

Smart destination cards as big data generators: A proposal for a checklist and its application to Trentino Guest Card

Chiara Dalle Nogare*

Università degli Studi di Brescia (Italia)

Raffaele Scuderi**

Università degli Studi di Enna "Kore" (Italia)

Abstract: Quality data on tourist behaviour is essential for destination management organisations, the promoters of smart destination cards (SDC). The different configurations of SDC stem from the relative importance attributed to their goals and entail different levels of quality of the data they collect. SDC are not only big data generators, but also marketing tools and the outcome of the cooperative games between the included attractions, with a trade-off between these features. Consequently, strong sample selection, price distortion effects, and collection of limited personal details on card users often characterize SDC data. We propose a checklist for assessing the potential of SDC as big data generators, whose items are: large coverage of diverse attractions; same discount for all included attractions; low card price; stability of features over time; collection of personal data at issue. We exemplify its use by applying it to the SDC of Trentino, an Italian mountain destination.

Keywords: Smart destination cards; Tourism big data; Tourist preferences analysis; Checklist.

Tarjetas de destino inteligentes como generadoras de big data: una propuesta de lista de verificación y su aplicación a Trentino Guest Card

Resumen: Los datos sobre el comportamiento de los turistas son esenciales para las organizaciones de gestión de destinos, que son los promotores de las tarjetas turísticas smart (SDC). Las diferentes configuraciones de las SDC derivan de la importancia relativa atribuida a sus objetivos y conllevan diferentes niveles de calidad de los datos que recopilan. Las SDC no son solo generadoras de big data, sino también elementos del marketing y el resultado de un juego cooperativo entre las atracciones, con un compromiso entre estas características. En consecuencia, los datos de las SDC se caracterizan a menudo por una fuerte autoselección, hay efectos de distorsión de precios y la recopilación de datos de los usuarios puede ser limitada. Destacamos las características deseables de una SDC como generadoras de big data a través de una lista de verificación: gran cobertura de diversas atracciones; mismo descuento para todas las atracciones incluidas; precio de tarjeta bajo; características estables a lo largo del tiempo; recopilación de muchos datos personales. Aplicamos la lista a la tarjeta de un destino de montaña italiano: Trentino.

Palabras clave: Tarjetas de destino inteligentes; Grandes datos turísticos; Análisis de preferencias turísticas; Lista de Verificación.

* Università degli Studi di Brescia (Italia); <https://orcid.org/0000-0001-9502-0319>; E-mail chiara.dallenogare@unibs.it

** Full professor of Applied Economics, Università degli Studi di Enna "Kore" (Italia); <https://orcid.org/0000-0001-5373-3775>; E-mail raffaele.scuderi@unikore.it

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1. Introduction.

Tourism destinations have been the focus of a large part of the literature in tourism economics and tourism management in the last decades, because they have been identified as the most relevant observation units (Candela and Figini, 2012). As a matter of fact, tourism is more about location than a single service industry, and the consideration of the role played by unique local assets (both natural and cultural, tangible and intangible) in making a place attractive is essential to its understanding. However, focusing on destinations poses severe challenges to empirical research. In particular, lack of consistent data on the demand side of the market is a serious problem. All a scholar finds is, at best, the number of tourist arrivals and nights (sometimes that is not even the case: think of cross-border destinations), perhaps complemented by some sporadic, unsystematic survey data. Exceptions are few.

Often, data on tourist choices, behaviours and movements across attractions and places within a destination are simply not collected, or not *systematically* collected. When they are, collection is *decentralised* (hotels investigate their guests, museums their visitors, means of transport their users), and often not shared by all actors involved. In the past, lack of a centralised data collection on tourist behaviours was the consequence of very high coordination and collection costs. This is no longer the case since technology has allowed the tracking of tourist activities in several, relatively inexpensive ways. This has shifted the balance, Gajdosik (2019) argues, in disfavour of traditional data collection methods, namely survey data (reporting intentions to consume or statements about present and past consumption) and time-space diaries. These methods also suffer from the typical shortcomings of stated preferences recordings.

One of the ways technology now allows the tracking of actual consumption and behaviour is by means of the adoption of a smart destination card. Destination cards are not a new phenomenon in XXI century tourism destinations (Pechlaner and Abfalter, 2005). Their evolution into *smart* destination cards (SDC hereafter) has turned them into tools allowing the generation of database associating a single user to all her pics from the set of services included in the card. This type of datasets are clearly richer than the sum of the information collected individually by the single attractions, as they allow the identification of each single card user's consumption bundle. This is valuable information for profiling tourists and study their behaviour at the destination. In turn, this allows better management of tourists at the destination (in view to mitigate congestion phenomena, for instance), better future marketing campaigns and better long-term investment policies. A large survey on the impact of ITC (including SDC) on destination appeal concludes that ITC increases it by improving tourist flows management and tourism planning (Mandic and Garbin Praničević, 2018).

Our aim is here to discuss the desirable features of a smart destination card for the investigation of tourists' choices vis-à-vis a consumption space. We argue that not always do SDCs meet all the necessary requirements to produce a database suitable to reach this goal. This may be the case because the adoption of a SDC serves multiple purposes. SDC are not just big data generators, but also coordination tools and the object themselves of marketing campaigns. When destination management organisations (DMO, i.e. the organisations usually promoting the adoption of SDC) configure their SDC project, they often trade off the expected benefits from data investigation for the desired outcomes in the other two domains. The literature has often recognised the multiple facets of SDC, but it has not yet highlighted that their multiple goals may be in conflict with each other.

Our contribution therefore unveils the complexity of SDCs, and has a clear recommendation for scholars approaching them. Before considering working on the data generated by a SDC, one should assess to what extent its characteristics are not likely to produce strong sample selection, price distortions or simply too few observation units, and how fit they are for the collection of personal data. We propose a checklist for data analysts, and for those DMOs who consider sound empirical evidence as the cornerstone of their operations.

We then exemplify the use of this checklist by considering a specific card, Trentino Guest Card (TGC hereafter). TGC is promoted by the DMO of Trentino, a lake and mountain region set in the Italian Alps. Our exercise reveals that this specific card has some unique features making it an interesting big data generator, though some features are improvable.

This contribution is organised as follows: section 2 reviews current research on SDC and the use of the data generated by them in tourism studies; section 3 discusses the requirements for a SDC to generate a dataset suitable for research on tourist preferences and behavior; section 4 illustrates the reasons why these requirements are not always met; section 5 considers Trentino Guest Card in light of the discussion in section 3; section 6 concludes.

2. Scholarly literature on destination cards: a critical survey

2.1. Conceptualization

Destination cards, also called tourist cards or tourist passes, have been an object of investigation in diverse scholarly domains: game theorists, management and marketing scholars and even informatics engineers have written about them. However, not all of them have recognized the multiple goals of SDC. When they have, they have rarely reflected on the fact that using a single tool to obtain different results may come at some cost. This happens when the characteristics making this tool perfect to reach one goal are not the same as the most desirable ones when it comes to reach a different objective.

The role of destination cards as cooperation tools is known (Pechlaner and Zehrer, 2005; Angeloni, 2016), but the contributions focusing on it are often vague about the exact nature of the inefficiency DC eliminate or mitigate, with few exceptions. Puhe (2014) advocates for an approach in which the adoption and the characteristics of an e-ticketing scheme for transport (possibly integrating also tourist services) are considered in the context of the interaction of many stakeholders, having (partially) different goals and some of which are in competition with each other. Candela and Figini (2012) propose a model, based on game theory, which may be seen as the perfect illustration of the strategic inefficiency a destination card mitigates. They see tourist destinations as strategic contexts in which the different actors on the supply side of the market end up choosing inefficient price strategies, namely too high prices. Their game predicts that, in the absence of cooperation, prices are so high that revenue is not maximized (given certain hypotheses on costs, profit is neither). Cooperation on a set of lower prices, they argue, is the only solution, as it allows to reach the Cournot point (maximum tourist expenditure) on the demand curve. Though the authors do not mention destination cards as a possible commitment technology, these cards do allow the coordination of all suppliers on a lower set of prices. In fact, the managers of tourist attractions (often of transport companies, too) tie their hands with a credible promise: they sign a contract by which they provide their services to the card holders at a lower price. As this leads to a more competitive consumption bundle, there are more tourist arrivals and nights at the destination and revenues grow.¹ Alvarez-Albelo and Martinez-Gonzalez (2022) add to this conceptual framework by considering also the effects on consumer surplus, and Alvarez-Albelo and Martinez-Gonzalez (2023) by extending it to the relevant case of a destination with a foreign tour operator selling transport and accommodation packages.

Considering the demand side of the market, Zoltan and Masiero (2012) use survey data to detect the most desirable features of a destination card, and confirm that access to attractions and facilities at lower prices is one of them. A recent research on Hong Kong tourists by Leung (2021) confirms that saving money is the main motivation, followed by saving time. Seidl and Schnitzer (2021) ask the users of a leisure card. Their survey, too, confirms the salience of lower prices for users. This is indirect evidence of the fact that lower prices for attractions and transport make a destination more competitive.

Besides being important coordination devices, destination cards are part of marketing strategies themselves. In fact, they can give higher visibility to what a destination can offer. From an economist's perspective, their importance in this respect is due to the fact that tourism, being an experience good, is exchanged on a market with great information asymmetries as to the nature of what is exchanged at the time of the purchasing decision. Many scholarly contributions on destination cards highlight their role as marketing strategies as pre-eminent (Ispas, Constantin and Candrea, 2015; Thirumaran and Eijdenberg, 2021); Buonincontri and Micera (2016) highlight their role in tourist experience co-creation, one of the main goals of destination marketing managers. In these studies, enhancement of tourist loyalty is also often mentioned as a goal (for a general view on how smart tourism technologies may affect loyalty, see Azis, Amin, Chan and Aprilia, 2020).

When a destination card is smart, it also serves a third purpose: that of collecting relevant data on the demand side of the market. This, in turn, is useful in many respects. A peculiarity of the tourist services market is that the behaviors of the actors on the demand side are relevant for the quality of the exchanged good because of consumption externalities (think of congestion phenomena). Collection of information on tourist choices and behaviors is then essential for programming (attraction timetables, public transport capacity etc.). Collection of such data is important also in a long-term perspective, in view of the proposal of new attractions. Finally, it allows better marketing campaigns through tourists' profiling. Not all the literature on destination cards recognizes the data collection function (perhaps also because not all cards analyzed are *smart* cards), but some do. Most of these focus on supply-side oriented analyses of technologies (Egger, 2013; Basili, Liguori and Palumbo, 2014), with little illustration of economic implications, but there are exceptions (Gajdosik, 2019).

Technologies have then enriched the nature and purpose of destination cards, making them an alternative source of information on tourist behaviour with respect to mobile positioning data, other GPS data and geotagged information derived from social media. Since these are often more readily available, their use is more widespread,² yet the various sources should not be seen as substitutes, but as complements, as suggested by the proponents of a pioneering project of the smart destination Åre in Sweden (Kolas et al., 2015). One of the advantages of using SDC data stems from their record of *actual* consumption, which is not always the case with the other types of user-generated data (think of social media pictures of tourists in front of a monument: a visit is not to be given for granted). A second advantage is that they may collect *uniform* relevant information on each individual holder.³

2.2. Empirical contributions using SDC data

In the course of the last years, smart destination cards have witnessed a relatively wide adoption: Euro Test detected 16 in 14 European cities as early as in 2012; Garibaldi (2012) reports 14 in Italy by the same year; Drozdowska, Duda-Seifert and Faron (2018) report 21 in metropolitan areas around the world four years later (including some US cities and Singapore), many of which sharing the same technology. Nevertheless, research on SDC is still in its infancy (Leung, 2021), and the empirical contributions using their data are very few. This is especially strange considering that similar smart devices, such as retail loyalty cards and transport passes, have been the object of more consideration (Chen, Mandler and Mayer-Waarden, 2021; Pelletier, Trepanier and Morency, 2011; Gutierrez, Domenech, Zaragoza and Miravet, 2020). To our knowledge, there are only three empirical papers using SDC data.

Zoltan and McKercher (2015) use data coming from the destination card of Ticino, a Swiss canton. They use cluster analysis, complemented by discriminant analysis, to profile groups of tourists according to their use of the card and see whether demographic variables and place of purchase predict cluster membership.

Scuderi and Dalle Nogare (2018) use Trentino Guest Card data to investigate tourists' preferences. They classify the activities included in the card along the indoors-intellectual engagement/outdoors-physical engagement and leisure dimensions, and test for the presence of high-brow, low-brow and omnivorous preferences. They do this by using advanced clustering techniques (sequence clustering), and find that omnivorousness (love for variety) is most common.

Oliva, Capone, Lazzarretti and Petrucci (2020) consider the data generated by Firenze card, a museum card tailored to the needs of tourist visitors.⁴ They use social network analysis to investigate co-visits patterns in order to understand tourist priorities and analyse tourists' movements within the city.

A possible reason for the small number of empirical papers using SDC data may come from the fact that the features of these data do not always perfectly correspond to those tourism scholars consider as desirable in order to obtain a truthful picture of tourist preferences and behaviours. We argue here that this lack of correspondence is due to the fact that SDC characteristics are devised by their promoters having multiple goals in mind.

3. Desirable features of a smart destination card: a checklist.

As it emerges from the previous literature review, the use of SDC has not been widespread in tourism research despite its potential. In light of the features of the empirical papers making use SDC data, in this and the following sections we present a critical qualitative assessment based on what emerges from those contributions and cited relevant literature. We begin with what we believe are the most relevant requirements for a SDC to generate a dataset suitable for sound research on tourist preferences and behavior:

a) Coverage of the whole of the tourist consumption space

In case some attractions are not included, there may be two undesired consequences. The first is a change in the relative price of included vs not included services, that may bias choices in favor of the former. The second is the lack of data collection for the portion of those attractions that are not included.

b) Inclusion of a sufficiently large number of diverse attractions

SDC are often offered in cities and mainly/only include museum admissions. Research on such a database can only focus on tourists' short itineraries and preferences for the different types of

museum collections. In the fortunate case of a SDC covering larger geographical areas, attractions tend to be more diverse, but it is true that such diversity may characterize a SDC in an urban context, too – think for instance of a city card granting discounts on both museums and purchases at the local shops. The related data allow scholars to investigate more general questions on preferences and behavior. For instance, using data from a SDC covering a mixed large urban/rural area, Scuderi and Dalle Nogare (2018) consider the preferences over the engaging vs leisure activities spectrum and find that tourists love variety.

- c) Neutrality with respect to the choice between all included services, or an associated discounting policy minimizing price distortions
 The most fortunate case for a scholar is to find a SDC by which the card holder is guaranteed the same percentage discount on all attractions (and free public transport). Another interesting case is the one of SDC allowing free admissions to all of them. In the first case, the consumer's problem retains the same opportunity costs one would find if the card had not been introduced. When all prices are zero (or have the same value) the quantities exchanged on the market of each attraction only depend on own demand, and this allows to investigate preferences directly. Noticeably, this feature is not necessarily dependent on the cooperative outcome of the game between the service providers. Think for example of a SDC that comes at a cost and allows admission to all attractions for free or grants the same percentage discount on all of them; nothing prevents the service providers to agree on asymmetric allocations of the card's revenues.⁵
- d) A pricing policy minimizing self-selection due to purchase
 Destination cards come at a cost, and the reduction on admissions they offer are more or less pronounced (from free admissions to small discounts). The price-discount bundle is the outcome of the cooperation game among the service providers involved. Let us concentrate, for simplicity, on the case of a card granting the same discount on all services, whose price determines the size of the revenues of each service provider for every admission. From the point of view of the database the card generates, the higher the card price, the more numerous the visitors who will not buy and use it. This has two undesirable consequences. The first is that the card produces too small a dataset. The second is that too small a price advantage with respect to visiting without the card introduces a strong self-selection bias in the sample. In fact, the dataset produced by the card only covers the subset of the most active tourists (those interested in visiting a large number of attractions), because the higher the number of visits, the more the cost of the card is amortized.
- e) Invariance of the card's characteristics (stability).
 From a scholarly perspective, the longer a SDC project retains its original features, the better it is. In fact, this allows for the generation of a large, homogeneous panel dataset. When the original project changes or evolves, it may alter relevant elements (consumption space, relative prices). In particular, the inclusion of new attractions and/or of new geographical areas makes it necessary to segment the data collected in different time periods or/and regions; otherwise, one would consider the choices of tourists picking from different consumption spaces.
- f) An associated collection of as much information on card holders as possible
 Profiling needs the collection of personal data in order to associate behaviors to market segments. Ideally, both demographic and psychographic data should be collected at emission. If the card is a family/group card, data on each member are desirable.

4. Desirable features of SDC and participation constraints.

DMOs are usually the promoters of the introduction of SDC. DMOs are in charge of devising an incentive-compatible revenue allocation scheme for the attractions included in the card; a price that tourists are willing to pay; the card's technical implementation (which is likely to be outsourced); the identification of distribution channels and the related marketing campaigns.

Scientific investigation of the data collected by a SDC is very interesting for the destination, because it allows focused marketing campaigns, better management of tourists' transits and an intelligent vision informing future investments. However, DMOs' preferences as to the features of SDC may not be fully aligned with those of scholars working on data collected through the card. This is because they must configure the card considering the preferences of both service providers and users, which entails considering also SDCs' functions as cooperation devices and marketing tools.

At one end of a SDC stakeholders' spectrum there are the providers of transport and attraction services. Their preferences with respect to SDC prices must be taken into account; there is a participation constraint to consider. Two SDC features are relevant for them: its price and its revenue-allocation rule. While the latter may be irrelevant for empirical research focusing on the use of the card (as mentioned in c) above), price is not. It is ideal for empirical research when coordination happens at a card price allowing to reach the Cournot point (Candela and Figini, 2012), but in the context of an infinitely repeated game multiple equilibria are possible, many of which entailing a higher price. In other words, it is likely that the cooperation between service providers improves competitiveness, but not to the full, which means a not so high increase of arrivals, hence a small number of card holders. As a side effect, self-selection due to purchase becomes a serious problem, because there is a participation constraint for tourists, too. To our knowledge, there are no contributions highlighting this shortcoming of costly SDC. Alvarez-Albelo and Martinez-Gonzalez (2022) do focus on tourists' participation constraint in analyzing destination cards, but from the different perspective of welfare analysis.⁶

The demand side of the market come into the picture in other ways, too. Seidl and Schnitzer (2021) find that what tourists appreciate are three relevant features: the discount on the prices for attractions and services (cheapness); the inclusion of as many attractions and services as possible; an area where they are offered as vast as possible.⁷ Clearly, these features are the same as d), a) and b) above, so in many respects there is alignment between scholars' and tourists' preferences as to the features of a SDC. However, as far as the personal data requested for obtaining the card are concerned, tourists may be reluctant to give a lot, both because this is time consuming and because they are concerned with their privacy.⁸ Besides, DMOs may want to increase their loyalty (and induce arrivals by newcomers) by innovating the SDC every year: inclusion of new attractions, extension of the covered area... This clashes with scholars' wish of stability of the SDC features (point e) above).

The above considerations highlight that scholars' and DMOs' preferences are not always aligned when it comes to the features of a SDC. Table 1 summarizes the points of convergence/divergence.

Table 1: Desirable characteristics of a SDC according to its different goals.

dimension	goal: collection of data suitable for quantitative analysis	goal: cooperation between service providers	goal: marketing
coverage of attractions	full	full	full
diversity of included attractions	wide	irrelevant	wide
discounts	same for all attractions	it depends on cooperation (some configurations allow same discounts and asymmetric payoffs)	irrelevant if same or not
card price	small	it depends on cooperative equilibrium	small
stability of card features	full	irrelevant	need to innovate and diversify through time (and sometimes space)
recording of personal data	collection of many demographic and psychographic data	irrelevant	light

There is often a trade-off: the features making a SDC a more effective coordination device or marketing tool may limit the usability of the dataset it generates. In this respect, smart destination cards are different, more complicated objects than other options available for the scholar (big data generators such as GPS, social media etc.).

This is not to say that DMOs always sacrifice the quality of the collected data to goals such as cooperation and visibility. Rather, it depends on their farsightedness. We exemplify this type of assessment by analyzing a specific SDC: Trentino Guest Card.

5. Case study: Trentino Guest Card as a big data generator

We now present the case study of Trentino Guest Card, a SDC that tourists receive when they visit Trentino, an Alpine region in the North of Italy. We will make a qualitative assessment of its features compared to those we presented as desirable in section 4.

Trentino's main tourist destinations are the Dolomites, a UNESCO-listed chain of mountains with a unique landscape and cultural background, and part of lake Garda. In the last 15 years also the main town in the region, Trento, has gained tourist fame thanks to the opening of a new science museum (MUSE), the organization of new festivals (festival of Economics) and a Christmas market. The area has two main tourist seasons: winter, when Trentino is mainly a ski destination, and summer, a season in which hikers and bikers mix with tourists with more multi-faceted motivations for a holiday.

Trentino is an autonomous region and all administrative powers with respect to tourism are delegated to the local level of government, who has set up a public company, Trentino Marketing, to design and implement all tourism policies. The region is divided into different tourist districts, each having their own DMO, called APT (Azienda di Promozione Turistica). There are 14 major APTs in Trentino, corresponding to the main tourist districts. APTs are public-private institutions in which (most of) the local tourist entrepreneurs are involved – the share of affiliated hotels, cable car companies etc. is above 90% in all tourist districts. The contribution by local accommodation facilities and other tourist-related service providers to APT budgets varies here and there, but it is often close to 50%.⁹ Trentino Marketing acts as an umbrella DMO with respect to the local APTs as to the promotion of quality standards, tourist product clubs and common marketing strategies both in Italy and abroad.

In summer 2013 Trentino Marketing asked the local APTs to join a project called Trentino Guest Card (TGC). Only a few joined, but the number has constantly increased, and by summer 2021 all local DMOs had joined.¹⁰ Trentino Guest Card started as a summer card, and though now a winter version exists, the core of the project is still the summer version. TGC is a group/family card; in summer 2021 about 90.000 were issued and used.¹¹ The card is a smart one: a Qcode tracks the users' admissions. Originally a physical card, in 2015 the TGC App was launched, and now about 60% of the card users use the Qcode on their phone.¹² The card has a personalized length: it is valid for the whole of a tourist's stay. The distribution is based on accommodation facilities.¹³

Table 2: Reports information on the extent to which TGC satisfies the requirements to be a good big data generator.

Table 2: Assessment of Trentino Guest Card features as big data generator.

Checklist	Trentino Guest Card features	Evaluation of features
% of included attractions	Over 300 attractions included; transport included; food and wine buys included but often not recorded	Coverage: good; recording: improvable
Diversity of attractions	Very diverse attractions included, both in and out of the local tourist district	Good
Discount level for average service consumption	Inclusion in the tourist tax	Excellent
Uniformity of discount level for all included services	Free admission to public transport and most cultural institutions; different discounts at other attractions and private producers of food and wine	Improvable
Stability	Across space: the different tourist districts offer a different consumption set; across time: frequent variation of included attractions and price variation	Improvable
Depth of personal data collection	Date of arrival and departure; no. of adults and children and their age; place of residence; type of accommodation facility issuing the card and tourist district it is located in	Improvable

As far as point a) is concerned, TGC is a good case: in the summer, the number of included attractions is outstanding, and include museums, sports facilities, spas, organized outdoors and tasting experiences, activities targeted to families with children.¹⁴ Not only are the included services very many, but also very diverse (point b)). Public transport is included, too.¹⁵ Unfortunately, the recordings are not always as good, because of occasional lack of compliance in the case of private providers in the retail sector (they grant their discounts at those just showing, not using the card).

It is important to notice that there are services located all over Trentino that are included in all TGC (point b) satisfied), while other services are for free or discounted for the card holder only if she stays in the district where the attraction is located. In fact, Trentino Marketing leaves the possibility for local DMOs to integrate the basic TGC offer with extra local services. This introduces variability across districts as to the covered consumption space, and this is not a nice feature for the data analyst (point e): stability across space), also because it may generate self-selection into the different tourist districts. The fact that the card offers a different set of services according to the season is also a shortcoming (no intra-year stability), but this is perhaps inevitable, given the very different features of a mountain holiday experience in winter and summer.

Perhaps the most innovative aspect of the Trentino Guest Card project is the fact that it is included in the tourist tax,¹⁶ so every tourist (in recent years, every tourist staying at least 2 days) is entitled to have one and pays approximately 1 € a day for it.¹⁷ The project is economically sustainable with very little public contribution.¹⁸ The fact that TGC is paid through the tourist tax, a mandatory (but small) cost for the tourist, eliminates of all concerns regarding self-selection biases in the database it generates (point d)).

The services the card offers are sometimes for free, sometimes come at a discounted price. The discount itself is not always the same: not across types of service and not across tourist districts (the latter case refers, in particular, to cable cars; in some areas these are not even included in the services TGC offers). This is not a very nice feature of TGC from the point of view of the scholar (point c)). Moreover, free admissions and types of discounts have often changed from one year to the next, making it impossible for the scholar to analyze more than one tourist season at a time (no infra-year stability).

Finally, the personal data TGC collects at emission are date of arrival and of departure, number of members of the family/group and their age, country of residence (province of residence for Italian tourists), tourist district and type of accommodation issuing the card. With respect to other SDC, this is not little; however, important personal features, such as the distinction between first-timers and repeat tourists, are absent. TGC has then an intermediate score as far as point f) is concerned.

All in all, TGC scores rather high as a big data generator. This is due especially to two peculiar features: its inclusion of a very vast number of admissions/services; its avoidance of sample selection due to its inclusion in the tourist tax.

6. Conclusions.

Why so little empirical evidence using data generated by smart destination cards, in spite of their wide adoption? We argue that the reason lies in the multi-faceted nature of smart destination cards: they are not just big data generators, but also marketing tools and the outcome of price coordination in a strategic context (that of the service providers). The features of a SDC making it perfect as a marketing strategy or coordination device are not necessarily those generating the best dataset for the investigation of tourists' preferences and behaviours. DMOs, the organisations promoting the adoption of SDC, cannot but configure them by trading off between the different aims.

We exemplify this by looking at a specific SDC, namely Trentino Guest Card. Some of its features correspond to scholarly requirements (inclusion of all attractions; no self-selection bias due to purchase), while some are far from being optimal from a scholar's point of view (intra- and infra-year changes in included attractions; different discounts for the different services). Nevertheless, this card may be considered as a much better big data generator than the many destination cards sold at a rather high price and including only few attractions.

Our critical perspective on SDCs as big data generators is not meant to suggest that all the database they generate are not worth consideration; our point is that their suitability for research purposes may vary a lot from case to case. We invite analysts coming across one of such datasets to go deep in the knowledge of the whole SDC project before working on it. The checklist we propose (section 3) may be useful in this respect. It is meant to discriminate between SDCs likely to produce unbiased evidence

on tourists' preferences, and SDCs that are not because of the presence, in the data they generate, of card holders' self-selection, price distortions produced by the card itself, lack of relevant personal data collected through the card or simply insufficient numerosness of observation units.

As a final note, we would like to highlight the following circumstance. In the last 20 years DMOs have commissioned a lot of impact studies (on events, investment in tourist infrastructure etc.), but apparently, no research on their SDC data – the few scholarly contributions using this type of data were financed by academic institutions. A possible explanation is that their full potential is underestimated by DMO managers. Big data are here already, but the awareness of their relevance is far from being satisfactory, especially in the tourist industry. From a policy perspective, this contribution then also calls for more education for destination managers. It is essential to lead them to a full appreciation of the higher quality of data-driven decision-making. More education would also lead them to configure their SDC taking more into consideration the needs of researchers. This would benefit the very destination, because sound tourism data analysis translates into better tourism management and marketing.

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Notes

- ¹ It is usual that destination cards do not include accommodation and catering services, but this does not mean these two industries are not involved in the coordination process. Rather than committing to lowering their prices, in fact, hotels and restaurants carry extra costs for the technical implementation and advertisement of the card, often through their financial contributions to the local DMO, which is usually the promoter of the card project.
- ² Pioneering contributions using mobile positioning data were De Cantis, Ferrante, Kahani, and Shoval (2016) and Raun, Rein and Margus (2016); Tchetchik, Fleischer & Shoval (2009) used GPS data; geotagged information derived from social media are used by Chua et al. (2016) and Vu, Li, Law and Ye (2015). Vu, Luo, Li and Law (2020) is a more recent study using the data generated by Foursquare, a social network particularly suited for this type of investigations because it is based on users' geolocalisation.
- ³ Hardy et al. (2017) report of more and more contributions combining the use of GPS data (and App-based GPS data) and traditional surveys. This approach tries to overcome the issue of too little personal data collected directly through the smartphones (for privacy reasons). However, such an approach is likely to produce datasets that are possibly small and suffering from both self-selection and untruthful self-representation.
- ⁴ Not all museum cards can be considered tourists cards; many of them target residents, as the length of their validity reveals, and they are often managed by the very museums, not by local DMOs. De Graaf, Boter and Rouwendal (2009) and Bertacchini, Nuccio and Durio (2019) are empirical investigations of such cards.
- ⁵ See Casas-Mendes et al. (2014) for a survey of the game-theoretic literature focusing on the so-called museum pass problem, i.e. the revenue-allocation rules between the service providers satisfying the participation constraint.
- ⁶ These authors conclude that, while SDC always increase a destination's profits as long as it provides access to its attractions at an equal or smaller price, the effect on consumers' surplus depends on the relative share of tourists interested in just one attraction at the destination, because a cheap DC admission is compensated by higher prices for non-card holders. The cheaper the card, the more likely the need of an anti-collusion action. This is in contrast with the view here expressed that cheap cards must be preferred because they mitigate self-selection at purchase. Alvarez-Albelo and Martinez-Gonzalez (2022) claim that the presence of many tourists not buying destination cards is indirect evidence that many do not want to visit more than one attraction, but the survey of Leung (2021) highlights that the main reason why tourists do not buy a DC is that they do not know about it.
- ⁷ Zoltan and Masiero (2012) confirm the relevance of the first two features, and find that the time-saving dimension and customization are not so relevant factors for tourists.
- ⁸ If the SDC distribution relies on the destination's accommodation facilities, the other stakeholders disliking the collection of tourists' personal data are hotel managers, who wish to minimize the administrative burden of their staff.
- ⁹ Trentino Marketing itself is partially funded by contributions by the local DMOs.
- ¹⁰ For more details, see Nascivera and Maccagnan (2020).
- ¹¹ Trentino's 2021 summer arrivals (excluding second homes) were just above 2.1 million (in line with pre-COVID 5-year average value). The vast majority of tourists visiting Trentino in the summer are Italian and they are not on an organized tour.
- ¹² The app is used also to launch surveys.
- ¹³ The survey on tourists in Romania analysed in Ispas *et al.* (2015) reveal that the most appreciated distribution channel for a destination card is based on accommodation units.
- ¹⁴ The average number has been 300 in summer 2021. As made clear in the following paragraph, the number of included services is not the same all over Trentino.
- ¹⁵ Providers are sometimes public institutions (for instance, public museums). All providers are free to join the project or not according to their convenience and/or goals. The increase in admissions after the introduction of the card has been important, and so all service providers have agreed to confirm, year after year, their partnership with TGC. This is indirect evidence that TGC is an effective cooperation device.
- ¹⁶ Trentino's tourist tax is a regional tax; TGC was first introduced on the same year the tax was introduced.
- ¹⁷ The card is not an add-on product in this case, and part of the cost is paid by non-users. This is justified by their enjoyment of non-use values (existence, option values).
- ¹⁸ Public money is only in terms of Trentino Marketing personnel dealing with the general administration of the project and of the payment of the outsourced IT system supporting it. When admission is free, service providers are compensated according to the number of admissions, and the compensation is calculated as full admission times 0.7, but there are ceilings for the most popular museums. This clause was introduced as a way to attract small museums. It was also meant to consider the fact that in larger museums TGC visitors make extra purchases (guided visits, bookshop).

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