



Examining the adoption of destination management systems

An inter-organizational information systems approach

Examining the adoption of DMS

1011

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Abstract

Purpose – The study aims to adopt a multi-stakeholder and inter-organizational information systems (IOIS) approach for investigating the factors affecting the adoption of destination management systems (DMS) by various tourism stakeholders in Greece.

Design/methodology/approach – A literature review and focus groups were used for identifying and contextualizing the factors affecting the tourism stakeholders' decision to adopt DMS. In addition, a nationwide survey was conducted measuring the perceptions of various stakeholders in Greece about the factors influencing their DMS adoption.

Findings – The findings demonstrate that inter-organizational and collaboration issues, secondary intra-organizational and technological factors affect stakeholders' decision to adopt DMS. Significant different perceptions about the role and effectiveness of DMS were found between private and public tourism organizations, which highlight the need to manage the different (and sometimes conflicting) stakeholders' perceptions and interests.

Research limitations/implications – Research can be conducted in different sectors to refine and test the findings about the factors influencing IOIS adoption in various social and environmental contexts. Future studies could also refine the findings by investigating not only the factors affecting the adoption of DMS but also the factors influencing their implementation and operations.

Practical implications – The findings reveal important factors that need to be considered for influencing the stakeholders' decision to adopt IOIS and DMS in tourism. Specifically, the study highlights the need to address the adoption of DMS as a socio-technical project that primarily emphasizes the management of stakeholders' relations, perceptions and interests. The findings also reveal the organizational and behavioural changes that are required in order to transform the management and increase the effectiveness of public DMS, which in turn can significantly increase the DMS adoption.

Originality/value – The findings contribute to the tourism field by examining DMS from a multi-stakeholder and IOIS approach. The study also contributes to the IOIS literature by contextualizing and providing evidence of IOIS results from the tourism industry, since contextualization is considered crucial for refining and enhancing the transferability of IOIS research. The study also further advances IOIS research by including and investigating the perceived importance of items about the social context of IOIS (i.e. interorganizational and collaboration issues) as explanatory factors of IOIS adoption.

Keywords Destination management systems, Adoption, Multi-stakeholders, Inter-organizational information systems, Collaboration, Stakeholders, Information systems, Tourism, Greece

Paper type Research paper

Introduction

Tourism destinations consist of an amalgam of various tourism stakeholders located at a specific geographical location (e.g. accommodation and food & beverage suppliers,



attraction and cultural/heritage operators, transportation providers etc.), while the tourism demand is geographically distributed all over the globe. The destination management systems (DMS) are internet-based information systems developed by destination management organizations (DMO) for representing the totality of tourism suppliers and stakeholders at a destination and connecting them with the tourism demand (Sigala, 2012). In doing this, DMS support the provision of customer information and communication services to travelers as well as of promotional and marketing activities to tourism suppliers (Wang, 2008a; Cuauhtemoc and Hyman, 2012; Choi *et al.*, 2007). It is widely argued that DMS can substantially enhance the competitiveness of tourism destinations (Choi *et al.*, 2007; Morgan, 2012) and specifically, of small and medium tourism enterprises (SMTEs) that do not have the resources to provide such services themselves (Archdale, 1994; Sussmann and Baker, 1996). However, although DMS represent the backbone of many destinations, they lack the technological, financial and knowledge resources for using e-marketing channels (e.g. Frew and O'Connor, 1999; Frew and Horan, 2007; Li and Wang, 2010). Nevertheless, even if the DMS's *raison d'être* is focused on supporting SMTEs, several authors (e.g. Sigala, 2012; Beaver, 1995; Morrison, 2001; Morrison and King, 2002; Frew and Horan, 2007) have shown that SMTEs' participation in DMS is low and faced with difficulties, which in turn demotivates other firms from joining DMS and deteriorates the DMS success (Frew and Horan, 2007; Woodside and Sakai, 2009). In other words, although DMS are created for representing the various tourism destination stakeholders and promoting them on the internet, the success of DMS heavily depends on the adoption of DMS by tourism stakeholders and the integration of DMS' services in stakeholders' operations.

However, previous studies investigating DMS adoption have mainly focused on solely examining the SMTEs' perspectives about their use and attitudes towards DMS (Frew and O'Connor, 1999; Morrison, 2001; Morrison and King, 2002). On the other hand, recent studies (e.g. Frew and Horan, 2007; Bornhorst *et al.*, 2010) have showed that the various destination stakeholders have conflicting perceptions about the role and the management of DMS, and so, they have concluded that a multi-stakeholder approach is a more appropriate and holistic approach for studying DMS. Earlier, Sussmann and Baker (1996) had also argued that DMS success depends on good DMS management and governance including the ability of DMS stakeholders to agree on the DMS roles and activities. However, none study has addressed this issue yet. Moreover, since a DMS represents an inter-organizational information system (IOIS) (Sheldon, 1993; Chen and Sheldon, 1997), a multi-stakeholder approach is also advocated as a more robust methodological approach to study DMS.

This study adapts an IOIS approach (e.g. Kumar and Crook, 1999; Iacovou *et al.*, 1995; Zhu *et al.*, 2004) for conducting a more holistic examination and interpretation of the factors influencing the adoption of DMS by Greek tourism firms. Data were gathered through a nation-wide survey that was co-organized with the E-Business Tourism Forum (part of the National Network of Research & Technology, Greek Ministry of Development) and targeted various DMS stakeholders for investigating their perceptions about the factors influencing their DMS adoption. The findings contribute to the tourism field by examining DMS from a multi-stakeholder and IOIS approach. The study also contributes to the IOIS literature by contextualizing and providing evidence of IOIS results from the tourism industry, since contextualization is

considered crucial for refining and enhancing the transferability of IOIS research (Kuan and Chau, 2001; Son and Benbasat, 2007). The study also further advances IOIS research by including and investigating the perceived importance of items about the social context of IOIS as explanatory factors of IOIS adoption (Robey *et al.*, 2008). Consequently, the findings contribute to IOIS research by highlighting the importance of interorganizational and collaboration issues on IOIS adoption. The practical and theoretical implications of the findings are extensively discussed.

DMS as IOIS

Defining DMS

The lack of a commonly agreed terminology of DMS led the various researchers to create their own DMS conceptualization depending on their perspective about the DMS roles (e.g. Vlitos-Rowe, 1992; Pringle, 1995; Sussmann and Baker, 1996; Buhalis and Spada, 2000; Chen and Sheldon, 1997; O'Connor, 1999). However, all DMS definitions emphasize the inter-organizational role that DMS play by linking tourism demand with tourism suppliers (Sheldon, 1993; Sigala, 2012) and specifically, by empowering SMTEs to electronically distribute their products. For example, Chen and Sheldon (1997) defined the DMS as an inter-organizational system that links tourist products, suppliers and offers with consumers and intermediaries for enabling easy access to completed and up-to-date destination information, and allowing reservations and purchases.

A Delphi study surveying multiple tourism stakeholders has concluded to a more comprehensive DMS definition that states (Frew and Horan, 2007: 63):

[...] DMS are systems that consolidate and distribute a comprehensive range of tourism products through a variety of channels and platforms, generally catering for a specific region, and supporting the activities of a Destination Management Organization (DMO) within that region. DMS attempt to utilize a customer centric approach to manage and market the destination as a holistic entity, typically providing strong destination related information, real-time reservations, destination management tools and paying particular attention to supporting small & independent tourism suppliers.

Finally, it is widely agreed that the successful development and adoption of a DMS require the support of an efficient DMO with clear tourism policy, goals and sufficient resources that will represent the destination by consolidating and aligning the interests and activities of all destination stakeholders (e.g. Wang, 2008a; Frew and Horan, 2007; Presenza *et al.*, 2005; Morgan, 2012, Alford and Clarke, 2009; Sigala and Marinidis, 2012). Research in IOIS has advocated that in order to better understand IOIS issues, researchers have to raise the level of analysis of IOIS to that of the industry (Steinfeld *et al.*, 2005). Thus, the destination is an appropriate "industry" level for studying DMS and their stakeholders from an IOIS perspective.

DMS adoption

A review of the tourism literature. Although DMS aim to empower SMTEs by providing e-presence and e-capabilities, SMTEs' demonstrate low levels of participation and motivation to use DMS (Wang, 2008a; Frew and Horan, 2007). This limited representation has a vicious circle impact on DMS adoption, because of network externalities effects: i.e. the less SMTEs are in the system, the fewer tourists are willing to use it, and so, the fewer SMTEs are willing to subscribe to DMS. This



lack of comprehensiveness and low representation of tourism suppliers in DMS represent major causes for the failure of several DMS internationally (e.g. Bornhorst *et al.*, 2010; Sussmann and Baker, 1996; Mutch, 1996; Daniele *et al.*, 2000; Morrison and King, 2002; Tourism Training Victoria, 2002). Consequently, research investigating the factors inhibiting DMS adopt has boomed (e.g. Sussmann and Baker, 1996; Palmer and McCole, 2000; Archdale, 1994; Palmer, 2004). Low DMS participation is widely attributed to SMTEs' lack of technology skills, which coupled with difficulties in the sign-up process and technology use, creates a lack of confidence and trust in the DMS (Sussmann and Baker, 1996; Mutch, 1996; Daniele *et al.*, 2000; Morrison and King, 2002; Tourism Training Victoria, 2002; Beaver, 1995).

Bedard *et al.* (2008) summarized the organizational, technological and managerial characteristics of SMTEs that inhibit them from adopting DMS as follows: reluctance to use technologies; lack of technology training; poor strategic management and marketing skills; the short-term operational focus of SMTEs' managers; lack of basic technology infrastructure (e.g. Property Management Systems) that in turn, requires SMTEs to connect with DMS through laborious, time consuming and inefficient manual processes; reluctance to allocate and/or maintain adequate and up-to-date room inventory in DMS. Research also reports the impact of technology factors (such as low DMS's reliability, quality and user-friendliness) on DMS adoption (e.g. Tourism Training Victoria, 2002). However, recent studies (e.g. Wang, 2008a; Alford and Clarke, 2009; Sigala and Marinidis, 2012; Bornhorst *et al.*, 2010) advocate that not only technological, but also additional (inter-)organizational and collaboration factors can affect the SMTEs' participation in DMS. These are analyzed below.

Several studies (Alford and Clarke, 2009; Palmer and McCole, 2000; Palmer, 2004; Morrison and King, 2002) reveal that participation in DMS is affected by the firms' judgments about the importance and the performance results of DMS operations (i.e. the business value generated by the DMS relative to the DMS costs). For example, the majority of accommodation providers in Ireland disagreed about their participation benefits in Gulliver (an Irish DMS), because although Gulliver was perceived as a cost effective mean for promoting their business, it did not reduce the need for other promotional and cooperative marketing costs (Blank and Sussmann, 2000). Frew and Horan (2007) found that the various DMS stakeholders held different beliefs about the role, the operations and the performance evaluation of DMS, which in turn affected their perceptions about the benefits they expected to get from joining DMS. Hence, although tourism suppliers expected the DMS to generate them a substantial number of e-bookings, this requirement was not shared by the DMS operators, who perceived that the major DMS role is to create, protect and promote the brand image of the destination. Overall, stakeholders' perceptions about the role and performance of DMS had restrained them from participating in DMS.

Studies (e.g. Blank and Sussmann, 2000; Morrison, 2001; Morrison and King, 2002) have also shown that the existence, legitimacy and level of the transaction fee (booking commission) and membership cost charged by DMS are important demotivating factors for DMS participation. This is also because firms believe that DMS should support them for free as a return of their taxes paid to the state (Tourism Training Victoria, 2002). Firms' reluctance to pay commissions and disclose data (about room allocations, prices and availability) are also reported as a reason for not joining DMS (Sussmann and Baker, 1996; Archdale, 1994). DMS commission percentages were also

perceived as too high and raised firms' suspiciousness about the transaction auditing process and the reliability of the DMS operator (Palmer, 2004).

Indeed, several studies show that DMS adoption is negatively affected by the low reliability and trust as well as high inefficiencies of the (usually publicly owned) DMOs responsible for operating the DMS. Specifically, Frew and O'Connor (1999) found that SMTEs are reluctant to use a DMS, because of the ineffective management of DMOs that is attributed to the organizational inefficiencies and bureaucracy, poor databases and IT systems, bad communication, trust and cooperation with the tourism industry. Vlitos-Rowe (1992) also found that the structure of public organizations is not suitable for carrying out distribution functions in tourism. Moreover, Bedard *et al.* (2008) also reported that SMTEs' low participation in DMS is affected by: their concerns about the marketing and cost effectiveness of DMS; the negative inter-organizational relationships (trust, communication and coordination) amongst SMTEs and the DMS operator; SMTE's reluctance to pay commissions and/or membership fees. Other studies (Morrison and King, 2002; Tourism Training Victoria, 2002; Morrison, 2001; Daniele *et al.*, 2000) have also highlighted the existence of communication problems between the DMS operator and the tourism firms, and their negative impact on DMS adoption.

To address these intra- and inter-organizational problems, there have been many (successful and unsuccessful) attempts to create public and private partnerships (PPP) for implementing DMS and overcoming the inefficiencies and inflexibility of public administration structures and providing distribution services (Mistilis and Daniele, 2004). Some sectors criticize the formation of PPP for operating a DMS as an anticompetitive behavior, since subsidizing an organization (public DMS or a PPP) to provide travel services (such as bookings) results in unfair competition to private travel firms (O'Connor, 1999). Opponent arguments also exist with several stakeholders supporting the necessity of public DMS to offer booking services in order to ensure access to comprehensive and unbiased destination information, since private DMS have little incentive to incorporate and support SMTEs (Hurst, 1992; O'Connor, 1999). These conflicting stakeholders' perceptions about the operations and ownership status of DMS have significantly affected the adoption and success of DMS during the last decade (Frew and Horan, 2007; Sigala and Marinidis, 2012).

However, previous studies examining DMS adoption have mainly surveyed the SMTEs (penalizing them for the poor DMS participation), excluded the perspectives of the DMS operators (DMOs) and ignored that the various stakeholders may hold different perceptions. Buhalis and Spada (2000) surveyed various SMTEs, but they solely examined SMTEs' perceptions about the DMS functionality. The previously reviewed studies are also limited, because they examine the perceptions of firms that are already DMS users and they exclude firms non-participating in DMS.

A review of the IOIS literature. DMS represent internet based IOIS, as they enable collaborative practices amongst various tourism stakeholders (Lai *et al.*, 2011). As the success of IOIS necessitates their adoption and success within the internal operations of individual collaborating stakeholders (e.g. Iacovou *et al.*, 1995; Zhu *et al.*, 2004; Sheng *et al.*, 1992), the literature discussing the adoption and operational success of information systems (IS) is also important to the adoption of IOIS. Hence, the literature about the adoption and the success of IS and IOIS provides a solid theoretical background for identifying the factors influencing the DMS adoption.

In examining the adoption and success of IS, DeLone and McLean (2003) developed a comprehensive six-dimensional model including the following factors:

- (1) the quality measuring the IS technical success (ease of use, functionality, reliability, flexibility, data quality, transportability, integration and importance, system response time);
- (2) the information quality of IS (personalized, precise, complete, relevant, coherent, easy to understand and secure information);
- (3) the quality of the service provided (based on SERVQUAL);
- (4) the IS use (frequency, navigation time, number of accesses, mode of use and dependence);
- (5) the IS user satisfaction; and
- (6) the impacts measuring the IS success at individual (better task performance, work environment), organizational (market impact, strategic, transactional, efficiency, control) and inter-organizational or societal level.

In conducting a meta-analysis of variables affecting IS success, Larsen (2003) identified the following five constructs' categories, which also stress the influence of organizational factors on the successful adoption of IS: technology; IS expertise; organizational dimension (structure, environmental complexity and inter-organizational relationships); communication about tasks; individual- and job-related dimensions influenced by IS.

Studies confirm the following holistic framework of factors influencing IOIS adoption (Kumar and Crook, 1999; Geri and Ahituv, 2008): collaboration factors combining economic, strategic and social elements (e.g. value sharing and trust amongst stakeholders) and conflict management; organizational factors related to the stakeholders' organization (size and resources), the individual-user (involvement, perceived simplicity, task importance and time) and the leadership style; technological factors including security, standardization, system integration and stakeholders' level of IS competence. Collaboration factors stress the impact of aligning and managing the different perceptions of the IOIS stakeholders, while organizational factors stress the need of stakeholders to have organizational support like training, upper management involvement, implementation planning and impact evaluation (Bergeron and Raymond, 1992). The financial resources and technological skills of the collaborating organizations are also key factors (Iacovou *et al.*, 1995; Zhu *et al.*, 2004; Wang, 2008a). Concerning the technological factors, studies revealed the significance of the firms' IT skills and readiness, which are reflected in the intensity of their IT use (Zhu *et al.*, 2004; Sheng *et al.*, 1992) and the integration degree of the IOIS with the existing, internal IS applications (Bergeron and Raymond, 1992; Iacovou *et al.*, 1995; Zhu *et al.*, 2004; Lai *et al.*, 2011).

The organizational and technological factors severely restrain small businesses from implementing IOIS. Kuan and Chau (2001) reviewed several IOIS studies and identified the following factors making small firms to lag behind in IOIS adoption: inadequate financial and human resources; limited IS education about computer experience and internal IS expertise; lack of internal management support and internal IS training; lack or limited evidence of the performance impact of IOIS on firm performance; lack of internal IS infrastructure, which further inhibited integration with



IOIS. Kuan and Chau (2001) and Clemons and Kleindorfer (1992) also confirmed the influence of the following factors affecting the adoption of EDI by firms: perceived direct (e.g. internal efficiencies) and indirect benefits (e.g. competitive advantage); organizational readiness; technology costs; and external pressures. These findings are also in line with tourism research examining the factors inhibiting SMTEs to adopt DMS.

Other studies have also stressed the impact of the following environmental factors on IOIS adoption: the diversity of the IOIS functionalities (Zhu *et al.*, 2004); the diversity and the number of participating firms and government pressures (Bergeron and Raymond, 1992; Iacovou *et al.*, 1995; Teo *et al.*, 2003; Kuan and Chau, 2001); the sector competitiveness (Bergeron and Raymond, 1992; Cavaye and Cragg, 1995; Chwelos *et al.*, 2001; Zhu *et al.*, 2004; Lee *et al.*, 2005); the dependence or interdependence, cooperation, conflict management, power and inter-organizational trust amongst partners (Choudhury, 1997; Kumar and van Dissel, 1996; Boonstra and de Vries, 2005; Rodon *et al.*, 2008); and the organizational readiness, perceived benefits and commitment of potential adopters of IOIS (Hart and Saunders, 1997; Son and Benbasat, 2007; Lu *et al.*, 2006; Kuan and Chau, 2001; Lai *et al.*, 2011). Studies also confirm a mimicry effect boosting IOIS adoption, as potential firms decide to join IOIS for enhancing their professionalism or status by mimicking competitors and existing IOIS practices (e.g. Barringer and Harrison, 2000; Teo *et al.*, 2003).

The influence of mimicry, the power and (inter)dependence of partners and suppliers on IOIS adoption (Bergeron and Raymond, 1992; Iacovou *et al.*, 1995; Premkumar and Ramamurthy, 1995) is also found by tourism studies. For example, e-procurement adoption in hospitality was driven by supply chain pressures, e.g. suppliers, partners and corporate customers (Sigala, 2006); the number of competing firms already present in DMS affects the DMS adoption by SMTEs (Wang, 2008a). Amongst all these factors, more recent studies reemphasize the impact of the following contextual factors on IOIS adoption: trust, competitive pressures, systems integration/interoperability and support from the IOIS initiator (Lai *et al.*, 2011; Lin, 2006; Markus and Christiaanse, 2003; Ramamurthy *et al.*, 1999).

The literature also stresses the necessity to adopt a multi-stakeholder approach for studying IOIS. Kambil and van Heck (1998) proposed a process-stakeholder framework for studying the adoption and success of IOIS, which highlights the existence and the need to manage the (conflicting) interests of IOIS partners. Boonstra and de Vries' (2005) findings highlighted that IOIS fail when the different interests, expected benefits, contributions and power between IOIS partners are ignored. Partners with high power in IOIS, can use normative pressures, a compensation system and/or coercive/threatening measures for influencing IOIS adoption (Chwelos *et al.*, 2001; Iacovou *et al.*, 1995). Arguments showing the impact of power, (inter)dependence and collaboration factors on IOIS relationships draw from the socio-political perspective (Ramamurthy *et al.*, 1999), institutional theory and resource dependence (Teo *et al.*, 2003), and they stress the impact of soft inter-organizational and collaboration factors (e.g. trust, commitment, conflict management, shared/aligned strategies and operations amongst the various IOIS stakeholders) on IOIS adoption (Lee and Lim, 2005; Sigala, 2006; Kumar and Crook, 1999; Zhu *et al.*, 2004; Kumar and van Dissel, 1996).

Overall, research in IS and IOIS provides a good theoretical underpinning that is also in line with tourism findings showing that the DMS adoption is influenced by the

following categories of factors: inter-, intra-organizational, technological and environmental/competitive factors. Based on a meta-analysis of numerous studies, Robey *et al.* (2008) found the same categories of factors affecting IOIS adoption, but they highlighted the importance of the social context surrounding the inter-organizational relations on IOIS adoption. Hence, in order to advance research and better explain the influence of the social context on IOIS adoption, Robey *et al.* (2008) stressed the need to incorporate characteristics of the inter-organizational relations as explanatory variables.

Research methodology

This study aimed at investigating the factors influencing the adoption of DMS by following an IOIS approach and examining the perceptions of multiple DMS stakeholders. To achieve that, the paper reviewed the related literature in the tourism and IOIS fields, while primary data were collected from DMS stakeholders in Greece. Greece was chosen as the context of this study for two major reasons. DMS adoption and development is a topic of high national importance, because, although tourism and DMS are critical for the competitiveness of destinations, SMTEs and the Greek economy, Greece is found to be very slow and delayed in the development and adoption of successful DMS at national, regional and local destination levels (www.ebusinessforum.gr); this is also true despite various national and European funds and efforts invested for developing DMS in Greece. Secondly, the professional connection between the researcher and the E-Business Tourism Forum (part of the National Network of Research & Technology, Ministry of Development) ensured the co-financing and so, the successful implementation of a large scale national study.

It should be noted that there are only publicly owned and operated DMO/DMS in Greece, while only recently the government created a legislative framework allowing the development and operation of DMO/DMS by PPP (e.g. www.breathtakingathens.gr, the only Greek DMO/DMS run by a PPP and established in 2009). The study took place from 2007 - 2009, and so, the DMO/DMS examined in this study represent DMS/DMO developed and operated by public organizations.

A questionnaire was developed for gathering primary data and the following actions were undertaken for achieving validity and reliability. To ensure content validity, an extensive literature review was conducted for identifying appropriate factors influencing DMS/IOIS adoption. Specifically, the study required respondents to state their perceptions about the importance (five-point Likert scale) of the influence of the 32 items on their decision to adopt and/or further use the DMS representing their destination. The 32 items (Table I) represent the four categories of factors that previous studies found to affect IOIS/DMS adoption. Items were also contextualized, reviewed, pre-tested and validated within the tourism/DMS field by conducting focused groups attended by tourism professionals and experts that were members of the E-Business Tourism Forum Group.

Four focused groups (with the total participation of 131 professionals representing various tourism stakeholders) were conducted for developing and validating the inclusiveness, the relevance and the easiness to understand and respond to the research instrument's questions. The focused groups were particularly helpful in contextualizing and specifying the factors affecting DMS adoption that are related to the inter-organizational relations between DMO/DMS and the tourism firms as well



Constructs	Definition/items	Support from previous studies
Organizational readiness and factors	<p><i>Perceptions about the existence/legitimacy of DMS costs</i> The use of DMS involves the charge of illegitimate costs</p> <p><i>Perceived benefits/costs and affordance of firm</i> There are more efficient e-channels than DMS that my organization can use High operating costs of DMS relative to its services for my organization The cost for joining or using a DMS is high for my organization The DMS does not support/generate e-bookings</p> <p><i>Technological, human and managerial resources of the organization</i> Lack of internal IT infrastructure in my organization Lack of IT skills and education in my organization Lack of training about the role and benefits of DMS Lack of organizational/managerial structures to support DMS use in my organization Difficult to integrate DMS with existing internal IT applications</p>	<p>Blank and Sussmann (2000); Morrison (2001); Morrison and King (2002); Sussmann and Baker (1996); Archdale (1994); Palmer (2004); Bedard <i>et al.</i> (2008); Palmer and McCole (2000); Palmer (2004); Morrison and King (2002); Frew and Horan (2007); Tourism Training Victoria (2002); DeLone and McLean (2003); Kumar and Crook (1999)</p> <p>Bedard <i>et al.</i>, 2008); Sussmann and Baker (1996); Mutch (1996); Daniele <i>et al.</i> 2000); Morrison and King (2002); Tourism Training Victoria (2002); Beaver (1995); Kumar and Crook (1999); Geri and Ahituv (2008); Kuan and Chau (2001)</p>

(continued)

Table I.
Theoretical underpinning of the factors affecting DSM adoption

Constructs	Definition/items	Support from previous studies
Inter-organizational factors	<p><i>Factors influencing the inefficiencies and trust/reliability of the DMS operator</i></p> <p>Unreliable public management mechanism</p> <p>Lack of a skilled/specialized labor force at the public DMO operating the DMS</p> <p>Lack of a strategy and/or tourism policy of the public DMO operating the DMS</p> <p>Bureaucratic and inefficient management of the public DMO operating the DMS</p> <p>Lack of trust and commitment to the activities of the public DMO operating the DMS</p> <p>DMS are related to heavy overspending and inefficient use of financial resources</p> <p>Bad cooperation & communication with public DMO operating the DMS</p> <p>Lack or inefficient financial resources of the public DMO operating the DMS</p> <p>The public DMO has inappropriate managerial structures for performing distribution functions</p> <p>The dominance of a DMO management philosophy to develop a DMS for simply getting subsidies without having a strategy ensuring the sustainable and long term development of the DMS</p>	<p>Frew and O'Connor (1999); Vitos-Rowe (1992); Bedard <i>et al.</i> (2008); Morrison and King (2002); Tourism Training Victoria (2002); Morrison (2001); Daniele <i>et al.</i> (2000); Kumar and Crook (1999); Zhu <i>et al.</i> (2004); Kumar and van Dissel (1996)</p>

(continued)

Constructs	Definition/items	Support from previous studies
Environmental/competitive factors	<p><i>Factors related to the tourism industry environment</i></p> <p>Lack of tourism planning, policy & strategy at national level</p> <p>The DMO operating the DMS does not have clear tourism goals and strategies</p> <p>Lack of a central body and/or procedures to collect & analyze destination data</p> <p>Lack of a DMO at the destination</p> <p><i>Factors related to competitive forces and power/relations amongst tourism firms</i></p> <p>Lack of a leading firm to motivate and push DMS adoption</p> <p>Conflict of stakeholders' interests at local destination</p> <p>Competing tourism firms do not participate in DMS</p>	<p>Wang (2008a); Frew and Horan (2007); Bedard <i>et al.</i> (2008); Bergeron and Raymond (1992); Cavaye and Cragg (1995); Chwelos <i>et al.</i> (2001); Zhu <i>et al.</i> (2004); Lee <i>et al.</i> (2005)</p>
Technological factors	<p><i>Factors related to the technical characteristics of the DMS platform</i></p> <p>Limited functionality and services offered by DMS</p> <p>It is not easy to learn to use the DMS</p> <p>The DMS is difficult to use</p> <p>Low quality or comprehensiveness of the DMS information</p> <p>The reliability of the DMS platform is low</p>	<p>Frew and Horan (2007); Wang (2008a); Bergeron and Raymond (1992); Iacovou <i>et al.</i> (1995); Teo <i>et al.</i> (2003); Choudhury (1997); Kumar and van Dissel (1996); Boonstra and de Vries (2005)</p> <p>Tourism Training Victoria (2002); Frew and Horan (2007); DeLone and McLean (2003)</p>

Table I.

as the competitive and environmental factors of the Greek tourism industry. This qualitative approach also contributed to the inclusion of items that represented a realistic, context specific and up-to-date representation of the perceptions of the various Greek stakeholders about the social context within which the IOIS/DMS is developed. In this vein, the study further advances the field of IOIS adoption, because it includes items referring to the stakeholders' perceptions of the social context of IOIS as explanatory factors of the IOIS adoption (Robey *et al.*, 2008). Following the focused groups, the wording of few questions was changed and few items were condensed into more general questions in order to make the questionnaire shorter/quicker to complete and easier to understand. After making the adjustments, the questionnaire was pre-tested by six professionals and no further changes were made. The questionnaire also gathered data about the stakeholders' profile (type, size and management of the firm, current information technology (IT) use and future investments).

The databases of the following organizations were used for identifying various stakeholders: the E-Business Tourism Forum; two national tourism professional organizations representing accommodation providers and tourism firms accordingly; www.traveldailynews.gr (the major e-tourism news portal in Greece); the National Institute of Local Administration (www.kedke.gr/), the representation body of public DMOs. The questionnaire was distributed through an e-mail survey to 2,846 various tourism firms and organizations and it was addressed to the general manager of the targeted organization. The questionnaire was also published on the portals of www.traveldailynews.gr and www.ebusinessforum.gr (from 12/2007 to 12/2009). The results of these nation-wide surveys produced 441 usable questionnaires.

Analysis and discussion of the results

Respondents' profile

Respondents represent a variety of stakeholders in terms of type, management style and size of business (Table II). The majority (44.7 percent) of the respondents represents accommodation providers, 20.2 percent are travel agents/tour operators, while less respondents (12.7 percent) represent DMOs, cultural organizations (12.7 percent), and significant less respondents are in the business of food service/bars (5.2 percent), wineries (2.3 percent), rent-a-car (1.8 percent) and casino (0.4 percent). Although the majority of the respondents (52.9 percent) are independent private firms, the management governance of respondents also represents an interesting mix, since 39.2 percent are public organizations, 3.4 percent belong to a chain/corporation, 2 percent are consortia members and 2.5 percent represent management contract operators or franchisees. Respondents' profile regarding the size of their business confirms the dominance of SMTEs in Greece, as the greatest majority of respondents (49.4 percent and 44.1 percent) employ less than nine employees or ten to 49 employees respectively, while the remaining 6.5 percent employ more than 50 employees.

Data reveal that respondents use very few IT applications (Table III). The greatest majority of respondents use simple IT applications (such as having an internet presence and e-commerce), while only few respondents reported to use more sophisticated IT applications such as GDS, intranet, e-procurement and CRM. Only 41.7 percent of respondents reported to currently use a DMS (for any application, e.g. online promotion, e-bookings etc.). Respondents' intentions to further invest on IT were also low, as the majority of them claimed to either retain or decrease their IT

Examining the adoption of DMS

1023

Table II.
Respondents' organizational profile

	No.	%
<i>Type of firm</i>		
Accommodation provider	197	44.7
DMO	56	12.7
Travel agent or tour operator	89	20.2
Casino	2	0.4
Rent a car	8	1.8
Cultural organization	56	12.7
Food service and bar operators	23	5.2
Wineries	10	2.3
Total	441	100
<i>Management style</i>		
Independent private firms	233	52.9
Public organizations	173	39.2
Member of a chain/corporation	15	3.4
Member of a consortium	9	2
Management contract operators or franchisees	11	2.5
Total	441	100
<i>Size of firm (no. of employees)</i>		
1-9	218	49.4
10-49	194	44.1
50-99	20	4.5
100 +	9	2
Total	441	100

Table III.
IT profile of respondents

	No.	%
<i>Current use of IT application</i>		
Internet presence	427	96.8
E-commerce/online transactions	237	53.7
Destination management systems	164	41.7
Global distribution systems (GDS)	68	15.4
E-procurement	4	0.9
Intranet	3	0.6
Customer relationship management	2	0.4
Total	441	100
<i>Future intentions for IT investments (next three years)</i>		
Decrease IT investments	49	11.1
Keep the same level of IT investments	290	65.8
Increase IT investments	102	23.1
Total	441	100

investments for the next three years (65.8 percent and 11.1 percent respectively). The low current and future use of IT applications is not surprising given the nature of the respondents (i.e. small independently run firms) and it highlights the need to promote the adoption and diffusion of DMS for e-empowering SMTEs with several internet-based applications.



Factors affecting DMS adoption

A two-stage approach was used for validating the unidimensionality of the 32 items developed in this study for measuring the importance of the factors influencing DMS adoption. Churchill's (1979) Exploratory Factor Analysis (EFA) procedure (i.e. item-total correlation, and coefficient alpha) was used for uncovering the underlining dimensions of the factors and then, Confirmatory Factor Analysis (CFA) was used for confirming and validating this dimensionality (Gerbing and Anderson, 1988).

Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and Bartlett's test of sphericity were used for examining the sample appropriateness for running EFA. The results showed a robust measure of sampling adequacy ($KMO = 0.81$, $X^2 = 2,484$, significant at $p < 0.001$) (Tabachnick and Fidell, 1997). The 32 items were subjected to EFA, item-to-total correlation and coefficient alpha for item refinement (Churchill, 1979). To create a parsimonious measure, items with the following criteria were eliminated (Churchill, 1979; Tabachnick and Fidell, 1997): an average corrected item-to-total correlation below 0.35; an average interitem correlation below 0.2; factor loadings below 0.45; and items with cross loading greater than 0.4 on more than one factor. When suspect items were identified, a standardized α for each factor was calculated with and without this suspect item. Suspected items were eliminated when a factor's reliability score was improved with the removal of these items, and then a new α reliability coefficient was calculated. The process finished, when no further improvements in reliability scores could be achieved on each identified factor. Consequently, seven items were excluded from further analyses (Table IV).

The remaining 25 items were subjected to an EFA again. Factors were extracted by using principle component analysis and then, rotated to terminal factors with varimax rotation, which centers on simplifying the columns of the factor matrix, for better interpreting the results. Five factors influencing the respondents' decision to adopt/further use a DMS were identified by using Kaiser's (1960) criterion (eigenvalues greater than 1.0). These factors explained 60.98 percent of the total variance with a high level of reliability (total reliability $\alpha = 0.87 > 0.8$) and high mean values for almost all their items (mean value varying from 4.31 to 3.01) (Table IV). The five factors had an acceptable reliability ($\alpha > 0.7$, Nunnally, 1978) and include:

- (1) F1 – the level of reliability and trust demonstrated by the public DMO consisting of four items reflecting the respondents' perceptions about the unreliable management mechanisms and goals of the public DMO;
- (2) F2 – the organizational and managerial inefficiency of the public DMO that consisted of four items illustrating the inefficient resources, and incompetent strategic and operational management practices of the public DMO;
- (3) F3 – the environmental and competitive operating context of DMS including six items referring to the national and local context in which the tourism organizations operate;
- (4) F4 – the tourism firms' organizational readiness and attitudes including seven items representing the resources that firms require to possess for using DMS and the firms' perceptions about the costs/benefits of using DMS; and
- (5) F5 – the DMS technological features and characteristics including four items referring to the technical DMS characteristics.

How important are the following factors on your decision to adopt and/or further use the DMS representing your destination ^a	M	SD	n = 441	F1 $\alpha = 85$	F2 $\alpha = 83$	EFA F3 $\alpha = 83$	F4 $\alpha = 81$	F5 $\alpha = 80$	Factor loadings	CFA	t-value
Unreliable public management mechanism	4.27	0.74	0.902						0.83		-
Lack of trust and commitment to the activities of the public DMO operating the DMS	4.16	0.76	0.881						0.87		20.24
Bad cooperation and communication with the public DMO operating the DMS	4.25	0.80	0.802						0.78		17.19
The dominance of a DMO management philosophy to develop a DMS for simply getting subsidies without having a strategy ensuring the sustainable and long term development of the DMS	4.11	0.89	0.794						0.76		16.42
Lack of a strategy and/or tourism policy of the public DMO operating the DMS	4.01	0.88	0.812						0.72		-
Bureaucratic and inefficient management of the public DMO operating the DMS	4.17	0.89	0.801						0.77		16.98
Lack of a skilled/specialized labor force at the public DMO operating the DMS	4.13	0.93	0.792						0.78		18.56
Lack or inefficient financial resources of the public DMO operating the DMS	4.29	0.87	0.781						0.77		15.04
Lack of a central body and/or procedures to collect and analyze destination data	3.94	0.86	0.803			0.803			0.76		-
Lack of a DMO at the destination	4.31	0.92	0.783			0.783			0.77		15.01
Lack of tourism planning, policy and strategy at national level	4.03	0.91	0.776			0.776			0.81		16.76
Lack of a leading firm to motivate and push DMS adoption	3.91	0.85	0.764			0.764			0.79		15.07
Conflict of stakeholders' interests at local destination	3.86	0.96	0.761			0.761			0.76		13.48
Competing tourism firms do not participate in DMS	3.67	0.92	0.700			0.700			0.78		14.97
Lack of internal IT infrastructure in my organization	3.88	0.86	0.823				0.823		0.73		-
Lack of IT skills and education in my organization	3.94	0.83	0.776				0.776		0.75		14.34
Difficult to integrate DMS with existing internal IT applications	3.01	0.82	0.741				0.741		0.74		13.98
Cost for joining or using a DMS is high for my organization	3.24	0.94	0.733				0.733		0.76		14.03

(continued)

Table IV.
Factors affecting the adoption of DMS

	<i>n</i> = 441	F1 $\alpha = 85$	F2 $\alpha = 83$	EFA F3 $\alpha = 83$	F4 $\alpha = 81$	F5 $\alpha = 80$	CFA Factor loadings	<i>t</i> -value
How important are the following factors on your decision to adopt and/or further use the DMS representing your destination ^a	M	SD						
Lack of organizational/managerial structures to support DMS use in my organization	3.57	1.04			0.704		0.76	14.97
There are more efficient e-channels than DMS that my organization can use	3.86	0.97			0.682		0.68	13.85
Lack of training about the role and benefits of DMS	3.12	1.02			0.646		0.74	14.46
Limited functionality and services offered by DMS	3.42	1.17				0.721	0.74	—
The DMS is difficult to use	3.01	1.01				0.613	0.61	12.84
It is not easy to learn to use the DMS	3.04	1.04				0.610	0.65	10.52
Low quality or comprehensiveness of the DMS information	3.24	1.21				0.606	0.70	11.37
Percentage of variance explained			23.11	11.14	10.42	9.16		
Cumulative percentage of variance explained			23.11	34.25	44.67	53.83		
Eigenvalues			13.24	10.03	4.56	1.45		

Notes: ^a(1-5 Likert scale, from not important to very important); significant at $\alpha = 0.05$; Excluded items from EFA: The public DMO has inappropriate managerial structures for performing distribution functions; low internal consistency; DMS are related to heavy overspending and inefficient use of financial resources; low item-total correlation value; The DMO operating the DMS does not have clear tourism goals and strategies; an environmental/competitive item that loaded with inter-organizational items; The use of DMS involves the charge of illegitimate costs; an organizational item loaded with environmental/competitive items; The reliability of the DMS platform is low; low item-total correlation value; The DMS does not support/generate e-bookings; low item-total correlation value; High operating costs of DMS relative to its services for my organization; low item-total correlation value; composite reliability/AVE (CFA): F1 = 0.88/0.62; F2 = 0.85/0.57; F3 = 0.86/0.58; F4 = 0.85/0.58; F5 = 0.84/0.54

Items from all five categories of factors were identified as influential on DMS adoption, which showed the need to adopt a socio-technical approach to DMS adoption. Actually, respondents perceived the technical issues and resources as less important on determining DMS adoption than the importance of inter-organizational, social and environmental/competitive factors, which is also compatible with Rodon *et al.* (2008) findings. This is also in line with previous findings emphasizing the impact of inter-organizational and social factors (e.g. Kumar and Crook, 1999; Zhu *et al.*, 2004; Lai *et al.*, 2011) and of the industry context (Cavaye and Cragg, 1995; Chwelos *et al.*, 2001; Lee *et al.*, 2005) on IOIS adoption. These findings are also compatible with tourism results showing the firms' negative perceptions about the unreliable and inefficient management of public DMOs (e.g. Frew and Horan, 2007; Bedard *et al.*, 2008), which in turn demotivate the former from adopting and using DMS. Findings also confirm tourism research emphasizing the need to nurture good inter-firm relations and a supportive operating environment (with strategic orientation) as crucial pre-requisites for implementing collaborative practices such as, destination marketing and DMS (Aas *et al.*, 2005; Wang, 2008a, b). The results also demonstrate the negative impact of the corrupted Greek public system and the inefficient public sector on the firms' motivation to support and pursue collaborative practices with any public organization. Greek public organizations have been continuously negatively evaluated for their management inefficiencies (e.g. bureaucracies, over-spending) and lack of transparency (e.g. political lobbying, lack of transparency in budget management), which in turn has created negative perceptions, attitudes and use of public services by Greek firms (Philippidou *et al.*, 2004). In this vein, the findings of this study simply reaffirm that the Greek tourism industry and the Greek public tourism destination organizations are not an exception from this reality. The findings also confirm arguments (e.g. Boonstra and de Vries, 2008) that IOIS, and so, DMS, are not and should not be viewed solely as a technology project, but also as a social, collaborative project requiring the participation and cooperation of various destination stakeholders. Thus, the successful initiation and adoption of DMS depend primarily on the social components and the socio-contextual and environmental issues of the network of the heterogeneous DMS stakeholders and secondarily to the technological characteristics of the DMS.

F1 was perceived as the most important factor influencing DMS adoption, as it explained 23.11 of the variance and all items had very high average scores. The four items loaded to F1 mainly reflect and confirm the impact of variables characterizing inter-organizational relations (e.g. trust, reliability, communication) on the decision of a firm to support and adopt an IOIS/DMS (e.g. Kumar and Crook, 1999; Frew and Horan, 2007). The items also specify how the organization leading the IOIS implementation can instill trust with its partners, i.e. by developing good communication practices, ensuring the long-term sustainability and public benefit of the pursued collaborative practices, and by adopting transparent and reliable management systems. In other words, this factor emphasizes the ways in which the organization supporting the IOIS should operate and act, so that it would instill and foster good inter-organizational relations amongst all the IOIS partners. To that end, literature examining how trust, transparency and accountability can be established and nurtured amongst collaborative partners can be very useful to further advance IOIS research.

F2 is the second important factor as it explains 11.14 percent of the total variance and all its items feature relatively high average scores. This factor consists of four items referring to the managerial capabilities and resources of the public DMO supporting the DMS. The importance of these items is not surprising when considering that IOIS adoption depends on the existence and support of a leading organization that possesses the necessary power and resources (Ramamurthy *et al.*, 1999) to support and lead the implementation of an IOIS. When considering that public DMOs can also use their legal power and constituents (Kuan and Chau, 2001; Sigala and Marinidis, 2012), then the pressure that they can exercise for increasing DMS adoption is even greater. In other words, the findings highlight the importance that respondents place on the presence of an efficient public organization with the appropriate (financial and human) resources to support, motivate and legitimately command the industry adoption of a DMS.

F3 includes six items referring to the competitive and environmental context that is required for supporting the adoption of a DMS. The items have relatively high average scores (but lower than the average scores of F1 and F2 items), explain 10.425 of the total variance and confirm the importance of competitive pressures and sector competitiveness on the adoption of an IOIS (Bergeron and Raymond, 1992; Cavaye and Cragg, 1995; Choudhury, 1997; Kumar and van Dissel, 1996; Boonstra and de Vries, 2005). These items also reveal the roles that the organization supporting the DMS should undertake. Specifically, the organization supporting the DMS should: push and motivate firms to adopt/use it; be responsible for collecting and managing destination data; formulate/influence the design of tourism policies and planning strategies; converge the conflicting interests of the various stakeholders. The findings also highlight the need of an organization to assume the responsibility for instilling, supporting and promoting a collaborative mindset and practices (such as, a DMS) within the fragmented tourism destination context consisted of many and various stakeholders with different (and sometimes conflicting) interests, goals and ideologies. The fact that respondents perceived “the lack of a DMO” as the most important item (the highest average score amongst all items) affecting their decision to adopt/use a DMS reveals respondents’ perceptions that the organization that is most appropriate for initiating and supporting a DMS is a DMO. The role of a DMO to act as a catalyst for a DMS and as a leader in promoting consensus, collaborative spirit and practices in a tourism destination is widely discussed (e.g. Wang, 2008b; Sigala and Marinidis, 2012; Morgan, 2012).

F4 reflects the impact of factors related to the organizational readiness, resources and perceptions of tourism firms on their decision to adopt a DMS. It consists of seven items explaining 9.16 percent of the total variance and referring to the organizational/managerial, human, technological and financial resources that a tourism firm should possess for adopting a DMS. The importance of these items is not surprising when considering that respondents represent SMTEs whose resources may constrain them from adopting DMS. The low importance of this factor is also not striking when considering that the adoption and use of DMS require firms to solely possess basic technical knowledge and resources, which respondents already possess (i.e. the technological profile of respondents showed that almost all respondents already know and use the internet for online promotion and transactions). The fact that respondents gave high importance (average value 3.86) to one item referring to their



perceptions “that there are other more efficient e-channels that they can use” also provides the following interesting observations: respondents are aware of other e-channels and their effectiveness; when deciding whether to adopt an e-channel, respondents consider both its costs and benefits; and respondents feel competent to use other channels. This in turn demonstrates that despite the small size of their firm, respondents may indeed possess the necessary managerial and technological knowledge to use many other e-channels and so, the need to rely on DMS for having an e-presence is limited. Coupled with the fact that respondents also reported low and negative perceptions about the effectiveness and costs/benefits of DMS, the low adoption of DMS is not surprising.

F5 explains 7.15 percent of the total variance and consists of four items reflecting the impact of DMS technical characteristics on DMS adoption. The items refer to the functionality, services, content, interface and easy-of-use of DMS. As respondents reported a low importance of the influence of these factors on DMS adoption, this reconfirms that DMS should not be primarily viewed as technological, but as social and inter-organizational projects.

Confirmation of factors affecting DMS adoption

CFA using maximum likelihood method (Table IV) was conducted for validating the unidimensionality, composite reliability and construct validity of the factors influencing DMS adoption. Table IV provides the standardized loadings and the average variance extracted (AVE) of each construct.

The standardized loadings for the items met the minimum criterion of 0.40 (Hair *et al.*, 1998), and the values of goodness-of-fit indices were also acceptable confirming the appropriateness of the model's fit with the data (Anderson and Gerbing, 1988) ($\chi^2 = 768.316$, $df = 263$, $\chi^2/df = 2.86 < 3$, ($p < 0.001$), $CFI = 0.94 > 0.9$, $NNFI = 0.92 > 0.9$, $RMSEA = 0.04 < 0.10$). The coefficient α of the five constructs also exceed the minimal acceptable level 0.70 (Nunnally, 1978), and AVE of all items exceeds 50 percent (Gerbing and Anderson, 1988). Convergent validity was assessed by checking the statistical significance of the factor loadings in CFA (Anderson and Gerbing, 1988). As all factor loadings for items measuring the same construct were significant (at $p < 0.001$), the convergence validity is passed and so, all items effectively measure their corresponding constructs. To investigate whether constructs measure different dimensions, discriminant validity is checked by calculating the intercorrelations between constructs. Discriminant validity was satisfied because none of the pairwise correlation between factors exceeded 0.85 (Kline, 1998) meaning that the five constructs are relatively independent from one another (Table V).

Overall, both EFA and CFA supported this five-structure of factors influencing the respondents' decision to adopt DMS.

	F1	F2	F3	F4	F5
F1	1.00				
F2	0.53	1.00			
F3	0.50	0.32	1.00		
F4	0.33	0.35	0.21	1.00	
F5	0.23	0.22	0.20	0.18	1.00

Table V.
Correlations between factors

Factors influencing respondents' perceptions

T-tests were conducted for examining whether any significant difference exist between the perceptions of respondents representing small and large firms, DMS adopters and non-adopters, private and public organizations. The size of a firm may affect its perceptions of the importance of factors influencing its decision to adopt an IOIS (e.g. Kuan and Chau, 2001). However, *t*-tests revealed that firms with less than 49 employees did not hold different perceptions about the importance of items influencing their DMS adoption/use in relation to larger firms (more than 50 employees). This is not surprising when considering that using DMS only requires basic internet knowledge and infrastructure that most SMTEs currently possess.

According to previous findings (Lai *et al.*, 2011), previous use and experience with an IOIS may positively influence a firm's perceptions about its decision to adopt/use an IOIS. None significant difference was found between adopters and non-adopters meaning that both of them gave similar importance to all factors affecting their DMS adoption/use. For example, both DMS adopters and non-adopters gave similar importance to factors related to the inter-organizational and contextual factors on DMS adoption. Hence, the lack or the previous experience with the DMO/DMS and the tourism environment did not make respondents to hold different perceptions. This may be due to the fact that the negative perceptions towards public organizations and their social (inter-organizational context) is widely spread and known within the Greek industry, and any attempt to change such attitudes would require time, great effort and radical changes (Philippidou *et al.*, 2004).

Public and private tourism stakeholders also hold different perceptions and attitudes to destination management and marketing (Sigala and Marinidis, 2012; Alford and Clarke, 2009). *T*-tests comparing the perceptions of public and private organizations revealed statistically significant differences in only two items. The fact that both private and public organizations gave similar importance to almost all items means that all stakeholders, irrespective of which stakeholder they represent, recognize the existence and negative influence of factors such as (inter)organizational and managerial inefficiency of the public DMO on DMS adoption. This may reflect a positive perspective of the study's findings, since the industry wide recognition and awareness of the problem is a good start for solving it.

However, findings revealing significant differences in stakeholders' perceptions about specific items may not provide a positive perceptives, because these perceptual differences may reflect that stakeholders have different perceptions about the reasons of the problem (i.e. the low DMS adoption). Specifically, in relation to respondents from private firms, respondents from public organizations gave statistically significant lower importance to the impact of the item "lack of a DMO on DMS" on DMS adoption ($t = 0.0021$, $\alpha = 0.05$). So, although public organizations recognize the impact of their inefficiencies on DMS adoption, they may still consider that the existence of their organization does play an important DMO role at the destination. In addition, relative to private firms, public organizations reported significant lower importance of the item "There are more efficient e-channels than DMS that my organization can use" ($t = 0.0035$, $\alpha = 0.05$). This may reflect again that in relation to private firms, public organizations have stronger perceptions about the efficiencies and benefits of DMS as an e-channel despite the reported inefficiencies of the DMOs/DMS. The existence of these significant differences may imply the existence of different and/or conflicting

interests, perceptions and ideologies amongst tourism stakeholders regarding the role, the performance and the importance of DMOs and DMS in the tourism industry. If this is true, then the cooperation of all stakeholders for supporting the collaborative development of a DMS through a public DMO may not be realistic, unless these different perceptions are first addressed.

Conclusions and implications for future research

The study contributes to the literature by investigating the perceptions of several stakeholders about the importance of factors influencing DMS adoption. Findings also advance IOIS research by contextualizing findings to an industry, which in turn also helped in specifying and including particular social/inter-organizational factors as explanatory factors to IOIS adoption. An EFA and CFP analysis confirmed the influence of five factors referring to: inter-organizational factors; organizational factors of the supporting DMS organization; environmental/competitive factors; organizational readiness of firms; and DMS technical characteristics. Firm's size and previous use/experience of DMS were not found to significantly affect the importance of these factors. However, there is evidence that some significant differences between the perceptions of public and private tourism stakeholders do exist. Specifically, in relation to respondents representing private firms, respondents from public organizations reported to have more positive perceptions about the role of DMOs and the effectiveness of the DMS in tourism destinations. The existence of these different perceptions are very important, as they show that the various stakeholders may possess different understanding about the root of the problem (i.e. low DMS adoption) and so, of the possible solutions and changes required to address it. Overall, the study findings highlight the need to address the adoption of DMS as a socio-technical project that should primarily emphasize on the management of stakeholders' relations, perceptions and interests. Hence, future studies should focus and further investigate how to identify and manage the different interests and perceptions of DMS stakeholders.

The findings also revealed that several issues relating to DMO management and to the ways in which DMOs operate their DMS are perceived as very important factors determining the adoption of DMS. Hence, it is suggested that future research should focus on examining the factors affecting the success of DMS not only at their adoption stage, but also at their implementation and day-to-day operating stages. Since the way in which DMOs are managed and operate their DMS plays a major role on the firms' decision to adopt and use DMS, future studies should provide further light into the managerial and operational aspects of DMS. Moreover, as the perceptions and interdependencies of stakeholders change depending on the time and the stage of the IOIS implementation (Boonstra and de Vries, 2008), the success of an IOIS project and/or of an inter-organizational collaborative practice (such as a DMS) requires the management of different resources and the co-ordination of various (conflicting) power stakeholders' relations during each stage of the IOIS' lifecycle. To that end, research into IOIS could be further advanced by adopting a longitudinal and qualitative approach that covers all the stages and all the stakeholders involved in the IOIS implementation and operations.

The findings also imply the need of the behavioral, institutional and organizational changes that DMS stakeholders (specifically, the public DMOs) have to undertake for

supporting the DMS adoption. In this vein, future studies could also be directed in investigating the specific changes (for example in attitudes, cultures, political structures and mechanisms) that IOIS' partners are required to go through for accepting and fostering collaborative relations amongst various tourism stakeholders and the public organizations. For example, Greek DMOs would need to be transformed and modernised by adopting new public management principles and practices (e.g. less bureaucratic hierarchies and structures, transparency, accountability and reliability in services and budget management) that can in turn nurture trust and communication with destination stakeholders and so, support the development of collaboration activities. Research should also examine the change management processes that are required and can support such changes in DMO's management, as current research on these issues is still scarce (Philippidou *et al.*, 2004). Studies may also investigate the processes and the strategies required to be adopted by DMOs in order to change the other stakeholders' perceptions about them. To that end, the findings also identify three areas of organizational and behavioral change that is required for increasing DMS adoption: relationship change (related to the behavior that instills and supports trust building, reliability, commitment and communication quality amongst the stakeholders and the operator of the DMS); knowledge sharing (related to the behavior supporting information sharing) and goal sharing change (related to the behavior aiming to aligning goals, developing and participating in collaborative practices, solving conflicting interests and aims).

The findings are based on a specific type of IOIS and sector/context, i.e. the public owned and developed DMS in the Greek tourism industry. Thus, caution is required in generalizing the results to other types of IOIS as well as to other social and environmental contexts. As there are many types of IOIS (e.g. public, private, electronic monopolies, electronic dyads, multilateral, vertical or horizontal industry specific) each one having and operating in a different context (Son and Benbasat, 2007), it is suggested that the study is replicated in different IOIS contexts in order to refine, test and enhance results. Lastly, given the complex nature of the topic, it is suggested that future research should use multiple theories, perspectives and study fields (e. collaboration theories, political science, IOIS, supply chain, etc.) in order to more holistically examine the issues of DMS adoption and management.

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