Artigo submetido a 28 de Novembro 2021; versão final aceite a 19 de Setembro de 2022
Paper submitted on November 28, 2021; final version accepted on September 19, 2022
DOI: https://doi.org/10.59072/rper.vi65.125

Factors Affecting the Adoption of Destination Management Systems by Stakeholders: Proposal of an Explanatory Model

Fatores que Influenciam a Adoção de Sistemas de Gestão de Destinos pelos Stakeholders: Proposta de um Modelo Explicativo

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Resumo

Apesar do importante papel dos Sistemas de Gestão de Destinos (SGD) na gestão e promoção dos destinos, a investigação sobre os fatores que influenciam a sua adoção é escassa. Este artigo visa analisar empiricamente a influência de uma gama abrangente de fatores na adoção de SGD e propor um modelo. Foi aplicado um inquérito por questionário a agentes de turismo numa região portuguesa (Centro) sem SGD. Os resultados foram subsequentemente analisados utilizando Análises de Componentes Principais e regressões lineares múltiplas. O estudo corrobora os resultados de pesquisas anteriores. Contudo, também revela uma influência positiva dos recursos disponíveis e visão estratégica dos atores do destino sobre a vontade dos intervenientes em adotar SGD e um impacto negativo de plataformas web alternativas e a inexistência de SGD complementares, sobre as intenções de adoção. Com base nos resultados obtidos é proposto o Modelo de Adoção de SGD (DeMSAM).

Palavras-chave: Sistemas de gestão de destino; Modelo de adoção; Stakeholders do destino; Sistemas de informação

Códigos JEL: Z32, M31, O33

Abstract

Despite Destination Management Systems' (DMSs) important role in management and promotion of destinations, the research on factors influencing their adoption is scarce. This paper aims to empirically

analyse the influence of a comprehensive range of factors on DMS adoption and propose a model. A questionnaire survey was applied to tourism players in a Portuguese region (Centro) without DMSs. Results were subsequently analysed using Principal Component Analyses and multiple linear regressions. The study corroborates the findings of previous research. However, it also provides new insights, revealing a positive influence of available resources and strategic vision of stakeholders on the stakeholders' willingness to adopt DMSs and a negative impact of alternative web platforms and inexistence of complementary DMSs, on adoption intentions. Based on the findings, the DMSs' Adoption Model (DeMSAM) is proposed.

Keywords: Destination management systems; Adoption model; Destination stakeholders; Information systems

JEL codes: Z32, M31, O33

1. INTRODUCTION

The advent of the Internet dramatically changed the relationships between firms and customers (Hjalager & Nordin, 2011). Perhaps due to the intangible nature of tourism, the planning and purchase of products was revolutionised by the internet, offering to both the demand and supply a vast array of alternatives to traditional distribution channels (Kotoua & Ilkan, 2017; Neuhofer, Buhalis, & Ladkin, 2014). While favouring disintermediation in some contexts, the Internet simultaneously spurred reintermediation, favouring the emergence of meta-search engines, such as *TripAdvisor* (Barrio, Domecq, & Ballestero, 2017).

Previous research indicates that, as far as the planning and acquisition of online composite products by individual consumers is concerned, the progressively sophisticated demand tends to use websites promoting and selling different kinds of products from various suppliers (Gamper, 2012). This is also true in the case of tourism products, whose complexity and multifaceted nature spurs consumers to search, plan and buy such products on aggregator websites, such as online travel agents (OTAs) (Inversini & Masiero, 2014). In fact, some of the fastest growing web-based companies operating in the tourism industry are OTAs, such as *Expedia* or *Booking* (Carroll & Sileo, 2014).

The OTAs' current global dominance seems to contradict one of the proclaimed major advantages of the Internet towards tourism destinations: the empowerment of small and medium-sized tourism enterprises (SMTEs) to relate directly with potential clients without the need for intermediation (Kracht & Wang, 2010).

In recent years, destinations have been progressively recognising the importance of Information and Communication Technologies (ICTs), which represent vital instruments in creating and maintaining networks between DMOs and destination stakeholders to promote a participated and coordinated attraction of new market segments and the satisfaction of potential visitors' demands (Ali, Cullen, & Toland, 2015; Buhalis & Law, 2008).

Shortly after the advent of the Internet, British and Alpine DMOs began their attempts to create online collaborative networks joining destination-based SMTEs and providing tourists access to a bundle of tourism destination products and several travel arrangement tools (Bethapudi, 2013). Although, in this infancy, there were considerably more failed implementations attempts (Alford & Clarke, 2009; Sussman & Baker, 1996) than those rewarded by success (Bédard & Louillet, 2011; Guthrie, 2011), the DMS era had begun.

Although, according to Sigala (2014), we still do not have a universally accepted definition of a DMS, the author defines it as a collection of computerised facts about a destination, accessible in an interactive way, which usually includes information about the attractions and services of a destination, incorporating the possibility to make reservations and purchases. DMSs differ from traditional DMOs' websites, which are often mere relatively static electronic brochures, because they include (Estêvão, Carneiro, Teixeira, 2020): (i) networks linking the DMOSs' staff members and offices/departments thought an intranet, thus fostering a coherent and timely provision of information to tourists in tourism information offices, as well as the digitisation of processes; (ii) an extranet connecting the destination-based stakeholders, such as attraction managers, suppliers and the DMO, empowering communication and collaboration between them, as well as permitting to participate in the management of their own

contents in the consumer-facing website of the destination; (iii) a website available to all internet users, allowing potential visitors to search, plan and book tourism services of the destination. Some examples of DMSs are the Visit Napa Valley (USA), Visit Britain (Great Britain), Visit Bergen (Norway), which support the booking of accommodation, the planning of tourism activities, the purchase of museum tickets, among other advanced funtions.

According to Buhalis (2003: 282), "DMSs are usually managed by Destination Management Organisations (DMOs), which can be public, private or public-private organisations". Previous research refers to successful cases of DMS implementation at national – e.g. VisitBritain (Guthrie, 2011) -, regional – e.g. QuebecOriginal (Bédard & Louillet, 2011) - and local destination levels – e.g. VisitBath (Inversini, Cantoni, & Di Pietro, 2014). While some earlier definitions suggested that "a DMS is essentially a marketing tool, promoting tourism products in a particular destination, which might be a nation, region, town" (Sussman & Baker, 1996: 102), the most differentiating features of DMSs are the opportunities these systems offer to make transactions, bookings and other commercial activities (Pollock, 1995), thus aiming to bypass external intermediaries, such as traditional tour operators and, more recently, OTAs (e.g. *Booking*, *Expedia*). However, evidence shows that only a handful of DMOs have ever attempted to create a DMS (Horan & Frew, 2007; Wang, 2008).

Since the distinctive functionalities of DMSs require great cooperation among stakeholders at a virtual level, namely concerning sharing and coordination of information (Estêvão et al., 2020), DMSs may provide important contributions to the creation of digital ecosystems that, as argued by Baggio and Del Chiappa (2014) demand strong virtual relationships among stakeholders of the destination. Recent research also suggests a link between DMSs and Smart Destinations (SDs). According to Gretzel, Reino, Kopera and Koo (2015), SDs provide visitors with technologies and connectivity in ways that were not possible before, giving them real-time awareness of destination offerings and helping them to make intelligent decisions. Hence, tourism information systems providing connectivity are of great relevance to enhance the development of SDs (Koo, Ricci, Cobanoglu, & Okumus, 2017). In addition, Gretzel, Sigala, Xiang and Koo (2015) suggest that the key distinctive aspect of SDs is the integration of ICTs into the physical structure of destinations, such as those applied to hotel buildings and transportation in order to make them "smart". Hence, research on SDs started by addressing the technological applications which they were expected to provide to tourists, such as (i) augmented reality enhancing the visitors' experience to attractions; (ii) vehicle tracking systems providing travellers real-time information about traffic or parking; (iii) Information provided through Near Field Communication (NFC) or Quick Response (QR) codes available at points of interest (Buhalis & Amaranganna, 2013). A subsequent set of studies addresses the strategic and relational levels of SDs, which focuses on the destination-based stakeholders rather than on visitors. Thus, the technological tools assisting smart destination governance, sustainability, connectivity between local suppliers, often highlighted the need to successfully adopt open source interorganisational information systems (IOISs), which are shared by different partner organisations, thus fostering networking between them (Boes, Buhalis, & Inversini, 2015; Femenia-Serra, Perles-Ribes, & Ivars-Baidal, 2019). Ivars-Baidal, Celdrán-Bernabeu, Mazón, & Perles-Ivars, 2019 (2019) argue that a DMS is the most suitable type of IOIS assisting these strategic and relational levels of SDs.

Gretzel et al. (2015a) argue that SDs are an evolution from E-Tourism. According to Buhalis (2020), E-tourism emerged in the early 1990s as a consequence of the widespread of the Internet, which allowed tourism organisations to develop their own websites, conveying information and, sometimes, eCommerce tools. From 2005, the advent of social media enabled a two-way communication through Web 2.0 websites, such as *TripAdvisor*, which encouraged users to take part in the editing process of the information they conveyed (Egger & Buhalis, 2011). Smart tourism as well as SDs emerged in the mid-2010s as a result of the growing interconnectivity and interoperability of integrated technologies, such as smartphones, which enabled suppliers, intermediaries, public administrations and consumers to become networked, thus co-producing value for all those interconnected in a given ecosystem (Buhalis & Amaranganna, 2015).

Since DMSs are technological platforms that promote the diffusion of information and knowledge, issues that are considered by Del Chiappa and Baggio (2015) as crucial for the development of digital ecosystems, DMSs may have a critical role in fostering the creation of SDs. Femenia-Serra et al. (2019) suggest that the opportunities offered by SDs give tourists a central place in their relationship with the destination. Also taking a destination management perspective, Ivars-Baidal et al. (2019) argue that SDs

open new horizons with DMSs, where tourists can have access to social media regarding the destination, as well as obtaining real-time information using mobile applications.

It would, however, be inappropriate to consider that SDs, although being a newer and distinct step in the evolution of ICTs in tourism, should dismiss any research carried out on previous E-Tourism tools, such as DMSs. Although not referring specifically to DMSs, in the research work that seems to have coined the expression, "Smart Tourism Destination", Buhalis and Amaranggana (2013: 557) suggest that "bringing smartness to tourism destinations requires dynamically interconnecting stakeholders through a technological platform on which information to tourism activities could be changed instantly", which is consistent with the types of roles often attributed to DMSs and highlights the relevance of these systems.

Most studies on DMSs are conceptual or analyse their post-adoption benefits to destinations (Baggio, 2011; Bédard & Louillet, 2011; Buhalis & Spada, 2000; Pollock, 1995). Only few researchers have analysed the factors that may foster or rather inhibit the adoption of DMSs (e.g., Estêvão, Carneiro, & Teixeira, 2020a; Sigala, 2013) and even fewer (Sigala, 2013) attempt to explain DMS adoption through empirical approaches. Despite the relevance of Sigala's (2013) study undertaken in Greece, it does not specifically analyse the willingness of DMSs' stakeholders to adopt these systems, a fact that needs to be addressed considering the efforts needed to implement and successfully use them. Moreover, it also does not consider some factors that may influence the adoption of DMSs, namely, the existence of complementary web platforms and competing technological solutions, such as the OTAs. As suggested by Werthner et al. (2015), it is necessary to further study the competition between electronic players.

This paper aims to fill these gaps in the literature by empirically analysing the willingness of DMSs' stakeholders to adopt DMSs, as well as identifying factors that may influence this adoption, including the technological perspective regarding the existence of complementary and alternative solutions to such systems. A final aim is to propose, based on findings, a DMSs' Adoption Model (DeMSAM). To achieve this aim, a questionnaire survey was applied to several stakeholders of the Portuguese Centro region - managers of tourism attractions, tourism accommodation businesses and city councils. The survey aimed at understanding their willingness to adopt a DMS of the Centro region and at grasping their perceptions on (i) a wide range of factors influencing the adoption of a DMS and (ii) the most suitable funding and management model for that a DMS of the Centro region. The influence of factors on the willingness to adopt a DMS of the Centro region was assessed using a multiple linear regression model.

Regarding its structure, the present work begins by exploring the existing research on the factors affecting DMS adoption. The context of study and the methods adopted are subsequently addressed, followed by the analysis and discussions of the findings, which culminate with the proposal of a model - the DeMSAM. Finally, conclusions, as well as theoretical and practical implications, are presented.

2. LITERATURE REVIEW: FACTORS INFLUENCING DMS ADOPTION

The literature on DMSs and IOISs identifies several factors influencing DMS implementation and adoption, namely: (i) organisational factors (Mistilis & Daniele, 2005; Ndou & Petti, 2007; Petti & Solazzo, 2007; Sigala, 2013; Sigala, 2014; Wang, 2008); (ii) tourism relevance of the destination (Buhalis & Law, 2008; Zehrer, Pechlaner, & Hölzl, 2005); (iii) pressure from the external environment (Alford & Clarke, 2009; Brown, 2004; Horan & Frew, 2007; Sigala, 2013); (iv) perceived benefits and costs concerning DMS adoption (Mistilis & Daniele, 2005; Wang, 2008); and (v) constraints related to technology and respective business models (Guthrie, 2011; Kärcher & Alford, 2011).

2.1 Organisational factors

To be successful, DMSs depend on the capacity of DMOs to implement and manage this type of system. Previous research indicates that the management practices of a DMO is one of the most decisive determinants of DMS adoption by destination players (Sigala, 2013). However, there is a considerable variety of DMOs in terms of their expected role and capabilities (Pechlaner, Zacher, Eckert, & Petersik, 2019). Thus, certain DMOs may lack the necessary strategic vision or resources (financial and/or human) to implement an open source IOIS, such as a DMS, that is both more complex to implement and manage than a typical destination website (Ndou & petti, 2007).

Since DMOs are often the initiators of the DMS adoption process, their levels of strategic vision, as well as their expertise and leadership skills, are likely to determine their willingness and capacity to adopt such systems (Bédard, Louillet, Verner, & Joly, 2008). According to Sautter and Leisen (1999), destination competitiveness heavily relies on the ability of DMOs to coordinate stakeholders and to encourage cooperation amongst them, which is crucial in the implementation of DMSs. To effectively foster cooperation, a DMO must inspire internal credibility, trust and reputation (Boksberger, Anderegg, & Schuckert, 2011). Spyriadis, Buhalis, and Fyall (2011) identified the potential benefits of DMSs in facilitating the internal management of DMOs, as well as the coordination of local suppliers. However, as suggested by Ndou and Petti (2007), a pre-existent high level of DMO leadership and internal coordination are prerequisites for successful DMS adoption processes.

Moreover, the public nature of most DMOs alone often instils in destination-based stakeholders the perception that they are too bureaucratic, inefficient and, as a result, untrustworthy, even when this is not the case (Sigala & Marinidis, 2010). The fact that tourism businesses hold such views often discredits any DMO's initiatives in the eyes of the stakeholders, including the adoption of a DMS (Frew & O'Connor, 1999).

DMOs may have different models of ownership and management, which vary according to the tradition of public participation of individuals and organisations, as well as to the socio-economic importance of the tourism sector (Hall, 2008). Hence, in some cases, DMOs may be totally integrated in the public sector, in others they are a completely private affair with no state participation, while still others assume the form of a consortium between public and private entities that jointly own and manage the DMO (Presenza, Sheehan, & Ritchie, 2005). This variety of DMO models is reflected in the role they are expected to play and in the technologies they adopt. In addition, the perceived role of DMOs is changing alongside the evolution of the "destination" concept itself, which evolved from being the mere destination of a journey to become a territorial and conceptual "umbrella" beneath which coherent and complementary products are offered to carefully targeted visitors (Volgger & Pechlaner, 2014). Hence, the focus regarding the role of DMOs has moved from the promotion of existing attractions to network management aimed at coordinating the whole value chain of a given territory (Sheehan, Vargas-Sánchez, Presenza, & Abbate, 2016).

Some authors suggest that DMOs should implement destination management techniques and models like those used in private corporations (Beritelli, Bieger, & Laesser, 2007). Such enlargement of DMOs' roles led some of them to believe they would be able to assist SMTEs, not only in promoting their offerings but also in marketing them without depending so heavily on external intermediaries (Buhalis, 2003). However, this commercial role that some DMOs have assumed is far from consensual, often being criticised as protectionist and an illegitimate interference in the private sector market (Lexhagen, Eriksson, Olausson, & Fuchs, 2014). Moreover, DMOs are often considered inappropriate in terms of managing transactions due to their complexity and the human and technical resources they require (Werthner & Ricci, 2004), as well as due to the growing dominance of OTAs (Werthner et al., 2015).

DMSs are primarily aimed at assisting smaller tourism firms improve their competitiveness, either by providing greater visibility or by giving them advantageous distribution channels (Horan & Frew, 2007). However, the scarce technological assets and managerial skills often inherent to smaller firms in general (Chwelos, Benbasat, & Dexter, 2001), and in the tourism sector in particular (Egger & Buhalis, 2011), may explain the lack of adhesion of destination-based stakeholders to DMS adoption and, ultimately, the high rates of unsuccessful DMS implementation (Alford & Clarke, 2009). Thus, one of the most frequently referenced barriers to DMS implementation is the poor organisational ability of SMTEs to adopt them, due to lack of funds, skilled human resources to operate the platform (Buhalis, 2003), or cultural and strategic vision compatible with DMS adoption (Ndou & Petti, 2007). Moreover, an organisation may not adopt a DMS for lack of resources, or due to the perception that other organisations of the same destination miss the required resources.

As previously mentioned, DMSs differ from traditional destination online platforms because they provide stakeholders with a network linking them to a DMO and to each other, thus fostering their communication and collaboration. However, as suggested by Ndou and Petti (2007), it is not plausible to think that a DMS would thrive in fragmented destinations in which there is no leadership from a DMO, alongside a low degree of collaboration amongst stakeholders. Hence, to be viable, DMSs require a pre-existent culture of collaboration amongst tourism players, which the DMS would help to improve (Petti & Solazzo, 2007). Trunfio and Campana (2019) further suggest that the adoption of technological

innovations by destination stakeholders often requires major social innovations, which can originate new scenarios in which unusual relationships amongst destination actors may question the typical top-down process, thus creating new patterns of relations. Previous research indicates that the mere implementation of a DMS does not automatically promote knowledge creation and collaboration amongst organisations (Gretzel & Fesenmaier, 2003). It is, rather, the social capital gained from a collaborative culture that is enhanced by a DMS (Gretzel & Fesenmaier, 2003; Ndou & Petti, 2007).

2.2 Tourism relevance of the destination

Tourism boards, particularly at local and regional levels, still tend to prioritise activities aiming to promote the destination in source markets, as well as provide information to current visitors (Van der Zee, Gerrets, & Vanneste, 2017). In destinations where tourism plays a vital role to communities' welfare, tourism boards tend to coordinate the management of all elements of the destination (attractions, access, marketing and pricing), thus becoming DMOs (WTO, 2007). For only a minority of DMOs, the relevance of the tourism sector justified the adoption of DMSs aiming to optimise internal coordination and to attract more sophisticated demand segments (Zehrer et al., 2005). The greater the number of tourism suppliers, the greater is the need to coordinate them (Buhalis & Law, 2008). Thus, it seems reasonable to assume that the relevance of tourism to a certain community is likely to influence the adoption of a DMS by its DMO.

2.3 Pressure from the external environment

Only a handful of studies (e.g. Bédard et al., 2008; Sigala, 2013; Sigala, 2014) have discussed or empirically tested the influence of the pressure from the external environment on DMS adoption. However, in literature addressing IOISs, this type of factor was often found to have a significant influence on adoption (Chwelos et al., 2001; Iacovou et al., 1995).

Sometimes organisations are likely to adopt a DMS due to the social influence of competing organisations. Recognising the benefits that competitors obtain from the adoption of a specific technology, some organisations become more open to also adopting that technology (Alford & Clarke, 2009; Buhalis, 2003; Sigala, 2013). Despite being one of the major sectors in the global economy (Edgell, 2016), the players of the tourism sector are predominantly SMTEs, with relatively low levels of managerial skills (Alford & Clarke, 2009). Previous research suggests that although competition can be intense in the context of regional or national destinations and major players (e.g. airlines, hotel chains, OTAs), the relatively low levels of competition amongst the stakeholders for which DMSs primarily cater (SMTEs) may sometimes be a constraining factor in their adoption (Alford & Clarke, 2009; Sigala, 2013).

The literature reveals that some stakeholders are likely to adopt a DMS to decrease their dependence on intermediaries and inherent costs (Bédard & Louillet, 2011; Buhalis, 2003). Hence, the adoption of Gulliver, the Irish national DMS, was seen as competition by the tour operators, who threatened to boycott sales of package tours to Ireland (Keany, 2011). However, as suggested by Werthner et al. (2015), the latest developments regarding ICTs in tourism indicate a scenario where platforms of OTAs may become alternative technological solutions to DMSs, which discourage stakeholders from adopting them.

To become successful, the Business-to-Consumer (B2C) portal of a DMS must be widely used by potential visitors, namely, to plan their travels and book tourism services (Buhalis, 2003). The tendency of prospective visitors to use integrated online platforms enabling them to search for information, plan tourism experiences and purchase specific products seems likely to influence organisations to adopt solutions as DMSs (Brown, 2004). However, in some destinations, the traditional predominance of demand segments which tend to plan and book their travels through traditional intermediaries such as tour operators, has been pointed out as an obstacle to DMS adoption by stakeholders (Buhalis, 2003).

2.4 Perceived benefits and costs of DMSs

Most DMSs demand stakeholders who adopt these systems, to participate in their funding in various ways, such as through commissions on bookings done in the DMS or by asking for higher fees in exchange for additional exposure on the front-end website (Bédard & Louillet, 2011; Guthrie, 2011).

Iacovou et al.'s (1995) model, which identifies factors influencing the successful adoption of IOISs, suggests that the perceptions of potential users about adoption costs and benefits have an influence on the decisions to adopt these systems. Some acceptance models, such as the TAM (Technology Acceptance Model), which encompasses the factors which influence the adoption of technologies by individuals and organisations, reveal that perceived usefulness has a strong impact on the adoption of technologies (Davis, 1989). The main benefits of DMSs are strategic and encompass, for instance, gradually achieving autonomy from external intermediaries, fostering collaboration amongst stakeholders, improving the portfolio of destination offerings or attracting a more sophisticated demand (Ivars-Baidal et al., 2019). The lack of strategic orientation by SMTEs, often too absorbed in their daily tasks and by the need for immediate profit, may represent a barrier to DMS adoption (Egger & Buhalis, 2011). In addition, the growing relevance of major OTAs to small tourism businesses (e.g. *Booking*) may move them away from adopting other types of systems, such as DMSs, due to recognising less benefits from such systems (Hwang and Lockwood, 2006).

2.5 Constraints related to technology and respective business models

When addressing the successful implementation of DMSs, Guthrie (2011) suggests that the success of the Visit Britain DMS was heavily determined by its integration at national, regional, sub-regional and local levels. The author suggests that the British official national front-end website gives visibility to smaller local and regional destination platforms, which are integrated in the Visit Britain system, and, at the same time, fosters coherent contents and functionalities. Hence, it seems plausible to consider that the absence of a DMS at the national level or in other neighbouring regions might jeopardise attempts to adopt regional and non-integrated DMSs.

Another constraint to DMS development, suggested by Werthner et al. (2015), is the advent of other types of platforms, which enjoy higher global visibility and economic strength, including search, planning and booking functionalities. These authors suggest that, especially when it comes to transactional functionalities, DMSs must reinvent themselves in order to avoid redundancy.

Since most DMSs are totally or partly funded by the public sector, criticism regarding their unfair competition with private initiatives, aiming to assist tourists in planning and purchasing tourism products online (e.g., *Booking*, *Expedia*), has often arisen since the early days of these systems (Sussmann & Baker, 1996).

3. CONTEXT OF THE STUDY AND METHODS OF THE EMPIRICAL STUDY

3.1. Context of the study

The empirical study was developed in a Portuguese region—the NUT II Centro—due to its great diversity regarding tourism destinations. With a total area of 28,199 km^2 (31% of the Portuguese territory), this region is the second largest of the seven Portuguese NUTs II (Instituto Nacional de Estatística, 2018). Extending from the western seacoast to its mountain ranges with isolated rural communities in the east, this region offers a considerable diversity of communities and landscapes, which is reflected in the variety of tourism destinations and tourism products. Nonetheless, its tourism activity indicators suggest that the Centro region is still an emergent destination which is still not consolidated (Mira, Mónico, Breda, & Moura, 2020).

Despite the traditional centralism of the political power and of its institutions in Lisbon (Maia & Costa, 2019), all Portuguese NUTS II have public regional DMOs—the Regional Tourism Entities — as well as public-private consortia specifically mandated by the central government to promote the region abroad, designated as Regional Tourism Promotion Agencies. The latter entity takes the form of an association composed of both public administrations and affiliated private members, which are mostly tourism businesses. Both entities have developed their own official destination portals, which are a long way from being considered similar to a DMS, due to their predominantly informative nature.

3.2. Data collection methods

The present study aimed to identify the factors that influence the willingness of stakeholders of tourism destinations, namely tourism service providers, to adopt DMSs. In order to ensure some variety amongst the service providers included in the sample, it seemed adequate to carry out a questionnaire

survey amongst stakeholders who represent three destination supply components proposed by Cooper, Fletcher, Wanhill, Gilbert, and Fyall (2008), namely, attractions, amenities and ancillary services. Therefore, questionnaires were given to representatives of tourism attractions, tourism accommodation and city councils, who had the authority to decide on the adoption of ICT platforms.

The questionnaire encompasses questions regarding the following features: (i) factors that may influence the adoption of a DMS; (ii) the hypothetical implementation of a future DMS in the region and intentions to adopt it, as well as preferred DMS funding and management models; and (iii) characteristics of the surveyed entity, including its current use of Internet for marketing purposes.

Before asking questions about DMSs to respondents, the concept of DMS was briefly explained. Respondents were then asked to indicate to which extent they agreed that a set of twenty-five factors identified based on the literature, influenced the DMS adoption: organisational factors, the tourism relevance of the destination, pressure from the external environment, and constraints related to technology and respective business models. Respondents were also requested to state whether they agreed with nine statements concerning their perceptions on the costs and benefits of DMSs, other factors that may affect DMS adoption. This last question was designed to help understand how useful the respondents perceived the DMSs to be. All the factors that may influence DMS adoption included in the questionnaire were identified in the literature review of the present paper. In all the questions, the respondents had to report their level of agreement using a Likert-type scale from 1 "completely disagree" to 7 "completely agree".

The questionnaire also included questions on the hypothetical implementation of a future DMS in the region and, specifically, on any intentions to adopt it, as well as on preferred types of funding and management models. One question, for example, asked whether the destination *Centro de Portugal* (Centre of Portugal) should implement an official DMS and if the respondent's own organisation would adopt the official DMS of such a destination. Again, agreement had to be expressed in terms of the scale mentioned above.

It was necessary to slightly adapt the questions concerning the characterisation of the respondents to each of the three types of organisations interviewed. Thus, while the accommodation businesses were asked to mention the number of rooms and categories, attraction managers, for example, had to indicate the kind of tourist features they managed.

Different methods were adopted to identify potential respondents within the three kinds of destination organisations. As far as ancillary services were concerned, the one-hundred city councils managing the one-hundred municipalities of the region were contacted. These are the region's main players providing ancillary services such as tourism information offices, tourism-related signage, and destination promotion, amongst others. Respondents were asked to answer the questionnaire considering the city council's role as a planning and coordinating entity.

Regarding attractions, organisations managing them in the region, were asked to participate in the study. It was considered appropriate to interview players belonging to the categories of attractions proposed in the International Recommendations for Tourism Statistics (WTO 2008) —"cultural activities" and "sports and recreation activities"—and to another category added by the authors—"natural resources". Due to the difficulty in identifying the managers of all tourism attractions in the Centre Region, a snowball sampling technique was adopted and respondents contacted by the researchers were asked to indicate other managers of tourism attractions. If a city council was identified as one entity managing tourism attractions, it received another questionnaire and was asked to respond considering its role as the manager of such attractions.

Tourism accommodation was selected to represent the amenity component. Two specific types of accommodation were considered in this study, namely, hotels and rural tourism businesses located in the Centre Region. They were identified based on the online National Tourism Registry of the Portuguese national DMO (*Turismo de Portugal*) (Turismo de Portugal, 2018). All the 607 hotels and rural tourism businesses located in the Centre Region were asked to participate in the study.

The questionnaire was administered online during four months, from April to August 2018. After identifying potential respondents, the authors contacted them via telephone, briefly explaining the scope of the study and asking for their participation. Afterwards, the authors sent an e-mail with the link to the questionnaire to all contacted stakeholders who had shown interest in participating in the survey.

3.3. Data analysis methods

Two exploratory factor analyses, specifically two Principal Component Analyses (PCA), were carried out. The first was specifically designed to identify factors that may influence the adoption of a DMS in the following areas: organisational factors, the tourism relevance of the destination, pressure from the

external environment, and constraints related to technology and respective business models. The aim of the other PCA was to confirm that the scale of the perceived usefulness of DMSs was unidimensional, given that this construct has been considered in several studies on the technological platforms' field as a unidimensional construct. Next, two multiple regression analyses were done in order to understand how the factors that emerged from the two PCAs influenced the willingness to adopt DMSs.

4. ANALYSIS AND DISCUSSION OF RESULTS

4.1. Characteristics of the sample and intentions to adopt DMSs

A total of 326 completed questionnaires were obtained (93 from representatives of tourism accommodation, 100 from representatives of city councils, and 133 from managers of tourism attractions) (Table 1). In the case of tourism accommodation, 63 respondents were hotel managers, with a predominance of hotel managers of 4-star and 3-star hotels (60) as well as of independent hotels (i.e. not integrated in hotel groups or chains) (43), while 30 respondents were owners of rural tourism units. Regarding tourism attraction managers, there was a prevalence of respondents from the public sector, and in charge of cultural heritage assets (103) or of sites of natural interest (80), with some respondents managing different types of attractions.

Table 1 - Characterisation of the organisations that the respondents are representing

	N
Tourism accommodation	93
Type of tourism accommodation	
5-star hotels	3
4-star hotels	28
3-star hotels	32
Rural tourism units	30
City councils	100
Tourism attractions	133
Ownership of tourism attractions	
Private sector	19
Public sector	112
Associations	2
Types of tourism attractions	
Cultural heritage assets	103
Sites of natural interest	80
Other types of attractions (e.g. recreational or sports facilities)	60

Respondents, overall, agreed that the Centre Region should implement a DMS (5.39 on a Likert-type scale from 1 "completely disagree" to 7 "completely agree") and that their own organisation should adopt a DMS, although the level of agreement in this latter case was slightly lower (5.06 on the same scale).

Regarding opinions about the ownership and management of a possible DMS in the Centre Region, a consortium between the Regional Tourism Entity of Centro (RTEC) and the Regional Tourism Promotion Agency of Centro (RTPAC) had the broadest consensus (66.3%) (Table 2). Scenarios in which the only owners and managers were the RTEC (26.3%) or the RTPAC (7.4%) were clearly less desirable.

The question concerning the best financing model for a hypothetical DMS of the Centre Region allowed respondents to choose more than one option. The respondents' preferred funding modality was an additional monthly fee/annuity to be paid by organisations wishing to be included in the system (54.9%), followed by the option of the commissioning of DMS sales of tourism products (52.5%) (Table 2). It seems clear that the respondents preferred funding models that were limited to stakeholders who benefitted directly from DMS functionalities, rather than to a widespread funding of a DMS across the entire destination.

Previous research suggests that tourism websites presenting updated and detailed information to potential visitors are more likely to be revisited and to generate transactions (Wu and Chang, 2005). The question referring to the responsibility of updating and managing the contents of a DMS also allowed respondents to choose more than one option. The results suggest that the preferred modality would be a

combination of two response options, namely, content updating by the company supplying a particular product in the DMS (73.9%) and by the Centre Region DMO (70.6%) (Table 2). Only 8 respondents (2%) considered that local public administrations should also be included in the process of managing and updating the contents of a regional DMS.

Table 2 - Preferences on ownership, management and business model of a hypothetical DMS in the Centro Region

	N	%
Ownership and management of a hypothetical DMS in the Centro Region		
Regional Tourism Entity of Centro (RTEC)	86	26.3
Regional Tourism Promotion Agency of Centro (RTPAC)	24	7.4
RTEC and RTPAC	216	66.3
Best financing model for a hypothetical DMS of the Centro Region		
Additional monthly fee/annuity to be paid by organisations wishing to be included in the system	179	54.9
Commissioning of DMS sales of tourism products	171	52.5
Tuition/annuities paid by all members of the system promoter	106	32.5
Tuition/annuities paid by RTPAC members	50	15.3
Responsibility of updating and managing the contents of a hypothetical DMS of the Centro Region		
Content updating by the company supplying a particular product in the DMS	241	73.9
Content updating by the Centre Region DMO	230	70.6
Local public administrations should also be included in the process of managing and updating contents of a regional DMS	8	2.5

4.2. Factors that may influence the willingness to adopt DMSs

In order to determine the factors that may influence the intention to adopt a DMS, first a PCA with a Varimax rotation was undertaken on a set of items concerning organisational factors, the tourism relevance of the destination, pressure from the external environment, as well as constraints related to technology and respective business models. Several variables were excluded from the factor analysis due to having a low communality. A total of five factors emerged from the PCA, namely (Table 3):

- Factor 1: Destination readiness and favourable conditions for DMS adoption. This factor encompasses the perception of several aspects of the destination that may act as facilitators of DMS adoption. They include the counterparts' willingness to integrate DMSs (including their likelihood to cooperate), the suitability of adopting DMSs based on the importance of the destination and its tourism sector, and the DMOs' ability to adopt such systems.
- Factor 2: Pressure from the external environment. This factor comprises items representing the willingness to adopt DMSs in order to decrease certain kinds of pressure, such as from traditional intermediaries, from competing destinations and from demand.
- Factor 3: Resources and strategic vision of the respondents' own organisations. This factor includes the respondents' perceptions about their own organisations concerning culture and strategic vision, as well as the resources needed to integrate a DMS.
- Factor 4: Constraints related to technology and respective business models, as well as the DMO's unfavourable role. This factor encompasses features that may have a negative influence on the adoption of DMSs, related to either complementary (e.g. a national DMS) or alternative web platforms (e.g. *Booking*, *Expedia*), and to a perceived unfavourable role of the DMO, often due to the bureaucratic nature of public DMOs.
- Factor 5: Lack of resources and cooperation of other organisations of the destination. This factor is related to constraints posed by other organisations in the destination, such as an unwillingness to share data and the lack of enough resources to successfully integrate a DMS.

Table 3 - Factors regarding organisational factors, the tourism relevance of the destination, pressure from the external environment, as well as constraints related to technology and respective business models - Results of a PCA (with Varimax rotation)

	Com.	Mean	Factor 1: Destination readiness and favourable conditions for DMSs' adoption (DREFC)	Factor 2: Pressure from the external environment (PEE)	Factor 3: Resources and strategic vision of the respondents' own organisation (RSVOO)	Factor 4: Constraints related to technology and respective business models, as well as the DMO's unfavourable role (CTBMDUR)	Factor 5: Lack of resources and cooperation of other organisations of the destination (LRCOO)
Collaboration levels between destination-based stakeholders favour DMS adoption	0.652	4.6	**0.790**				
Players of the destination would adopt a DMS	0.663	4.7	**0.757**				
Other destination players' willingness to pay commissions for sales made through the DMS	0.535	4.2	**0.718**				
DMO's ability to lead and coordinate the implementation of a DMS	0.670	4.5	**0.691**		0.308		
Adequacy of adopting a DMS given the territorial size of the destination	0.775	5.5	**0.665**	0.314		-0.423	
Adequacy of adopting a DMS given the relevance of the tourism sector	0.769	5.5	**0.641**	0.333		-0.425	
Appropriateness of enlarging the DMO's functions to include the implementation of a DMS	0.616	5.3	**0.631**	0.340			
Enough human resources and knowledge to manage a DMS in regional tourism organisations	0.610	4.3	**0.578**		0.371		
Ability of the DMS to decrease the power of tour operators and of other intermediaries	0.748	4.0		**0.788**			
Competitive pressure of other destinations	0.799	4.2		**0.787**	0.323		
Willingness to adopt a DMS if other destination-based players would	0.592	3.9		**0.719**			
Pressure exerted by tourism demand to adopt a DMS	0.523	3.3	0.300	**0.599**			
Own organisation has financial resources required to adopt a DMS	0.860	3.6			**0.890**		
Own organisation has adequate technological resources required to adopt a DMS	0.763	3.8			**0.839**		
Own organisation has adequate human resources required to adopt a DMS	0.688	3.4			**0.775**		
Own organisation has culture and strategic vision compatible to DMS adoption	0.628	4.8		0.424	**0.590**		
The absence of a national or regional DMS would jeopardize any attempt to adopt a regional DMS	0.605	3.6				**0.722**	
Existence of online tourism platforms that make DMSs unnecessary	0.694	3.2		-0.407		**0.705**	
A publicly funded DMS would be unacceptable	0.581	3.3		-0.449		**0.605**	
The bureaucratic and inefficient nature of the public sector would jeopardize DMS adoption	0.520	4.5			-0.361	**0.549**	
Uwillingness of other players of the destination to share data related to their operations (e.g. available rooms)	0.785	4.1					**0.854**
Fear of other players of the destination to adhere to a DMS due to penalties imposed by intermediaries	0.743	4.1				0.322	**0.790**
Insufficient resources of other players to manage a DMS	0.552	4.5					**0.724**
Eigenvalues			4.229	3.391	3.239	2.393	2.120
Variance explained (%)			18.386	14.742	14.081	10.406	9.218
Cumulative variance explained (%)			18.386	33.128	47.209	57.615	66.833
Cronbach's alpha			0.891	0.855	0.873	0.676	0.752

Note: Only factors loadings with absolute values >= 0.3 are presented in the matrix. Values in bold represent factor loadings >= 0.5. Com - Communalities.

KMO = 0.846; Bartlett's Test of Sphericity = 4743.228 (p = 0.000). N=326.

The factor analysis proved to be of good quality since it had a KMO = 0.846 (higher than the 0.7 required), the *p*-value of the Bartlett's test was <0.05, while all the communities were higher than 0.5, and all the items had a factor loading higher than 0.5 in one of the factors identified. In addition, the cumulative variance explained was 66.833%, which was higher than the 60% required (Hair, Black, Babin, & Anderson, 2010). Furthermore, all the factors identified had a Cronbach's alpha higher than the 0.7 required, except factor 4, which had a Cronbach's alpha of 0.676. However, as stated by Hair et al. (2010), this value is acceptable since this is an exploratory study.

Another PCA was done to confirm the unidimensional character of a set of nine items adopted to measure the usefulness of a DMS. The unidimensional character of this scale was confirmed, since only one factor emerged, the set of items had a Cronbach's alpha of 0.948, the communalities and factor loadings of all the items were > 0.5, the cumulative variance explained was 71.654%, the KMO was 0.898 and the *p*-value of the Bartlett's test of sphericity was < 0.05 (Table 4).

Table 4 - Perceived usefulness of a DMS - Results of a PCA

	Com.	Mean	Factor loadings
Improve the quality of the services	0.607	4.5	0.897
Diversify rendered services	0.679	4.6	0.893
Enhance the attractiveness of the promotion of services	0.700	5.5	0.892
Improve the organization's performance	0.773	5.0	0.879
Facilitate customers' feedback on rendered services	0.797	5.2	0.843
Maximize visibility / presence in source markets	0.710	5.6	0.837
Reduce costs	0.583	4.4	0.824
Develop a closer and more regular communication/relationship with the DMO	0.796	5.1	0.779
Develop a closer and more regular communication/relationship with other destination stakeholders	0.804	5.2	0.764
		Eigenvalues	6.449
Note:		Variance explained (%)	71.654
Only factors loadings with absolute values >= 0.3 are presented in the matrix.		Cumulative variance explained (%)	71.654
Values in bold represent factor loadings >= 0.5. Com - Communalities.		Cronbach's alpha	0.948
KMO = 0.898; Bartlett's test of sphericity = 3032.107 (p = 0.000). N=326.			

Concerning all the factors that may influence the adoption of a DMS, and specifically, the means presented in tables 3 and 4, respondents do not perceive a strong pressure from the external environment to adopt DMSs but find them useful tools. Furthermore, they recognise that their own organisations lack some resources (human, financial and technological) to adopt a DMS, and consider that other players of the tourism destination do not have a high willingness to adopt this kind of systems, neither to pay a commission or cooperate to adopt them (Table 3). The destination and the DMO have some appropriate conditions to the implementation of the DMS although, in the opinion of respondents, the DMO may have some difficulties in coordinating the implementation of a DMS.

Two stepwise multivariate regression analyses were carried out to analyse the influence of the factors emerging from the two previous PCAs on the adoption of DMSs. The first was designed to examine the impact of the factors on the perceived importance of the Centre of Portugal destination adopting a DMS. The second aimed to analyse the impact of the same factors on the willingness of the respondents' own organisations to adopt a DMS (see equation 1). Each factor that emerged from a PCA was included in the regression analysis as an independent variable that corresponded to the average of the set of items represented by that factor.

$$\text{(Eq. 1)} \quad AD_{ij} = \alpha + \beta_1 DREFC_i + \beta_2 PEE_i + \beta_3 RSVOO_i + \beta_4 CTBMDUR_i + \beta_5 LRCOO_i + \beta_6 PU_i + \varepsilon_i$$

Note:

Dependent variables

AD – Adoption of a DMS

i = 1… n – Number of organisations that answered the questionnaire

j = 1… 2 – Adoption of a DMS by different organisations (1 = Perceived importance of the Centre of Portugal destination adopting a DMS, 2 = Willingness of the respondent's own organisation to adopt a DMS)

Independent variables

Factors concerning the respondent's own organisation, the destination and the external environment that may affect the adoption of a DMS

DREFC – Destination readiness and favourable conditions for DMSs' adoption (mean);

PEE – Pressure from the external environment (mean);

RSVOO – Resources and strategic vision of the respondent's own organisation (mean);

CTBMDUR – Constraints related to technology and respective business models, as well as the DMO's unfavourable role (mean);

LRCOO – Lack of resources and cooperation of other organisations of the destination (mean);

PU – Perceived usefulness of a DMS (mean).

All the assumptions of the regression analyses, including those related to normality, homoscedasticity and independence of errors, as well as multicollinearity, were tested and all of them were met. The results of the first regression analysis reveal that four factors considered in the regression analysis as independent variables have a high power in explaining the perceived importance of the Centre of Portugal destination adopting a DMS ($R^2 = 0.603$) (Table 5). The factor with the highest impact on the perceived importance of the destination adopting a DMS is the perceived usefulness of DMSs (PU), followed by the readiness and favourable conditions that the destination presents for DMS adoption (DREFC), and by pressure from the external environment (PEE). All these features have a positive impact on the adoption of DMSs. Thus, the findings highlight that the more usefulness respondents recognise in a DMS, the more favourable are the conditions existing in the destination—such as DMO ability to adopt a DMS, the willingness of other organisations to integrate a DMS, the high tourism relevance of the destination—and the higher the pressure from the external environment (from intermediaries, competing destinations and demand), the more the respondents consider that the destination where they are located should adopt a DMS.

Table 5 - Factors influencing the perceived importance of the Centre of Portugal destination adopting a DMS - Results of a regression analysis

	Unstandardized coefficients		Standardized coefficients	t	*p*	Collinearity statistics	
	B	Std. Error	Beta			Tolerance	VIF
Destination readiness and favourable conditions for DMSs' adoption (DREFC)	0.343	0.067	0.246	5.079	0.000	0.514	1.947
Pressure from the external environment (PEE)	0.227	0.052	0.202	4.379	0.000	0.570	1.754
Constraints related to technology and respective business models, as well as the DMO's unfavourable role (CTBMDUR)	-0.163	0.048	-0.129	-3.420	0.001	0.853	1.173
Perceived usefulness of DMSs (PU)	0.424	0.055	0.386	7.725	0.000	0.485	2.063
(Constant)	1.366	0.360		3.793	0.000		

N=324; R=0.784; R^2=0.614; F=127.077 (p =0.000).

Respondents also perceive some constraints with regards to adopting a DMS related to the DMO of the destination and, specifically, to the bureaucracy and inefficiency of the public sector, and constraints related to technology and respective business models (CTBMDUR). The technology-relevant aspects are the inexistence of a national or regional DMS with which the DMS could interconnect, and the existence of alternative platforms that would probably render the DMS less useful (e.g., OTAs such as *Booking* or *Expedia*). The features concerning the business models of technology are such that the creation of a publicly funded DMS would be unacceptable. However, the constraints previously mentioned, although having significant influence on the recognition that the destination should adopt a DMS, have a negative and lower impact on this construct than the other three factors.

Neither the resources and strategic vision of the respondent's own organisation (RSVOO) nor the potential constraints related to other organisations of the destination—lack of resources and

cooperation of other organisations of the destination (LRCOO)—have a significant effect on the perceived importance of the destination adopting a DMS.

The second regression shows that five factors have a significant impact on the willingness of the respondents' own organisations to adopt a DMS, explaining almost 70% (69.3%) of the variance of this construct. Once more, similarly to what happened in the other regression, the factor with the highest impact is the perceived usefulness of a DMS (PU), followed by the favourable conditions of the destination (DREFC) and by pressure from the external environment (PEE) (Table 6). However, in this case, the resources and strategic vision of the respondent's own organisation (RSVOO) also have a significant positive impact on the dependent variable of the regression, which corresponds to the willingness of the respondent's own organisation to adopt a DMS. Similarly, to what happened in the first regression, the constraints to DMS adoption related to technology and respective business models, as well as to a DMO's unfavourable role (CTBMDUR), also reveal a negative effect on the adoption of this kind of technological system, although lower than that of the other variables.

Table 6 - Factors influencing the willingness of the respondent's own organisation to adopt a DMS - Results of a regression analysis

	Unstandardized coefficients		Standardized coefficients	t	*p*	Collinearity statistics	
	B	Std. Error	Beta			Tolerance	VIF
Destination readiness and favourable conditions for DMSs' adoption (DREFC)	0.270	0.068	0.183	3.955	0.000	0.453	2.206
Pressure from the external environment (PEE)	0.165	0.053	0.140	3.098	0.002	0.474	2.108
Resources and strategic vision of the respondents' own organisation (RSVOO)	0.129	0.043	0.122	3.001	0.003	0.588	1.702
Constraints related to technology and respective business models, as well as the DMO's unfavourable role (CTBMDUR)	-0.146	0.046	-0.110	-3.207	0.001	0.821	1.218
Perceived usefulness of DMSs (PU)	0.546	0.051	0.477	10.614	0.000	0.483	2.069
(Constant)	0.432	0.353		1.223	0.222		

N=321; R=0.832; R^2=0.693; F=142.226 (p =0.000).

The findings of the two regressions corroborate that four factors have a significant impact on the adoption of DMSs, specifically revealing a positive significant impact of the perceived usefulness of a DMS (PU), of favourable conditions of the destination (DREFC), and of pressure from the external environment (PEE), as well as a negative significant effect of the constraints relating to technology and respective business models, and to a DMO's unfavourable role (CTBMDUR). Interestingly, the perceived usefulness of a DMS is absent from studies encompassing DMS adoption factors, although it has some similarities to the perceived cost-benefits analysis, which is suggested by previous research as relevant (Mistilis & Daniele, 2005; Sigala, 2013; Wang, 2008). The positive impact of pressure from the external environment (PEE) is in line with previous research on IOIS adoption (Chwelos et al., 2001; Iacovou et al., 1995) and with some of the scarce works on DMS adoption (Alford & Clarke, 2009; Sigala, 2013). The organisational readiness and the existence of favourable conditions for DMS adoption (DREFC) at the destination also corroborates most DMS adoption-related research as a factor influencing adoption, especially in what is referred to as the levels of relationship and collaboration between destination-based stakeholders (Gretzel & Fesenmaier, 2003; Ndou & Petti, 2017; Petti & Solazzo, 2007; Sigala, 2013) and, to a minor extent, the trust of the stakeholders in the DMO's ability to manage the system (Bédard et al., 2008).

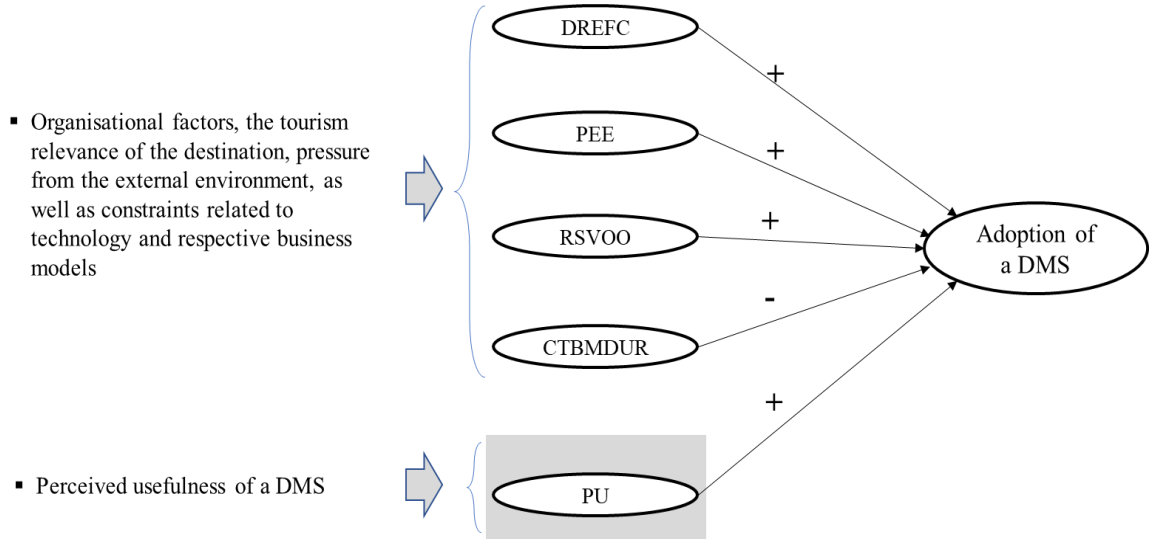
The regressions also complement each other since the resources and strategic vision of the respondent's own organisation (RSVOO), despite not influencing the opinion of the organisation regarding the adoption of a DMS by the destination, have a significant impact on the willingness and, probably, also on the decision of the organisation to adopt a DMS itself. The influence of the availability of resources from destination-based stakeholders has also been identified as influencing adoption in previous research (Sigala, 2013). However, no empirical studies on DMS adoption have yet indicated the strategic vision of the potential adopters as a factor influencing adoption. Regarding

this factor, the disparities identified in both regressions highlight that resources and vision do not affect the opinion of whether others should adopt a DMS, but are clearly relevant to organisations deciding whether or not they are going to adopt or integrate a DMS themselves.

When it comes to the factor indicated by the empirical analysis as negatively affecting the adoption of DMSs—constraints relating to technology and respective business models, and, specifically, to a DMO's unfavourable role (CTBMDUR), usually attributed to its bureaucratic public nature—previous empirical research has also demonstrated its negative influence on adoption (Bédard et al., 2008; Mistilis & Daniele, 2005; Sigala, 2014). However, the influence of the absence of a national or regional DMS, and the existence of alternative tourism platforms that make DMSs unnecessary, has never been tested in any study on DMS adoption. Similarly, the effect of constraints created by the unacceptance of some business models of DMS has never been tested.

Considering the results obtained, the Destination Management Systems' Adoption Model, named DeMSAM and presented in figure 1, has been proposed. This model includes factors that influence the adoption of a DMS that must, therefore, be considered to foster the adoption of DMSs.

Fig. 1 – Model proposed: The Destination Management Systems' Adoption Model (DeMSAM)



Note: DREFC - Destination readiness and favourable conditions for DMSs' adoption; PEE - Pressure from the external environment; RSVOO - Resources and strategic vision of the respondents' own organisation; CTBMDUR - Constraints related to technology and respective business models, as well as the DMO's unfavourable role; PU - perceived usefulness of a DMS.

5. CONCLUSIONS AND IMPLICATIONS

This paper provides an in-depth analysis of factors influencing DMS adoption, including an empirical study, and proposes an adoption model. It offers important contributions, empirically testing the influence of some factors on DMS adoption that were never examined before or were examined within a very limited geographical context.

The empirical study underlying this article provides novel and relevant theoretical implications to the still scarce body of research on DMS adoption by destination stakeholders. First, it does not simply empirically examine the factors that influence DMS adoption by asking stakeholders about their importance, but also analyses the willingness of stakeholders to adopt these systems, thus requiring them to consider the efforts needed to implement and successfully use DMSs. This approach revealed to be both pertinent and relevant, since it has demonstrated that factors influencing the opinions of the stakeholders regarding the importance of implementing a DMS in a destination differ from those factors affecting the stakeholders' willingness to adopt, themselves, a DMS. In fact, while the empirical analysis indicated that the resources and strategic vision of the stakeholders' own organisations are influencing factors in the second case, they were irrelevant in the first. Second, the impact of major electronic intermediaries on stakeholders' willingness to adopt a DMS, not previously analysed, was also examined in this paper. The results seem to be relevant since they indicate that OTAs, which already assume an important role in travel planning and booking, negatively influence stakeholders' intention to adopt a DMS. Moreover, the empirical study provides a further

original perspective on the factors explaining DMS adoption, by testing and confirming the negative influence that the lack of other DMSs in neighbouring regions or at the national level may have on stakeholders' adoption intentions.

Other factors, which had been previously tested by research, were confirmed as influencing DMS adoption, namely, stakeholders' resources, the DMO's role and its strategic vision, the destination's organisational readiness including the willingness of other entities of the destination to cooperate, as well as pressure from the external environment. Furthermore, considering all the findings, an explanatory model, including new factors that influence the adoption of a DMS by destination-based stakeholders, has been proposed. The paper also provides several practical implications. First, the factors that were found to influence DMS adoption highlight the need for destination managers who are aiming to implement a DMS to develop socio-technical strategies to cope with the lack of skills of the tourism industry regarding DMSs, as well as with challenges deriving from poor collaboration levels amongst stakeholders. The identified novel factors also provide practical implications, such as the need for an integrated and complementary approach to DMS implementation from DMOs. As indicated by the results, it is crucial to ensure cooperation amongst entities adopting a DMS in one specific destination, while isolated attempts to implement a DMS in the absence of such systems in neighbouring destinations, or on a higher level of the administration (i.e., a national DMO), are likely to be less successful in ensuring the adoption of these web platforms by stakeholders, than those which are integrated in a broader system.

In addition, the original factor related to the negative influence that major OTAs have on DMS adoption intentions asks for a thorough analysis, both from destinations already adopting DMSs as well as from those considering adoption, on the role that these systems should play. Results indirectly suggest that DMSs should not aim at competing with OTAs, offering the same transactional functions, because they will be perceived as irrelevant by stakeholders, but instead try to offer new opportunities for destinations to be managed and promoted in an integrated way.

Taking into account that the respondents recognised the usefulness of the DMSs, but also identify some potential constraints for the implementation of this kind of systems, to encourage the implementation of such a system in the Centro Region, it would be especially important to provide some training to staff of organisations that may adopt DMSs and to develop technological solutions compatible with those of these organisations. It would also be relevant to promote the advantages of DMSs among the players of the destination, including the financial ones, and make people aware of different financing models available to use in DMSs.

Although providing important contributions to the tourism field and research on DMSs, this paper has some limitations, especially regarding the restricted territorial context where the model was tested. Therefore, it would be important to test it in other territorial contexts. Another limitation of the study is that the divergent opinions of different stakeholders regarding the adoption of DMSs, and factors that affect this adoption, have not been examined and, as such, this is a relevant topic to explore in future studies. Finally, further research should also be carried out to analyse which types of functionalities destination players would find relevant to have in a DMS.

REFERENCES

Alford, P., & Clarke, S. (2009), "Information technology and tourism a theoretical critique", Technovation, Vol. 29, nº 9, pp. 580-587.

Ali, V., Cullen, R., & Toland, J. (2015), "ICTs and tourism in small island developing states: The case of the Maldives", Journal of Global Information Technology Management, Vol. 18, nº 4, pp. 250–270.

Baggio, R. (2011), "Province of Rimini: Communicating with the customer" in Egger, R. & Buhalis, D. (coord.), Etourism Case Studies, Abingdon, Routledge, pp. 248-258.

Baggio R., & Del Chiappa G. (2014), "Real and virtual relationships in tourism digital ecosystems", Journal of Information Technology and Tourism, Vol. 14, nº 1, pp. 3-19.

Barrio, M.D.F., Domecq, C.F., & Ballestero, P.T. (2017), "La evolución de los procesos de mediación en la distribución turística: El caso de Expedia y Priceline", International Journal of Information Systems and Tourism, Vol. 2, nº 1, pp. 73-86.

Bédard, F. & Louillet, M.C. (2011), "BonjourQuebec.com: A vision, a strategy, a brand" in Egger, R & Buhalis, D. (coord.), Etourism Case Studies, Abingdon, Routledge, pp. 200-212.

Bédard, F., Louillet, M.C., Verner, A., & Joly, M.C. (2008), "Implementation of a destination management system interface in tourist information centres and its impact" in O'Connor, P., Höpken, W., & Gretzel, U. (coord.), Information and Communication Technologies in Tourism 2008, Vienna, Springer, pp. 220-231.

Beritelli, P., Bieger, T., & Laesser, C. (2007), "Destination governance: Using corporate governance theories as a foundation for effective destination management", Journal of Travel Research, Vol. 46, nº 1, pp. 96-107.

Bethapudi, A. (2013), "The role of ICT in tourism industry", Journal of Applied Economics and Business, Vol. 1, nº 4, pp. 67-79.

Boes, K., Buhalis, D., & Inversini, A. (2015), "Conceptualising smart tourism destination dimensions" in Tussyadiah, I. & Inversini, A. (coord.), Information and Communication Technologies in Tourism 2015, Cham, Springer, pp. 391-403.

Boksberger, P., Anderegg, R., & Schuckert, M. (2011), "Structural change and re-engineering in tourism: A chance for destination governance in Grisons, Switzerland", Tourist Destination Governance: Practice, Theory and Issues, pp. 145-158.

Brown, G. (2004), "Developing a destination management system to act as an enabler in sustaining a competitive advantage in the (net) marketplace" in Frew, A.J. (coord.), Information and Communication Technologies in Tourism 2004, Vienna, Springer, pp. 326-336.

Buhalis, D. (2020), "Technology in tourism-from information communication technologies to eTourism and smart tourism towards ambient intelligence tourism: A perspective article", Tourism Review, Vol. 75, nº 1, pp. 267-272.

Buhalis, D. (2003), Etourism: Information Technology for Strategic Tourism Management, London, Pearson Education.

Buhalis, D. & Amaranggana, A. (2013), "Smart tourism destinations" in Xiang, Z. & Tussyadiah, I. (coord.), Information and Communication Technologies in Tourism 2014, Cham, Springer, pp. 553-564.

Buhalis, D., & Law, R. (2008), "Progress in information technology and tourism management: 20 years on and 10 years after the Internet - The state of eTourism research", Tourism Management, Vol. 29, nº 4, pp. 609-623.

Buhalis, D. & Spada, A. (2000), "Destination management systems: Criteria for success–an exploratory research", Journal of Information Technology and Tourism, Vol. 3, nº 1, pp. 41-58.

Carroll, B. & Sileo, L. (2014), "Online Travel Agencies: More than a distribution channel". PhoCusWright White Paper, New York, Northstar Travel Media LLC.

Chwelos, P., Benbasat, I., & Dexter, A.S. (2001), "Research report: Empirical test of an EDI adoption model", Information Systems Research, Vol. 12, nº 3, pp. 304-321.

Cooper, C, Fletcher, J. Wanhill, S., Gilbert, D., & Fyall, A. (2008), Tourism: Principles and Practice - Fourth Edition, Upper Saddle River, Prentice Hall.

Davis, F.D. (1989). "Perceived usefulness, perceived ease of use, and user acceptance of information technology", Management Information Systems Quarterly, Vol. 13, nº 3, pp. 319- 340.

Del Chiappa, G. & Baggio, R. (2015), "Knowledge transfer in smart tourism destinations: Analyzing the effects of a network structure", Journal of Destination Marketing and Management, Vol. 4, nº 3, pp. 145-150.

Edgell, D.L. (2016), Managing Sustainable Tourism: A Legacy for the Future, Abingdon, Routledge.

Egger, R., & Buhalis, D. (coord.) (2011), Etourism Case Studies, Abingdon, Routledge.

Estêvão, J.V., Carneiro, M.J., & Teixeira, L. (2020), "Destination management systems' adoption and management model: Proposal of a framework", Journal of Organizational Computing and Electronic Commerce, Vol. 30, nº 2, pp. 89-110.

Estêvão, J., Carneiro, M.J. & Teixeira, L. (2020a), "Destination Management Systems: Key distinctive functionalities aimed at visitors and destination suppliers", Journal of Global Information Technology Management, Vol. 23, nº 4, pp. 292–325.

Femenia-Serra, F., Perles-Ribes, J.F., & Ivars-Baidal, J.A. (2019), "Smart destinations and tech-savvy millennial tourists: Hype versus reality", Tourism Review, Vol. 74, nº 1, pp. 63-81.

Frew, A.J., & Horan, P. (2007), "Destination website effectiveness: A Delphi study-based emetric approach", Orlando, HITA Conference, pp.49-80.

Frew, A.J., & O'Connor, P. (1999), "Destination marketing system strategies: Refining and extending an assessment framework" in Buhalis, D. & Schertler, W. (coord.), Information and Communication Technologies in Tourism 1999, Vienna, Springer, pp.398-407.

Gamper, H.C. (2012), "How can internet comparison sites work optimally for consumers?", Journal of Consumer Policy, Vol. 35, nº 3, pp. 333-353.

Gretzel, U., & Fesenmaier, D.R. (2003), "Implementing a knowledge-based tourism marketing information system: The Illinois tourism network", Journal of Information Technology and Tourism, Vol. 6, nº 4, pp. 245-255.

Gretzel, U., Reino, S., Kopera, S., & Koo, C. (2015a), "Smart tourism challenges", Journal of Tourism, Vol. 16, nº 1, pp. 41-47.

Gretzel, U., Sigala, M., Xiang, Z., & Koo, C. (2015b), "Smart Tourism: foundations and developments", Electronic Markets, Vol. 25, nº 3, pp. 179-188.

Guthrie, C. (2011), "VisitBritain: Satisfying the online market dynamics" in Egger, R. & Buhalis, D. (coord.), Etourism: Case Studies, Abingdon, Routledge, pp. 216-224.

Hall, C.M. (2008), Tourism Planning: Policies, Processes and Relationships, London, Pearson Education.

Hair, J.F., Black, W.C., Babin, B.J., & Anderson, R.E. (2010), Multivariate Data Analysis: International Version, New Jersey, Pearson.

Hjalager, A.M., & Nordin, S. (2011), "User-driven innovation in tourism—A review of methodologies", Journal of Quality Assurance in Hospitality and Tourism, Vol. 12, nº 4, pp. 289-315.

Horan, P., & Frew, A. (2007), "Destination website effectiveness–A Delphi-based eMetric approach–A DMS Perspective", Conference Papers, Vol. 7, pp. 1-28.

Hwang, L.J., & Lockwood, A. (2006), "Understanding the challenges of implementing best practices in hospitality and tourism SMEs", Benchmarking: An International Journal, Vol. 13, nº 3, pp. 337-354.

Iacovou, C.L., Bensabat, I., & Dexter, A.S. (1995), "Electronic data interchange and small organizations: Adoption and impact of technology", Management Information Systems Quarterly, Vol. 19, nº 4, pp. 465-485.

Inversini, A., Cantoni, L., & De Pietro, M. (2014), "Destination online communication: Why less is sometimes more. A study of online communications of English destinations". Journal of Travel & Tourism Marketing, Vol. 31, nº 5, pp. 563-575.

Instituto Nacional de Estatística (2018), Anuário Estatístico da Região Centro 2017, Lisbon, Instituto Nacional de Estatística.

Inversini, A., & Masiero, L. (2014), "Selling rooms online: The use of social media and online travel agents", International Journal of Contemporary Hospitality Management, Vol. 26, nº 2, pp. 272-292.

Ivars-Baidal, J.A., Celdrán-Bernabeu, M.A., Mazón, J.N., & Perles-Ivars, Á.F. (2019), "Smart destinations and the evolution of ICTs: A new scenario for destination management?", Current Issues in Tourism, Vol. 22, nº 13, pp. 1581-1600.

Kärcher, K., & Alford, P. (2011), "Tiscover: Destination Management System pioneer" in Egger, R & Buhalis, D. (coord.), Etourism: Case Studies, Abingdon, Routledge, pp. 233-242.

Koo, C., Ricci, F., Cobanoglu, C., & Okumus, F. (2017), "Special issue on smart, connected hospitality and tourism", Information Systems Frontiers, Vol. 19, nº 4, pp. 699-703.

Kotoua, S., & Ilkan, M. (2017), "Tourism destination marketing and information technology in Ghana", Journal of Destination Marketing and Management, 6(2), pp. 127-135.

Kracht, J., & Wang, Y. (2010), "Examining the tourism distribution channel: Evolution and transformation", International Journal of Contemporary Hospitality Management, Vol. 22, nº 5, pp. 736-757.

Lexhagen, M., Eriksson, L.B., Olausson, F., & Fuchs, M. (2014), "Defining tasks and creating financial innovations: Challenges of a Swedish local DMO", Proceedings of the 2nd Biennial Forum Advances in Destination Management, St. Gallen, pp.10-13.

Maia, T., & Costa, L. (2019), "On the Porto Atlantic Front", Revista Portuguesa de Estudos Regionais, nº 52, pp. 95-114.

Mira, M.D.R.C., Mónico, L., Breda, Z.M., & Moura, A.F.A. (2020), "Qualidade em turismo na perspetiva dos decisores públicos locais portugueses: O caso da região Centro de Portugal", Revista Portuguesa de Estudos Regionais, nº 56, pp. 19-41.

Mistilis, N., & Daniele, R. (2005), "Challenges for competitive strategy in public and private sector partnerships in electronic national tourist destination marketing systems", Journal of Travel and Tourism Marketing, Vol. 17, nº 4, pp. 63-73.

Neuhofer, B., Buhalis, D., & Ladkin, A. (2014), "A typology of technology-enhanced tourism experiences", International Journal of Tourism Research, Vol. 16, nº 4, pp. 340-350.

Ndou, V., & Petti, C. (2007), "DMS business models design and destination configurations: Choice and implementation issues", Journal of Information Technology and Tourism, Vol. 9, nº 1, pp. 3-14.

Pechlaner, H., Zacher, D., Eckert, C., & Petersik, L. (2019), "Joint responsibility and understanding of resilience from a DMO perspective-an analysis of different situations in Bavarian tourism destinations", International Journal of Tourism Cities, Vol. 5, nº 2, pp. 146-168.

Petti, C., & Solazzo, G. (2007), "Architectural scenarios supporting e-business models for a DMS" in Sigala, M., Mich, L., & Murphy, J. (coord.), Information and Communication Technologies in Tourism 2007, Vienna, Springer, pp.195-206

Pollock, A. (1995), "The impact of information technology on destination marketing", Travel and Tourism Analyst, Vol. 3, pp. 66–83.

Presenza, A., Sheehan, L., & Ritchie, J.B. (2005), "Towards a model of the roles and activities of destination management organizations", Journal of Hospitality, Tourism and Leisure Science, Vol. 3, nº 1, pp. 1-16.

Sautter, E.T., & Leisen, B. (1999), "Managing stakeholders a tourism planning model", Annals of Tourism Research, Vol. 26, nº 2, pp. 312-328.

Sheehan, L., Vargas-Sánchez, A., Presenza, A., & Abbate, T. (2016), "The use of intelligence in tourism destination management: An emerging role for DMOs", International Journal of Tourism Research, Vol. 18, nº 6, pp. 549-557.

Sigala, M. (2014), "Evaluating the performance of destination marketing systems (DMS): Stakeholder perspective", Marketing Intelligence and Planning, Vol. 32, nº 2, pp. 208-231.

Sigala, M. (2013), "Examining the adoption of destination management systems: An inter-organizational information systems approach", Management Decision, Vol. 51, nº 5, pp. 1011-1036.

Sigala, M., & Marinidis, D. (2010), "DMOs, e-democracy and collaborative destination management: An implementation framework" in Gretzel, U., Law, R., & Fuchs, M. (coord.), Information and Communication Technologies in Tourism 2010, Vienna, Springer, pp. 235-246.

Spyriadis, T., Buhalis, D., & Fyall, A. (2011), "Dynamics of destination governance: Governance and metagovernance in the composite industrial environment of destinations" in Laws, E. (coord.), Tourist Destination Governance: Practice, Theory and Issues, Wallingford, Cabi, pp. 187-202.

Sussmann, S., & Baker, M. (1996), "Responding to the electronic marketplace: Lessons from destination management systems", International Journal of Hospitality Management, Vol. 15, nº 2, pp. 99-112.

Trunfio, M., & Campana, S. (2019), "Drivers and emerging innovations in knowledge-based destinations: Towards a research agenda", Journal of Destination Marketing and Management, Vol. 14, pp. 1-11.

Turismo de Portugal, IP (2018), "Registo Nacional de Turismo", Avaliable at: https://rnt.turismodeportugal.pt/RNT/ConsultaAoRegisto.aspx (accessed 2 April 2019).

Van der Zee, E., Gerrets, A.M., & Vanneste, D. (2017), "Complexity in the governance of tourism networks: Balancing between external pressure and internal expectations", Journal of Destination Marketing and Management, Vol. 6, nº 4, pp. 296-308.

Volgger, M. & Pechlaner, H. (2014), "Requirements for destination management organizations in destination governance: Understanding DMO success", Tourism Management, Vol. 41, pp. 64-75.

Wang, Y. (2008), "Examining the level of sophistication and success of DMS: Impacts of organisational factors", Journal of Travel and Tourism Marketing, Vol. 24, nº 1, pp. 81-98.

Werthner, H., Alzua-Sorzabal, A., Cantoni, L., Dickinger, A., Gretzel, U., Jannach, D., & Stangl, B. (2015), "Future research issues in IT and tourism". Journal of Information Technology and Tourism, Vol. 15, nº 1, pp. 1-15.

Werthner, H., & Ricci, F. (2004), "E-commerce and tourism". Communications of the ACM, Vol. 47, nº 12, pp. 101-105.

World Tourism Organization (2007), A Practical Guide to Tourism Destination Management, Madrid, World Tourism Organization.

World Tourism Organization (2008), International Recommendations for Tourism Statistics, Madrid, World Tourism Organization.

Wu, J.J., & Chang, Y.S. (2005), "Towards understanding members' interactivity, trust, and flow in online travel community", Industrial Management & Data Systems, Vol. 105, nº 7, pp. 937-954.

Zehrer, A., Pechlaner, H., & Hölzl, B. (2005), "The development of a Destination Management System (DMS) in South Tyrol", Anatolia, Vol. 16, nº 2, pp. 147-161.

Acknowledgements:
This work was financially supported by the research unit on Governance, Competitiveness and Public Policy (UIDB/04058/2020)+(UIDP/04058/2020), funded by national funds through FCT - Fundação para a Ciência e a Tecnologia.