

Merging vSa and SS. An ABSA for Smart Tourism Ecosystem

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1. Introduction

Service Research deals with value co-creation processes within and between different entities that can be considered as systems. Recent advances in the main theoretical approaches to service call for a more inclusive view, able to better represent the interactions and transactions among several different entities or actors aimed at creating value as well as fostering the systems' survival. This view roots on the so-called service system, a complex and composed set of interactions among people, organizations, and technologies (Spohrer et al., 2007), and on a service ecosystem approach (Vargo et al., 2010), that is the study of systems of service systems. Following a service ecosystem perspective, this study aims at deeply investigating a specific tourism area.

In addition, the holistic perspective of the Viable Systems Approach (vSa) (Golinelli, 2002, 2005, 2011; Barile, 2009; Barile et al., 2015) allows to embrace the complexity of the phenomenon. A rereading of a tourism ecosystem through a viable systems perspective increases the awareness of an irreducible link that connects each entity into a single network, adopting a more general vision of a system's survival.

In this context, the phenomenon of big data and the availability of tools for their processing widens the possibility of acting on system's survival, by involving the actors in the analysis carried out. Specifically, an advanced Sentiment Analysis technique, the Aspect Based Sentiment Analysis (ABSA), highlights the sentiments and opinions expressed in the texts generated in the social network (big data) (Manyika et al., 2011; Troisi et al., 2018a.; Troisi et al., 2018b) by citizens and visitors of Rome's centro storico.

The paper is organized as follows: after this Introduction, Section 2 illustrates the theoretical evolution of tourism from a service system perspective to a smart ecosystem perspective, thus defining the Smart Tourism Ecosystem (STE). Furthermore, through the main conceptualizations of the Viable Systems Approach (vSa), a theoretical proposal is defined for linking viability and sustainability to Smart Tourism Ecosystem's survival. Subsequently, Section 3 is focused on the big data collection and methodology. Then, in Section 4 and Section 5 the results of the analysis are shown and discussed. The possible implications are argued under both theoretical and practical profiles in Section 6 and Section 7. Finally, the conclusions of the paper are presented along with the limitations of the study and ideas for a future research agenda.

2. Tourism as a viable smart ecosystem

2.1 Tourism: from service system to smart ecosystem

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The complex and dynamic nature of the current socio-economic context calls for the definition of a theoretical framework for a better understanding of “value co-creation and systems (re) formation” (Vargo and Akaka, 2012).

To this end, a holistic approach could support a better comprehension of the dynamic and systemic nature of all the exchanges occurring among actors, which can be summarized in their ability to mutually share and integrate resources and service provision to create value for *themselves and others* (Wieland et al., 2012).

The relevance of service provision, conceived as a dynamic and mutual exchange, and characterized by systems characteristics, has been declined into several theoretical and scientific approaches that refer to Service Dominant Logic (SDL), Service Science (SS), and to Service Science, Management, Engineering and Design (SSMED).

The above-mentioned theoretical approaches strictly relay to Service Research and put the service at the core of their conceptualization, giving a great emphasis to value creation and to the interactions and exchanges on which it roots.

According to SD Logic, service represents the application of *operand* (tangible and static) and *operant* (intangible and dynamic) resources aimed at value co-creation. In terms of resources, service can be seen as a series of activities in which different types of resources (employees, physical resources, goods, systems of service providers) are used in interaction with the customer, in order to solve a problem or satisfy a need (Grönroos, 2006).

The concept of service, considered as the basic unit of all the exchanges, is fundamental in the shifting from the traditional Goods Dominant Logic, in which services (plural) are seen only as the intangible components of tangible goods (Vargo and Lusch, 2004; 2006; 2010) to Service Dominant logic. This perspective mainly roots on ten foundational premises (Vargo, Lusch, 2008a), which put service at the core of all the interactions and transactions, being the element that allows the participation of all the parties directly or indirectly involved in value creation processes.

Going beyond the previous definition, Service Science looks at service as strictly related to the value that can be added thanks to customers’ direct involvement (Lusch et al., 2007). In other words, a service arises from “the application of resources for the benefit of another” (Spohrer et al., 2008).

Finally, Service Science, Management, Engineering and Design (SSMED) has provided a further definition of service, conceived as a system of interacting and interdependent parts, involving people, technologies and business activities (Maglio et al., 2006; Maglio and Spohrer, 2008; Demirkan et al., 2011a). According to this perspective, the “it is all about service” (Vargo, Lusch, 2004, 2008a) approach implies the abandonment of the traditional producer-consumer separation in favour of an ‘actor to actor’ logic (Wieland et al, 2012). This logic leads actors to create value within complex systems that Service Science defines “service systems” (Maglio and Spohrer, 2008), and SD logic “service ecosystems” (Vargo and Lusch, 2011a).

One of the main characteristics of a service system is its dynamic configuration of resources in value co-creation processes, including people, organizations, shared information, and technologies, which are internally and externally connected to other service systems by specific value propositions (Spohrer et al., 2007). This definition implies that “the smallest service system centres on an individual as he or she interacts with others, and the largest service system comprises the global economy. [...] Every service system is both a provider and a client of service that is connected by value proposition in value chains, value networks, or value-creating systems.” (Maglio and Spohrer, 2008). Consequently, every service system, through its life, experiences “a sequence of interaction episodes with other service systems in which service systems act as resource integrators of operant and operand resources” (Wieland et al., 2012; Vargo and Lusch, 2006). A further definition reads service system as “a network of agents and interactions that integrate resources for value co-creation” (Ng et al., 2012). It follows that service systems can be defined as networks, in which the value of

the provided solutions always derives from interactions (Spohrer et al., 2008; Spohrer et al., 2010). However, even if the concepts of interaction and integration are present in the previous definitions, a systems view seems to be more consistent than the notion of network, as it does not always imply a changing of the system nature after the exchanges occur.

SS has provided a definition of service systems that can be integrated with the SD logic in terms of right perspective, vocabulary, and assumptions provisioning (Maglio and Spohrer, 2008), which represents the starting point for the development of a service systems theory. To this end, the fundamental construct of service system, enhanced by the theoretical foundations of SD logic, has led to the development of service eco-system notion. According to one of its first definitions, a service eco-system is “a spontaneously sensing and responding spatial and temporal structure of largely loosely coupled, value-proposing social and economic actors interacting through institutions, technology, and language to (1) co-produce service offerings, (2) engage in mutual service provision, and (3) co-create value” (Vargo and Lusch, 2011a). Starting from this definition, Vargo and Lusch (2011b) proposed a more advanced formulation, according to which service ecosystems are “relatively self-contained, self-adjusting systems of resource-integrating actors connected by shared institutional logics and mutual value creation through service exchange” (Vargo and Lusch, 2011b). This definition looks at value creation and the related concept of value-in-context as a process able to contribute to systems’ viability (e.g. surviving and wellbeing) (Vargo and Lusch, 2011b).

Some authors (Akaka et al., 2013) stated that the extension of service ecosystem definition opens to a systems view, mainly focused on: the central role of dynamic interactions and exchanges between actors; the role of institutions (Williamson, 2000) in value creation processes; the importance of social contexts (Chandler and Vargo, 2011; Edvarsson et al., 2011) within value is created. These considerations also imply that each service eco-system is formed and reformed through recursive links (transactions and interactions) that can shape new and different service ecosystems sharing meanings (e.g., social norms, culture, etc.) (Akaka et al, 2013).

The variety and variability of the possible connections within the reticular service systems promote new forms of co-operation, interpreted as interactions between the actors of a cognitive system in line. At the same time, the opportunity to explore the value creation processes in a networked environment identifies the ‘eco-system complexity’ (Basole and Rouse, 2008) within which everything is collected, identified and active. This complexity does not depend only on the number of actors present, but also on the conditional probability that these entities may be involved in service delivery (Barile and Polese, 2009). Therefore, the qualification and enhancement of the relations, the redesign of organizational configurations, the management of complexity, the sharing of the value generating processes are all elements that identify a successful system (Polese et al., 2015), that is a system able to survive.

Starting from the considerations above, combining the practical features of SS and the social implications emphasized in S-D logic, we intend tourism as a service ecosystem. Over the years, in fact, due to the extreme expansion of local infrastructure and tourist facilities, the ‘tourism product’ has suffered from many changes that have affected its configuration, composition, and concept, shifting to a much more service-centered orientation; thus, several are the linked services, such as: transport (e.g. air, rail, ship, etc.), hospitality and accommodation (e.g. hotels, guest houses, resorts, etc.), related and additional services (e.g. tour guides, sightseeing tours, planning tours, museum visits, exhibitions, fairs, natural parks and other tourist attractions, insurance services for the traveller, catering, etc.). What a tourist perceives of a destination is the set of services that are ensured and proposed with it, but, when this set shows some breaks, the tourists will not benefit of full correspondence to their expectations (Macchiavelli, 2001; Polese and Carrubbo, 2008; Bassano et al., 2019; Ciasullo et al., 2018). The satisfaction obtained through the provisioning of individual services

and products influences the overall satisfaction derived from experience in the target and, consequently, the perception of the consumer after leaving the visited place.

The interdependence of attractions, transportation, information, promotions and integrated services highlights the need to collaborate; this means that in order to be efficient, a destination must operate as an integrated system, characterized by a single shared vision and the same long-term aims (Ritchie, Crouch, 2003; Crouch, 1992). This type of synergistic ‘coopetition’ (Della Corte, 2000) bankrolls an innovative environment and encourages the participation of all actors involved in the use of experience (Pine and Gilmore, 2000).

In other words, an insufficient pursuit of common objectives by all the suppliers necessarily imposes an effort towards the search for interpretive approaches consistent with this new dimension of the phenomenon (Macchiavelli, 2001; Della Corte and Sciarelli, 2012; Franch and Martini, 2013; Martini, 2015; Barile, 2015; Barile e Saviano, 2015; Polese et al., 2017a, 2017b). From this, it derives that the set of systems included within destinations rises to the role of service eco-system of reference for all the actions developed therein. Furthermore, considering the service-oriented perspective of this work, a service system so structured, which exploits reticular synergies and benefits of co-creation, can be considered *smart*, being able to survive over time within such a complex eco-system. Resources that actors may possess and exchange in a smart tourism ecosystem can relate to the following types: tangible or intangible resources (e.g., tools, software, and information); human resources (e.g., skills, knowledge, and virtual communities); and relational ones (e.g., relations to partners and suppliers, and network membership). Accordingly, a smart tourism ecosystem (STE) can be defined as a tourism system that takes advantage of smart technology in creating, managing, and delivering intelligent touristic services/experiences and is characterized by intensive information sharing and value co-creation (Gretzel, 2015; Napoletano and Carrubbo, 2010).

From the above, it derives that the importance of an inclusive approach to the analysis of dynamic interactions and transactions between actors (Iandolo et al., 2016; 2019; Simone et al., 2018), the link between value creation and viability, and the individual notion of context in which these processes occur, calls for a system approach pointing to the investigation of systems behaviour. It is evident that a system perspective contributes to the shifting from a reductionist approach to a holistic approach for the analysis of phenomena, mainly focused on the dynamics occurring and involving all the actors that participate to organizational processes.

2.2 The Viable Systems Approach (aSv) for a STE

Based on a constructivist approach, the investigation should consider several different actors, needs, and systems configurations (Barile et al., 2014), including also the emerging demands arising from organizations participating to complex and ever-changing socio-economic contexts. Therefore, the emerging trends in the analysis of service ecosystems can be linked to one of the most recent and main drivers of economic, social, and environmental development: sustainability. This issue has gained a growing importance for the analysis of organizations’ behaviour, as well as in the definition of general development paths, offering important insights in terms of social, environmental, and economic responsibilities for organizations’ survival and viability.

In what follows, based on viable systems theories, and in particular on Viable Systems Approach (aSv) (Golinelli, 2002, 2005; Barile, 2009), we will define a theoretical proposal for linking viability and sustainability to organizations’ survival. According to vSa, each organization can be seen as a viable system; this approach is defined as axiomatic, and is based on some foundational premises and principles (Barile et al., 2015; 2018b):

- Survival: a viable system has the aim to survive in a specific context;

- Eidos: from an ontological viewpoint, a viable system can be considered in both a structural and a systemic perspective;
- Isotropy: in terms of behavior, a viable system distinguishes an area of decision-making and one of acting;
- Acting: its aim is to reach a result, an objective, through the interaction with supra and subsystems from which the system receives, but to which it also supplies, indications and rules;
- Exhaustiveness: external entities are also Viable Systems, which are components deriving from a superior level.

The purpose of survival characterizes all the Viable Systems and is reflected in the change and adaptation processes of the system's components and elements that are needed to preserve its viability.

Therefore, by making reference to the principles shown above, it is possible to represent a Smart Tourism Ecosystem (STE) as a viable system; this means simultaneously considering two different perspectives: static and dynamic, structure and system, deciding and acting, power and act. In substance "what a system is" and "how a system behaves".

The system's survival derives from the decision maker's ability to establish synergistic relationships (defined by the concept of *consonance*) with the entities that populate the same context. Therefore, it is necessary to base decisions on a participatory logic, which can act as a driver towards a shared objective. The pursuit of initiatives that reflect a unitary vision (*resonance* effect) defines one of the central moments in the overcoming of the limits of a merely structural perspective. In this way, through the evanescence of physical boundaries, the focus is shifted towards systems dynamics and towards a wider pool of inter and intra-systemic relations that characterize a STE, increasing the probability of survival of the system itself.

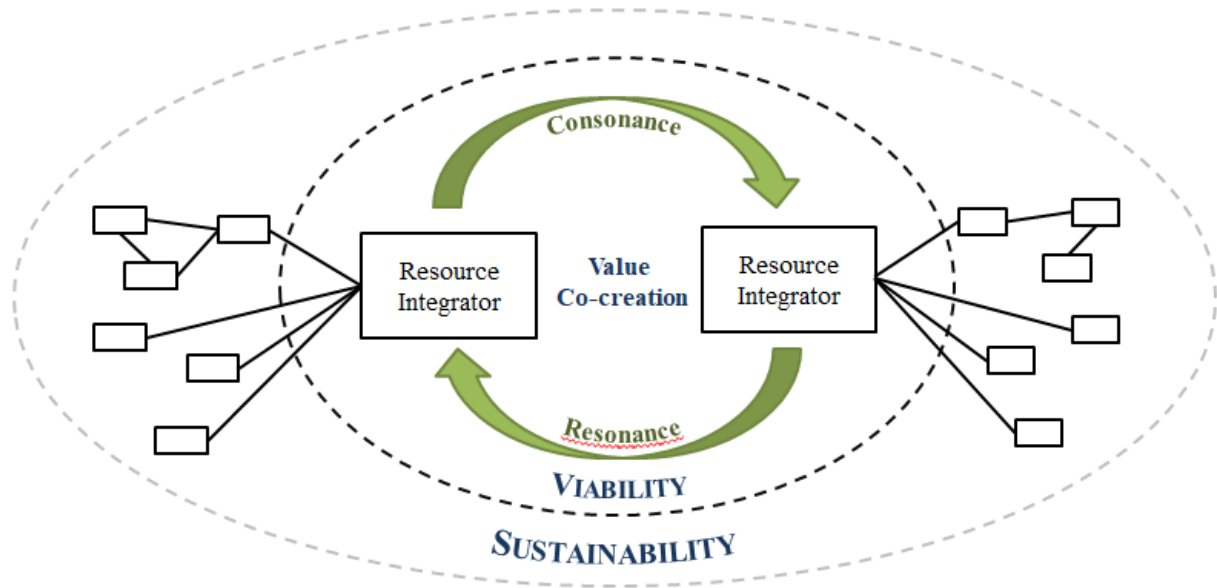
Thus, the decision maker should proceed:

- to the evaluation and selection of the entities with which he intends to interact;
- to the mapping of the network of relationships he wishes to establish with the different entities (Polese and Minguzzi, 2009);
- to the activation of these relations (Polese, 2002);
- to the definition of a strategy that can interpret the needs of the entities, translate them into objectives and enable them to be achieved.

Given these premises, it is now possible to refer to the framework of the *conceptual matrix* to bring out and deepen the link between the concepts of viability and sustainability (Golinelli, 2002). In particular, we focus on the moment in which the voluntary cognitive action of the decision maker is expressed: the transition from the *extended structure* to the *specific structure*.

If we define the extended structure as the set of relational possibilities that can be activated on the basis of consonance relations, and the specific structure as the set of relational actualities defined and activated in relation to the pre-existing consonance (and in the perspective of resonance development), it is possible to link the concepts of sustainability and viability to the two concepts of structure introduced. Therefore, if the viability, intended as the ultimate goal of any system, can be attributed to the specific structure, sustainability can be traced back to the extended structure. Then, viability becomes the translation into an act (i.e. in the specific structure) of all the possible configurations of sustainability existing potentially in the extended structure (Figure 1).

Fig. 1- Systems thinking and Service logic: linking value co-creation, viability and sustainability



Source: Authors' elaboration from Vargo, 2008

Since the configurations of sustainability exist 'in power' in the extended structure, sustainability is linked to a proactive attitude of the organizations, whereas viability is linked to a reactive attitude. Saying that sustainability implies a proactive attitude means that the decision maker of a viable smart tourism ecosystem must 'translate' power into an act. He must choose and activate, among all possible relationships, those that generate the highest level of consonance with the greatest number of systems present, thus shifting from *dyadic* to *context consonance*. To allow this, the decision maker must work on the redundancy typical of the extended structure, or rather on the "overabundance, excessive or not necessary"; in other words, on the possibility of creating a variety of possible and different contexts. In fact, the redundancy, if physiological, is linked to the ability of organizations to "return" to the extended structure and redefine new specific structures, where the previous configurations were not able to guarantee the system's survival.

Therefore, in line with the previously mentioned literature, it can be stated that the final aim of STE can be the production of technology-mediated experiences for enhancing destination competitiveness and acquiring a sustainable competitive advantage in the long-run (Polese et al., 2018). In addition, according to survival principle, the STE aims to survive in a specific context, creating the basis for a context consonance through the consideration of the different expectations of the actors.

3. Materials and methods

3.1 Overall approach

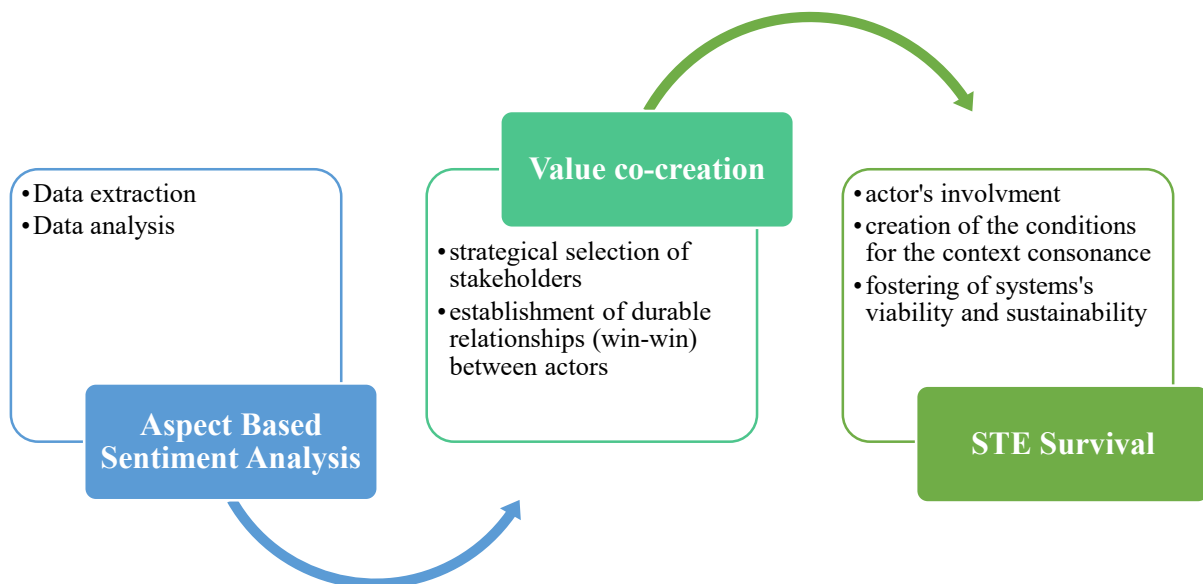
Based on the concepts and vision of vSa and SS theories exposed in the previous section, and according to the multidisciplinary view of SSs professed by service science, a possible approach able to carry out an advanced sentiment analysis and favour a value co-creation process related to the survival of a Smart Tourism Ecosystem can be presented (Figure 2).

To reach this goal is adopted an advanced Sentiment Analysis technique, the Aspect Based Sentiment Analysis (ABSA), in order to highlights the sentiments and opinions expressed in texts generated in the social network (big data) (Barile et al., 2018a; Manyika et al., 2011; Troisi et al., 2018a.; Troisi et al., 2018b) by citizens and visitors of a specific touristic area.

In this direction, the proposed approach, starting from a first experimentation conducted on a point of interest (POI) (D'Aniello et al., 2016; D'Aniello et al., 2017), is able to:

- extract and analyse data, proposing shared evaluations about a STE;
- harmonize value co-creation by acquiring the ability to strategically select the right stakeholders providing the most adequate resources;
- establish durable relationships leading to win-win situations, thus fostering an equal distribution of (economic and social) value among actors;
- gain sustainable competitive advantage;
- encourage actors' involvement in order to increase the viability of the STE, creating the conditions for context consonance;
- allow a return to the *extended structure* and the definition of new specific structures, if the previous configurations are not able to guarantee the system's survival.

Fig. 2 – ABSA for value co-creation and survival in STE



Source: Authors' elaboration

3.1.1 ABSA for a smart tourism ecosystem

With the aim to evaluate the opinions of a selected community with respect to the various components of a STE, this work uses the Aspect Based Sentiment Analysis technique, an evolution of Sentiment Analysis (Pang and Lee, 2008) for providing information no longer on the whole "Sentiment" level, but on the various components of the same, allowing a more precise and accurate analysis (Liu, 2012; Pavlopoulos, 2014). In addition, in this work, the ABSA is not adopted to conduct marketing analysis, as usual, but in an urban context, in order to increase the awareness of the collective opinions regarding the different characterizing aspects of a point of interest, thanks to the possibility of obtaining aggregate analyses at different levels of granularity in output.

Therefore, according to Liu's approach, ABSA identifies the feelings expressed by the users of the community under analysis, called "*holders*", with reference to the individual "*aspects*" of urban resources (monuments, places of tourist interest, services, etc.), and establishes whether they are positive or negative, with the possibility of aggregate analyses at different levels of granularity. To this end, we define: the *opinion-city* as a quintuple $(e_i, a_{ij}, s_{ijkl}, h_k, t_l)$, where:

- e_i is the name of the *entity-city* (for example a monument, a square, a point of tourist interest, etc.);
- a_{ij} , is an *aspect-city* of e_i (for example regarding a district: statues, square, etc);
- s_{ijkl} , is the sentiment about the aspect a_{ij} , of the entity e_i (for example: “graceful”);
- h_k is the *opinion holder* (user expressing sentiment);
- t_l is the time in which opinion is expressed by h_k .

In order to apply this technique, the step carried out in this work are:

- Representation of the quintuple (Liu, 2012);
- Representation of the “sentiment” level through Sentiwordnet (Baccianella et al., 2010) of each tuple;
- Aggregation of results through an aggregation function;
- Graphical representation of the results: the polarities of each entity of the analysed city and the aspects identified are summarized by a bar chart.

Therefore, a synthesis is obtained and organized in different levels of "sentiment" concerning urban entities and their different aspects, thanks to the process of transforming unstructured data into structured data. In this way, the decision maker can use this output to carry out both qualitative and quantitative analyses, in order to fully evaluate the opinions of the actors identified as relevant (in this specific case, the top users), and increase the sustainable value co-creation process and the possibility of the system’s survival.

3.2 Research design

A large-scale text analysis study was conducted with the aim of understanding, in relation to an identified point of interest, the main sentiments expressed within texts generated online by the citizens and visitors of the old town of Rome, as depicted in Figure 3. Indeed, the zone is of particular interest because Rome is confirmed as the queen of monuments, with 21 million visitors in 2017, with a further record increase: + 66% compared to 2010 (Il Messaggero, 2017).

The collection of users’ opinions took place in a community of a website, TripAdvisor.com, a travel web portal that publishes user reviews about hotels, B&Bs, apartments, restaurants and tourist attractions, which, with over 60 million reviews and opinions, represents the largest travel site in the world, capable of dynamically connecting a wide network of relationships. The reviews were collected using an automated program, through a process of Web scraping, which permits for retrieving a semi-structured document from the Internet and analysing these documents to obtain data. In this case, Python programming language was used to create scripts in this study. The process of data extraction has been implemented within the chosen online community for four continuous months, in particular from the beginning of September to the end of December 2018. After crawling, a significant number of reviews have been analysed with a sentiment analysis through the software SentiWordNet, to verify which are the positive or negative perceptions. Finally, the authors have appropriately analysed the summary sheet provided by the ABSA, interpreting results in an effort to define a kind of ranking of the potentialities.


Fig. 3 - TripAdvisor’s screenshot of Rome’s Centro Storico

Centro Storico

5,962 Reviews | #15 of 1,948 things to do in Rome | Sights & Landmarks, Points of Interest & Landmarks, Historic Walking Areas
00185 Rome, Italy

Save Share

Book In Advance	
Classical Rome City Tour with Trevi Fountain and Pantheon BUS & MINIVAN TOURS	From €33.00* More Info
Ancient Rome Half-Day Walking Tour SKIP-THE-LINE TOURS	From €35.90* More Info
Heart of Rome Private Family Tour with Gelato and Pizza KID FRIENDLY TOURS & ACTIVITIES	From €69.00* More Info
See More Tours	



Source: <https://www.tripadvisor.com>

3.3 Data collection

The reviews regarding Rome's centro storico appeared to be, on the date of data collection, 5.962 visible reviews. On this population, for both time constraints and reliability of information, we identified a sample size n , equal to 256 reviews, provided by the top travel reviewers. Indeed, in order to select only the strategical stakeholders, and according to RQ of the work, only users which left a minimum of 100 reviews on website were selected.

After, the reviews that were downloaded required a series of text pre-processes before they could be analysed through text mining (spelling normalization, filtering, case folding, lemmatization, and sentence boundary) (Prameswari et al., 2017).

Subsequently, the aspects of the POI were determined, still through text mining approach using the rules from previous studies by Hu and Liu (2004).

3.4 Data analysis

Once the data collection phase was completed, the entities, the aspects, the opinions, the opinion leaders, together with the time interval in which the review was left, were represented in quintuple, sets of five elements that were related to some attributes of the extracted text. Subsequently, using Sentiwordnet (Esuli and Sebastiani, 2007; Denecke, 2008), the "sentiment" values of each tuple were represented. In particular, considering each keyword extracted, the terms were analysed in order to establish their positive, negative or objective connotation. The semantic tool, therefore, outputs, for each term, the values in the interval $[0,1]$, which represent the positivity, negativity or neutrality of each keyword analysed, whose total sum must be equal to 1 .

Based on what has been said, for each term, the relative values were evaluated positive Sp_i , negative Sn_i or neutral Su_i , as shown below:

$$Sp_i = \frac{\sum_{k=1}^K p_k}{K}$$
$$Sn_i = \frac{\sum_{k=1}^K n_k}{K}$$
$$Su_i = \frac{\sum_{k=1}^K u_k}{K}$$

Finally, we proceeded with the aggregation of the results using the average function, in order to be able to perform evaluations at different levels of granularity, focusing both on the point of interest in its entirety and on the different aspects that compose it.

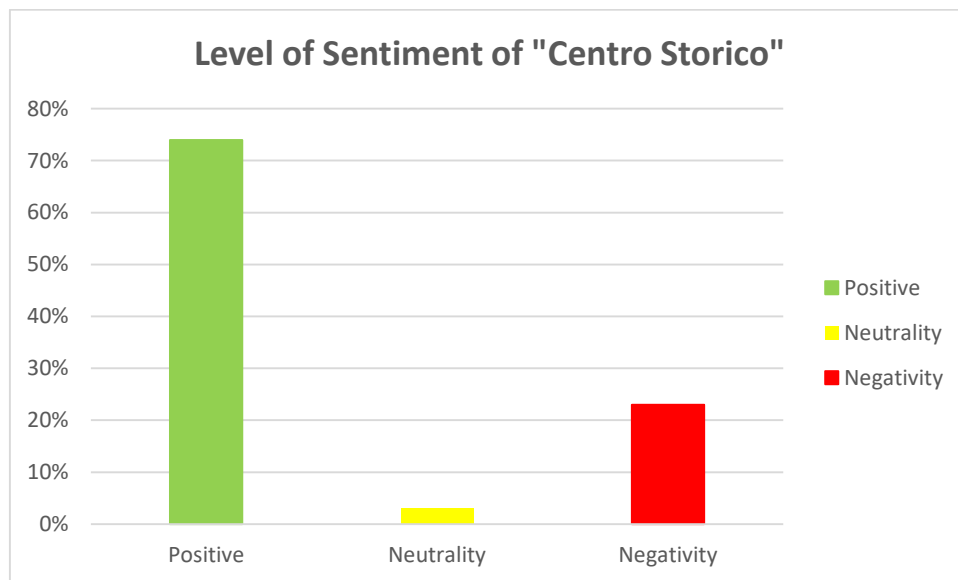
4. Results

Once represented the levels of "sentiment" of each tuple, concerning the entity examined and the corresponding aspects, we proceeded with the aggregation of the latter, in order to be able to make general assessments on the point of interest considered. From Tab.1 and from the graph that emerges, it appears that the collective opinions regarding "Centro Storico" are mainly positive, confirming the place as one of the points of the city with the highest level of attractiveness.

Tab. 1 - Polarity of "Centro Storico"

	Level of Sentiment
Centro Storico	0.74; 0.03;0.23

Fig. 4 - "Centro Storico" - Level of Sentiment



Source: Authors' elaboration.

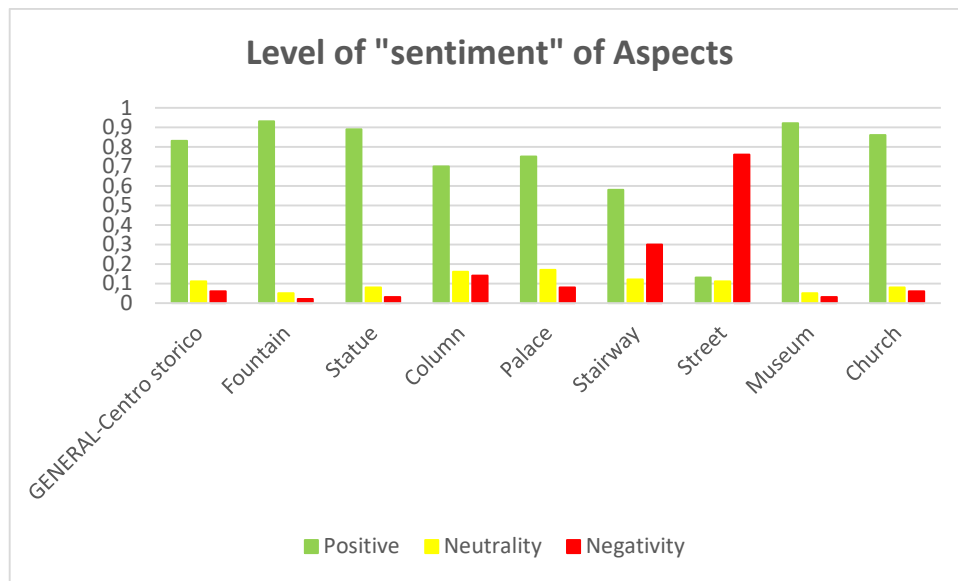
At this point, in order to understand if, from the users of the community, there is the emergence of details positive feelings, or, on the contrary, negative opinions, representative of hidden problems of the urban context, we analysed the different aspects that compose the point of interest.

Tab. 2 - Polarity of "Centro Storico" Aspects

Entity	Aspect	Polarity
Centro storico		
	<i>GENERAL-Centro storico</i>	0.83; 0.11; 0.06
	<i>Fountain</i>	0.93; 0.05; 0.02
	<i>Statue</i>	0.89; 0.08; 0.03
	<i>Column</i>	0.70; 0.16; 0.14
	<i>Palace</i>	0.75; 0.17; 0.08
	<i>Stairway</i>	0.58; 0.12; 0.30
	<i>Street</i>	0.13; 0.11; 0.76
	<i>Museum</i>	0.92; 0.05; 0.03

	<i>Church</i>	0.86; 0.08; 0.06
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Fig. 5 - “Centro Storico” Aspects - Level of “Sentiment”



Source: Authors' elaboration.

5. Discussion

From the graphs of the obtained results above, it is possible to synthetically represent the polarities of each aspect of the analysed entity (Centro Storico).

In particular, as can be seen from Tab. 2 and from the graph in Fig. 5, there are some aspects perceived as particularly positive. In fact, especially towards the aspects as “*fountain*”, “*statue*” and “*museum*” users expressed a strongly positive opinion, linked respectively to expressions like “*charming*”, “*breathless*” and “*insuperable*”. The positive connotation characterizing these aspects suggests to emphasize the historicity of the place and the attractiveness linked to the Italian historical-cultural tradition through exchange of operand resources (e.g. information materials, gadgets, maps) and operant resources (e.g. information and suggestions about everything the actors needs) (Vargo and Lusch, 2008) between actors (visitors and citizens), the municipality, and the Tourism Local Authority.

From a more accurate analysis, it should be noted that, although to a lesser extent, there are some early symptoms of discontent on the part of the community, with reference to particular aspects of the Centro Storico. These negative opinions reveal veiled signals that must necessarily receive attention. In fact, in the analysis, the level of “*sentiment*” associated with the “*street*” aspect is mainly negative, since, considering the tuples, the connection with the adjective “*damaged*” has emerged several times. This is a symptom of a principle of strongly negative perception by users with respect to the place of interest that underlines the need for a better management of the resources to improve the attractiveness of the POI. Again, by analysing the tuples, the aspect “*stairway*” is connected to the adjective “*dirty*”. This information can be of particular relevance for the institutions, in order to allocate with greater capillarity the resources devoted to the disposal of waste in the interested area, as well as establish strict laws for those who don’t respect the environment and contribute of dirtying the area.

Therefore, the institutions, considering these suggestions from actors, can allow also a social innovation, through a service innovation characterized by technological innovation, and considering the social dimension through the co-creation and collaborative recombination of practices that provide novel social habits, norms, and rules deriving from experiences integration (Barile et al.,

2016). In this direction, social innovation, supported by ABSA framework for STE, can be viewed as the generation of new value propositions and the emergence of new rules, able to lead to the development of the entire local system (Spohrer and Maglio, 2008). Therefore, thanks to the possibility given by the ABSA to select and re-select the relevant actors with which interact, the STE survival increases.

6. Theoretical implications

This paper offers some interesting and new insights on destination management, looking at a tourism destination as a viable smart eco-system. Assuming an eco-system perspective, it has been possible to better understand the way multiple interacting actors contribute to make a tourism destination as sustainable as possible; in other words, the way they contribute to its long-run viability (Wieland et al., 2012).

The study also attempts to better define the fundamental assumptions at the roots of a tourism-based sustainable service ecosystem, proposing a possible theoretical model. The model has been built merging SS and vSa, in order to explain the complexity (Basole and Rouse, 2008), the interactions, and interdependencies (Ritchie and Crouch, 2003) typical of a tourism destination. The vSa, in fact, recognizing the complexity of social phenomena, in general, and of the territorial decision-making processes, specifically, pushes to evaluate numerous information, without losing a systems perspective, in order to co-create value through an increasingly dynamic interaction with ecosystem actors (Barile et al., 2012). Therefore, the model has also contributed to better define the inner nature of tourism actors (e.g. institutions, tourists, citizens, etc.), their contribution to shaping eco-system, the operant and operand resource they share in specific co-creation practices, and the following value propositions (Frow et al., 2016).

Finally, the proposed approach leads to an emerging interpretation of value co-creation processes in tourism sector, oriented to the creation of long-lasting advantages for all the actors that interact in this eco-system. In fact, the application of ABSA to the STE permits to overcome current limitations and guarantee to the whole eco-system an enduring wellbeing (Peters et al., 2016), which can be achieved by cooperating and sharing resources in order to make them available for the actors involved. Additionally, sustainability emerges as an all-encompassing element. This is mainly due to its multifaceted perspective and to different features of service-based contexts and service provisions. In fact, being sustainable is a matter of performing activities considering all actors' potentialities and needs, integrating the current perspective and the short-term outcomes with a long-term approach, and considering the use of resources and their combination as the key leading to value propositions able to offer valuable outcomes for all the interacting actors. In this sense, actors are expected to perform a crucial role to make a service eco-system sustainable. However, further research is needed to empirically validate the proposed model and check the eco-system sustainability and its long-run wellbeing.

7. Managerial implications

The work offers interesting managerial insights for improving the results pursued in different areas of administrative life. In fact, value co-creation processes underline that an adequate combination of activities carried out by managers, citizens-users, technology, and other players in social life leads to improved performance. In addition, the model could be a valid support for the decision-making activities of a tourism point of interest, proposing, in a flexible way, shared assessments on the levels of "sentiment" perceived by the community with respect to the urban area of interest. Therefore, it is possible to offer the decision-maker an immediate awareness of the different opinions expressed by the community, both to evaluate the main attractions of an urban area and to detect the symptoms of a principle of discontent (Medhat et al., 2014). Based on the information from the synthetic pictures,

the decision maker is able to implement a series of interventions, aimed at establishing the conditions for a context consonance, by obtaining an overall view composed by the different perceptions of the community (Irvin and Stansbury, 2004; Barile, 2009).

In conclusion, this paper highlights the increasingly strong and inseparable connection between technology, people and institutions: the concept of “smart city”, based on a series of multidimensional components, represents the challenge for a successful urban initiative (Nam and Pardo, 2011). Infrastructure integration, technology-mediated services, social learning to strengthen human infrastructures, governance systems for institutional improvement and citizen engagement are just some of the components on which to base the new governance systems of modern cities (Nam and Pardo, 2011; Barile et al., 2017; Pellicano et al., 2019).

8. Final remarks, limitations and future research

This paper offers an integration of the current literature on service eco-systems and systems thinking, with the aim to represent a tourism destination as a complex context in which the two above-mentioned theoretical streams can be merged to further advance the extant theoretical contributions. In fact, thanks to the adoption of a constructivist approach and the shaping of a proposal of a viable smart tourism ecosystem model, this study has offered some interesting insights, even if it can be improved by extending the analysis from the individual point to a larger urban area of interest, determined, in turn, by the aggregation of the assets present in it. Furthermore, in a future work, the proposed model could be defined through a more sophisticated aggregation function, in order to carry out an ABSA with greater precision. Finally, it would be of great interest to integrate into the model a possible evaluation of the levels of consonance and resonance obtained, in order to provide the decision maker with information on the effectiveness of the territorial policies implemented, in a virtuous circle aimed at the pursuit of a greater probability of survival in the considered context. Finally, as both service ecosystem and ABSA literature are still flourishing, the analysis of new contributions will be needed to better focus some of the elements presented in this research.

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