the Marble Church. Only a few passengers

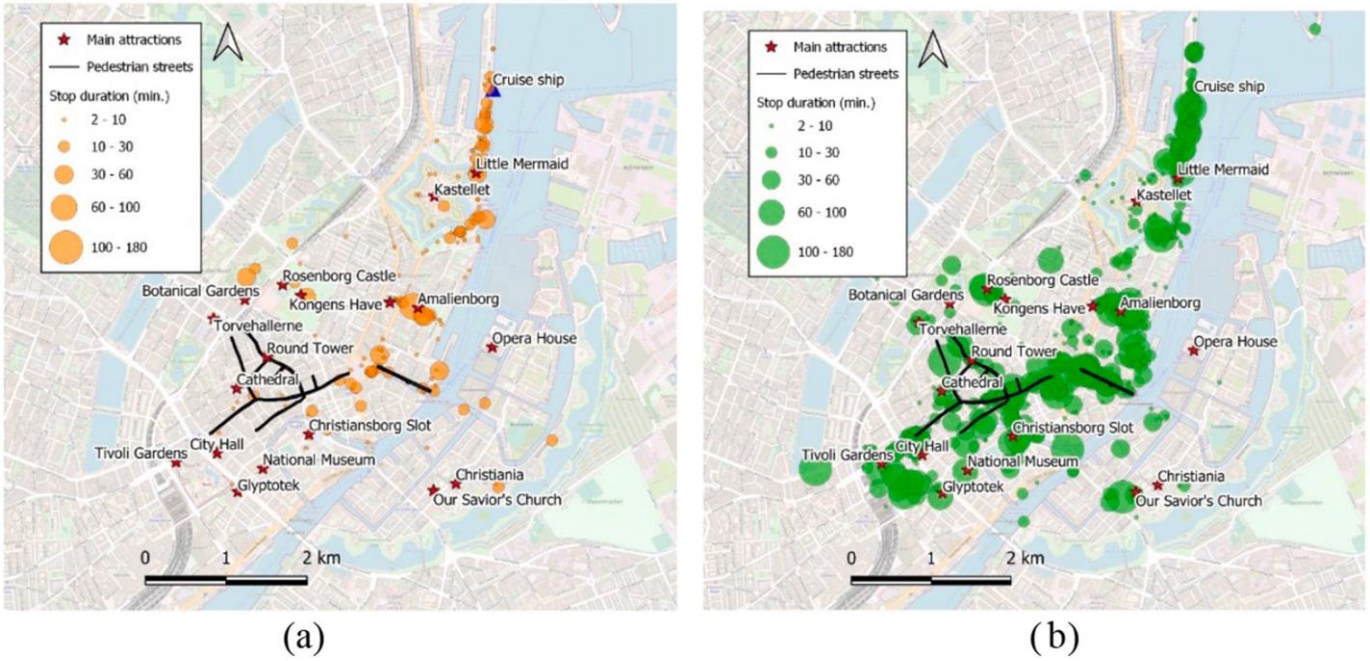

Fig. 3. Spatial distribution of stop locations for non-spending (3a) and spending (3b) cruise passengers (Base Map: OpenStreetMaps).

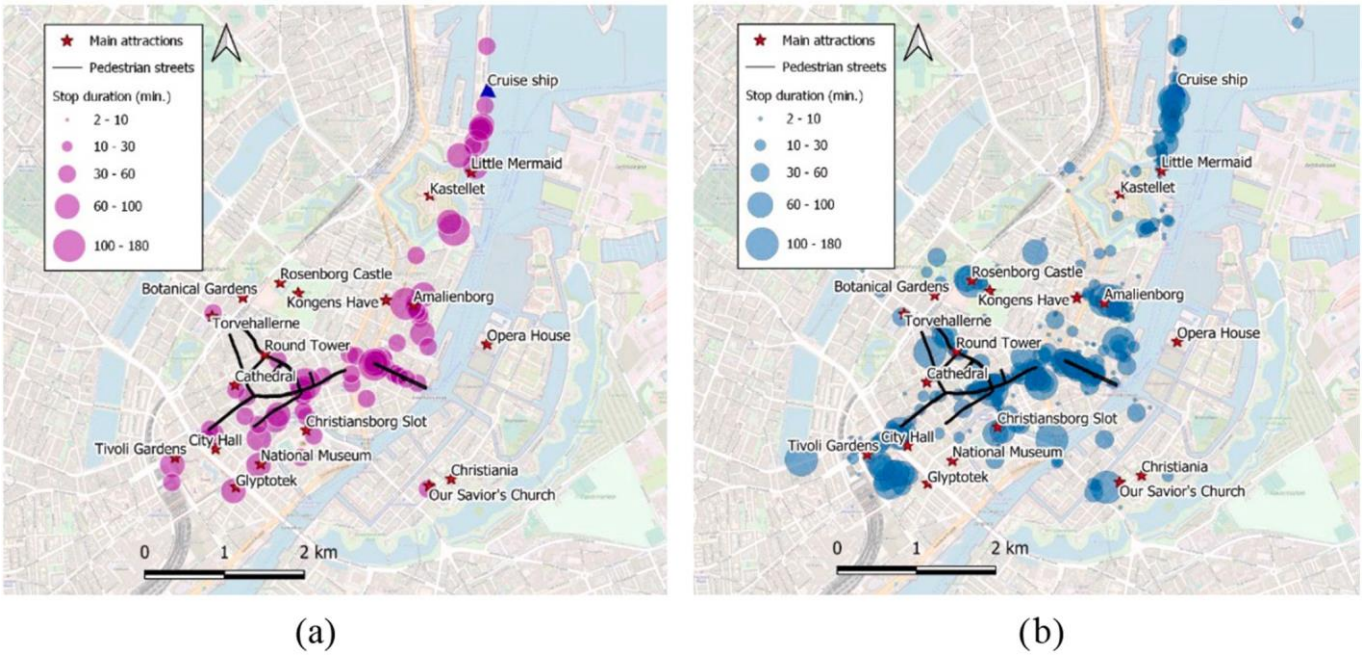

Fig. 4. Spatial distribution of stop locations for low-spending (<50€) and high-spending (>50€) cruise passengers (4a and 4b, respectively). (Base Map: OpenStreetMaps).

visited pedestrianized areas, and the stops made were brief.

A more varied pattern emerged from the analysis of spender stop locations, as confirmed in Fig. 3b. The stops are more widely scattered and distributed across the various attractions of the city (excluding the Opera House). Spenders spent more time onshore, with their stops generally being longer. All the pedestrianized areas were densely filled by stops made by spenders, who also visited attractions further from the port: for example, the Tivoli Gardens and the Glyptotek Museum).

The analytical differences in terms of spatial activity among low-spending and high- spending passengers which emerged are also visible by examining the stop locations for the two segments, that is, spending vs. non-spending passengers, and high- and low-spending passengers (Fig. 4a and b). Indeed, the intensity of stop activity is heightened for high-spending compared to low-spending passengers, and the distance of the stop location from the port is greater for high spenders. These results seem to confirm the specific findings of Domènech, Gutiérrez, and Anton Clavé (2020), namely that, high spenders spent more time in mixed activity (recreational and commercial) areas, instead of visiting the main tourist sites.

High-spending cruise passengers spent more time in the pedestrianized areas, in the proximity of the Cathedral and city hall with its ample shopping opportunities; this finding is supports the propositions

of McKercher (2018) with regards to the impact of distance on tourism mobility. It is of interest to note that, in contrast with low spenders, none of the high-spending passengers visited the National Museum or Kastellet citadel. As entrance to these attractions is free of charge, they may be particularly appealing to more frugal tourists.

5. Conclusion

The authors of this study hope that it will make a contribution in enhancing our understanding of the spatiotemporal consumption of cruise visitors. It is to be hoped that the extensive empirical material has demonstrated how tourism spending is located in geographical space, thereby indicating significant relationships between mobility and expenditure behaviour. Despite the small sample size, it was possible to establish that spending propensity is associated with spatial movement. While selected socio-demographic characteristics were found to be insufficient in explaining the scope and composition of visitor expenditure, distinct mobility characteristics (such as: distance travelled, tour and stop duration, and the use of transport) have highlighted substantial variations in expenditure levels and composition. These findings resonate well with the empirical studies, which were conducted in the ports of Tarragona (Domènech, Gutiérrez, & Anton Clavé, 2020), Valencia (Casado-Díaz et al., 2021), Hobart (Hardy et al., 2020) and Sydney (Hardy et al., 2021). Furthermore, the dispersion of stops in the destination space confirms the generic assumption that territorial characteristics and consumption are related to each other (McKercher & Lew, 2004).

5.1. Contributions and further avenues of research

This paper demonstrates the utility of geolocational analytical methods in tourism studies. It supplements the pioneering work of Hardy and colleagues, who introduced innovative indicators to illustrate the spatial dispersion of consumption on a larger regional scale. In contrast, our study offers micro-scale metrics in order to express tourist movement in terms of meaningful temporal and spatial variables. Specifically, a reliable method with which to derive stop locations and related characteristics from GPS-data has been presented. This permits the identification of hotspot locations with the highest density of spending in city destinations. The proposed analysis has also been supported by graphic visual projections of stop patterns, which have indicated distinct differences among the mobility patterns of various passenger segments (spending vs. non-spending passengers, and high- and low-spending passengers).

Nonetheless, it has not been easy to identify a causal link between stopping and spending activities. A propensity to higher expenditure may determine a greater propensity to reach more distant attractions, in addition to stops for shopping, food and beverage consumption and other activities, all of which may imply additional expense. On the other hand, the presence of consumption opportunities (shopping, catering or other attractions) may have an influence on the tourist's choice of stopping at these places and possibly spending money. However, the acknowledgement of links between expenditure and mobility suggests segmenting cruise passengers appropriately (where possible), according to spatiotemporal consumption behaviour.

Based on the substantial mobility/spending differences in the sample presented in this paper, its authors would like to suggest a simple typology, which is defined by spatial and expenditure behaviour patterns, rather than sociodemographic characteristics alone. Fig. 5 below illustrates a potential framework with four ideal-typical consumption forms, which have been derived by juxtaposing stop intensity (frequent vs. few stops) and economic yield (high vs. low spending). *Swarming* is determined by high stopping intensity and zero or low expenditure levels, where stops would most likely indicate photo stops or a fleeting glance of tourist sites. *Grazing* entails frequent stops of a short duration, which are combined with considerable total expenditure (e.g. on an organized sightseeing tour). Jaakson's (2004) "pack" and "shopping browsers" would probably follow a swarming or grazing pattern. In contrast, *mooring* and *savoring* segments demarcate mobility patterns with few longer stops, where the latter is usually associated with higher levels of spending. Such a spatiotemporal consumption style would well describe "explorers" and the "café crowd" (Jaakson, 2004), while the *mooring* behaviour describes a new segment, which could easily be observed in recreational areas (parks and benches) in urban destinations.

Future research could further delve into operationalizing and testing the four ideal-typical spatiotemporal forms, which are offered by the model in different empirical settings. In order to test this model, future studies could combine geolocational data with the sensory metrics of emotional variables (Shoval, Schvimer, & Tamir, 2018a, 2018b). External factors (e.g. time constraints, unfamiliar environments) and personal characteristics (neophilic or allocentric personality, age, physical conditions) may condition affective responses, such as stress,

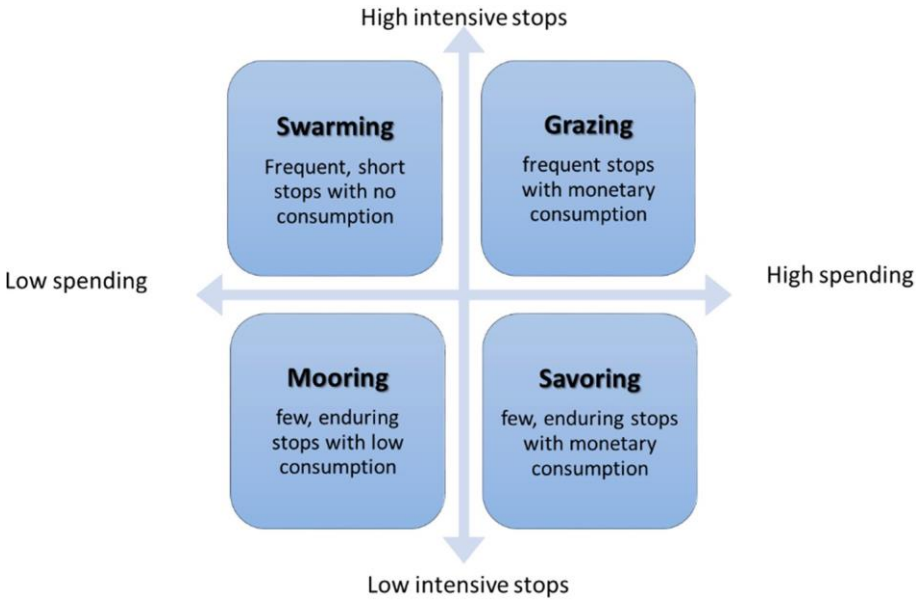

Fig. 5. Towards a typology of spatiotemporal consumption forms.

anxiety and excitement. It is likely that the arousal levels and types will differ between high and low intensity segments.

5.2. Implications for practitioners

The results presented in this paper have clearly established an association between cruise passenger mobility and expenditure behaviour. Three insights are of interest to destination marketers and planners, whose aim is to make cruise tourism more sustainable after the COVID-19 pandemic. Firstly, it has been verified that cruise passenger expenditure increases with more intense mobility characteristics (in terms of a greater distance from the port, tour length and duration), and this resonates well with the findings of De Cantis et al. (2016) and Hardy et al. (2021). Secondly, stop intensity is also associated with expenditure, and higher-spending passengers stopped more frequently and for a longer time than non-spending and low-spending passengers. Thirdly, a visual mapping of stop locations indirectly highlights where most expenses are likely to be concentrated in the urban landscape, also in terms of expenditure category. Mapping stops may assist in the identifying bottlenecks of crowd concentrations and areas flocked by tourists, in addition to highlighting less visited attractions and shadow areas. Combining new insights into mobility intensity and stop locations may also contribute to redefining the tourist landscape and smoothen the beaten track corridors in urban destinations.

The associations thus far identified in this paper between walking behaviour, stops and expenditure in the city of Copenhagen suggest that the presence of more varied expenditure opportunities (not only souvenirs) in the vicinity of the port may increase the visitor duration of onshore visits and spending propensity. Drawing on the observations of Domènech, Gutiérrez, and Clavé (2020) regarding the role of the built-up environment, improved the signposting to nearby attractions and shopping streets in the residential neighbourhood of Østerbro could alleviate the pressure of tourist traffic in the congested areas and balance spatial consumption patterns. Finally, the authors of this paper would like to propose that planners facilitate the introduction of accessible onshore experiences in the form of bookable activities; this would also increase the economic benefits of cruise tourism to local businesses. Innovative initiatives (involving encounters with the local community), personalised guided tours, targeting small groups, or thematic retail experiences could offer competitive alternatives to existing standard packages.

5.3. Limitations

Reflecting on the limitations of this study and future research, an inherent difficulty relates to the collation of data relating to tourist expenditure. Whilst its collating at the termination of a passenger's onshore visit may reduce recall bias, and, therefore, avoid the risks of modifying the expenditure patterns, compared to diary reporting (Faulkner & Raybould, 1995; Shoval & Isaacson, 2007), the presence of errors due to omissions (under reporting) and telescoping (over reporting) are difficult to avoid (Breen et al., 2001). With this in mind, the use of Citycards (prepaid or discount cards with chips) or mobile devices afford many new opportunities with which to enhance the data collection relating to tourist expenditure. And this is notwithstanding the current paucity of evidence of effective ways for integrating these new technologies into survey data collection (Jäckle, Burton, Couper, & Lessof, 2019). A second limitation regards the choice of metrics used for summarizing passenger mobility at their destination, as obtained with GPS tracking data. A set of significant indicators has been used in this paper but much more information could be derived from raw GPS data, the selection of which depends on the research aims. Similar considerations may also be made regarding the algorithm used for stop identification, in addition to the values used for tuning parameters. Such considerations, regarding the use of the total number of stops, herald a note of caution in favour of more reliable information, as derived from a categorization of stop duration. It has not been possible in this study to link stop location information with the type of expenditure effected. Indeed, there is a need for comparative studies, focusing on linking observations to cruise passenger stop activity and related expenditure at different destinations. The development of algorithms, which are capable of linking the most probable places to be visited by cruise passengers and based on stop location coordinates, could provide information regarding the exact locations in which expenditure was made, thereby signalling future avenues of research.

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Appendix A. Supplementary data

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Conclusions

This final section is devoted to reflecting on the main lessons and views around the issues of tourism expenditure, mobility intra-destination and the relationship between these. Furthermore, the final issue is devoted to reflecting on the main limitations of the phD dissertation and future lines of research that will be undertaken around the issues discussed here extensively and which deserve more attention.

This doctoral thesis actively participates in enriching the literature on the topic of tourism expenditure and tourism mobility to destination. This work attempted to propose two relevant issues in the tourism scenario from a theoretical and methodological point of view. This study explored how tracking technologies can be an added value in the construction of tourism profiles, in particular to show that there is a relationship between cruise passengers' expenditure levels and movement patterns. Above all, the work presented in chapter four had this objective and thanks to the case study of Copenhagen, the literature on the topic of cruise passengers and spending, and, mobility has been enriched (De Cantis et al.,, 2016; Ferrante et al., 2016; Domenech et al., 2020).

Starting from the table 1.0 presented in the Introduction section, the table here presented (Table 3.8) give an idea about some considerations included in each starting hypothesis of the phD dissertation, which are all confirmed in terms of expected results.

Research Question	Principal results
RQ1: is it possible to establish whether nationality determines different levels of spending among tourists?	**1.** The significant relationship between nationality and tourist expenditure. **2.** Different nationality for different length of stay. **3.** Different level of income determines different level of expenditure. **4.** Nationality can be used for market segmentation. **5.** Cruise passenger expenditure is a specific tourist segment for different nationalities.
RQ2: are the investigation techniques presented in the	Research related to the spending of cruise passengers has undergone an extraordinary evolution, accompanied by the

review sufficient to define of cruise passengers' behavior?	development of the cruise sector. Each research, having different populations and samplings, different places and methods, offered a broad investigation of the topic.
RQ3: is there a relationship between mobility behavior and economic behavior of the cruise passengers in the destination?	Although the size of the sample is one of the limitations of the study, the data obtained from Copenhagen cruise passengers are a good data in qualitative terms
RQ4: Is it possible to manage the tourist destination starting from the the stop locations analysis?	The "beaten tracks" determined by the GPS tracks have allowed the study to evaluate the areas of greater tourist concentration on which the policymaker must pay more attention, to improve the fruition and avoid overtourism phenomena

The potential of GPS tools is one of the most discussed topics of the thesis and is one of the most current topics in the scientific literature. it took decades To arrive at using GPS to track the movement of cruise passengers on the one hand and the use of traditional tools on the other, .The first studies focused exclusively on evaluating at a descriptive level this segment of tourists, assessing through travel diaries, questionnaires, the spatial and economic profile of the cruise passenger (Hentorne, 2000; Brida et al., 2014; Gargano & Grasso, 2016; Lee & Lee, 2017; Marksel et al., 2016).

Casado-Díaz et al. (2021) explains how previous studies for cruise passengers can be divided into:

1. Studies conducted on the expectations, motivations, satisfaction and/or intention of these passengers to return or to recommend a destination (e.g. Andriotis & Agiomas et al. 2010; Gabe et al., 2006; Hosany & Witham, 2010; Larsen & Witham, 2010. Witham, 2010; Larsen & Wolff, 2016; Scherrer et al., 2011);
2. Spending in a destination (e.g., Pino & Tovar 2019; Brida et al., 2018Douglas & Douglas, 2004; Henthorne, 2000; Larsen, Wolff, Marnburg, & Øgaard, 2013; Marksel,Tominc, & Bozicnik, 2017);
3. Spatiotemporal behaviour: (e.g., De Cantis et al, 2016; Ferrante et al., 2018; Andriotis and Agiomirgianakis, 2010Scherrer et al., 2011).

This thesis is halfway between point 2 and point 3, with the aim of increasing the literature conducted on the topic of the movement-expenditure relationship. Apart from the various case studies presented through the submitted and published works that defined, respectively:

- the methodologies used when dealing with cruise passengers' expenditure (Chapter two)
- The possible relationship between nationality and tourist expenditure (Chapter two)
- the relationship between mobility and tourist expenditure at the destination (Chapter four),

It is opportune here to define the different results and objectives achieved through chapters one and three which act as a theoretical framework for the entire thesis and without which the in-depth study of the different issues involved in this research would not have been possible.

The first chapter defined tourism expenditure from different points of view. Starting with a general consideration of the tourism market, what it means to do tourism and the different meanings of tourism supply and demand, it discussed how the tourism product is unique.

An important highlight of the first chapter is the review of the literature conducted on the topic of tourism consumer behaviour theory, with the aim of offering a connection between the economic sciences and the tourism sciences, also in the light of recent work conducted on the topic. In particular, the first generation of studies conducted about tourism consumer behavior were studies of a descriptive nature, particularly: between the 1930s and 1940s (late), characterised by commercial research concerning the effects on distribution, advertising, and promotion strategies. At this stage the only focus is on purchasing behaviour.

The second generation of studies, on the other hand, is called the “motivational research phase”: In the 1950s, research focuses on Freudian and drive concepts. In this phase there is the analysis of the predictors of the purchasing procedure. Finally, a third generation called the formative phase: in the 1960s, it is the phase of the "big models", which are the most influential theories to date. After the 1960s, there was a willingness on the part of individual researchers to look for models that could reflect tourist behaviour.

It is noted that in this first part of the literature there is a main gap, which has been underlined several times in the article, namely that too much attention has been paid to the decision-making process behind the purchase of a trip or tourist experience, but not enough attention has been paid to the decision-making process that actually drives the action of buying a

particular good. In fact, it is like if they considered the factors that drive the tourist to consume a particular good but did not pay attention to the process and all that is consumption which is considered a "black box".

A main point of the first chapter was to distinguish the different meanings of tourism expenditure and how the economic impact of tourism should be assessed from different considerations that have to do with:

- the point of view where it is looked at: the destination, tourism agencies, tour operators, the policymaker, the residents, the country as a balance of payments promoter.
- The definition of the basis of expenditure: at the destination, before the destination, after the destination
- The type of tourism: cruise, excursion, holiday tourism.

It discussed the potential of data sources and how they have been refined and specialized over time by various national and international agencies. For example, at the European level, it is possible to obtain microdata to assess the tourist experience in the national destination, in terms of socio-demographic profile and expenditure.

Another aspect discussed was how the questionnaire tool has a potential that is now overused by the academic community but needs further tools and specifications to function and to obtain increasingly cutting-edge information and data on tourists. The study of this section has shown that there are many applications for this tool and that it is essential for understanding the economic behavior of tourists.

This led to the first case study of the thesis, which is described in chapter two. The study of the literature conducted about the cruise industry and how their spending is studied at a methodological level is part of chapter two of this paper. There are many studies on cruise passengers' spending all over the world. In recent years, they have increased and refined thanks to new survey techniques that have better-captured cruise passengers' behavior in the destination. On the other hand, the lack in the literature, even in the case of cruise passengers, is the care for the methodology behind the surveys, the construction of the questionnaire, the methods of survey, and data collection in general. The case study proposed in chapter two contributes to this gap in the literature and gives the academic research an idea about the methods used in this regard.

Following the chapter second, the second part is related to the influence of the socio-demographic profile of the tourist on spending levels. Among all the socio-demographic factors that can be studied and that make up the profile of tourists, it was decided to study nationality, because it was never discussed in the literature in these terms. The thematic review proposed in this second case study helps the academic world to understand how and how much the country of turists' origin have some meaning in the different levels of expenditure can have produced in the destination.

Some considerations should also be made for the second part of this paper, which deals with the theme of tourist mobility. Chapter three focused on intra-destination tourist mobility and did not focus on intra-destination mobility. Mobility is an ancient phenomenon that unites all people, while tourist mobility deals with the spatial behavior of tourists about the characteristics of destinations and attractions inside.

The chapter explains how to start from the concept of tourism movement and how this, if in the first instance extremely theoretical and not applied in the destination, Today, thanks to the tracking tools and modern communication technologies, it is possible to determine at any time where the tourist will go. Even sharing tools such as travel platforms and social networks also relate with this potential, but it is not considered in this process. Rather, there is the study of old and new tools, which have made it possible to identify the phenomenon of tourist mobility, with a very specific discussion on methodological aspects (modalities of collection and analysis of tourist mobility data) and the most practical aspects in terms of the advantages and disadvantages of traditional data collection tools and new generation motion detection tools (GPS first) and their limitations.

The last section has been dedicated entirely to the tourist studies conducted with the GPS tracking and to the different factors that influence the intra-destination movement for the tourist, and then to introduce the last case study that is the heart of the fourth chapter of the dissertation.

The most important results of the case study are summarized here:

- the spatio-temporal consumption of the cruise passengers and the possibility to make to interaction traditional instruments (the surveys with the questionnaires) and modern instruments of tracking the position (GPS)

- Analysis of stopping positions (that is, stop locations) to identify the density of expenditure in the urban space. The literature turns out to be empty in this sense and this work fills the huge gap.
- Analysis of the expenditure composition: the instruments available have made it possible to define who spends from those who do not spend but especially who spend a lot from those who spend little.
- The high and low spending propensity is explained by the different mobility models: there are spending behaviors that are associated with different GPS tracks. There are cruise passengers that spend a lot because they remain in the destination for a superior time, others instead that do not go away from the point of disembarkation and that also spend money, this is not destined to the local destination.

The most important limits of this phD dissertation can be summarized in the following points:

- The economic impact of the tourism industry on the destination and how the sector impacts on the local destination are a topic that is only superficially addressed, despite the extreme importance of tourism for countries today.
- Macroeconomic models supporting tourism spending and how this can be modelled from the components of countries' balance of payments: these macro studies are only mentioned as completeness of the thesis, but the focus of this paper is on microeconomic studies.
- The studies conducted on the mobility of tourists, in general, is another limitation of the dissertation because most of the literature study conducted deal with cruise passengers who, being forced excursionists, do not have the possibility to stay overnight in the destination.
- The sample presented in the Chapter 4 study is a not large sample, because there has been a substantial loss of data due to the different tools that researchers have made available for collection, namely the opening questionnaire, the GPS track and the closing questionnaire. Obtaining all three data sources was extremely complex and this led to a deterioration in the sample number. The choice, however, is of a qualitative nature, because the quality of the data obtained has been a point in favor of research.