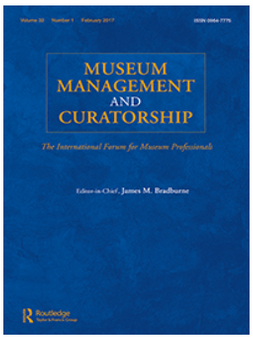

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Smart, open, user innovation and competitive advantage: a model for museums and heritage sites

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ABSTRACT

The aim of this paper is to analyze the meanings and the contents of innovation and its role in museums and heritage sites' management to create higher levels of competitiveness. Through a complex framework, we investigate the key role of innovation in determining the competitive advantage. We propose a theoretical model to study smart and open innovation in cultural services, with specific reference to museums and heritage sites, building up an 'innovation indicator', in order to measure the nature and the intensity of innovation as well as to identify how it can be leveraged to sustain a business-oriented approach and to get competitive advantage. This latter is conceived in strategic terms, using a resource-based theory approach: competitive advantage is therefore considered with respect to both economic and social performance, market and competitive positioning. We apply our index on a group of innovative selected cases of museums and heritage sites using nonlinear principal component analysis and hierarchical clustering. Empirical results show that smart innovation seems to be a necessary path to achieve competitive parity but it is not sufficient for competitive advantage.

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Museums and heritage sites; smart innovation indicators; open; user and smart innovation; nonlinear principal component analysis; hierarchical clustering

1. Introduction

Innovation is studied in a complex stream of research that encompasses a huge range of aspects and that can be addressed to various sectors. The first contributions to the field date back to the 1960s, when technical progress and development of new organizational forms inspired scholars to investigate the management of innovation (Burns and Stalker 1961).

Some research contributions focus on technological innovation in the systems of production and marketing (Dosi 1982; Teece 1986). Over the years, scholars have started to consider other dimensions of innovation, such as the social (Kanter 1988) and the systemic ones (Ahuja 2000), introducing new applications of the concept and inspiring further reflections on the theme. Kanter (1988), in particular, defines innovation process as uncertain, knowledge-intensive and controversial, because it implies that firms combine different behaviors, such as competition, cooperation and cross-boundaries.

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It becomes clear that innovation has to be studied with reference to different fields: from strategic management to marketing, to organization, to the development of new tools and systems and to the relationships with other firms of the same sector as well as of other sectors.

This is particularly true with reference to the shift from the manufacturing to the service economy, within which, in particular, knowledge-intensive industries require intensive innovation both in management and in organization (Kandampully 2002; Hipp and Grupp 2005). Traditionally, the theme of innovation has been studied in the literature with reference to manufacturing industries or to some service industry, disregarding the cultural sector. As known, this sector is wide and includes different kinds of products/services and therefore different organizations (heritage sites, museums, cultural guides, information and communication technology (ICT), entertainment, advertising and film productions to include design and manufacturing industries such as fashion clothing, jewelry, craftsmanship – Scott 2004).

Hence, the aim of this paper is to investigate the role of innovation in determining competitive advantage for a specific category of cultural firms: museums and heritage sites. The focus is on these two categories of cultural organizations because of the peculiarities they express, which can be useful to highlight certain results and insights that show the growing importance of innovation for the whole industry.

Words like innovation and creativity in a business-oriented approach may appear rather unusual when they refer to museums or heritage sites. Over time, the concept of innovation, however, has translated itself into those of open and user innovation. Open innovation can be defined as ' … the use of purposive inflows and outflows of knowledge to accelerate internal innovation, and expand the markets for external use of innovation, respectively' (Chesbrough, Vanhaverbeke, and West 2006, 2) and involves different perspectives (Gassmann, Enkel, and Chesbrough 2010), among which are, the user perspective, the institutional perspective and the cultural perspective. In particular, literature on user innovation has shown how users can sometimes generate more innovative ideas than designers themselves in product innovation (Von Hippel, De Jong, and Flowers 2012) and both minor and major innovations across industries have often been determined more by users than designers (Von Hippel 2005): that consumers can in fact apply some innovations for their own use of the product can be shown to be commercially attractive for organizations (Poetz and Schreier 2012). This perspective has also led many firms toward crowdsourcing activities (Bayus 2013), even if this process has to be guided, since it often happens that user-promoted innovations create more benefits for the customers but show a lower feasibility (Poetz and Schreier 2012; Nishikawa, Schreier, and Ogawa 2013). In this regard, smart innovation can be defined as 'the capability for firms to create new opportunities through a continuous relationship with the main actors in a destination, fostering an innovative managerial approach in an effective way in order to gain sustainable competitive advantage' (Della Corte 2014, 203) and therefore the result of a combined approach that takes into account both user and open innovation. Smart innovation and its links with open innovation have been widely dealt in the literature with reference to innovation in services also within smart cities (Nam and Pardo 2011; Errichiello and Marasco 2014). The terms 'Smart Cities' and 'Intelligent Cities' are usually used to define destinations where advanced ICT infrastructures and digital tools help in providing high-quality and speedy services, with a consequent overall development of cities,

both economically and socially (well-being for visitors and for residents). This approach of course requires a user-driven open innovation approach, characterized by real-life experimentations and cooperation among stakeholders, here including users across the value chain. This issue has to be studied not only with reference to the destination as a whole, but also to its main attraction factors (resources) and actors of the local system of offer, like museums and heritage sites. These latter are 'smart' when they pass from the static structure to an open and intelligent model of services (the so-called intelligence of technology (IOT – Chianese and Piccialli 2014). In this view, museums and cultural heritage can be considered as 'environments where people come into contact with a reality of objects capable of arousing interest and excitement because they are offered a direct perception or their knowledge or a combination of perception and knowledge' (1). Intelligent museums and heritage sites present a high technological level based on high-tech sensors immersed in the environment and specific communication tools.

Museums and heritage sites, however, in their mission, also pursue social goals (such as education, accessibility and cultural diffusion), but management still appears rather *retro* in its approach: curators are sometimes primarily focused on preserving the cultural resource, rather than on finding new ways to promote it and make it more usable.

In front of the progressive extension of the competitive environment and of the intensification of competitive forces worldwide, such firms are called to face important shifts, in a context where the cultural resource per se is not sufficient any longer, and significant strategic and marketing innovations are necessary to satisfy the expectations of the demand and to interact with market targets.

Therefore, why should museums and cultural heritage sites 'smartly' innovate? Among the different factors that are determining the shifting scenario where they are competing, one of the most relevant is represented by the abrupt and radical changes in technologies: the digital era, the world of apps, the social networks and the relational tools are having a growing impact on services, here including tourism and cultural services. Besides, there is an increasing need and will to apply ICT to museums' fruition, coherent with the growing experience-based approach (Prahalad and Ramaswamy 2004) in tourism and cultural services. Another relevant aspect is the growing variety and variability of the demand: targets markets increasingly change their preferences and needs. All these factors prove that nowadays even the cultural sector is exposed to 'hypercompetition' (D'Aveni 1994; Alén, Losada, and Domínguez 2015). Museums and heritage sites are seen as incubators of different cultural activities and products, for different target markets, according to a continuous relationship with the customer, before, during and after the visit. Digital activities are often involved in the whole process.

In such a scenario, innovation appears to be the appropriate choice in gaining a sustainable competitive advantage.

In this work we define competitive advantage according to resource-based theory (RBT) (Barney 1996; Barney and Clark 2007), which uses a concept of competitive advantage in terms of above-normal performance. This has to be conceived in two directions: competitors on one side and investors' expectations on the other. Firms have to try to gain a competitive advantage, and more precisely a sustainable competitive advantage, which means not just in the short run but over time. Of course, the application of these concepts to cultural organizations – like museums and heritage sites that also have both a strong social

and cultural vocation – seems difficult. And yet it has been proved that the concepts of business orientation, efficacy and efficiency can also be applied to sectors considered to be non-profit or at least pursuing a social mission. In this case, therefore, competitive advantage has to be considered with respect to the role that the cultural resource plays in the attraction of the territory where it is located and faced with the other culturally attractive factors of the destination. Besides, ownership can include both private and public owners, with a complex set of economic, social and cultural objectives.

Competitive advantage and performance of museums and heritage sites can be measured in different ways. Most of the literature underlines that both economic and non-economic aspects have to be taken into account (Gainer and Padanyi 2005) more precisely economic, market and social (Camarero, Garrido, and Vicente 2011). In our opinion, the economic and market performance includes data on visitor numbers in terms of total attendance (Larceneux, Caro, and Krebs 2016), membership numbers (Stolle and Rochon 1998) in case they are cultural associations and job creation, all aimed to ensure survival and/or profitability, visitor satisfaction and interests in follow-up activities through social media. The social and cultural dimensions refer to the approach toward cultural diffusion, conservation and improvement in residents' standard of living.

Before starting the analysis, some preliminary definitions are necessary, in order to better develop the research, in order to single out the specificities of innovation strategies and processes in museums and heritage sites.

As noted above, these firms are more and more exposed to competitive pressure and need to use some economic milestones in order to gain efficiency for development and even survival. And yet, especially in Europe, managers reveal a rather conservative and preservative approach which does not foster innovation. This is due to the fact that cultural organizations like museums and heritage sites have a double soul: on one hand, they have the social responsibility of preserving the works of art that are the patrimony of the local community as well as the social role of informing and promoting arts and culture within the population; on the other hand, they are called to face the more and more competitive environment in the global context, which requires a business and market-oriented approach (Scott 2004).

In this paper, we define the concept of open, user and smart innovation applied to museums and heritage sites, basing the analysis on a complex conceptual framework. We therefore propose a theoretical model, which we apply to a group of innovative selected cases through a multiple case study analysis (Stake 2013) that provides very interesting results for discussion and suggestions for further research. Results show, however, that the application of the forms of innovation described above, rather than being a source of competitive advantage (either sustainable or not), merely leads to competitive parity between firms.

2. Theoretical framework and proposed model

The topic of innovation can be set within a complex and integrated framework (Figure 1), in which different approaches on innovation, developed both in strategic management and marketing, converge.

Cultural organizations, such as museums and cultural heritage sites, represent territorial attractive factors (resources able to attract visitors, even becoming one of the main

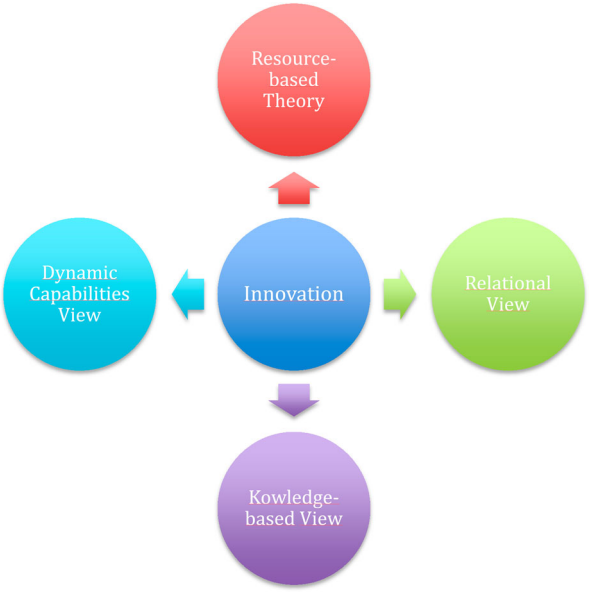

Figure 1. The theoretical framework.

motivations in choosing a specific destination – Della Corte 2013). This concept recalls RBT (Rumelt 1984; Barney 1996), according to which resources can be viewed as strategic when they are valuable, rare, costly or difficult to imitate and organizationally used. This approach is based on the so-called VRIO framework and analyses the resources in terms of value, which means the ability of neutralizing the threats and exploiting the opportunities from the environment; rarity, which refers to a resource that is rarely present among existing and potential competitors; inimitability, which concerns a resource that is costly or difficult to imitate; organization, that explains if the resource is used and valorized within the firm. Museums and heritage sites are often potentially strategic resources because, even if they are valuable, rare and unique or difficult or costly to imitate, they are not well used at a local level, owing to the lack of organization in terms of valorization, promotion, fruition and coordination of local cultural attractive factors.

In order to overcome organizational weaknesses, three further approaches (knowledge-based view, dynamic capabilities view and relational view), which represent developments of RBT, have to be taken into account. The knowledge-based view (Kogut and Zander 1992; de Castro, Sáez, and Verde 2011) can help in developing a new approach in managing cultural organization, considering knowledge (the culture and the cultural identity expressed by the cultural firm with its historical and artistic patrimony) as the main and even unique source of innovation (Zhou and Li 2012). Therefore, the factors behind the social and socially responsible mission can be the basis on which to develop innovation through new knowledge generation and transfer. This process, however, requires a dynamic approach that takes into account the dynamic capabilities (Teece 2007), able to develop tools and methods to change and/or use differently the available set of resources and knowledge. Besides, it can be fostered by the set of relationships the cultural firm is able to initiate and develop with other actors, within their proper industry

as well as with their connected sectors (such as the tourism industry, craftsmanship, manufacturing, etc.). In this direction, the relational view (Dyer and Singh 1998) concentrates on cooperation, skills and knowledge acquisition through relationships as well as coordination issues. Therefore the cultural firm operates among a network of actors which create value reciprocally through interaction.

Within this theoretical framework, the concept of open and user innovation, from the relational view perspective, can be defined as the process according to which the cultural firm uses both internal and external ideas and hints, internal and external paths, thereby acquiring and sharing at the same time knowledge and competences in a complex set of relationships. Indeed, open innovation allows a cultural firm to activate and exploit the power of co-operating activities beyond the firm's boundaries (Bogers and West 2012). If open innovation is applied well, it can generate ideas that permit a better commercialization of the cultural product since it is the outcome of 'combinations and re-combinations' between the museum/cultural heritage site and the external context in terms of either actors or factors. In this light and according to the perspective of user innovation (Von Hippel 2005), users are considered the source of both incremental and radical innovation. The key elements inciting users to co-innovate are not only their knowledge but also their motivation. In this regard, the cultural organizations must be able to feed this motivation through smart technologies, tools and smart co-planning activities. Furthermore, managers of cultural organizations have to own managerial strategic competences, recognizing not only the innovative idea but especially ideas having a certain degree of innovativeness. In practice, only in the case of useful and novel ideas can the user innovation that results be applied afterwards.

Among these innovations, the strategic role of the interactions with consumers becomes a key actor in marketing activities.

In this work, we adopt the definition of smart innovation (Della Corte 2014, 203) as 'the capability for firms to create new opportunities through a continuous relationship with the main actors in a destination, fostering an innovative managerial approach in an effective way in order to gain sustainable competitive advantage'. Looking specifically at museum and cultural heritage sites, moreover, these are often key attractive factors for visitors to a certain tourist destination. Their competitiveness, however, does not depend only on the resource they represent or their managers' capabilities in promotional activities and innovativeness in their fruition, but also on the overall set of relationships they develop with other key actors on the territory, from tourist firms (travel agents, excursion companies, conventions and visitors bureau, local Institutions, universities, hotels – just to mention the main ones) to local transports (for co-marketing promotions) and others (craftsmanship, local productions of excellence, etc.). This is the reason why the relational view is also useful to the theoretical construct.

Starting from these definitions, it is possible to take into account the main dimensions of this phenomenon, considering the following variables: the *technological dimension*, concerning the introduction of new tools and technologies that facilitate processes and contents sharing, increasing the value of intangible items (Gallouj and Weinstein 1997) in the 'smart optic'; the *experiential dimension*, which refers to the close interaction between the production and the consumption phases (Papastathopoulou and Hultink 2012); the *systemic* dimension, which implies that firms operating in a destination have to cooperate in a networking logic since they can take advantage of the creation of profitable

interactions among local actors and between local and external firms (Della Corte 2012; Della Corte and Aria 2014). With this view, as confirmed by several authors (Shalley, Zhou, and Oldham 2004; Camarero and Garrido 2011; Camarero, Garrido, and Vicente 2011), also the organizational dimension acquires importance, owing to 'the changes in the profile of the general managers and museum staff, specifically to art-expert curators being replaced by art and business-expert curators, as well as the introduction of a multidisciplinary managerial team balancing business and cultural skills' (Figure 2).

According to the aim of this work, innovation has to be studied from different perspectives, linking the specific cultural service dimension with the innovation stimulus and considering the various actors that are involved in this cultural innovation process at different levels. This helps, on the one hand, to define and evaluate the role of museums and heritage sites' resources and capabilities in using innovation to improve their performance and, on the other hand, to single out customers' as well as other stakeholders' perceptions about the services these firms are able to put in place.

The different dimensions of innovation concern both the induced (the customer's decision process before the actual visit) and the organic level (perceptions during the visit) of marketing (Della Corte 2013), in order to create increased value for museum visitors. This means that innovation can be introduced in the different phases of the creation and distribution of the product/service, affecting both promotion and use of cultural resources. If the customer has an active role in this phase, he/she will be more likely to achieve greater levels of satisfaction during the visit. On the other hand, it is necessary to organize and address the innovation process in the right direction, in order to take advantage promptly (Della Corte 2014).

According to these assumptions, we hypothesize the following:

HP1: Smart innovation can be a source of sustainable competitive advantage, able to transform cultural firms, such as museums and heritage sites, into modern cultural organizations.

HP2: Smart innovation's main variables are associated with different levels of innovativeness among cultural firms.

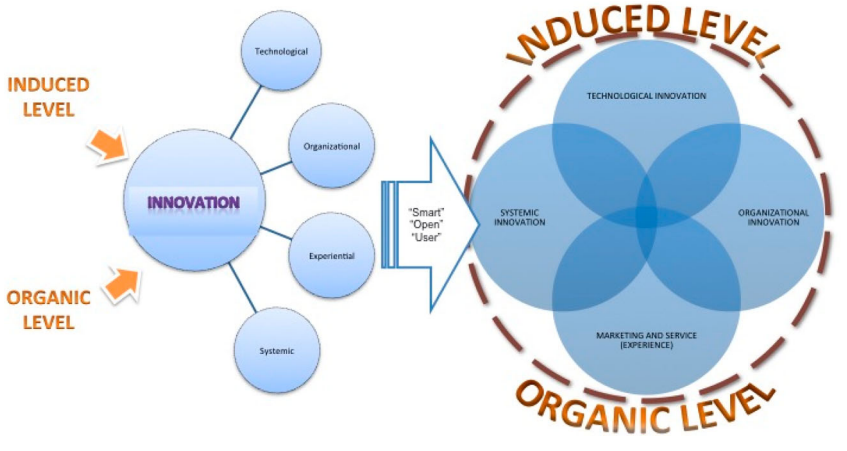

Figure 2. The different dimensions of innovation.
Source: Our elaboration from Della Corte (2014).

In order to test the above underlined hypotheses, a theoretical model is proposed, aimed at evaluating the main contents of smart innovation in cultural firms and at verifying if they represent possible sources of differentiation and competitive advantage for cultural firms. We would like to underline that our concept of smart innovation is, in this study, a wide umbrella that includes different features (ICT, organization and marketing), with differentiated factors linked to both open and user innovation. In this work the three explicated forms of innovation – open, user and smart – have to be considered as a whole: more precisely, in our view, smart innovation also includes open and user innovation. This is why we labeled the proposed model as the 'smart innovation model' (SIM).

Technological innovation is transversal between the organization and the marketing activities, affecting both the induced level (Bakhshi and Throsby 2009; Alfano and Pantano 2010) and the organic level of marketing, which involves organizational processes and human resource management. There is a strong link between technological and organizational innovation since technology cannot be considered as a resource per se, but if there are high human capabilities within a firm, they can be used to obtain competitive advantage. The complementarity between the technology and the organizational structure has been studied by numerous scholars, who have shed light on the importance of technological innovation as a driver of organizational changes within the firm (Danneels 2004; Mothe and Uyen Nguyen Thi 2010).

With reference to the marketing studies, at the induced level innovation can improve marketing activities to increase the information provided to consumers and to enhance both promotional and price policies (Tidd and Bessant 2011). This is even more possible thanks to web-based tools (like Big Data) that facilitate processes (Valencia, Valle, and Jiménez 2010) to understand and elaborate the customers' needs, in launching new products as well as in developing or refreshing the existing ones. Blogs, social networks and other online platforms are based on tourists' willingness to share their experiences and ideas with other people and take place thanks to the online communities in which there is the highest users' involvement. Tourism 3.0 takes advantages of intelligent systems of booking, personal trip advisors and recommendation systems (Cooper 2001, 330) based on relational marketing (such as viral marketing among others – Alkharabsheh et al. 2011), in order to deliver the most innovative tailored information (Steele, Mummery, and Dwyer 2007) to each user.

Looking more precisely at innovation and cultural heritage (Bowitz and Ibenholt 2009; Choi et al. 2010), this concept is still emerging and needs to adopt some of the insights developed in other fields (i.e., smart cities 'literature'). First of all, this paper identifies what are the components shaping the concept of 'smartness' for cultural heritage and museums.

Smartness implies the use of ICTs (Kanter and Litow 2009; Garau 2014). In this field, the implementation and use of augmented reality and 3D technologies is verified in the fruition phase of the cultural resources (Garau 2014). Furthermore, the creation of cloud environments is useful in the organic phase, while cloud platforms become of fundamental importance in the induced level of marketing. This has led to the IOT, where an intelligent environment is created, different layers creating an interactive setting and new communication tools (Kelly, Suryadevara, and Mukhopadhyay 2013; He, Yan, and Da Xu 2014). Thus *Technological changes* allow us to avoid binding consumption and the physical place. Nowadays, customers have the possibility to have access to an exhibition by using

their PCs or tablets, to attend a meeting or a show via conference call and to buy cultural items via e-commerce (Camarero, Garrido, and Vicente 2011). Furthermore, technological innovation allows us to safeguard, protect and enhance cultural heritage and the art resources it represents.

As regards *organizational innovation*, organizational structure and human resources' competences can increase competitiveness (Mietzner and Kamprath 2013). The more a firm is innovative, the more its organization has to be able to imagine and/or create needs and to manage its team in reaching common objectives. Individual contributions to service differentiation support the creation of an 'infinite field' of knowledge (Kandampully 2002).

This aspect is explicit in various variables connected with open innovation:

(1) *Interfunctional coordination*, when the functional areas are able to create synergies and to share information and knowledge among all members of the organization. It enhances relationships among groups with different experiences, skills, knowledge and background and fosters cohesiveness and collaboration (Auh and Menguc 2005), favoring achievement of goals.

The need for a managerial approach for cultural firms implies a multi-faceted set of competences in order to effectively manage firms' activities. For this reason, the organizational innovation also lies with the staff, whose members may have different educational backgrounds (art, history and business management) that can improve the offer and the services through the other dimensions of innovation. It is possible to introduce temporary and multidisciplinary teams through scholarships, fellowships or other initiatives, whose members can combine their competences in order to meet objectives.

(2) *Equity/structure*. The nature of the cultural sites can be public, private or mixed but top management decisions can lead to both radical and incremental changes in organizational structure (Camarero, Garrido, and Vicente 2011). The change from public to a mixed or totally private organization also implies changes to management, toward a prevalence of customer-oriented approaches. According to their organizational structure, some firms maintain a cultural model linked to the prevalence of their curatorial function, while others adopt a business model with integrated business functions (R&D, marketing and so on).

The variables described above shape the organizational innovation of the organizational structure. To these it is important to add the multidisciplinary teams and the general managers' background, as they can guarantee a smart decision-making process (Garau 2014). Indeed, the creation of a smart organization allows firms to share cultural knowledge (Ratcheva 2009) among the multidisciplinary teams. This leads to the development of a smart context where members of each disciplinary team can support the cultural heritage/museum firm through the diffusion of their 'tacit knowledge' and the activation of 'smart conversations' in order to achieve 'short feedback loops' (Botkin 1999). According to a technological point of view, the creation of the smart organization is supported by internal cloud systems and platforms, facilitating the organizational members' interactions.

The managers' background is also of fundamental importance as they can be one of the sources (Mascarenhas 2011) of smart innovation within the organization. Moreover, previous background has a positive influence on the leadership style, which can favor the diffusion of smart innovation among the members of the cultural organization. This

background is successful, however, when it creates new and different contexts, thereby creating continuous opportunities to capture or promote change.

Innovation in marketing and service deepens its roots in the issue of creating experience for customers (Pine and Gilmore 1998; Carù and Cova 2003) through educational and entertainment activities in which the customer is an active actor in the learning process, rather than the simple addressee of information. Being involved in creating an experience conceived as a set of knowledge, emotions and new sensations (Rinallo, Borghini, and Golfetto 2010), cultural firms have focused on creating activities addressed to more relational and involved marketing. Relational marketing can help create complex and tailor-made experiences for visitors. What in the past was conceived as after-marketing (feedback analysis, customer satisfaction analysis and so on), now can be a context for the provision of the activity, thanks in part to the support of social media and online communities (Della Corte 2013). One of the most powerful examples of this is 'Second Life', a virtual world where users can assume their favorite identity and 'live' with other users of a community where everyone exists in the real world and everything they see is built in real life. This is based on the idea that users seek the opportunity to live in a virtual environment where they can be what they want to be.

In this virtual space, there is a range of museum-like activities, such as Second Life museums that contain digitalized real artifacts and collections of 'born digital' artifacts that can be collected, curated and preserved by the community (Urban, Twidale, and Marty 2007). To give an idea, currently there are about 16 museums and more than 35 galleries that have created a virtual identity on Second Life (www.secondlife.wikia.com).

With reference to the marketing and service dimension, we drew from the existent literature the main variables used to study the issue and specified whether they refer to the induced level of marketing rather than the organic one.

The variables considered are the following:

Relational marketing. Cultural organizations may pursue innovation with the aim of creating greater value for visitors and other audiences through advanced customer relationship management (CRM) systems and relational marketing actions. In the first case, innovation can be measured according to the system used. Similarly, relational marketing actions can be measured according to the type of interactions between firms and customers on websites and social media, which can be spontaneous rather than guided, creating mutual values (Lusch, Vargo, and Wessels 2008). In this regard, customers as well as citizens and other stakeholders of the territory constitute the *humus* of the intellectual capital of smart organizations since this 'intangible social infrastructure' is shaped by people and by their relationships (Dameri and Ricciardi 2015). Indeed, their interactions through smart platforms, smart CRM systems and cloud engines can generate smart strategies both for the cultural organization and for the destination where it is situated. The variable connected with relational marketing and CRM refers to both the induced and the organic level of marketing. Indeed, the relationships between the cultural heritage site/museum and the potential or actual visitors can be activated, either before or after the visit to the site. Relational marketing and CRM have assumed even more articulated features, becoming a strategic tool for supporting organizational decisions. In this sense, the provision of smart innovation is deployed in terms of open and user innovation since it is well activated by relational marketing policies.

Customer involvement. Customer involvement is linked to the ability of cultural organizations to create activities that enrich their offers, matching specific customer needs (such as children's activities, family activities and so on). They refer to dedicated activities for groups, the creation of museum interactive labs and, at the most innovative stage, the introduction of high-tech activities that enrich and customize the customer's experience. Furthermore, the availability of innovative multilingual services can also improve customer involvement *in a smart way* (Ruotsalo et al. 2009). This variable concerns the organic level of marketing, where the cultural heritage site/museum activates strategies of involvement, creating connections and awareness between the contents of the cultural organization and its audience. In this case, user innovation is the prevailing component.

Learning about customers' needs. According to the emerging role of the customer in the service offering (Zeithaml, Bitner, and Gremler 2006; Sigala 2012), cultural firms have to overcome their curatorial role to be more focused on audience attraction (Gilmore and Rentschler 2002). The development of networks may allow a firm to redefine the boundaries of its core competences when customers require products or services that are not within its realm, procuring them from outside and improving its overall set of competences (Kandampully 2002). In this regard, 'making real re-use of personal experiences related to cultural heritage access for a variety of interest groups' (Ruotsalo et al. 2009) is the true key of smart innovation in this field. This is possible thanks to the implementation of smart devices that can personalize information, combining more services (i.e., core and supplementary services of cultural organization, services of both the destination and single firm). If the cultural organization or the tourist destination activates smart systems of tourist/visitor profiling, the understanding of the customers' needs not only becomes easier, but also serves as a strategic activity to outline future marketing plans. This variable relates to both the induced and the organic level of marketing and is more connected with user innovation.

Moreover, the collection of customers' reviews and critiques on Facebook, for example, shows a high degree of interaction between the firm and the customer, since feedback is collected in real time and cannot be hidden from other users.

Media and social innovation. The most innovative cultural firms have adapted themselves to the evolution in demand by changing their communication tools (Solima 2009). Social media and mobiles allow the two- and multi-way engagement of people through the exchange of comments, opinions, ideas and about the collections and their themes and concepts that is in contrast with the traditional guided tours and audio tours. Media and social innovation also refers to both the induced and the organic level of marketing. This allows the application of user and open innovation because social media tools create strategic bridges between the museum/cultural heritage site, its visitors and its other stakeholders (i.e., citizens, local institutions, various groups of interests, etc.).

Innovation in supplementary services. This kind of innovation is useful since it serves to reinforce the awareness of the cultural heritage site/museum itself. For example, the marketing of merchandise, not only from the perspective of traditional in-store activity, but also through the online shop, based on the use of apps (Garau 2014) can promote both the cultural attractor and the local productions of excellence. This is connected with the organic level of marketing and is more concentrated on user innovation.

Innovation in core service. Marketing strategies related to smart innovation in core service concentrate on policies and actions that increase 'interaction between visitors and cultural heritage' (Ruotsalo et al. 2009). Cultural organizations may pursue different aspects of innovation (Bakhshi and Throsby 2009, 2010). Among them, there is the innovation in extending audiences by using new information technologies in the core service (that can refer to one or more initiatives), such as online collections, social networking platforms, etc. These introductions allow cultural firms to transform the customer's needs into real experiences reaching an 'ideal degree' of innovation. This variable is connected with both induced and organic level and regards user and open innovation.

In order to explain the meanings and contents of the *systemic innovation*, it is important to recall two important concepts with reference to the relationship between museums and cultural heritage sites as strategic factors in a tourist destination: 'destination management' and 'networking'.

According to the international contributions on the theme (Murphy, Pritchard, and Smith 2000; Cantone, Risitano, and Testa 2007; Vasilliadis 2008), a destination is conceived as a place that is autonomously able to attract tourists (Della Corte, Savastano, and Storlazzi 2009), thanks to both tangible and intangible factors (Cantone, Risitano, and Testa 2007; Vasilliadis 2008). Other scholars have stressed the definition as a bundle of services and experiences, as a set of facilities and services formed by a number of multi-dimensional attributes (Echtner and Ritchie 1993), with a relevant role of the experiential component (Pine and Gilmore 1998), according to which the tourist can be involved at different levels of service, and the experience occurs through the interaction between the different actors involved in the process. In particular, these actors can be the users as well as the service providers, both at individual and systemic levels, as well as the service providers of the destination and the local community (Gentile, Spiller, and Noci 2007, 397). From this point of view, cultural resources and, in this case, specifically museums and heritage sites, are a key factor in the overall attractiveness of a destination, which is usually analyzed in terms of its main components (the six As, that is access, accommodation, amenities, attractive factors, assemblage and ancillary services – Della Corte 2013). Attractive factors (in this case, museums and heritage sites), in fact, are the main reason for choosing a destination to visit, and the tourist's satisfaction depends not only on the specific innovativeness and efficacy of the cultural services these organizations provide, but also on their level of integration and coordination with the other key players in the territory. In such view, networking (Morvillo 2007; Cominelli and Greffe 2012) can be argued to be strategic for these organizations, since they can increase their own competitiveness.

The network perspective, in particular, stresses the fact that economic actions are conditioned by the social context in which they are embedded. This means that exchanges are influenced by 'history, routines and stabilization of linkages among members' (Gulati 1998). This embeddedness suggests that firms cannot act as individuals, but that their choices are influenced by the structure of relations in which they operate. Marsden (1981) gives an important contribution on the social structure of networks, stating that

> a structure of relations affects the actions taken by the individual actors composing it. It does so by constraining the set of actions available to the individual actors and by changing the dispositions of those actors toward the actions they may take.

According to the network approach, it is possible to reduce uncertainty and to obtain grater benefits from the activation of inter-firms relationships. In this case, museums and heritage sites, through their interaction with the context, reinforce the whole local system of cultural offer, as well as the image of the territory and its perception by visitors during their visit. Hence, with regard to the variables of *systemic innovation,* it is important to understand whether and to what extent the cultural heritage site/museum activates collaboration with other stakeholders of the destination, either with actors from the tourist industry or with other actors in the territory. In this case, top managers of museums/cultural heritage sites have to own strategic networking capabilities in order to identify the key actors for their collaborations and know how to exploit the power of these partnerships.

These aspects can be expressed by some specific variables:

Partnerships. According to a systemic approach to innovation, museums and heritage sites have 'to create, build and maintain competitive advantage through utilization of knowledge and through collaboration practices' (du Plessis 2007). Hence, collaborative initiatives can produce benefits for the overall parties they involve since they allow a better codification of visitors' information, complaints and suggestions on new issues, needs and perspectives. It is important to study partnerships analyzing their occurrence, their nature (that can belong to different sectors) and the related area of activity (local, national and international). In the light of systemic innovation, the more smart museums and heritage sites located in smart destinations develop partnerships, the more competitive they are relative to other organizations operating in other destinations. The concept of smart destinations can assume different perspectives (Wang et al. 2016): the use of technologies into tourism destinations (Lamsfus et al. 2015), the smartphone apps (Dickinson et al. 2014) and smart cards; the new forms of augmented reality technology (Jung, Chung and Leue 2015); the smart systems of recommendation for tourists; the smart web and guide (Smirnov et al. 2013). Hence, the management of cultural heritage, according to a smart systemic, innovation must take into account these smart solutions and find a way of application with other actors of the destination.

Public–private cooperation. With reference to the nature of the relationships museums and heritage sites can develop, the creation of partnerships with public and private actors allows to achieve objectives that are difficult to reach differently. Since systemic innovation conceives the involvement of tourists, institutions and local communities in the value co-production and inter-firm relationships, public–private partnerships can allow museums to activate fundraising activities and sponsorships and starting co-operations with other firms of the territory in which they operate. On the one hand, smart fundraising is based on the strength the cultural organization can exploit with regard to different target groups (citizens, tourists, visitors, private entrepreneurs, public bodies, etc.) for crowdfunding campaigns, sponsorship or cause-related marketing. On the other hand, the strategic partnerships focused on co-marketing activities or on project-oriented cases are considered 'smart forms of co-operation' (Zygiaris 2013). Furthermore, 'interconnected and instrumented real-time operators that run on real time … and provide intelligence through several forms of ICT applications as … intelligent transport' (Zygiaris 2013) or other tools can act in a smart way on the components of the destination.

Starting with the evolution of the museum's core activity from a curatorial to a marketing function, in some cases, public museums have been faced with a 'privatization' process. In other cases, there are public–private hybrids with different degrees of 'privatization' (Schuster 1998). A third trend regards the case of public–private cooperation only in some activities, such as co-marketing initiatives, fundraising, R&D developments etc.

3. Methods

This research uses a multiple case study method, according to which it is possible to obtain empirical evidence by combining data, such as archives, interviews, questionnaires and observations. This evidence allows us to answer the research questions and to create a construct through which it is possible to analyze the different dimensions of innovation.

Over time, case study analysis has gained ground, since it is 'an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident' (Yin 2003, 13). As Eisenhardt (1989) underlines, case study methodology has three main strengths: '1) its likelihood of generating novel theories; 2) the testability of its emergent theories or hypotheses and 3) the likelihood of empirical validation of resultant theories' (Xiao and Smith 2006, 741).

In this research paper, we apply multiple case study analysis, in order to check the validity of the proposed theoretical model, aimed at evaluating museums' levels of innovation in strategy and marketing as sources of competitive advantage (HP1) and eventual differences among innovative cultural firms (HP2). Once the model has been defined and described, it is in fact important to define the most significant variables that allow identifying innovation in cultural sites practices, in order to 'measure' their level of innovation.

According to the focus of the research, the selected cases are museums and heritage sites, considered as local cultural resources that represent the typical attraction factors of a destination. The collection of the cases has included 23 cultural sites, selected from different international ranks of 2013, such as the 'Top 100 Art Museum Attendance', the 'National Geographic Top 10 Museum and Galleries', the 'TripAdvisor Top 25 Museums' and the 'Global Attractions Attendance Report'. The cases have been selected using a priori conditions in order to maximize certain differences (e.g., expression of territorial identity, ownership, size) and satisfying common requirements (e.g., high number of visitors, use of interactive tools). In particular, we selected the cases according to the following criteria:

- *absolute attendance*: the selected sites have registered a high number of visitors in 2013. We selected cases that have a minimum of 300,000 visitors per year;
- *appreciation*: according to some international rankings (National Geographic, The Art Newspaper, TripAdvisor, AECOM), these sites are considered the best attractions in the world;

- *interactions*: the selected cases use at least their websites and the social networks to communicate with the customers and, in some cases, to involve them in the creation process;
- *relative attendance*: the sites are considered the main attractions of the region in which they are located, based on the analysis of tourist flows.

We then proceeded to the analysis of the selected cases. First, we prepared a set of questions and submitted the list to a panel of experts at the international level in cultural heritage and museum management, asking them to validate the selected variables that express the different dimensions of smart innovation. They selected those that in their own experience could best fit the analysis of smart innovation in this precise field of analysis. As a consequence, we got the final list of information to collect from secondary sources (website, annual report and ranking lists) as shown in Figure 3.

Second, given these premises, we proceeded with an onsite analysis based on face-to-face interviews with directors and general managers of the selected museums/cultural

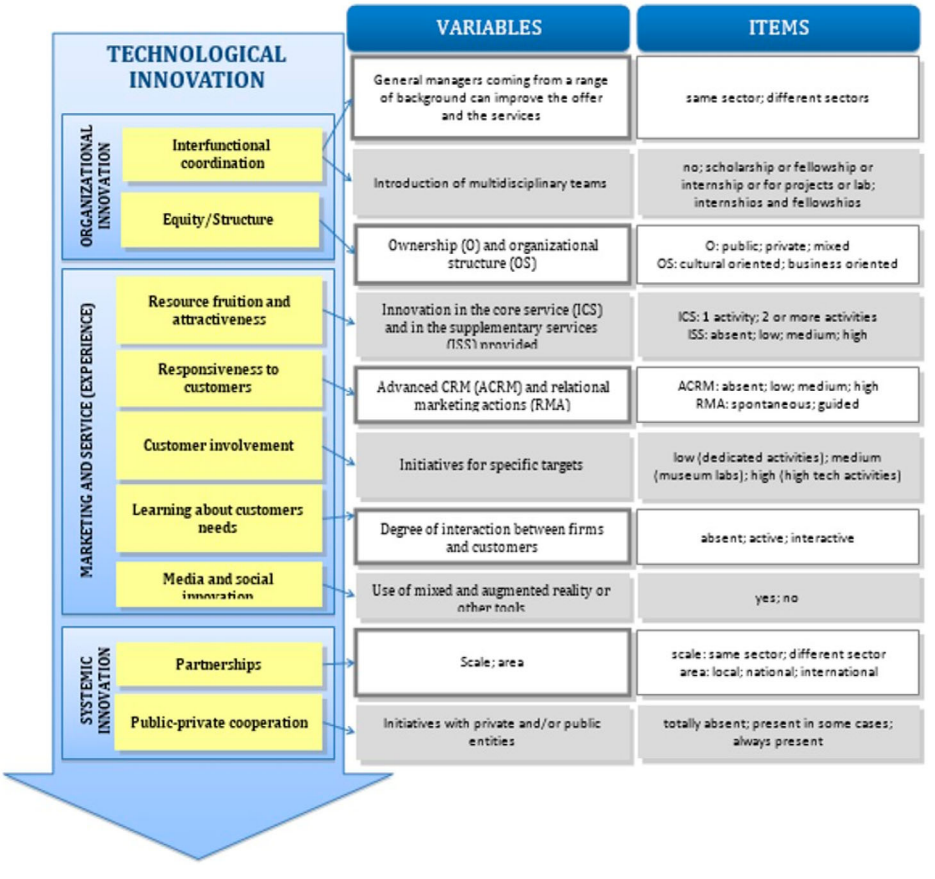

Figure 3. The smart innovation model.
Source: Our elaboration.

heritage sites to integrate the data collected and assure the internal consistency of this information.

Statistically, the smart innovation dimension can be considered as a latent variable that is not directly observed but is inferred (through a statistical methodology) from other variables observed (directly measured).

According to the *SIM* (Figure 3), we identified a set of ordinal variables that can be considered the measurement of behaviors of subjects generated by the innovation dimensions defined in Section 3.

The goals of the empirical analysis are:

- to identify the sub-set of observed variables which express significant information about smart innovation dimensions, and to measure the contribution of each selected variable to the quantification of the smart innovation complex indicator (HP1);
- to identify eventual differences among innovative cultural firms (HP2).

To achieve these objectives, we propose a strategy based on two statistical methods: factor analysis and clustering.

First, we perform a confirmatory factor analysis using the nonlinear principal component approach (nonlinear PCA, Linting et al. 2007).

This method is the nonlinear equivalent of standard principal component analysis and reduces the observed variables to a number of uncorrelated principal components. The most important advantages of nonlinear over linear PCA are that it deals with nominal and ordinal variables and that it can handle and discover nonlinear relationships between variables. Also, nonlinear PCA can deal with variables at their appropriate measurement level: for example, it can treat Likert-type scales ordinally instead of numerically.

Every observed value of a variable can be referred to as a category. Differently from performing PCA, nonlinear PCA converts every category to a numeric value, in accordance with the variable's analysis level, using optimal quantification.

The results of nonlinear PCA have been used to achieve different results.

The method assigns to each indicator a 'loading value' that expresses the correlation between an observed and a latent variable. A loading represents the contribution of each observed indicator to explain the information expressed by the latent variable innovation. Only variables with loadings higher than 0.3 are considered.

Moreover, we have built up a composite index *IL* that measures the innovation level of each observation. This index is defined as a weighted sum of observed variables where loadings are used to define a weight system:

$$IL_j = \frac{\sum_{p=1}^{P} x_{jp} \times u_p}{s} \times 100 \quad \forall j = 1, \ldots, n,$$

where x_{jp} is the measurement of the pth variable on the jth firm, u_p is the loading of the pth variable obtained through nonlinear principal component analysis and s is a normalization factor so that $0 \leq IL_j \leq 100$.

Later, we performed a hierarchical cluster analysis to identify the optimal partition of selected museums based on their innovation behaviors.

Hierarchical cluster methods produce a hierarchy of clusters from small clusters of very similar units to large clusters that include more dissimilar units. Hierarchical methods usually produce a graphical output known as a dendrogram, or tree, which shows this hierarchical clustering structure (Ward and Hook 1963). Agglomerative clustering begins by finding the most similar two groups, based on the distance matrix, and subsequently merging them into a single group. This procedure is repeated, step by step, until all the samples have been added to a single large cluster. The final partition is identified by a distance criterion (Fernandez and Gomez 2008). Starting from the bottom part of the dendrogram, the researcher decides to stop the agglomeration process when successive clusters are too far apart to be merged.

The output of this procedure is a partitioning of the museums, formed by k clusters, which describes their different typologies with respect to their innovation dimension.

Finally we conducted a dependence analysis of the clusters and several control variables, comparing their conditional distributions through cross-tables and Cramer's V association index.

Statistical analysis has been performed using IBM SPSS 21 statistical software (IBM Inc., Armok, New York).

4. Results

The empirical analysis was conducted and yielded very interesting results. Firstly, the variables of the model described above were verified using the selected cases. For each observed variable, we defined an ordinal scale that was checked consulting a focus group of experts in cultural firms and offers. On this set of variables, we performed a non-linear principal component analysis. We thus got to the relative loadings, according to the specific innovativeness of each single variable (Table 1).

In this first step, it was seen that systemic interaction does not seem to be strictly linked to cultural firms' innovativeness, or at most it has a very weak impact. Therefore, we decided not to consider this variable as relevant for the sample of our selected cases. The loadings took us to the map represented in Figure 4.

By combining the different variables with their relative loadings, we calculated the innovation index (measured in percentage) and performed a cluster analysis, which was conducted for the identification of three main clusters: high innovation-based cultural firms; medium innovation-based cultural firms and low innovation-based cultural firms (Figure 5). It comes out clearly that archeological sites are the less innovative firms, perhaps due to the uniqueness of their cultural resources. However, among them there are significant differences that did not come out of the research, based on official communication data and information. Masada, for example, through direct experience and deep analysis, is by far more innovative than it appears from the official sources.

By descriptive statistics, the innovation index shows a significant difference among the three examined clusters (Table 2).

Proceeding with dependence analysis, it came out that all clusters tend to develop partnerships, here including those at an international level, even if with different intensity (higher for the two more innovative clusters at an international level) (Table 3).

The nature of ownership varies among clusters. What emerges, however, is that the less innovative firms are public. This could be due to the fact that these museums are located

Table 1. Variables analyzed and first factor loadings of categorical principal component analysis.

Dimension	Variable	Scale	Loading	Innovation index
Marketing and service	Relational marketing actions	• None • Spontaneous • Guided	0.87	Item included
	Learning about customer needs	• None • Active • Interactive	0.82	Item included
	Advanced CRM	• None • Low degree • Medium degree • High degree	0.65	Item included
	Media social innovation	• Not • Yes	0.61	Item included
	Innovation in supplementary services	• None • Low degree • Medium degree • High degree	0.56	Item included
	Innovation in core service	• None • Low degree • Medium degree • High degree	0.33	Item included
	Customer involvement	• None • Low degree • Medium degree • High degree	0.05	**Item excluded**
Organizational innovation	Organizational structure	• Cultural • Business	0.67	Item included
	Multidisciplinary teams	• Absent • Single activity • Multiple activities	0.46	Item included
	General manager background	• Same sector • Different sectors	0.35	Item included
Systemic innovation	Partnerships scale	• Same sector • Different sectors	0.11	**Item excluded**
	Public–private cooperation	• Not available • Totally absent • Present in some cases • Always present	−0.15	**Item excluded**

Total variance explained by first factor 66.0%
Cronbach's alpha 0.78

Note: Item excluded means that it does not appear to measure the analyzed dimensions.

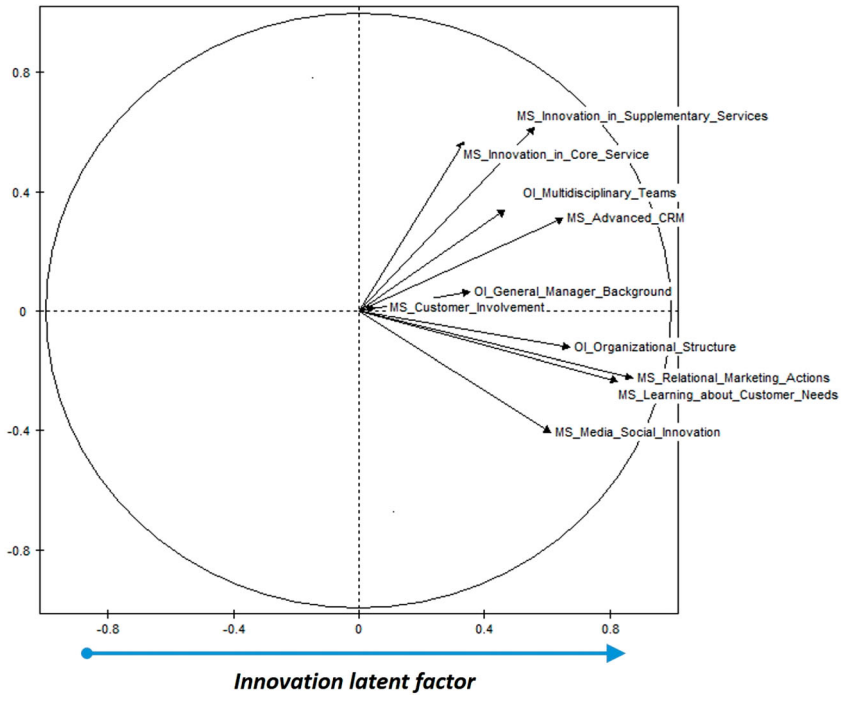

Figure 4. Variables loadings map of categorical principal component analysis.

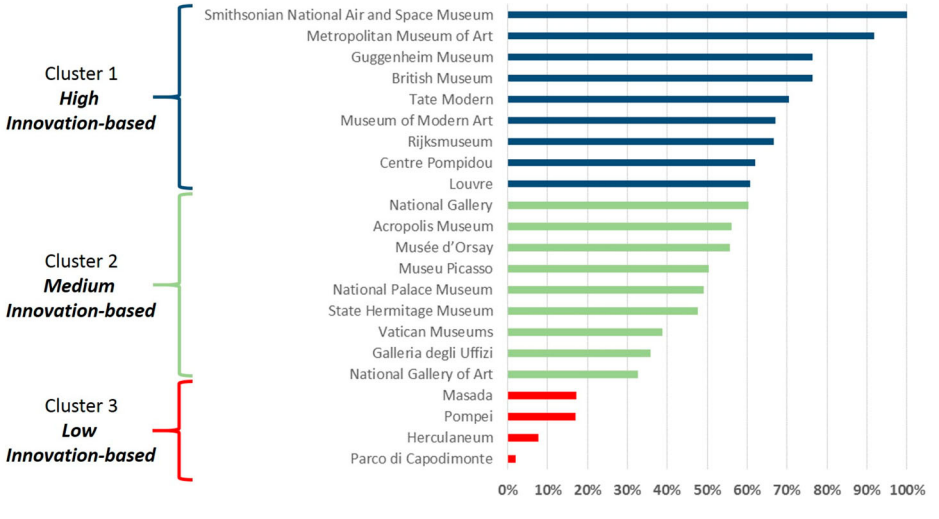

Figure 5. Innovation index distribution.

in countries where the public sector still has a strongly limiting effect on innovation, which necessarily requires a more business-oriented approach (Table 4).

This conservative approach seems to prevail in Europe (75% of low innovation firms are located in Europe), while U.S. firms appear more innovative (Table 5).

Table 2. Descriptive statistics of innovation index by clusters.

		Mean	Standard deviation	Min–max
Cluster	High innovation-based	74.7	13.3	61.0–100.0
	Medium innovation-based	47.6	9.5	33.0–60.0
	Low innovation-based	11.0	7.3	2.0–17.0
Total		51.9	25.7	2.0–1.0

Table 3. Dependence analysis of partnerships area by cluster.

		Partnerships area			
		Local	National	International	Total
Cluster	High innovation-based	0.0%	22.2%	77.8%	100.0%
	Medium innovation-based	11.1%	22.2%	66.7%	100.0%
	Low innovation-based	0.0%	50.0%	50.0%	100.0%
Cramer's *V* 0.247					

Table 4. Dependence analysis of innovation-based clusters by ownership.

		Ownership			
		Mixed	Private	Public	Total
Cluster	High innovation-based	0.0%	55.6%	44.4%	100.0%
	Medium innovation-based	22.2%	11.1%	66.7%	100.0%
	Low innovation-based	0.0%	0.0%	100.0%	100.0%
Cramer's *V* 0.448					

As far as innovative relational marketing tools are concerned (Table 6), it is interesting to notice that only the high innovation-based cluster tends to use guided processes, while in the majority of cases (medium innovation-based cluster and 55.6% of the high innovation one), the process develops spontaneously.

In the low innovation-based cluster relational marketing actions are not adopted at all.

Table 5. Dependence analysis of innovation-based clusters by country.

		Country			
		Europe	U.S.A.	Other	Total
Cluster	High innovation-based	55.6%	44.4%	0.0%	100.0%
	Medium innovation-based	77.8%	11.1%	11.1%	100.0%
	Low innovation-based	75.0%	0.0%	25.0%	100.0%
Cramer's *V* 0.358					

Table 6. Dependence analysis of innovation-based clusters by relational marketing actions.

		Relational marketing actions			
		None	Spontaneous	Guided	Total
Cluster	High innovation-based	0.0%	55.6%	44.4%	100.0%
	Medium innovation-based	0.0%	100.0%	0.0%	100.0%
	Low innovation-based	100.0%	0.0%	0.0%	100.0%
Cramer's *V* 0.802					

Connected with the previous table, from Tables 7–9 very interesting results are drawn. Social media innovation (Table 7) and interactive systems to learn about and from customers (Table 8) are widespread in the first two clusters but almost absent in the third.

However, structured CRM systems still appear difficult to apply in this type of firms: the only cluster that uses it, even if at different levels, is the first one (Table 9).

Coherently with the previous results, the only cluster that tends to adopt an organizational structure that mainly takes into account business management and innovation is the first one, which shows functions of research and development, rather than marketing. The others still appear more conservative and less business-oriented (Table 10).

The use of multidisciplinary teams still seems very weak. Probably not interaction in single activities, but rather in multiple activities is the real proxy for innovation, (Table 11). However, considering the modest value of the loading measure (0.46 – Table 1), this is not among the most significant variables for innovation.

Table 7. Dependence analysis of innovation-based clusters by social media innovation.

		Social media innovation		
		Not	Yes	Total
Cluster	High innovation-based	0.0%	100.0%	100.0%
	Medium innovation-based	33.3%	66.7%	100.0%
	Low innovation-based	75.0%	25.0%	100.0%
Cramer's *V* 0.608				

Table 8. Dependence analysis of innovation-based clusters by learning about and from customer needs.

		Learning about and from customer needs			
		None	Active	Interactive	Total
Cluster	High innovation-based	0.0%	11.1%	88.9%	100.0%
	Medium innovation-based	11.1%	22.2%	66.7%	100.0%
	Low innovation-based	100.0%	0.0%	0.0%	100.0%
Cramer's *V* 0.633					

Table 9. Dependence analysis of innovation-based clusters by advanced CRM.

		Advanced CRM				
		None	Low degree	Medium degree	High degree (%)	Total
Cluster	High innovation-based	33.3%	22.2%	11.1%	33.3%	100.0%
	Medium innovation-based	77.8%	0.0%	11.1%	11.1%	100.0%
	Low innovation-based	100.0%	0.0%	0.0%	0.0%	100.0%
Cramer's *V* 0.423						

Table 10. Dependence analysis of innovation-based clusters by organizational structure.

		Organizational structure		
		Cultural	Business	Total
Cluster	High innovation-based	22.2%	77.8%	100.0%
	Medium innovation-based	88.9%	11.1%	100.0%
	Low innovation-based	100.0%	0.0%	100.0%
Cramer's *V* 0.721				

Table 11. Dependence analysis of innovation-based clusters by multidisciplinary teams.

		Multidisciplinary teams			
		Absent	Single activity	Multiple activities	Total
Cluster	High innovation-based	44.4%	22.2%	33.3%	100.0%
	Medium innovation-based	66.7%	22.2%	11.1%	100.0%
	Low innovation-based	25.0%	75.0%	0.0%	100.0%
Cramer's *V* 0.370					

We finally made a correlation analysis between innovation index and attendance (number of visitors), getting to a Pearson correlation coefficient equal to 0.54, which means a quite high positive correlation. Analyzing the scatterplot, it comes out that, differently from the majority of heritage sites that show a level of innovation proportional to their relative attendance, the Acropolis shows a higher level of innovation, closer to museums. This means that archeological sites maybe foster less innovation because of the uniqueness of their cultural resources, but that they should also be prepared to use a more competitive logic which, in the short run, can involve any kind of cultural firm.

Another interesting remark is that The Louvre, numerically the most visited site, is less innovative than other museums located both in the U.S. and Europe. The upper part of the graph, moreover, shows the firms are seriously investing in innovation activities and structures in order to better compete in the future (Figure 6).

5. Discussion

By the analysis of the results, the empirical research did not completely satisfy Hypothesis 1 that asserts 'Smart innovation can be source of sustainable competitive advantage, able to transform cultural firms, such as museums and heritage sites, into modern

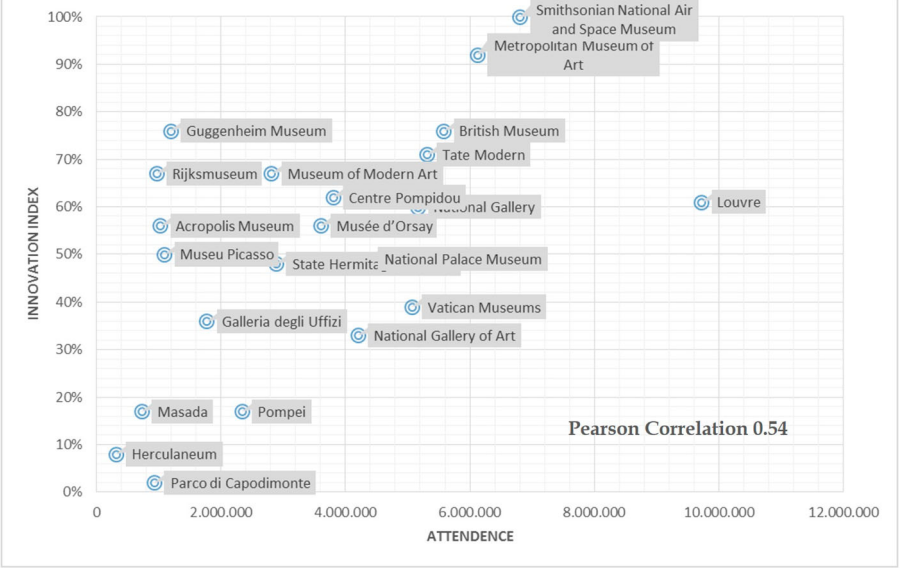

Figure 6. Linear correlation between innovation index and attendance.

cultural organizations', since smart innovation seems to be an obligatory path for the investigated museums and heritage sites to achieve competitive parity. This result should be read in the light that we measured the competitive advantage in terms of total attendance (Hanquinet 2013; Larceneux et al. 2016) per year and we noticed that smart innovation can be considered a source of competitive advantage connected with the process level performance rather than firm-level performance (Drnevich and Kriauciunas 2011). Indeed, in accordance with the reference literature (Nam and Pardo 2011; Chianese and Piccialli 2014; Errichiello and Marasco 2014), the use of smart ICT and IOT has a direct and positive impact on the quality of the service in terms of quality of core and supplementary (Ruotsalo et al. 2009; Garau 2014) services. Also in terms of productivity (Drnevich and Kriauciunas 2011), smart innovation generates, from the analyzed cases, a speediest result in the field of learning about visitors' needs (Zeithaml, Bitner, and Gremler 2006; Sigala 2012). While on the other side, a wider customer involvement (Ruotsalo et al. 2009) is not reached.

Moreover, smart innovation is the source of a more productive organizational structure (Camarero, Garrido, and Vicente 2011) which is influenced by open innovation.

Descriptive analysis, however, opens up new horizons for the firms that will be able to develop distinctive innovation resources and competences. Indeed, we verified that if the resources and competences of museums/heritage sites are 'VRIO' (Della Corte 2013, 2014), they attain competitive advantage. Museums/heritage sites that are in the high innovation-based cluster possess this kind of resources, whereas museums/heritage sites of medium and low innovation-based clusters have rare and/or easy-to-imitate resources and competences. Hence, they obtain competitive parity and/or a temporary advantage.

Hypothesis 2 'Smart innovation's main variables are associated to different levels of innovativeness among cultural firms' is confirmed as cluster analysis shows different behaviors and different levels of innovation with significant differences in the intensity of innovation.

Therefore, our analysis allows us to achieve some interesting results in terms of the intensity of innovation and useful comparisons on the theme. The adopted performance measure, however – the number of attendees – which is of course a useful parameter, also adopted in the literature (Hanquinet 2013; Larceneux et al. 2016) also depends on the size of the structures and on the overall flows of tourists to the destination. However, interesting differences in performance and in the strategic resources at the root of the innovation process do emerge. Hence, the variables show different levels of innovation according to which cluster the firm belongs to.

In terms of marketing and service innovation, relational marketing actions are the result of a spontaneous process in both high and low innovation-based clusters. This explains the existence of smart innovation and smart tools that facilitate the development (Dameri and Ricciardi 2015) of relational marketing.

Social media innovation is observed in the three clusters, while for the variable learning about and from customer needs, we found that museums/cultural firms in high and medium innovation-based clusters exploit user innovation, confirming that this kind of firm (Ruotsalo et al. 2009) makes an effective re-use of visitor experience. They activate, according to a user-innovation logic, a process of listening and co-creation of visitors' needs.

With regard to organizational innovation, museums/heritage sites must concentrate their efforts on the creation of multidisciplinary teams, as proposed by the literature (Garau 2014) in order to favor a smart decision-making process and to share cultural knowledge and practices (Ratcheva 2009). Hence, these organizations need to implement actions based on user innovation. Furthermore, for medium and low innovation-based clusters, a business approach rather than a conservative one is needed.

The dependence analysis also reveals, for systemic innovation, that partnerships are almost fully international in the three clusters. What is interesting to notice is the fact that only medium innovation-based clusters activate partnerships at a local level (11.1%). This result is in discordance with the literature (Zygiaris 2013) that highlights the importance of strategic partnerships in the local destination.

From a theoretical point of view, the model represents an advance on previous frameworks (Della Corte, Savastano, and Storlazzi 2009), opening new perspectives according to the different strategic approaches considered. They are all involved in the aspects and the variables of the model. From the analysis conducted, it emerged that some of the areas singled out (systemic innovation) do not seem to have an impact on the overall innovative approach of the firms examined. These seem to move in the same direction that is towards an innovation process more concentrated on core services. Certainly the systemic innovation of museums/cultural heritage sites needs to be combined with the systemic innovation activated by the destination management organization. Furthermore, if the museums/cultural heritage sites are located in smart destinations, they can be beneficiaries of the advantages coming from systemic smart innovation (Jung, Chung and Leue 2015; Wang et al. 2016).

Besides, ICT (and smartness) is not a component per se but rather a transversal factor that intertwines with two large areas: marketing and relationships with customers on the one hand, and the organization on the other. With appropriate revisions, the model works and can be applied also to other types of cultural firms. By enriching the analysis through interesting comparisons among different firms, further advances could be very interesting.

From an empirical point of view, one of the crucial issues in cultural offer is if the cultural resource (patrimony) itself is not enough to gain competitiveness or if innovation and new offers in terms of services and fruition are necessary to gain competitive advantage. Looking at Figure 2, Louvre's attendance seems to show that the pieces of art are the core attractive factors of a museum. On the other hand, some museums (MoMA, Smithsonian), even if more specific in their offers, point to innovation both in promotion and in fruition, thus attracting significant numbers of visitors also for their competences in innovation. Besides, archaeological sites appear to be the most 'relaxed' in terms of innovation, their attendance is moderate (also for the specific conditions of these heritage sites) and they appear to be the most conservative in their approach. This is a significant lesson for the destinations where there are heritage sites, since these represent unique and non-replicable resources that have the potential to become exclusive sources of competitive advantage for the whole territory where they are located, and yet are still well below the innovation level currently reached by museums. Therefore, in Hypothesis 2 we also found that museums are more open to innovation than heritage sites. There are, however, some isolated experiences in the world that show that it is possible and important to favor innovation both in the promotion and in the fruition of heritage sites.

Hence, the paper, in proposing an application of the concepts of smart (user and open) innovation, shows that the model can be applied to this kind of firm and allows us to put into practice some theoretical concepts that still need to be reinforced in the literature on the topic. Moreover, this model can be applied to other kinds of cultural firms, modifying the variables that in this case are very firm-specific.

The paper also proves that smart innovation is by no means just an empty concept discussed in the literature. It is instead a contemporary view of innovation that needs to be declined and in some way measured, with high potential to become a source of sustainable competitive advantage.

Looking at the results of the empirical investigation on museums and heritage sites, two remarks are necessary: first, a specific focus on museums and heritage sites was necessary, since most of conceptual contributions are concentrated on cultural firms in general, while the sector involves very different types of organizations, not always directly comparable and which therefore require specific analyses; second, testing such concepts on other types of cultural firms in other specific contributions can add value to the research on the field, with interesting comparisons. Third, firms of the cultural sector are still unexplored, traditionally considered conservative, whereas they show a strong need for innovation in order to increase their competitiveness.

A serious challenge for this research was to operationalize the analysis of general concepts of open, user and smart innovation to museums and heritage sites. We therefore developed a model of analysis that culminated in the innovation index, which can be extremely interesting as methodology to apply to different case studies, as in this research, or even to the destinations where these organizations are located. This, however, is a further step of analysis for future research.

6. Conclusions and hints for future results

This paper provides a contribution to the field of museum management with reference to the under-researched issue of innovation as applied to museums and heritage sites. It has in fact always been considered that for these types of cultural firms some strategic and marketing approaches could not be applied. And in fact there are some tentative attempts in the literature, apart from single contributions (Camarero, Garrido, and Vicente 2011) in the field. This opens up the future for empirical applications of important contents of strategic management and marketing to these types of firms, even if without forgetting their relevant role from a social and cultural point of view.

However, some of the results explained above must also be linked to the limits of our research: our variables are proxies of these firms' publicly communicated innovation, also because the majority of the analyzed cases were not conducted through interviews, and instead generated from the websites and social network pages from which information could be drawn. Probably an experience-based survey (in-depth visits to the sites and interviews of the staff at different levels of the organization) would modify the results. However, the research was objectively based on explicit data communication.

Moreover, it would be very interesting to focus further on the intangible aspects, examining the social and cultural variables and their interconnections with the strategic ones as well. This, however, would require a multidisciplinary approach and needs the collaboration of scholars from very different disciplines.

What comes out clearly is that cultural firms are in a strategic roundabout: if up to now they merely based their success on their own cultural patrimony, they now have to become creative and innovative, developing intangible resources, able to make the experience for the visitor as unique and possible, inventing new ways to interact with marketing targets. These challenges, however, require a more managerial and business-oriented approach, mainly focused on change and new ideas, with respect to which especially European firms appear to be still 'conservative' and less prone to change.

Disclosure statement

No potential conflict of interest was reported by the authors.

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