

Multi-Stakeholder Engagement in Agile Service Platform Co-Creation

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Abstract - In the recent decade, the concept of Smart Tourism Destination (STD) has emerged to represent both a strategic aim to develop sustainable competitive advantages for tourism destinations or wider regions, and a managerial approach and dimensions to enhance data-driven development to measure and apply smart technologies for competitive and inclusive change in a tourism ecosystem. In tourism destination development globally, the aim for sustainable digital transformation in low-productivity business sectors is one of the key drivers for smart tourism and smart destination development. More recently, the global Covid-19 pandemic has given a boost to touchless, digital and green tourism development initiatives in the EU and worldwide. To advance sustainable digital transformation with agile methods in STD development, a systemic service platform approach and agile prototyping with smart emerging technologies, (eg. with AI, IoT, Augmented & Virtual Reality, 5G and Robotics), and multi-stakeholder co-creation is needed to engage key tourism industry ecosystem representatives. This conceptual paper advocates that open-source solutions combined with comprehensive multi-stakeholder co-creation aid in prototyping a systemic digital platform solution for smart tourism destinations. The paper concludes with an illustration of a conceptual model of service platform development for smart destinations, utilizing network co-creation with quadruple-helix stakeholders for sustainable regional impacts.

Keywords - open source; co-creation; digital platform; service prototyping; smart destination

I. INTRODUCTION

The Fourth Industrial Revolution in tourism destination and place brand development has led to the application of Smart principles and disruptive technologies causing a paradigm shift in the tourism industry [1]. The study [2] defined a tourism destination as a “networked system of stakeholders delivering services to tourists, complemented by a technological infrastructure aimed at creating a digital environment which supports cooperation, knowledge sharing, and open innovation.” This dynamic view of destinations embedded in e-tourism networks consisting of various actors, online and offline resources and co-creative stakeholder activities [3], provides perspectives to deeper understand and to govern the complexity of destinations as multi-stakeholder ecosystems [4][5]. Entrepreneurs, developers as well as end users are increasingly seeking for new services and solutions to newly arisen challenges

yet, initially it has been the public sector that has recognised the wide potential of and the need to adapt to the ICT-enhanced smart development for the sustainability and economic growth for tourism destinations [6][7]. The increasing public sector interest towards “smartness” and urging for cross-sectoral dialogue [8] to enhance the effectiveness of sustainable development policies at tourism destinations has had an impact on the regional growth strategies and business & technology development initiatives worldwide [9][6].

Although the implementation of smart technologies and related service concepts has prompted critical notions and accusations of counterproductive effects to human wellbeing and social sustainability at large eg. [10][11], a notable majority of smart tourism literature emphasises the potential of smart technologies and principles for improving the competitiveness of tourism destinations and transforming the tourism industry’s sustainability towards more environmentally, socio-culturally and economically sound development paths eg. [12][13][6][14][15]. The study [16] offered a Six A’s Framework to comprise the core service components (ultimately experiences) of the tourism destinations:

- Attractions (natural, man-made, artificial, purpose built, heritage, special events)
- Accessibility (entire transportation system comprising of routes, terminals and vehicles)
- Amenities (accommodation and catering facilities, retailing, other tourist services)
- Available packages (pre-arranged packages by intermediaries and principals)
- Activities (all activities available at the destination and what consumers will do during their visit)
- Ancillary services (services used by tourists eg. banks, telecom, post, newsagent, hospitals, etc.)

These experience assets – things to see, do and use at the destination during the visit - and their perceived attractiveness are recognised to be at the core when developing the competitiveness of the tourism destination [17]. This is not surprising perhaps, considering the well-

recognised role of tourism experience resources and activities in building destination attractiveness. To enable a holistic approach aiming at transformative impacts when developing a tourism experience platform prototype for smart destinations, participatory means and engagement are needed to capture and co-create sustainable multi-stakeholder value in the dynamic destination ecosystem context [3][18][19][20]. In digital servitisation this continuous adaptation to the constantly evolving ICT landscape and the aim for innovative outcomes requires agile development processes [21][22].

By utilizing Application Programming Interfaces (APIs) when developing digital service platforms, tourism developers and operators can drive innovations [23] and move beyond core offerings providing holistic and smart services to their different customer segments with individual needs. Co-operating with API-related stakeholders could lead to experiments, create entirely new innovations, services and solutions, bring added value in tourism industry and profitability to all participants with new ways of connectivity between humans and machines and multi-device as networked exchange of information [24].

To scrutinise the role of multi-stakeholder engagement in the agile service platform development in the context of smart destinations, this conceptual paper first builds an up-to-date research overview of the main theoretical concepts, supported with illustrative smart tourism destination project case findings on the methods of stakeholder engagement (see Table 1). The paper then describes the principles of agile software development and the role of wider helix stakeholders in co-creating transformative and sustainable service development outputs. Finally, the paper concludes with a presentation of a conceptual model (Figure 1) that incorporates the quadruple-helix approach with the agile service platform development process for better balanced and sustainable outcomes and calls for further research in the highly topical research area.

II. LITERATURE REVIEW

A. Multi-stakeholder ecosystems

Emerging technologies are increasingly applied to facilitate tourist experiences co-creation and enable smart destinations and regions [25] to dynamically contextualise and individualise experiences towards delighting tourists in real time every time they visit a destination [26]. At a consumer level the ICT-enhanced interactions among tourists & tourism service providers, and the active participation of tourists, are recognised as antecedents of experience co-creation, which are linked to consumer satisfaction, positive impact on their willingness to pay for co-created experiences [19]. Memorable tourism experiences are further identified strengthening the revisit intention at the destination [27]. The data-driven approach of smartness development offers synergies to regions [25] and other tourism territories.

To shift the aim of development from a simple dyadic consumer/tourist relationship formation towards more strategic and sustainable transformation at a tourism destination level, more dynamic co-creation approach is needed to involve a multitude of stakeholders in the smart destination ecosystem [3]. As was discussed in the previous section, to boost smartness and agile co-creation in the wider destination ecosystem, a common cloud platform should be setup to enable data sharing and communication among stakeholders and applications. Dynamic data can be interchangeable, and it has been suggested that all stakeholders should have the option to obtain the required data for business forecasting and strategic planning purposes [28]. The study [29] describes big data warehouse handling requiring intelligent systems which are able to extract, transform and analyse blended data from internal and external sources.

[1] suggests that “[...] smartness takes advantage of interconnectivity and interoperability of integrated technologies to reengineer processes and data in order to produce innovative services, products and procedures towards maximising value for all stakeholders. This reengineering enables shaping products, actions, processes, and services in real-time, by engaging different stakeholders simultaneously to optimise the collective performance and competitiveness and generate agile solutions and value for all involved in the value system. Smartness is therefore the glue of interconnected and mutually beneficial systems & stakeholders and provides the infrastructure for the value creation for all.” The realtime characteristics of technology-enhanced co-creation and API-connectivity enable the mobilisation of the wider stakeholder ecosystem resources for the creation of “nowness” services [30], characterised by real-time, co-creation, data-driven, consumer-centric and experience co-creation. The use of APIs can be part of the service platform business models in many ways and [31], “API can be a key element that attracts actors to the ecosystem and related platforms.”

B. Quadruple helix collaboration

Driving regional sustainable development goals and digital transformation efforts simultaneously in smart tourism destination development, requires wider stakeholder collaboration to deploy social capital resources in networks for collective knowledge and competitiveness [6]. To enhance the collaboration between all stakeholders and aim for sustainable development outcomes and innovation, cities and regions typically call for a “triple helix” model, a “quadruple helix” model and an “ecosystem” structure [32]. Advancing systematic stakeholder collaboration in smart destination development has strategic benefits that include a shared vision among participants. Stakeholder engagement supports co-opetitive business and the public sector efforts to minimise the negative effects of stakeholder competition [16]. To elaborate the shared vision formation and multi-stakeholder co-creation further

TABLE I. METHODS OF ENGAGEMENT IN THE AGILE SERVICE DEVELOPMENT CO-CREATION

Helix stakeholders: Agile development:	Public organisations	Universities	Industry	Civil society
Co-creation initiation	Regional collaboration Funding opportunities Email contacting 1-to-1 meetings	University networking Joint research initiatives Joint proposals Funding agreements	Events Workshops Teleconferences Project website	Newspaper articles Some postings Project website
Needs identification	Previous project reports 1-to-1 meetings Interviews	Academic research Project team meetings Sub-team meetings	Industry reports 1-to-1 meetings	Journalistic sources Blogs & forums
Value prioritisation	Steering group	Steering group Project team meetings	Interviews	Online form
Ideation	Workshop 1-to-1 meetings Interviews	Course collaboration Reports & presentations Research group collaboration	Workshop Collaboration events	Online form Presentations
Design	POC simulation Digital content creation	POC simulation Project team iteration	POC simulation Digital content creation	Feedback form
Implementation	Steering group testing Project reporting	Demonstrations Feedback form Next-level idea collection	Demonstrations Feedback form Next-level idea collection	Public presentations Online & offline promotion
Evaluation	Steering group	Steering group	Workshop	Feedback form

in a smart tourism destination context, Table 1 provides an illustration of the key development steps and methods of engagement in an EU-funded regional smart tourism destination case project [33], taking place 2019-2021 in Western Finland. The project has a somewhat distinct combination of cross-disciplinary, technological, and collaborative characteristics, with an aim to develop a service ecosystem platform, which are summarised in the conceptual model (Figure 1) presented in this paper.

The methods depicted above in Table 1 illustrate the plurality of relational sub-processes that engage the smart tourism destination platform stakeholders in the co-creation processes. Digitally transforming the labour-intensive tourism destination service sector with sustaining impacts requires a holistic understanding (knowledge transfer) of the supply and demand sides of the market. – Here, public, and private stakeholders, the third sector, academia and citizens’ perspectives should be incorporated. Similarly, since the construction of a shared stakeholder vision is preferred [6] the major paradigm shifts and concerns in the past, at present and for the future need to be identified. During the Diginature development project, continuous interaction with the project steering group and other key helix stakeholders comprising the emerging ecosystem was maintained. A key challenge in the platform service co-creation is to identify and communicate the co-creation benefits to engage and encourage the stakeholder strategizing within the shared vision. The multilateral understanding of shared benefits and costs also aids the engagement and smooth interaction in the interconnected agile software prototyping process.

C. Service Platform prototyping

In tourism destinations that take on smart solutions to drive sustainability and digital transformation,

technological platforms are a common tool to boost connection and the interactions among a growing number of stakeholders [34]. Tourism experience platforms are perceived as shaping the “immersive, interactive and virtual context in which culture can be experienced and e-cultural value can be co-created” [35]. The development of service platform prototypes requires agile adoption of software methods. Agile software development methods provide a fast and seamless way to design and implement service prototypes for different purposes. According to the Agile Manifesto in [36], there are 12 principles that tell the ideology of agile development. The key values can be presented with these four main statements.

- Individuals and interactions over processes and tools
- Working software over comprehensive documentation
- Customer Collaboration over contract negotiation
- Responding to change over following a plan

The Agile movement emphasizes the relationship and role of software developers, as well as the human role seen in contracts, unlike institutional processes and development tools. In current agile methods, this is manifested in close team relationships, close work environment arrangements, and other practices that increase team spirit. [37]

An important goal of the software team is to continuously display the tested software. New versions are produced at regular intervals, in some approaches even hourly or daily, but usually every other month or every month. Developers are encouraged to keep the code as

simple, straightforward, and technically advanced as possible, which reduces the documentation burden to the appropriate level. [37]

The relationship and collaboration between developers and customers takes precedence over strict contracts, although the importance of well-developed contracts is growing at the same rate as the size of a software project. The negotiation process itself should be seen to achieve and maintain a viable relationship. From a business perspective, agile development focuses on generating business value as soon as the project begins, which reduces the risk of non-compliance with the agreement. [37]

The development team, which consists of both software developers and customer representatives, should be well-informed, knowledgeable, and empowered to consider any adaptation needs that arise during the lifecycle of the development process. This means that the parties are ready to make changes and that existing agreements are also made with tools that support and enable these solutions to be made. [37]

In general, agile software development is seen in a pattern that includes plan, design, develop, test, deploy, review. Around these stages several agile software development methodologies have evolved, such as, Scrum, FDD, XP etc. These all have their own characteristics and fit their own purposes. - Not just one method that suits everyone, but agile methods are flexible when needed.

There are two ways to develop software in organizations. One way is to develop software from scratch, which is a very time consuming and expensive process, and the other way to develop software with existing OTS-Based Software Development (OBSD) software. OBSD is a very efficient approach and is

classified into two categories called COTS (Commercial Off-the-Shelf) and OSS (Open Source Software) software development. When designing the most agile and fast way to create a prototype, can be leveraged by OBSD software. [38]

COTS software is for sale at a certain price and terms. COTS is difficult to influence future development. OSS is a licensed software that gives users the freedom to run, explore, modify, and distribute the software. Redistribution of derivative products is sometimes required under the same / original license. OTSD-based software development (OBSD) enables organizations to achieve better quality and faster use of technology and innovation while reducing development costs and time to market. [38]

Selecting the OSS software require more time to find out suitable component for the development process, but it gives much agile and flexible way to carry out for your purpose needs. OSS software is usually free to use and modify for your needs, so it will suit well for planning and developing software prototypes towards e.g., service platforms.

D. Open data and Public APIs

Open and free data resources are essential in these kind of innovation processes. High quality APIs are easy to find and use when they are properly documented. Public APIs provided by public sector is often well-structured and requires less processing before use, which reduce development lead time. [39] Public APIs also empower customers by giving them a broader range of choice and better information [40].

With open data, developers can test their applications and simulate project viability. [40] In the best cases external development can help data providers to see what

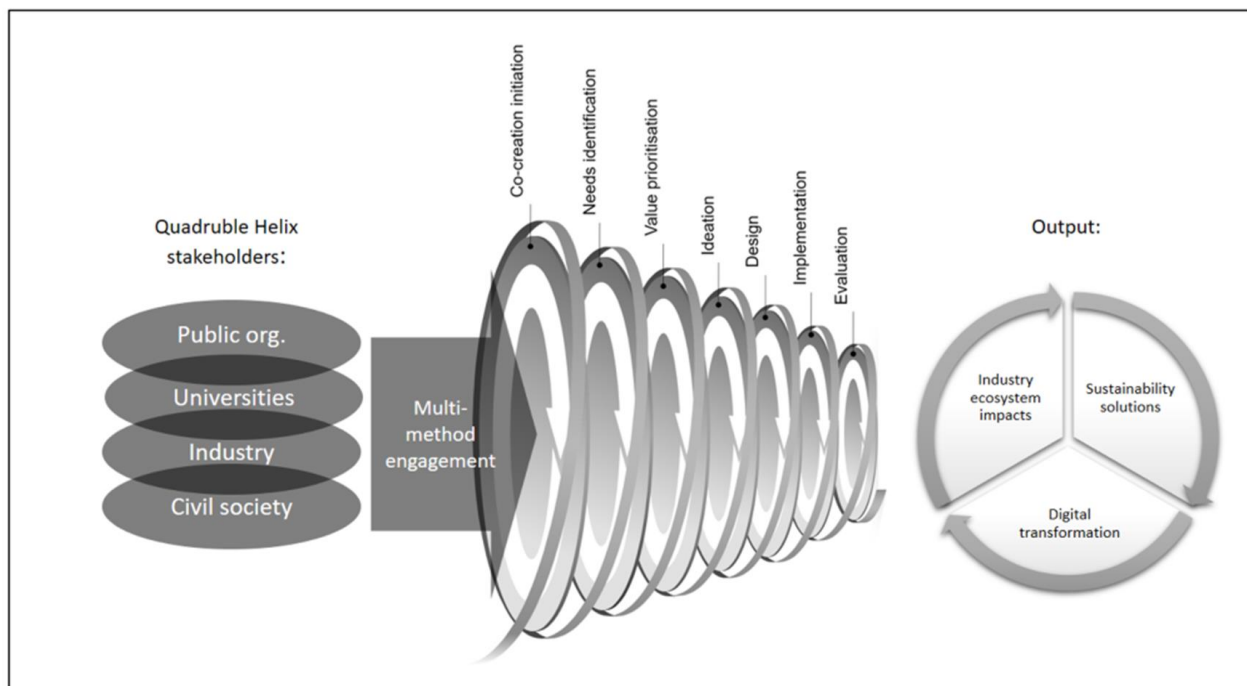


Figure 1. Multi-stakeholder engagement in agile service platform development co-creation

does and does not work, see possible new ideas and spring up innovations, acting as external R&D lab with practically no direct costs. From a business perspective, open data may open new digital routes to reach end users, collaborate with intermediaries and stakeholders and create supply for the customers.

For example, basic information like outdoor ski routes, campfire and lean-to shelter's locations can be fetched from open data sources. Different kind of IoT devices count visitors and send weather information by co-stakeholder. Another co-stakeholder maintains ski routes and snow grooming machine send ski track condition data when ski track is open. Nearby museum has open database with photos, videos and documents concerning local history. Local event organizer has organised guided journeys in area many years and have many stories behind sights. University have created open-source story-based game for education purpose. This all is available already. With co-operating and use of APIs, tourism operator can provide visibility and predictive information about services. Topical and up-to-date information allow travellers to plan their free time activities better and react to different conditions that may change in a destination. Combining data in smart ways and presenting it with visualisation and augmented reality, developers can provide new kinds of immersive location-based journeys, for example, to enable each member of a ski or hiker family to plan a meaningful and safe daytrip in a nearby national park.

III. DISCUSSION AND CONCLUSIONS

It is topical in the EU and worldwide that sustainable development and wider ecosystem impacts are expected outcomes in regionally bound projects that aim for smart transformations and regional resilience with new digital solutions and knowledge sharing (see Figure 1). Increasingly smarter destinations combine data from different sources produced, maintained, and managed by different stakeholders. Digital platforms are recognised as strategic solutions in the quest for transforming and improving the systemic competitiveness, productivity and innovation capabilities of regions and industry sectors. In tourism destination development, smart platform solutions are increasingly adopted to improve sustainable multi-stakeholder value co-creation capabilities. However, how these kinds of digital service development projects with aims for societal and industry ecosystem impacts best incorporate multi-stakeholder engagement in agile software development is currently not well documented in academic research.

In future-oriented innovation literature [41], and in the knowledge-based policy and smart specialisation (S3) objectives of the European Union [42], the quadruple-helix approach has been chosen to advance the competitiveness of the industries and regions. Similarly, in the service platform development project context, the engagement and agile participation of multiple stakeholders (see Table 1) has generated wider interest towards the project goals, technologies and emerging ecosystem collaboration than initially expected. It seems evident that the multi-faceted sustainability potential of the platform co-creation is strengthened by the increasing

number of participating stakeholders. This is also in line with tourism research context, especially when the collaboration is strengthened by cross-sectoral stakeholders [43].

Utilizing agile software development methods in service platform prototype development brings a new way of operating in the field of smart tourism. Combining agile methods with the quadruple helix model provides new ways to implement sustainable and systemic solutions. Utilizing the latest technologies, open-source software development and open data enables rapid prototyping of concepts. This requires sufficient and technical expertise e.g., the use of high-quality APIs, of novel development methods. When interacting with wider stakeholder groups, developers do not have to do everything their self, but they should make use of existing software components and modify it as needed. At best agile prototyping enables multi-stakeholder engagement by involving people from various backgrounds and fields, which results in new ideas and thoughts coming into the process of future development.

On a business network level, further research endeavours may benefit from complementing the sustainability objectives of service platform development with brand co-creation perspectives to help identifying those dynamic stakeholder resources and activities that most effect the competitiveness and customer orientation of the industry ecosystem. - In our case, the intangible and tangible brand co-creation elements that facilitate experience-centric service development for smart tourism destinations.

On the operational level, further studies could aim for deeper understanding and rigid assessment and validation of the methods of engagement in agile service co-creation aiming for competitive and sustainable systemic transformation of regions, industries, and destinations. Similarly, the engagement conceptualisation should address the how and when questions of the stakeholder engagement and data input to help managers and agile development specialists to better coordinate the development processes and to improve the effectiveness of multi-stakeholder co-creation. To further contemplate the digital experience and sustainability enhancement capabilities of smart destination platforms, research on smart digital technologies usage and their future co-creation potential in multi-stakeholder ecosystems is also called for.

REFERENCES

- [1] D. Buhalis, "Working definitions of smartness and smart tourism destination", 2015 available at: <http://buhalis.blogspot.co.uk/2014/12/working-definitions-of-smartness-and.html>
- [2] R. Baggio, & G. Del Chiappa, "Real and virtual relationships in tourism digital ecosystems.", 2014, *Information Technology and Tourism*, 14(1), 3–19.
- [3] Pohjola, T., Lemmetyinen, A., & Dimitrovski, D. (2020). Value co-creation in dynamic networks and e-tourism. *Handbook of e-Tourism*, 1-23.
- [4] Aubke, F. (2014). Applying a network-lens to hospitality business research: a new research Agenda. *Advances in Hospitality and Tourism Research (AHTR)*, 2(2), 1-23.

- [5] Baggio, R., Fuchs, M. (2018) Network science and e-tourism. *Information Technology & Tourism*, 97–102. <https://doi.org/10.1007/s40558-018-0125-8>
- [6] Boes, K., Buhalis, D. and Inversini, A. (2016) Smart tourism destinations: ecosystems for tourism destination competitiveness. *International Journal of Tourism Cities*, 2 (2). pp. 108-124. <http://centaur.reading.ac.uk/75357/> §
- [7] Buhalis, D., & Amaranggana, A. (2014). Smart tourism destinations. In: Z. Xiang, & I. Tussyadiah (Eds.), *Information and communication technologies in tourism, 2014* (pp. 553–564). Vienna, Austria: Springer.
- [8] Dimitrovski, D., Lemmetyinen, A., Nieminen, L., & Pohjola, T. (2021). Understanding coastal and marine tourism sustainability - A multi-stakeholder analysis. *Journal of Destination Marketing & Management*, 19, 100554.
- [9] Meijer, A., & Bolívar, M. P. R. (2015). Governing the smart city: a review of the literature on smart urban governance. *International Review of Administrative Sciences*. doi:10.1177/0020852314564308
- [10] Coca-Stefaniak, J. A. (2019). Marketing smart tourism cities—a strategic dilemma. *International Journal of Tourism Cities*. Vol. 5 no. 4, pp. 513-518, Emerald Publishing Limited, ISSN 2056-5607
- [11] Tamir, D.I., Templeton, E.M., Ward, A.F. and Zaki, J. (2018), “Media usage diminishes memory for experiences”, *Journal of Experimental Social Psychology*, Vol. 76, pp. 161-8.
- [12] Gretzel, U., Fuchs, M., Baggio, R. et al. (2020) e-Tourism beyond COVID-19: a call for transformative research. *Inf Technol Tourism* 22, 187–203. <https://doi.org/10.1007/s40558-020-00181-3>
- [13] Buhalis, D. (2019). Technology in tourism—from information communication technologies to eTourism and smart tourism towards ambient intelligence tourism: a perspective article. *Tourism Review*.
- [14] Buonincontri, P., & Micera, R. (2016). The experience co-creation in smart tourism destinations: a multiple case analysis of European destinations. *Information Technology & Tourism*, 16(3), 285-315.
- [15] Del Chiappa, G., & Baggio, R. (2015). Knowledge transfer in smart tourism destinations: Analyzing the effects of a network structure. *Journal of Destination Marketing & Management*, 4(3), 145-150.
- [16] Buhalis, D. (2000), “Marketing the competitive destination of the future”, *Tourism Management*, Vol. 21 No. 1, pp. 97-116.
- [17] Crouch, G. I. (2011). Destination competitiveness: An analysis of determinant attributes. *Journal of travel research*, 50(1), 27-45.
- [18] Campos, A. C., Mendes, J., Valle, P. O. D., & Scott, N. (2018). Co-creation of tourist experiences: A literature review. *Current Issues in Tourism*, 21(4), 369-400.
- [19] Buonincontri, P., Morvillo, A., Okumus, F., & van Niekerk, M. (2017). Managing the experience co-creation process in tourism destinations: Empirical findings from Naples. *Tourism Management*, 62, 264-277.
- [20] Suntikul, W., & Jachna, T. (2016). The co-creation/place attachment nexus. *Tourism Management*, 52, 276-286.
- [21] Djödin, D., Parida, V., Kohtamäki, M., & Wincent, J. (2020). An agile co-creation process for digital servitization. *Journal of Business Research*.
- [22] Qumer, A., & Henderson-Sellers, B. (2006, December). Crystallization of agility: back to basics. In *ICSOFT 2006-1st International Conference on Software and Data Technologies, Proceedings*.
- [23] Ofoeda, J., Boateng, R., & Effah, J. (2019). Application programming interface (API) research: A review of the past to inform the future. *International Journal of Enterprise Information Systems (IJEIS)*, 15(3), 76-95. 38
- [24] Gretzel, U., Zhong, L. and Koo, C. (2016), Application of smart tourism to cities, *International Journal of Tourism Cities*, Vol. 2 No. 2. <https://doi.org/10.1108/IJTC-04-2016-0007>
- [25] Gretzel, U. (2018). From smart destinations to smart tourism regions. *Investigaciones Regionales*, (42), 171-184.
- [26] Buhalis, D., & Foerste, M. (2015). SoCoMo marketing for travel and tourism: Empowering co-creation of value. *Journal of destination marketing & management*, 4(3), 151-161.
- [27] Zhang, H., Wu, Y., & Buhalis, D. (2018). A model of perceived image, memorable tourism experiences and revisit intention. *Journal of destination marketing & management*, 8, 326-336.
- [28] Buhalis, D., & Leung, R. (2018). Smart hospitality—Interconnectivity and interoperability towards an ecosystem. *International Journal of Hospitality Management*, 71, 41-50.
- [29] Ramos, C. M., Correia, M. B., Rodrigues, J. M., Martins, D., & Serra, F. (2015). Big data warehouse framework for smart revenue management. *Advances in Environmental Science and Energy Planning*, 13-22.
- [30] Buhalis, D., & Sinarta, Y. (2019). Real-time co-creation and nowness service: lessons from tourism and hospitality. *Journal of Travel & Tourism Marketing*, 36(5), 563-582.
- [31] Moilanen, J., Niinioja, M., Seppänen, M., & Honkanen, M. (2019). *API Economy 101: Changes Your Business*. BoD-Books on Demand.
- [32] Bakici, T., Almirall, E. and Wareham, J. (2013), A smart city initiative: the case of Barcelona, *Journal of Knowledge Economy*, Vol. 4 No. 2, pp. 135-48.
- [33] Diginature (2021). Digiluonto Satakunta –hanke. www.digiluonto.fi, Satakunnan ELY-keskus 2019-2021.
- [34] Bakhshi, H. and Throsby, D. (2012) *New Technologies in Cultural Institutions: Theory, Evidence and Policy Implications*. *International Journal of Cultural Policy*, 18, 205-222. <https://doi.org/10.1080/10286632.2011.587878>
- [35] Ciasullo, M. V., Troisi, O., & Cosimato, S. (2018). How Digital Platforms Can Trigger Cultural Value Co-Creation?—A Proposed Model. *Journal of service science and management*, 11(2), 161-181.
- [36] Beck, K., M. Beedle, A. Bennekum van, A. Cockburn, W. Cunningham, M. Fowler, J. Grenning, J. Highsmith, A. Hunt, R. Jeffries, J. Kern, B. Marick, R. Martin, S. Mellor, K. Schwaber, J. Sutherland and D. Thomas (2001). “Manifesto for Agile Software Development.” 2002(22.3.2002) <http://AgileManifesto.org>.
- [37] Abrahamsson, P., Salo, O., Ronkainen, J. & Warsta, J. (2002) *Agile software development methods: Review and analysis*, VTT publication 478, Espoo, Finland, 107p
- [38] Claudia Ayala, Øyvind Hauge, Reidar Conradi, Xavier Franch, Jingyue Li, Selection of third-party software in Off-The-Shelf-based software development—An interview study with industrial practitioners, *Journal of Systems and Software*, Volume 84, Issue 4, 2011, Pages 620-637, ISSN 0164-1212, <https://doi.org/10.1016/j.jss.2010.10.019>
- [39] Lakomaa, E., Kallberg, J. (2013). *Open Data as a Foundation for Innovation: The Enabling Effect of Free Public Sector Information for Entrepreneurs*, Vol 1
- [40] Diederich, J. The API Economy Why Public APIs are so important, <https://www.wavestone.com/app/uploads/2017/10/Api-Economy-2017.pdf>
- [41] Carayannis, E.G. and Campbell, D.F.J. (2009). “'Mode 3' and 'Quadruple Helix': toward a 21st century fractal innovation ecosystem” (PDF). *International Journal of Technology Management*. 46 (3/4): 201–234. doi:10.1504/IJTM.2009.023374.
- [42] Höglund, L., & Linton, G. (2018). Smart specialization in regional innovation systems: a quadruple helix perspective. *R&D Management*, 48(1), 60-72.
- [43] Dimitrovski, D., Lemmetyinen, A., Nieminen, L., & Pohjola, T. (2021). Understanding coastal and marine tourism sustainability - A multi-stakeholder analysis. *Journal of Destination Marketing & Management*, 19, 100554