



Exploring the contribution of neuroscientific approach to sustainable smart tourism

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Summary of the work

- As a result of smart destinations, knowledge and expertise are available to all parties involved, allowing for the constant transformation of activities by engaging tourists in actively co-creating their experiences.
- Significant beneficiaries, such as visitors, service providers, and destination marketing organizations, participate in the smart tourism ecosystem's combination of systems, structures, and technology to co-create value and experience its advantages.
- Sustainable value co-creation based on neuroscientific approach are the new building blocks of smart tourist ecosystems to attain visitor satisfaction and loyalty by establishing positive associations with the co-creation of tourist experiences.
- Considering neuroscience as a valuable tool for understanding how tourists interact with their environments and how ICTs can be used to enhance their experiences, this paper analyzed literature on smart tourism ecosystem and sustainable value co-creation to provide insights into how sustainable smart tourism can be improved through the use of the neuroscientific approach.



Introduction

- Tourism destinations can benefit from smart technology in three ways: first, by making better use of their resources; second, by encouraging their sustainable growth; and third, by raising the standard of living for locals and visitors (Buhalis, & Amaranggana, 2013).
- Smart experiences incorporate elements of both traditional and digital forms, with a focus on significant levels of engagement and interconnection to establish novel, personalized, and intuitive travel experiences (Kabadayi et al., 2019).
- Tourists can participate in a smart tourism ecosystem, which allows them to enjoy tourism offerings, explore novel approaches to examining information, and even express their value-creation behaviors through communication with other stakeholders (Chuang, 2023).
- Consumer neuroscience and neuromarketing incorporate viewpoints from marketing, economics, decision theory, and psychology (Hsu & Chen, 2020) which have been widely employed in the fields of marketing, tourism, and hospitality to analyze the efficacy in grabbing attention as well as identifying the driving forces behind consumer behavior and anticipating their decision-making procedures (Hong et al., 2019).
- Involving the service science and neuroscience approaches to tourism and hospitality evaluates the characteristics of tourist services and the cognitive and behavioral processes of tourists.

Methodology and Research Questions

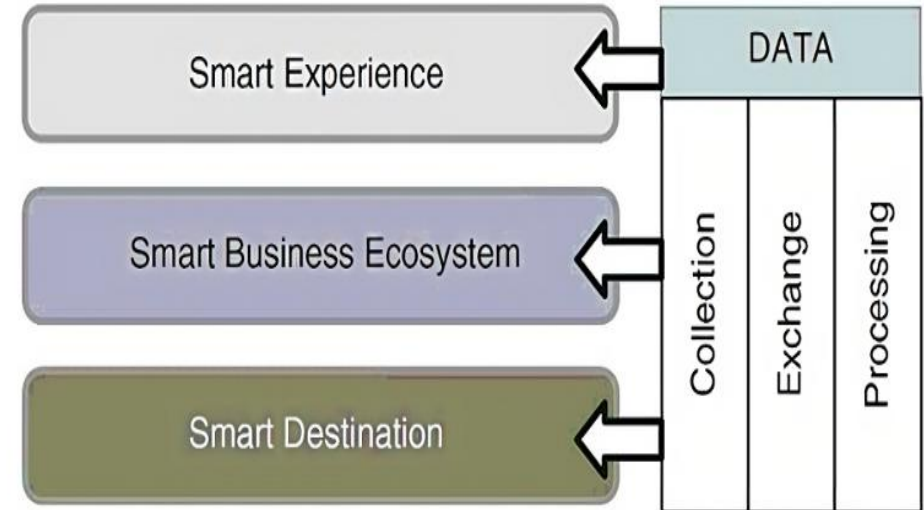
- This work analyzes multiple studies and concepts to provide an integrated examination of neuroscientific methodologies, sustainable value co-creation, and the smart tourist ecosystem.
- By outlining the most recent findings, this methodology provides a theoretical basis for comprehending the smart tourist ecosystem from the standpoints of neuroscientific research and sustainable value co-creation, which leads us to look into the following inquiries:
 - ❑ In the context of smart tourism, how could a neuroscientific approach enhance our comprehension of the cognitive behaviors, decision-making, and preferences of tourists?
 - ❑ Where do smart technologies stand in relation to the neurocognitive processes that visitors use while interacting with the tourism ecosystem?
 - ❑ In what way can the tourism industry overcome challenges and seize possibilities provided by the integration of smart technology and neuroscientific methodologies to co-create sustainable value?



Smart Tourism



- Smart destinations are a subset of smart cities; these places apply smart city principles to urban and rural areas (Buhnova et al., 2022), considering both locals and tourists in their pursuit of sustainability, quality of life, and efficient use of resources (Gretzel et al., 2015).
- Merging ICTs with the tourism experience has given rise to a social phenomenon known as smart tourism (Hunter et al., 2015).
- Smart business, as another component, is the intricate business environment that facilitates the creation and exchange of touristic materials and the co-creation of the tourism experience (Gretzel et al., 2015).
- Smart tourism extends to three layers across these three components:
 - ❑ a smart information layer that aims at collecting data,
 - ❑ a smart exchange layer that supports interconnectivity, and,
 - ❑ a smart processing layer that is accountable for the analysis, imagining combination, and intelligent use of data (Tu & Liu, 2014).



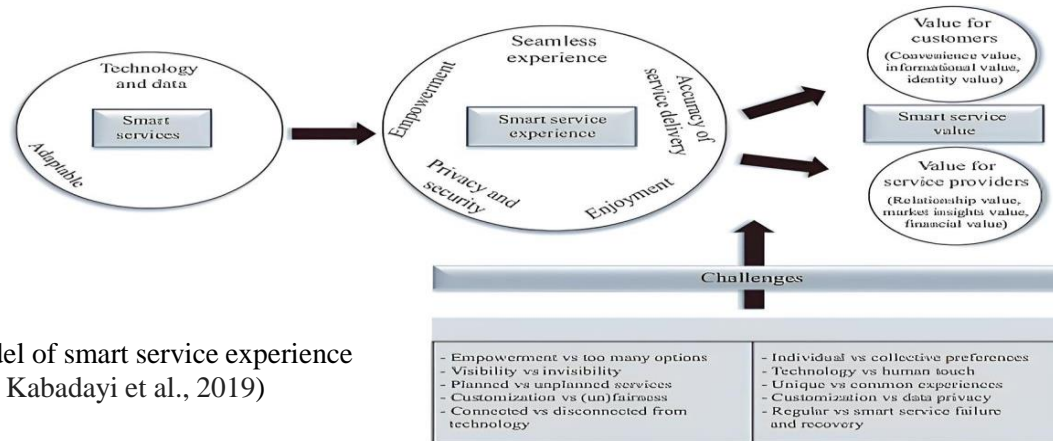
Components and layers of smart tourism. (Source: Gretzel et al., 2015)

Smart Service Experience



Smart service experience is the result of customers' direct contact with smart technology and its mental, emotional, and behavioral elements (Roy et al., 2017).

Customers' reactions to smart services are influenced by factors such as customer empowerment, charming experience, accuracy of service delivery, privacy and security, and general enjoyment (Kabadayi et al., 2019).



Conceptual model of smart service experience (Source: Kabadayi et al., 2019)

With the help of many devices' detecting, computing, communicating, and regulating capabilities, smart services enable different levels of self-directed decision-making (Gretzel et al., 2015), which allows for the provision of the appropriate service at the appropriate location and at the right time.

The role of smart service in the provider-customer relationship empowers users (Shaw et al., 2011). Customers are given more power and control over the service delivery process (Alt & Klein, 2011), and they can interact at different levels of the service environment to create their own unique experiences (Kabadayi et al., 2019).

Smart Tourism Ecosystem

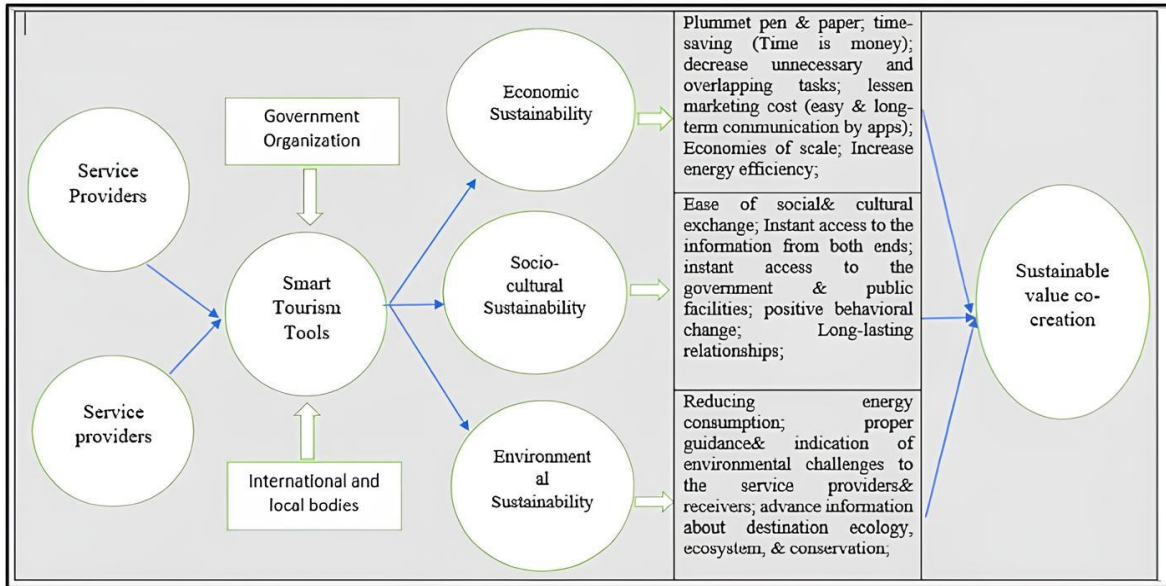


Dimensions	Definitions
Smart attraction service	The instant services of tourist experience and decision support are realized by the interconnections between the attractions and stakeholders through the dynamic platforms with information intensive communication flows (Jovicic, 2019).
Smart transportation service	The supply of location-based information, quality public transport, as well as navigation and parking, is achieved through the integration of technology and transportation systems (Gonzalez et al., 2020).
Smart accommodation service	Tourists are provided with access to ICT-integrated accommodation information and convenient booking services, and may arrange accommodation appropriately based on their demands (Stankova et al., 2019).
Smart diet service	Tourists are provided with access to ICT-integrated dining information and solutions, as well as convenient ordering services with healthier and suitable meals (Okumus et al., 2018).
Smart purchase service	The purchase system incorporates ICT with e-commerce environments to extend into m-commerce consumption platforms. Tourists can obtain commodity information and purchase from anywhere and at any time (Flavián et al., 2020).

Dimensions of a smart tourism ecosystem
(adapted from Chuang, 2023)(Source: Kabadayi et al., 2019)

- Smart tourism ecosystem is a framework that facilitates the development, management, and delivery of touristic services through advanced technology, which allows for the exchange of information and the generation of value (Gretzel et al., 2015).
- Businesses that want to give visitors comprehensive, cutting-edge service choices should consider leveraging intangible resources in a smart tourism setting to make visitors' trips more memorable (Barile et al., 2017).
- The primary components of the smart tourism service include attractions, transportation, lodging, food, and purchases to provide for tourists' needs (Chuang, 2023).

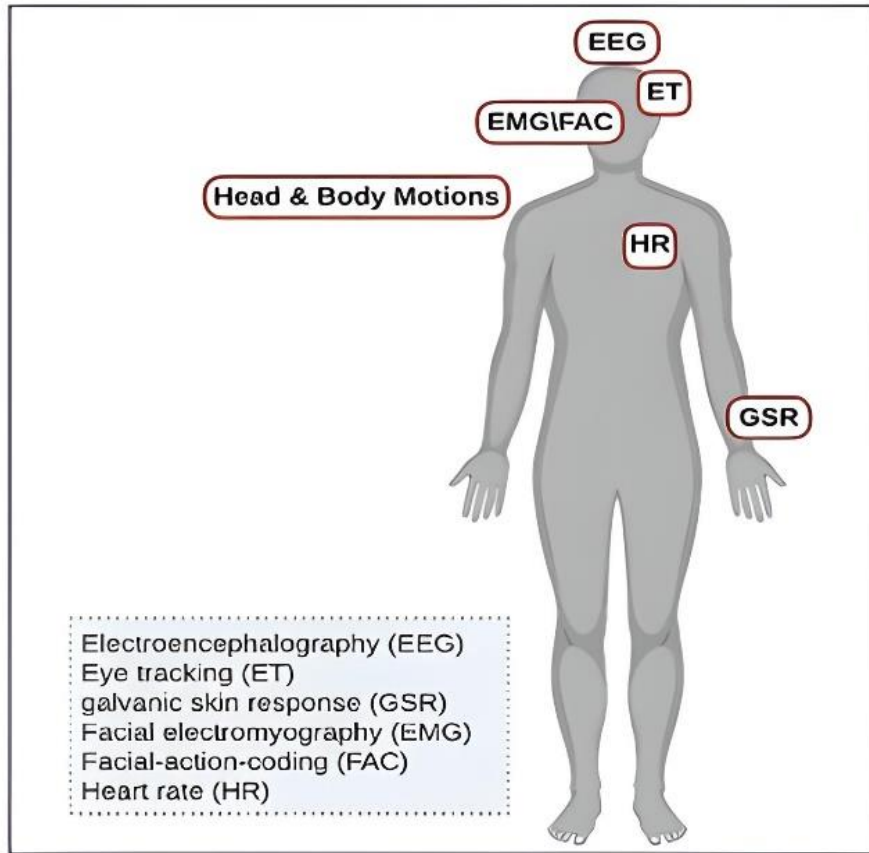
Smart Tourism Ecosystem and Sustainable Value Co-Creation



Sustainable Value co-creation. (Source: Bhuiyan et al., 2022)

- The concept of value co-creation is based on the premise that customers can significantly impact how new services and products are developed, aiming to ensure that their needs are met (Bhuiyan et al., 2022).
- Each co-creation model has three main parts: the supplier, consumer, and shared spheres (Ciasullo & Carrubbo, 2011).
- Sustainable co-creation encompasses a broad spectrum of customer-involved, more beneficial ways from an economic, social, and environmental perspective (Wang et al., 2020).
- Sustainable value co-creation is facilitated by tourists, who actively participate in the ecosystem. They prevail by having faster access to the data and cheaper travel.
- Tourists actively participate in the value co-creation process as part of the smart tourist ecosystem and contribute to environmental sustainability.
- There is a robust connection between a smart tourism ecosystem and sustainable value creation (the figure below).
- The model schematizes the existence of a solid connection between an intelligent tourism ecosystem and the creation of sustainable value.

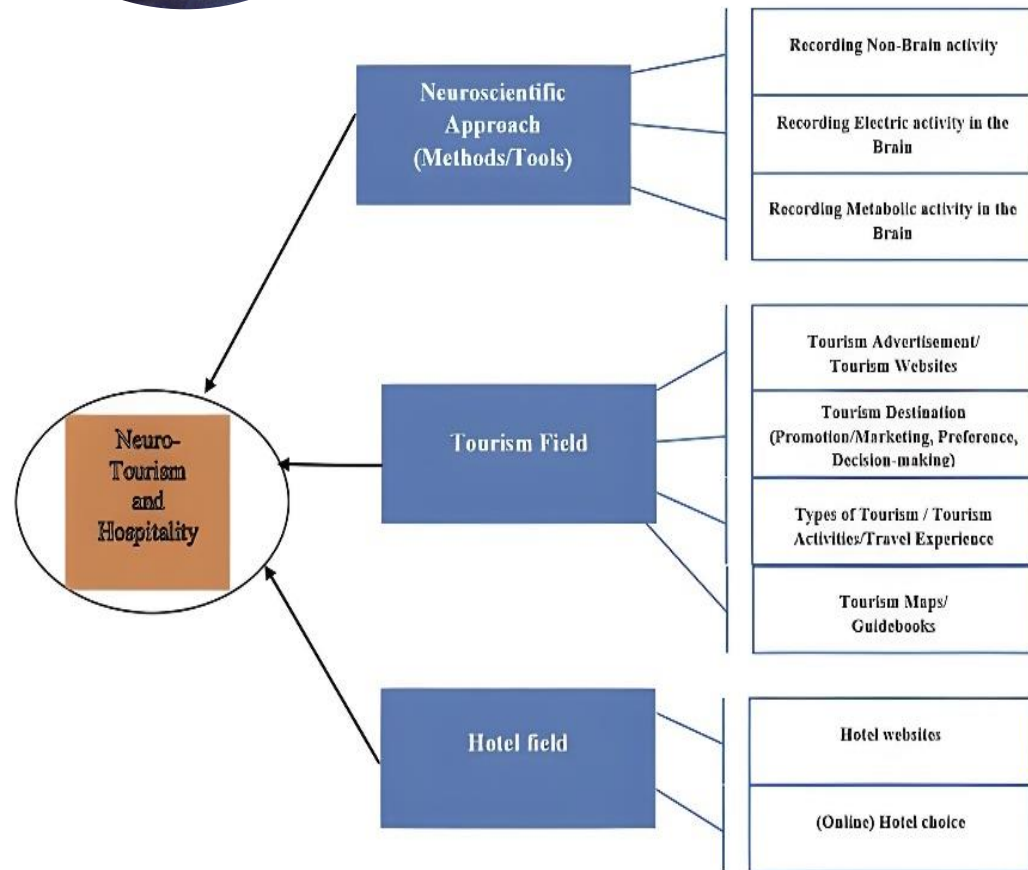
Contribution of neuroscience to sustainable smart tourism



Neuromarketing and Neuroscience

- Neuromarketing is the study of human behavior in relation to marketing through the use of neuroscience techniques (Lee et al., 2007).
- It aims to clarify the reactions of conscious and unconscious economic factors of the most diverse emotional, cognitive, physiological, and psychological types, and the behaviors and thoughts related to them (de Oliveira & Giraldo, 2017).
- Numerous neuroscience techniques are employed in neuromarketing to look into the emotions and psychological states of consumers. It makes use of two distinct methods (the figure below):
 - brain-computer interface (BCI)
 - ❑ to record electrical brain activities such as EEG and fNIRS or
 - ❑ to record metabolic brain activities such as fMRI;
 - recording the body's biological activities such as galvanic skin response, facial action coding (FAC), eye tracking (ET), and heart rate (HR).

Neuroscientific approach in sustainable smart tourism



• Neuro-tourism is the application of neuromarketing in the tourism context to enhance tourist marketing strategies; it integrates neuroimaging methods in tourism to analyze tourists' cognitive, psychological, and emotional effects on marketing strategies (Bercea, 2012).

• Ding et al (2022) used eye-tracking tests and questionnaires to scrutinize how different forms of social media advertising affect visual attention and travel decisions; Muñoz-Leiva, et al (2019) confirmed that Facebook ads are the most successful, accompanied by blogs and TripAdvisor's helpful information.

• The following model of the authors' elaboration illustrates how neuroscientific research can be widely used in tourism studies, allowing for a better understanding of tourists' physiological responses and an accurate assessment of their preferences.

• The “destination” context is the one most commonly used in real-life applications, in contrast, “tourism” maps/guides” is the last consideration.

Neuroscience can support both value co-creation and sustainability in smart tourism ecosystems:

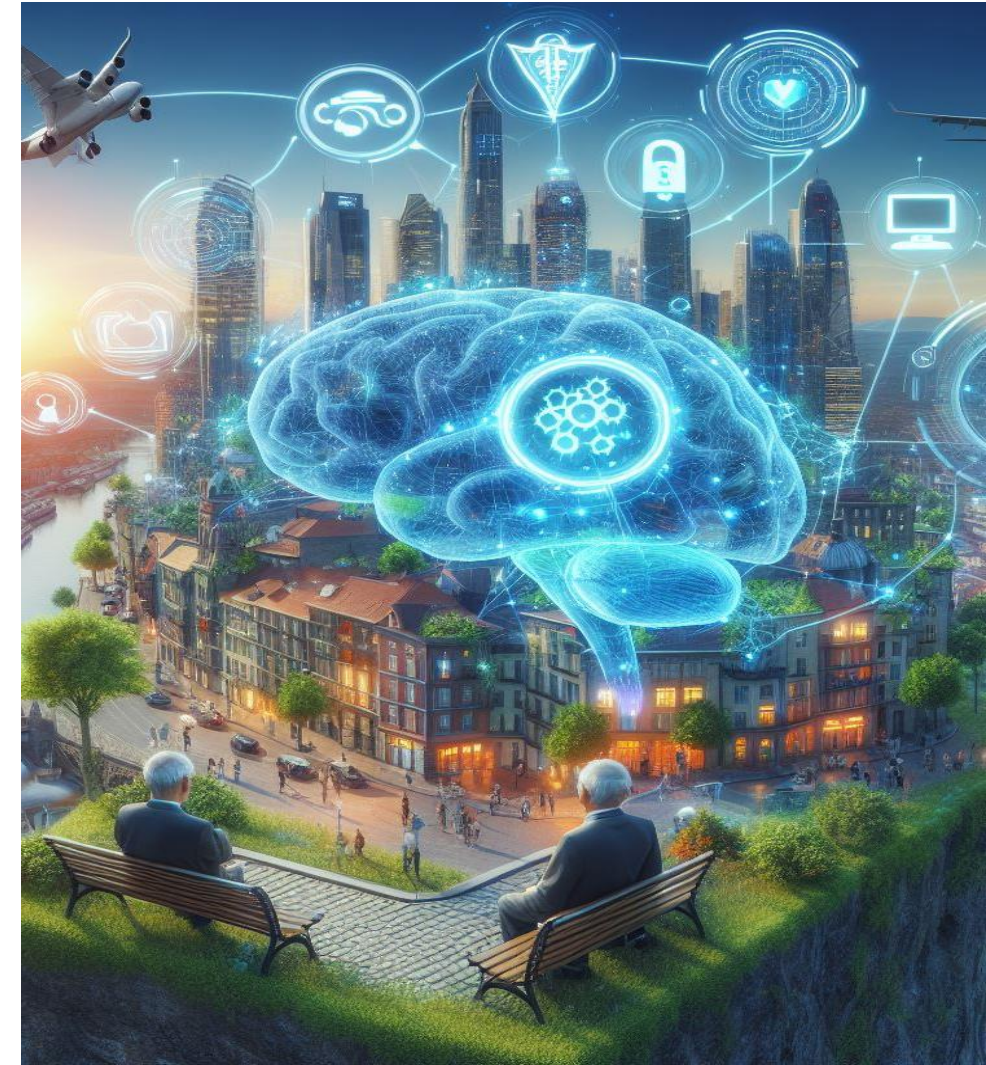
□ Neuroscience support to smart tourism ecosystems' value co-creation

- ❖ Destinations and businesses can benefit from a more comprehensive knowledge of visitors' mental and emotional reactions when they study and build smart tourism ecosystems with a neuroscientific approach.
- ❖ This paves the way for the development of more intelligent, more customized, and culturally aware tourist experiences, which in turn lead to effective value co-creation for all parties involved.
- ❖ To co-create value more effectively, businesses and destinations can tailor their services to match tourists' preferences.
- ❖ Neuroscientific methods can help designers create user-friendly smart technologies, which makes people more satisfied and more likely to co-create value.
- ❖ Neuroscientific research can also look into the reactions of visitors from various cultural backgrounds to smart tourism elements. Insights like these can guide the creation of culturally aware apps, which is crucial for a smart tourism ecosystem that respects various preferences and values.



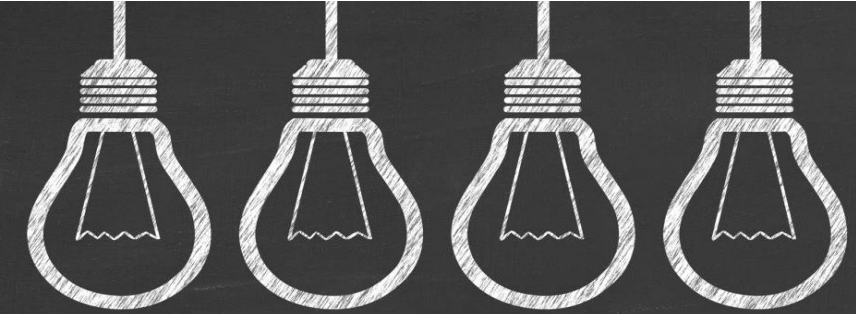
❑ Neuroscience support to smart tourism ecosystems' sustainability

- ❖ Using neuroscientific approach can help tourism businesses and destinations better understand how tourists make decisions about sustainable options and how to appeal to their environmental consciousness.
- ❖ Destination Management Organizations (DMOs) might benefit from neuroscientific studies of how visitors think about and respond to content related to sustainability (Al-Nafjan et al., 2023), which could help them better understand this content and make changes to smart tourism features that put sustainability first (Caputo et al., 2017).
- ❖ In a smart tourism environment, they can use neurofeedback processes to give visitors the latest information that will inspire them to engage in sustainable practices and raise their level of environmental consciousness.



With reference to the paper's research questions, we argue that:

- ❖ With the help of smart technologies, tourists can be more engaged and directed to see more of the attractions.
- ❖ Smart technology and neuroscientific approaches can revolutionize the tourism industry by bringing long-term sustainability to destinations and the industry as a whole.
- ❖ To better comprehend and accept neuroscientific methods and their role in co-creating sustainable value, a feasible approach could be to launch educational programs aimed at both visitors and industry players.
- ❖ To make sure neuroscientific data is effectively incorporated into smart tourism applications, DMOs may think about collaborating with tech developers, neuroscientists, tourism experts, and research institutes and universities that focus on sustainable tourism and neuroscience.
- ❖ Utilizing neuroscientific data in sustainable tourism planning can help with continual improvement and adapting to ever-changing socioeconomic and environmental demands.





Conclusions and future directions

- ❑ “Sustainable Value Co-creation” signifies a method of collaborating to design and implement tourist attractions that have a beneficial impact on local communities and the environment.
- ❑ Sustainable principles, when applied to smart tourism, may improve tourist experiences while reducing adverse effects on local ecosystems.
- ❑ To better understand how people experience, react to, and interact with smart tourism elements, the “Neuroscientific Approach” applies methodologies from neuroscience.
- ❑ Future studies should delve deeper into the distinctive neuroscientific tourism studies, exploring novel methodologies and expanding the scope of cross-cultural considerations, the long-term impacts of sustainable smart tourism practices and continuing to advance neuroscientific research methodologies in the context of smart tourism.
- ❑ Removable and wearing neuroscientific equipment may be employed to investigate tourists’ reactions in contexts outside the typical laboratories, including smart city sightseeing and museum exhibitions.

Thank you for your attention

