



# Value co-creation in sustainable tourism: A service-dominant logic approach

Xavier Font<sup>a,b,\*</sup>, Rosa English<sup>c</sup>, Alkmini Gkritzali<sup>a</sup>, Wen (Stella) Tian<sup>a</sup>

<sup>a</sup> School of Hospitality and Tourism Management, University of Surrey, GU2 7HX, UK

<sup>b</sup> Department of Business and Economics, UiT the Arctic University of Norway, Tromsø, Norway

<sup>c</sup> Independent Consultant, Weserstrasse 6, 12047, Berlin, Germany

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## ABSTRACT

To mainstream sustainability, we need to understand the value gained from sustainability by users. We apply a user-centred design methodology to develop an agile, iterative, incremental and reflexive process to understand the sustainability value proposition for Lufthansa City Center travel agents. We analyse the failure of sustainability communications within the online platforms used by these agents and explore why the agents factor out sustainability information during the customer sales process. We identify how agents and customers understand sustainability, and we explore opportunities to co-create sustainability value. Furthermore, we prototype, and then test, methods of empowering travel agents to communicate sustainability to their customers as a value-adding proposition.

## 1. Introduction

Much effort has been placed on how to educate consumers about the negative impact of their behaviour on the planet and how to market sustainable products to them; with mixed success (McDonagh and Prothero, 2014; White, Habib and Hardisty, 2019). Current thinking is shifting to consider how business models need to include *sustainable value*, that is a value proposition that involves and benefits multiple stakeholders (Baldassarre, Calabretta, Bocken, & Jaskiewicz, 2017; Bocken, Short, Rana, & Evans, 2014; Brown & Katz, 2011). This article responds to recent research by exploring the potential for travel agents to mainstream the consumption of sustainable products. It does so, by gaining an understanding of, and responding to, the co-created value that sustainability offers for: users of tourism services, supply-chain actors (such as distribution channels) and, ultimately, clients; all of whom obtain value from each other's operations. The article applies principles of service design for value co-creation to understand the value that sustainability has to consumers (Ostrom, Parasuraman, Bowen, Patricio, & Voss, 2015).

For its case study, the article uses the redesign of sustainability communication related to hotels on an online platform used in Lufthansa City Center (LCC). The redesign is based on consideration of the

customers' and travel agents' needs from a sustainability perspective. It aims to comprehend the co-created value that customers and distribution channels ascribe to different aspects of sustainability, and trusts that relevant stakeholders co-create value for themselves, for the supply chain and for society. To comprehend sustainability value, we apply the service dominant logic to market sustainability and acknowledge that the value of a service is experienced by its customers but created by a multitude of stakeholders (Echeverri & Skålén, 2011; Holbrook, 2006; Vargo & Lusch, 2004). Moreover, collaborative, user-driven innovation is necessary to design a sustainable value proposition (Baldassarre et al., 2017).

We employ a user-centred methodology, which responds to earlier calls for service research to place a greater focus on the value of sustainability co-created during the customers' service experiences (Ostrom et al., 2015) and we apply this logic to sustainable design (Charter & Tischner, 2017). "Design for service" is a valid methodological approach to deliver value co-creation, as it integrates the use of actors, resources and technologies to generate the intended value (Wetter-Edman et al., 2014; Yu & Sangiorgi, 2018). From the perspective of a user-centred methodology, we discuss how co-creating the meaning of sustainability means acknowledging the emotional and experiential values of sustainability for customers, and the trust and professionalism values it

\* Corresponding author. School of Hospitality and Tourism Management, University of Surrey, GU2 7HX, UK.

E-mail addresses: [x.font@surrey.ac.uk](mailto:x.font@surrey.ac.uk) (X. Font), [rosaenglish@posteo.de](mailto:rosaenglish@posteo.de) (R. English), [agkritzali@surrey.ac.uk](mailto:agkritzali@surrey.ac.uk) (A. Gkritzali), [stellatian.surrey@gmail.com](mailto:stellatian.surrey@gmail.com) (W.(S. Tian)).

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holds for travel agents. Finally, we conclude by reflecting on: i) the theoretical and methodological contributions of this study in relation to how to successfully integrate the roles of customers, employees and technology to create value; and ii) how user experience design approaches can be used to better understand the potential of introducing sustainability features in the co-creation of tourism offers.

## 2. Literature review

### 2.1. Value co-creation in sustainability and service dominant logic

We argue that sustainability can only be mainstreamed if the different stakeholders attach some cultural, social or emotional value to it. The concept of value co-creation is a well-established concept in the marketing literature, mainly developed through the evolution of the new Service Dominant (S-D) Logic (Vargo & Lusch, 2004, 2016). The S-D Logic of marketing refers to a set of foundational premises that help to: i) identify and develop core competences for competitive advantage, ii) identify customers that can benefit from these core competences, iii) develop relationships to deliver value propositions to meet customers' needs, and iv) learn how to improve performance through closely engaging with customers to offer better value (Vargo & Lusch, 2004). S-D logic suggests that value is created by all stakeholders and determined by the benefits gained from the use of products and services: firms make value propositions, but value can only be determined by the customer. Hence, sustainability, and the value created from it, should not be understood as resource based but as market led (Rex & Baumann, 2007). An S-D logic favours an open innovation culture within service ecosystems (Tussyadiah, 2014), defined as a "relatively self-contained, self-adjusting system of resource-integrating actors connected by shared institutional arrangements and mutual value creation through service exchange" (Vargo & Lusch, 2016, p. 161).

The resources used by the actors during the value formation process are operant and operand. Operand resources are those "on which an operation or act is performed to produce an effect", while operant resources are those employed to create value from the operand resources (and other operant resources) (Vargo & Lusch, 2004, p. 2). Contrary to the S-D Logic, a Goods Dominant (G-D) Logic sees the customer as an operand resource, that is, a resource that the organisation researches and promotes (sustainable) products to and, also, tries to modify the behaviour of (through social marketing). An S-D logic sees the customer as an operant resource, that is, one that produces effects on operand resources (Malone, McKechnie, & Tynan, 2018; Prebensen, Vittersø, & Dahl, 2013). The role of the customer changes to one that co-produces the services to be experienced because it is the customer who defines the meaning that those experiences have for them. Value is co-created by the customers' co-creating practices and the providers act as facilitators. Value differs for each customer, rather than being inherent in the goods, because value is created in use and value is specific to a context.

We know little about the implications of S-D logic on environmental and social sustainability, business ethics and public policy (Vargo & Lusch, 2017) nor the opportunity of tapping into personal and societal values in the co-creation of value (Williams & Aitken, 2011). The co-creation of value relies on mutual dependency and reciprocal exchange informed by the values of the economic actors in such relationships (Williams & Aitken, 2011) and that co-creation depends on the creation of meaningful social ties that add social value to the participants. An organisation designs sustainable products with customers, not for customers; co-creation means acknowledging customers as value-creating partners. This change of mind-set, and upfront investment in sharing decision-making with customers, reduces the post-production risk of customer product rejection; the often-seen apathy for sustainable products because they do not resonate with consumer values (Font & McCabe, 2017; Karlsson & Dolnicar, 2016; Rex & Baumann, 2007). Therefore, acknowledging and understanding the co-creation of cultural, environmental and social shared values is the

first step toward mainstreaming sustainability.

Accordingly, our first research question is: how can we unearth the shared value created from sustainability?

### 2.2. Co-creation of sustainability value in the supply chain

S-D logic needs to be cross-functional and inter-departmental, to offer stakeholders, in general, and customers, in particular, the best service possible. Hence, all partners in the supply chain, from customers to suppliers, need to be understood as operant resources (Lusch, 2011; Vargo & Lusch, 2004). Besides business to consumer marketing, S-D logic informs business to business marketing and, the flipped side of the same coin, supply chain management (Lusch, 2011). Sustainable supply chain management is increasingly well understood and integrated into mainstream business operations (Seuring & Müller, 2008), but it has received limited attention in tourism and hospitality to date (Schwartz, Tapper, & Font, 2008; Sigala, 2014; Xu & Gursoy, 2015; Zhang, Song, & Huang, 2009).

Very often, sustainable production and consumption have followed a G-D logic with an emphasis on production standards, sustainability product labelling and customer education (Rex & Baumann, 2007). Hospitality research has shown, however, that a G-D approach, such as sustainable tourism certification, does not affect booking revenue (Chong & Verma, 2013). In fact, communication of environmental performance is seen as an unnecessary risk, since hotels are judged against criteria that are perceived by customers as a basic part of the offer and not as a differentiating, decision-making factor (Borden, Coles, & Shaw, 2017; Robinot & Giannelloni, 2010).

Furthermore, companies trading business to business tend to feel less pressure to engage in sustainability practices due to low customer visibility (Bowen, 2000; Hoejmose, Brammer, & Millington, 2012). The result of this is sustainability messages that have failed to resonate with customers (Font & McCabe, 2017) and led to attitude-behaviour gaps (Juvan & Dolnicar, 2014). Also, it places greater responsibility on the distribution channels and requires additional supply chain systems to capture the evidence of sustainability performance and to identify methods to successfully communicate the added value of a sustainable product or service to the end customer (Richards & Font, 2019). As such, the definition of shared value from sustainability needs to permeate beyond business to consumer marketing and include the study of customer engagement in sustainable supply chain management (Tokman & Beitelspacher, 2011).

Therefore, our second research question is: how can shared value contribute to sustainable supply chain management?

## 3. Material and methods

The application of user-centred processes to develop sustainable value propositions is recent (Baldassarre et al., 2017; Brown & Katz, 2011; Daae & Boks, 2015; Wever, Van Kuijk, & Boks, 2008). This study applies User-Centred Design (UCD) thinking, which is a creative, collaborative, user-oriented process that engages stakeholders and customers from the very early stages of service design, tapping into their own experiences, needs and values to explore practices, habits and behaviours (Yu & Sangiorgi, 2018). UCD focuses on sustainability value proposition as perceived by customers (Baldassarre et al., 2017), and in this study we extend the concept of users to include supply-chain actors who have to obtain value from each other's operations. UCD is a multidisciplinary and multi-method process that allows flexibility; the design is not linear and procedural but agile, iterative, incremental and reflexive (Tussyadiah, 2014). The suitability of certain combinations of methods is context specific (Daae & Boks, 2015), what defines it is its user interaction process to facilitate user-centred co-creation and validation of different scenarios, while service prototyping supports customer centric innovation (Ostrom et al., 2015; Tussyadiah, 2014). The application of UCD to the design of sustainable tourism experiences

(that involve value co-creation) is a novel contribution to the literature (Smit & Melissen, 2018).

The case study organisation for this research is Lufthansa City Center (LCC), which is the largest worldwide travel agency of its kind, being a global franchise company with about 600 offices in 80 countries. More than 300 of these agencies are based in Germany, where this study is focused. While LCC is engaged in finding ways to become more sustainable, the process to date has been informed by top down staff education on the company values and factual product information (Fu, Richards, Hughes, & Jones, 2010), rather than stemming from interaction with customers and other stakeholders. It is fair to say that even the staff with pro-sustainability values have not found the current information empowering to support their sales pitches (as also seen in Chen & Peng, 2014), although the fact that German consumers trust the advice provided by travel agents means that there is clear potential to promote green holiday purchases (Kreilkamp, Krampitz, & Maas-Deipenbrock, 2017).

This two-year study explores the potential of (sustainability) value co-creation between LCC Head Office and the travel agents (two very important stakeholders in the supply chain) during the creation of an online product database, SmartSearch. The database includes inspirational information useful to the agents when they are researching and selling accommodation. This database allows LCC travel agents to search for thousands of hotels of any type, category and location. The database does not include objective (e.g. ecolabels) or subjective (e.g. customer reviews) data on sustainability, and LCC staff have no means of filtering the database in relation to sustainability practices, other than conducting a free text search on the search function of SmartSearch, that then queries multiple online sources from the travel industry. Hotels currently do not have a way of influencing the information held by them, as the scale of the database required relying on automated systems and algorithms to populate hotel information. Amongst other things, it allows travel agents to search for specific sustainability criteria using a number of sustainability related key words and browse a collection of sustainability certified hotels. SmartSearch is an interactional platform that can facilitate co-creation of value, as travel agents have access to reviews, written by other travel agents and guests, and are able to upload their own comments and feedback. Hence, the study follows a UCD methodology to develop a platform that allows the creation of shared value through interaction and, in turn, benefit all members of the supply chain (head office, travel agents, customers) by addressing the information searching needs of travel agents to respond to their customers' accommodation requests. The seven phases of UCD used in this study to elicit value co-creation activities among supply chain stakeholders are: understand, observe, engage, define, ideate, prototype, and test. The methodology to design a sustainable value proposition follows the principles of Brown and Katz (2011), and the methodological detail provided here is similar to other studies that take research through a design approach that is rooted in action research, such as Mitchell, Ross, May, Sims, and Parker (2016), Baldassarre et al. (2017) and Font, English, and Gkritzali (2018). Table 1 summarises the sequence of methodological phases. It also articulates key insights gained at each phase, and how the outcomes generated lead each phase onto the next. All seven phases contributed to answer our two research questions, 1) how can we unearth the shared value created from sustainability? and 2) how can shared value contribute to sustainable supply chain management?

The Understand phase aims to develop empathy for whom one is designing the products, following a deep dive into user experiences (Yu & Sangiorgi, 2018). Design problems are usually poorly defined and more effort needs to be placed on conjecture, which can be defined as an analysis cycle of empathetically understanding the design challenge, seeing design as an iterative problem solving approach (Tussyadiah, 2014). Our aim was two-fold at this stage. First, we wanted to gain a deep understanding of multiple factors pertaining to the head office staff at LCC and the travel agents; the factors included their workplace tools, tasks and routines, autonomy and latitude in decision-making, sense of

**Table 1**  
User-centred design process.

Phases	Methodology	Value co-creation steps and key insights	Outcomes informing the next phase
<b>Understand</b>	Customer meetings and regular correspondence.	- Understand the key values that customers attach to the consumption of sustainability.	Greater empathy towards the customer brief and underlying values and expectations.
<b>Observe</b>	Ethnographic observations of travel agent-customer interactions in travel agencies.	- Tap into the agents' perceptions on customer values and identify gaps and opportunities for shared value creation.	Raised awareness and appreciation of the hidden opinions, needs and desires of travel agents and customers.
<b>Engage</b>	One-to-one and telephone interviews in travel agencies to research their attitudes towards sustainability and their use of SmartSearch.	- Enhance the travel agents' understandings of the customers' emotions, beliefs and values. - Emphasise the importance of hedonic, rather than functional, needs and values for the consumers. - Identify the needs of travel agents to interact with one other, in order to form strong shared meanings and respond to their mutual customers' needs.	Opportunities found to: i) improve sustainability content, and ii) identify functionality shortcomings, of the SmartSearch website.
<b>Define</b>	Data analysis and consolidation from evidence gained in the three previous phases (understand, observe and engage).	- Explore shared values between agents and customers and help customers to make these a key part of their communications in order to establish, and potentially expand, the common ground between all the actors in the supply chain.	Three challenges were defined and "how might we" statements written.
<b>Ideate</b>	One day group ideation workshop, brainstorming and co-creating viable opportunities to make sustainability relevant to travel agents and customers.	- Identify key shared values, such as trust, and use them to form narratives that can help all actors make sense of the service experience and maximise its benefits.	Brainstorming sessions on: i) customer benefits of sustainability; ii) opportunities for travel agents to do things differently to reflect the benefits of sustainability; iii) opportunities to improve the way that sustainable products are chosen and offered; iv) opportunities to encourage travel agents to share and recommend sustainable products.
<b>Prototype</b>	Test of four screen mock-ups with the client and travel agents.	- Expand the understanding of important customer values, such as authenticity, and	Agreement to prototype three concrete ideas. Some broad sustainability terms were welcomed, while others were seen

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Table 1 (continued)

Phases	Methodology	Value co-creation steps and key insights	Outcomes informing the next phase
		help agents tap into these in order to enhance the service experience for all actors. - Including the shared values – both in the form of narratives and images – in the platform in order to allow interaction and enhance co-creation	as vague or overused. Specific examples were desired, but only when they had relevance to the customer experience. Importance of imagery congruence between technically certified sustainability and travel agents' beliefs of what sustainability is. 50 hotel prototypes commissioned, based on lessons learned.
Test	Digital lab user experience test with eye tracking technique, survey and interview analysis.	Test how value co-creation occurs through the common use of the platform and how a shared value could benefit the product and the experience.	Overall the user responses were very positive. The proposal to create a 'collection' of sustainable hotels was highly appreciated. Other sustainability-related features received different amounts of attention. Customers thought that sustainable hotels were under advertised. Website content, layout, and function suggestions were made.

identity, sources of joy and frustration in their jobs, individual values and, finally, the value they placed on existing products or services. Second, we sought to better understand the importance of sustainability to the LCC staff and travel agents, both in their personal and professional lives. We conducted five tasks in parallel: i) we developed a relationship with LCC head office staff through a number of face-to-face and online meetings during the first three months of the study; ii) we conducted ten, half-day visits to three different travel agencies in the Berlin area (one that had received sustainable tourism training previously and two that had not); iii) we conducted five, 1-h-long telephone interviews with staff from travel agencies elsewhere in Germany; and iv) we conducted desk research on the prototype of SmartSearch, in order to understand the potential for sustainability information to be introduced to it, and v) we surveyed which technologies might assist in the design of the communication message. We combined evidence from these four sources of data to better understand the potential sustainable business value proposition

(Baldassarre et al., 2017).

The Observe and Engage phases involved ethnographic and empathic research, incorporating the acts of watching, listening and engaging with LCC staff to interpret the meanings of behaviour of both customers and travel agents when they interacted, and then prompting for further information using reassessed, and reformulated, questions (Yu & Sangiorgi, 2018). Contextual inquiries, such as these, can help identify implicit factors to the user and, in doing so, uncover habits that explain unsustainable outcomes (Daae & Boks, 2015). Observing how the customers asked for holiday information and how the travel agents responded to such requests allowed us to visualise the users' service journey (Yu & Sangiorgi, 2018). Based on our observations, we designed holiday search tasks for travel agents that used specific scenarios, for example: i) a family holiday to include nature-based activities for relaxation, ii) an activity-based holiday staying at a hotel with environmental standards, and iii) justifying the reasons to recommend certain accommodation within a particular sample. The questions were designed to gain an insight into how staff listened to and interpreted customer requests for holiday information and how they used SmartSearch to suggest appropriate accommodations to suit the identified customer needs. The questions also enquired about the travel agents' perceptions of the suitability of the sustainability-related labels given to the accommodations in SmartSearch, including what these labels meant to them and the value they may have in presenting information to potential tourists. We observed six travel agents as they performed these tasks and then we interviewed each of them to understand, firstly, the strategies they had used to solve the tasks and, secondly, the suitability of the information search tools toward the same purpose. Interviews and co-creational sessions with users are common at this research stage (Baldassarre et al., 2017); following Patton (2003), we audio recorded interviews and made detailed field notes. Together with the earlier observations, the tasks allowed us to uncover elements of what they thought and how they felt that they themselves may not have previously been aware of (Daae & Boks, 2015). Thus, in these phases, we explored the existing interaction between travel agents and customers and looked for the co-creation of value that occurs through this interaction. We also used tasks to highlight areas where the system was not able to give them the information they needed, resulting in the travel agents not being able to respond appropriately to customer queries. The Define and Ideate phases allowed us to cluster the themes arising from, and patterns in, data collected during the previous phases. These two phases focused on exploring how the different stakeholders in the supply chain understood the values of the customer. Problem reframing, knowledge brokering and brainstorming are typical at this stage (Baldassarre et al., 2017), to see the problem through the lens of other stakeholder needs, and seeking alternative solutions to the reconceived problem. We developed "How might we" statements, which involved transforming problems into solutions and providing a framework to focus on (Mitchell et al., 2016). The statements co-created were: "How might travel agents do things differently to reflect the benefits of sustainability?"; "How might we improve the way that sustainable products are chosen and offered in SmartSearch?" and "How might we encourage travel agents to share and recommend sustainable products?".

Following examples from service design practice (Yu & Sangiorgi, 2018), an ideation workshop took place to condense and essentialise key insights by facilitating a transition from multiple, and often conflicting, sources of information to interpreting what the key challenges were. The nine workshop participants (LCC staff, travel agents and sustainability experts) worked for 6 h to brainstorm potential approaches to address

the three “how might we” statements (see Photograph 1). The participants were asked to associate sustainability concepts with value created for holiday makers, and opportunities for travel agents to engage in the value creation process, following the application by Baldassarre et al. (2017) of the techniques seen in Brown and Katz (2011). The approach followed was sharing and storytelling around what sustainability meant to the nine participants, and this was used to help the participants focus on the design experiences rather than the products or service touchpoints (Mitchell et al., 2016).

In the first challenge, participants identified the customer benefits of sustainability and clustered them into five themes, namely: Nature/Process, Uniqueness, Trust, Behaviour/Feeling, Culture/Destination. Based on the results, participants went on to brainstorm ideas around, “How might travel agents do things differently to reflect the benefits of sustainability?”. This challenge resulted in the identification of four key issues: the importance of building trust, the significance of identifying the right customer, the need to develop appropriate categories of thinking about sustainability, and the need to modify information in order to nudge customers and travel agents into acting more sustainably. Based on these issues, the next task was for participants to create concrete concepts responding to ‘How might we improve the way that sustainable products are chosen and offered in Smartsearch?’. Participants were given a limited time and asked to create visual ‘one pagers’ (descriptions of an idea on one page) that held sufficient information to convey their idea. These were then displayed on a wall and the participants were invited to vote (using coloured stickers) for the concept they believed would be most effective in reaching the aforementioned goal. In the third challenge, participants were asked to reflect on “How might we encourage travel agents to share and recommend sustainable products?”. Key outcomes were captured on post-it notes once more to facilitate a “design on the wall” visualisation and reorganisation of the findings (Sanders & Strappers, 2012), and were photographed to visualise patterns. As in Mitchell et al. (2016), storyboards were shared amongst the group and presented to each other (see Photograph 2). Participants came up with ideas on post-it notes that were shared on the wall with the rest of the group and, again, voted on to assess their popularity and potential effectiveness (see Photograph 1).

Through iterative analysis rounds, we subsequently visualised the meaning behind these stickers as infographics to facilitate storytelling (Lankow, Ritchie, & Crooks, 2012) and shared them with our design stakeholders (Baldassarre et al., 2017). The emphasis was on ensuring that travel agents can provide useful advice to customers, rather than the logistics of the tools available. After the workshop, we transcribed, amalgamated and codified all the data from the interviews, observations and workshop (Saldaña, 2015). From this dataset, we selected quotes to exemplify key findings and we completed a list of themes, with potential solutions, that would be shared with the co-authors and LCC, to inform the prototype designs.

The Prototype phase aimed to generate meaningful feedback from both travel agents and potential customers on new prototypes, with a view to developing a platform that would allow, facilitate and enhance sustainability value co-creation. This stage led to the creation of a minimum viable product and a test to see whether the product meets the requirements of different stakeholders (Baldassarre et al., 2017). Prototyping forces designers to consider the balance between desirability, feasibility, viability and sustainability (Baldassarre et al., 2020). The prototypes were presented in the form of mock up screen shots (simulating SmartSearch) that showed a core image of the sustainable product accompanied by a descriptive title that would be communicated to the travel agent. We facilitated a discussion with the travel agents to consider how they would use this information to communicate with their customers, consistent with service design practices (Yu & Sangiorgi, 2018). LCC staff and four travel agents tested the viability and desirability of each prototype by responding to the following questions to identify the sustainable value proposition (Baldassarre et al., 2017): 1) Who will benefit from this form of communication? 2) What is its

value to travel agents? And to customers? 3) Why and how is this better than alternative communication options or existing products?

Each prototype was briefly introduced by the participant that had developed it and several questions were asked to identify the desirability and usability of the accommodation product. The participants were asked to compare and contrast prototypes to encourage more genuine feedback. They were encouraged to ask questions at any point and to determine the pace of the feedback given. Subsequently, LCC commissioned 50 prototypes for sustainability certified hotels, for which sustainability text were developed and photographs sourced that focused on customer benefits as identified up to this phase.

The Test phase aimed to capture how value was perceived by potential customers (Yu & Sangiorgi, 2018) when the information from the 50 prototypes was presented to them; thus, by looking at the customers’ perspectives, this phase tested if value was co-created. Eye-tracking and interviews were used to explore how and why participants responded to the pictorial and textual information in certain ways (see Table 2 for a summary of the digital lab test arrangement). The eye-tracker pinpointed participants’ moment-to-moment eye gazes when browsing the information, which is a widely adopted attention research technique (Kingstone, Smilek, Ristic, Kelland Friesen, & Eastwood, 2003). The participants were instructed to complete three on-screen tasks and we followed up with a face-to-face interview. The on-screen tasks were executed through the iMotions® software platform integrated with the Tobii eye tracker x2-30 (iMotions, 2019). The three tasks required the participants to conduct increasingly complex comparisons. In Task 1 they compared one sustainable with five non-sustainable hotels; in Task 2, one sustainable with ten non-sustainable hotels; and, in Task 3, 50

**Table 2**  
The digital lab test arrangement.

Tasks	Level 1 comparison (10min): 1 sustainable vs 5 non- sustainable Hotels	Level 2 comparison (10min): 1 sustainable vs 10 non- sustainable Hotels	Level 3 comparison (10min): within the sustainable hotel collection	Post-test (15min): Survey + interview
<b>Instructions</b>	Task 1: - Search bar keywords: Laviyani Atoll -> Among this search result, the hotel that is <b>most attractive</b> to you is:	Task 2: Search bar keywords: regionale Spezialitäten (regional specialities) + Bali -> Among this search result, the hotel that is most attractive to you is:	Task 3: - After you login to the website, your task is to click into “Collections”. - Please browse the hotels within this page: Sammlungen/ Nachhaltige Hotels Weltweit: Mensch und Natur im Einklang (Collections/ Sustainable Hotels Worldwide: Man and nature in harmony) The hotel that attracts you very much is:  One of the hotel that does not attract you is:	- Website Usability & individual difference survey; - Verbal elaboration of individual feedback towards the website

sustainable hotels with each other. The first two tasks resembled how hotels may be typically displayed based on a query in SmartSearch, while the third task attempted to compare relative importance of sustainability features between each other. The eye tracking metrics used to analyse each participant's visual attention were heat maps, hit time, time spent and the ratio of noticing. In total, 19 participants took part in the test, which generated three sets of pilot data and 16 valid sets of full data.

#### 4. Results

In the Understand phase, we developed a research plan that included questions to ask at interviews in the subsequent phases and we outlined the design challenge as, "How to communicate sustainability attributes and practices of hotel suppliers in a way that is meaningful and practical for travel agents to promote these suppliers to their customers". The Observe and Engage phases provided evidence related to the value of sustainability communicated through the existing content and functionality of SmartSearch. These two phases also unfolded the customers' social, cultural and emotional values that were being disregarded by the other actors. Our first finding showed that the sustainability content that existed in SmartSearch disregarded customers' values, needs and desires towards sustainability. As in previous research (Chen & Peng, 2014; Kreilkamp et al., 2017), we found that travel agents never used terms like sustainability or environmentally-friendly to search for hotels, but they would consider customer benefits deriving from sustainability, albeit implicitly and often unknowingly. Most agents saw sustainability as an irrelevant factor in holiday decision-making for their customers as they experienced minimal explicit customer demand for it. Our second finding was that functionality shortcomings in SmartSearch meant that very few travel agents actually used it, due to performance issues, to compare accommodations in detail.

The Define and Ideate phases defined an overall goal of, "How might we improve the way that sustainable travel products are chosen and offered in high street travel agencies?" We discovered that, first, there was an overwhelming sense of a need to tap into the customers' values and then use those values more during the sales process. Second, the travel agents felt they needed to be better at highlighting the customer benefits of nature-related aspects of sustainability, such as real farm-based accommodations instead of concrete jungles, hotel supplies originating from natural materials and hotels situated in locations with untainted natural beauty. The rest of our findings in these phases related specifically to how sustainability, as a descriptive factor of a product, was perceived by customers. First, we found that, sustainability provided a sense of the product being special, exemplified by terms such as unique, exceptional, lifestyle, tailor-made, something different, authentic. Second, the sense that the product was special resulted in enhanced behavioural and emotional benefits. Third, sustainability fostered trust, as a very important shared value, as narratives of hotels are shaped around the story of being local. Finally, there was a sense that sustainability allowed a deeper connection with the culture and destination of the place visited, which the participants regarded as being very important values for their customers and the providers.

Our results suggested that LCC needed to reframe the purpose of sustainability in its SmartSearch platform around the benefits of: i) building relationships of trust (between travel agents and suppliers); ii) matching value propositions to customer types; iii) developing relevant categories of thinking about sustainability; and iv) changing the sustainability information to nudge their travel agents. The three most popular solutions generated in the ideation phase (by tapping into shared values and arising from interactions) were taken forward for prototyping. First, an "Emotional Connectedness Experience Recommender" tool was proposed (see Photograph 3), where travel agents themselves would be able to tag properties and leave notes for themselves and colleagues to highlight the added value of emotional aspects of a product and the connectedness of its sustainability profile. Second,

an "Eye-Catcher" tool was suggested that would combine travel agent experience with blog posts and images to promote shared experiences of sustainability. Third, a "Leaf" logo was proposed to easily distinguish sustainable products and provide a link to sustainability information that would be useful for the travel agents when recommending the product. All three enhancements were underpinned by a requirement to enable co-creation of the value of sustainability information with the travel agents' personal experiences of the places, plus a need for a greater emphasis on the emotional aspects, and added customer benefits, of sustainability. With these enhancements in place, the travel agents felt they would be able to share and recommend sustainable hotels better with a storyline that would reduce the use of sustainability terminology (instead presenting "the most amazing thing ..." about a particular property) and summarised sustainability facts for each property that would explain its unique selling proposition. They also welcomed: i) a mechanism that would enable agents to give feedback and see other agents' feedback; ii) a short training course covering the essentials of sustainability; and iii) a "Pinterest" style board, for travel agents to follow each other, that had an implicit sustainability story.

In the Prototype phase, four screen mock ups were developed to test: i) the terminology to use for the title of the sustainable hotels collection; ii) the impact of the thumbnail images for each hotel; iii) which keywords are most effective in eliciting a further click on the hotel; and iv) the impact of adding five sustainability facts to each hotel's description. An example can be seen in Photograph 4. A ranking exercise showed that terms that emphasised the individuality of an offer, including regional products and local building materials, were popular with travel agents and customers in Germany except when they became too specific, such as composting or green roofs, or too vague, such as indigenous culture. Terms such as social projects and fair trade, without being evidenced by concrete examples, were overused. Likewise, tailor-made was overused, whereas authentic was welcomed as a very important value shared between agents and customers. A hotel's social commitments were considered important and all travel agents wanted details of these. The mock-up of five (customer relevant) sustainability facts specific to each hotel, designed with a view to enhancing the customers' experiences, was found to be useful for all travel agents when recommending the hotels. The takeaway lesson from this is that keywords that relate to sustainability shared values need to be emphasised, in order for customers to attach meaning to what they are looking for and travel agents to pick the sustainable hotels and continue the sales.

Another key finding was that the keywords needed to be reinforced by imagery. On the one hand, a sustainability logo to easily identify offers with added value, visible on the first page, was desired by all. On the other hand, there were challenges of congruence in visualising sustainability, as travel agents associated sustainability only with small hotels with local architecture. There were mixed feelings about the potential appeal of some images associated with 'green' attributes and scepticism as to how true to life they were. In addition, all travel agents still needed to have quick access to the standard pictures of a hotel, such as those that display a hotel room, pool and other facilities that depicted "quality and hard facts". Hotels placing too much emphasis on sustainability images that did not convey essential customer experience were ignored.

In the Test phase, the visual saliency of the pictorial and textual

**Table 3**  
Pro-environmental attitudes.

	Average frequency (5 = always, 1 = never)
I consider hotels' eco-friendly practices when I book my holidays	1.81
I consider the carbon footprint of my choice of transport and distance travelled	1.75
I consider the impacts of my activities at the destination	2.94

information provided by the sustainability prototypes was identified by the eye-tracking analysis, and the perceived importance and promotion of sustainability features were extracted from the interview analysis. The participants had mixed backgrounds (gender, age, income, qualifications and place of residence). They reported low to medium pro-environmental attitudes while on holiday (see Table 3), and only five of the 19 people interviewed were aware of having stayed in hotels with eco-friendly features, hence their sustainability bias should be low.

First, the visual saliency of sustainability prototypes in each task was analysed. In Task 1 and Task 2, the visual saliency was mainly reflected by the visual attention allocated to the sustainability features on the landing page. Participants browsed an assortment of six hotels (one sustainable and five non-sustainable) in Task 1 and then 11 hotels (one sustainable and ten non-sustainable) in Task 2. The analysis compared the sustainable hotel with its closest competing hotel which was like the most among the non-sustainable hotels. The landing page displayed an assortment of all the hotels available in the destination being searched. The pictorial information of the sustainable hotels was highly visible on the landing page, including the sustainability logo and the thumbnail image. However, the textual information was only fully displayed after participants clicked into the individual hotel webpages. The visual saliency findings are shown in Table 4, which presents: i) the result of the ratio of noticing; ii) the average hit time of the sustainability logo (green leaf icon); and iii) the average time spent on the sustainable hotel's thumbnail image and its closest competitor (the non-sustainable hotel liked by a similar number of participants). The ratio of noticing suggested a low visual saliency of the sustainability logo. Also, the hit time (the average time it took for participants to first notice the logo) was very long; suggesting a lack of visual prominence. However, the sustainable hotel's thumbnail image had a good level of visual saliency. The ratio of noticing indicated that the sustainable hotel's thumbnail image was noticed by more participants than its competing hotel in both tasks. However, despite a higher ratio of noticing on the thumbnail image, neither the average hit time, nor the average time spent metric, showed much difference to the competing hotel in either task.

In Task 3, participants were asked to browse a collection of sustainable hotels and select one that they liked and one that they disliked. The visual saliency mainly reflected the visual attention distributed between the pictorial and textual information on the individual hotel webpages. Fig. 1 presents the heat maps of the most liked and the most disliked sustainable hotels' individual webpages, which is the visual way to identify which contents have sustained the majority of attention (Li, Huang, & Christianson, 2016). To maintain the quality and visual clarity of the images, Fig. 1 has been placed as an online appendix. The heat maps showed that all pictorial information was fully processed, while the textual sustainability information was only partially processed. For the four most liked sustainable hotels, their sustainability text information was fully scanned; while for the most disliked sustainable hotels, only two of the hotels had their sustainability text information fully scanned. To understand what value was perceived from the sustainability pictorial and textual information when making hotel choices, interviews with the participants were conducted, then transcribed and analysed.

A thematic content analysis revealed that using poor pictures was the main reason for a sustainable hotel to be disliked (mentioned by 11 out

of 16 participants). Pictures were deemed poor when they failed to express the service offerings, in addition to those with low quality/resolution. Participants expected pictures to be congruent with the self-claimed sustainability values of the hotels in relation to nature and local people rather than just traditional hotel pictures of the building, doorway or boring land of the hotel. The hotel needed to communicate its beauty and character too by avoiding using visual cues related to dull, hugely grey, concrete, ugly bedding, blunt, very beige, very old and cheap. Nobody mentioned sustainability certification as a factor that matters in selecting hotels. Only one participant pointed out the importance of sustainability in hotel choice due to his (vegan) lifestyle. Half of the participants mentioned they would always browse the pictures first to decide whether they wanted to read the text information about hotels. The remaining participants stated their priority selection criteria as being: i) the spa or luxury bathtub/bathroom (4 of 16); ii) the swimming pool, water or ocean activities (3 of 16); iii) the privacy and the relaxing, comfortable, cosy atmosphere (3 of 16); iv) the restaurant, dining experience and the offering of local food (3 of 16); and v) the unique nature and culture characters surrounding the hotel (3 of 16).

### 5. Discussion

It is important for researchers and industry to experiment together to redesign tourism services that lead to more environmentally friendly behaviours (Dolnicar, 2020). At present, tourism businesses primarily think that sustainability information disrupts, rather than contributes to, the customer experience (Borden et al., 2017) and deliberately under-communicate their sustainability practices (Font, Elgammal, & Lamond, 2017). Travel sales staff underplay sustainability features in their sales pitches (Mossaz & Coghlan, 2017), even when they personally have pro-environmental attitudes and knowledge (Chen & Peng, 2014). Top-down corporate attempts to increase the sales of sustainable products are challenged by resentment (Fu et al., 2010) hence, we need to better understand what sustainability means to the sales staff, who are in effect the gatekeepers to sustainable products, and how to empower these staff to promote the products to customers. We discuss the results in two stages, the co-creation of shared value from sustainable tourism broadly, and in its supply chain in particular.

#### 5.1. Co-creating shared value from sustainable tourism

Customer choices of sustainable tourism experiences are hedonistic (Malone, McCabe, & Smith, 2014) and sales staff endorse sustainable products that resonate with their own personal values (Fu et al., 2010). It is necessary to understand the symbolic features, meanings and social conventions of holiday-making in order to understand how to mainstream the uptake of sustainable practices based on relevance and desirability to one's own worldviews (Santamaria, Escobar-Tello, & Ross, 2016). Our results confirm that a co-created sustainability value proposition resides in the interactions between different actors and that shared value is hedonic, rather than functional (Baldassarre et al., 2017). Travel agents would communicate the emotional value of those sustainability aspects that satisfied customers' expectations of an exciting holiday, whereas they would not communicate sustainability facts per se (Grimmer & Woolley, 2014; Hartmann, Apaolaza Ibanez, &

**Table 4**  
Visual saliency of sustainability features in Task 1 and Task 2.

	Sustainability logo		Sustainable hotel's thumbnail image			Competing hotel's thumbnail image		
	Ratio of noticing	Average hit time	Ratio of noticing	Average hit time	Average time spent	Ratio of noticing	Average hit time	Average time spent
Task 1: browsing 1 sustainable and 5 standard hotels	5/16	52.2 s	13/16	22.5 s	0.5 s	11/16	23.4 s	0.6 s
Task 2: browsing 1 sustainable and 10 standard hotels	2/16	61.9 s	15/16	19.3 s	0.4 s	12/16	17.9 s	0.4 s

Forcada Sainz, 2005). Our study confirms that individuals with lower environmental affect (the majority of society) prefer positively framed (with perceived gain) messages (Kim & Kim, 2014) that tap into their personal values and even enhance them (Grimmer & Woolley, 2014). Environmental appeals, without utilitarian benefits, do not trigger behaviour change in hedonic contexts, such as hotels (Dolnicar, KnezovićCvelbar, & Grün, 2016). Hence, we need to better understand what forms of value can be derived by consumers from which sustainability actions and in which contexts. Sustainability's value does not reside in a G-D logic of the inherent value of the operand resources per se, but as operand resources, which are understood by our travel agents as behavioural and emotional benefits for the customer resulting from the quality of nature and a deeper connection with the place visited, which make customers feel special.

Methodologically, this study shows how a UCD approach facilitates the co-creation of value by placing the user at the center of the decision-making process of sustainability communication. The experiments of sustainable tourism preferences that have replicated actual travel purchasing conditions show that emotional sustainability communication is preferred over functional attributes (see Karlsson & Dolnicar, 2016; Penz, Hofmann, & Hartl, 2017; Wehrli et al., 2017). We have shown how UCD allows us to understand value co-creation in order to co-design sustainability communications that resonate with, and expand, customers' values. The Observe phase was a naturalistic enquiry to explore the interaction between different stakeholders and capture the experience of service users. The Ideation phase allowed for participatory design activities, using generative research methods such as co-creative sketching; in essence, illustrating interactions and unveiling shared values within the co-creation processes. In the test phase, we learned of the importance of using narratives, as the main sense-making tool in value co-creation, to understand the experience of the service. Iterative testing enabled ideas to be tried out and modified in order to identify and solve any problems in the early stages of design (Baldassarre et al., 2020). Testing the prototypes with real users informed the modification of prototypes. Collectively, we saw how bottom-up, customer-centric service experimentation reduces costly design failures (Tussyadiah, 2014) compared to top-down, theory driven experiments (Dolnicar, 2020) that can end up missing the mark (Dolnicar et al., 2016).

## 5.2. Co-creating sustainability value by, and for, the different stakeholders in the tourism supply chain

Sustainable business models require having a value proposition that benefits multiple stakeholders (Baldassarre et al., 2017). Yet value co-creation has been narrowly defined previously as being between a tourist, other tourists and the host (Prebensen et al., 2013), while ignoring the role of distribution channels in the co-creation of value (Lusch, 2011; Vargo & Lusch, 2004). In reality, customers and travel agents share, and exchange, operand resources for mutually beneficial purposes. This study contributes to the conceptual framework of value co-creation in tourism by showing that not only the customer is a resource integrator, but the travel agent also is. Our research provides further evidence that distribution channels have more than a technological transactional value (Lusch, 2011), unearthing their great potential to create and add value to products and processes. Our findings also contribute to explaining what kind of sustainability information can be an operand resource and for what purpose. Travel agents saw the opportunity to co-create value (as a result of realising sustainability as a conduit of trust between the customer and themselves) and to use this

value to legitimise their own relevance in the tourism supply chain, even when sustainability was not communicated explicitly (Mossaz & Coghlan, 2017).

Our results show that service encounter is a value exchange process between the customer and the travel agent, and between the travel agent and the technology service provider, and so on down the supply chain (Tokman & Beitelspacher, 2011). The travel agent needs to anticipate how to co-create value from sustainability with the customer and, in turn, the aggregators of tourism supplier information (usually the technology providers) need to see value in the role of the travel agent. But these travel agents felt constrained by the limited information given by hoteliers to the technology service providers. The hoteliers were ill-equipped to co-create value, at both the individual property (Chathoth et al., 2014) and corporate levels (FitzPatrick, Davey, Muller, & Davey, 2013), and they failed to communicate their sustainability practices (Borden et al., 2017; Font et al., 2017). Hence, we conclude that providing sustainability value requires the whole supply chain to collaborate in the value co-creation process. The travel agent is the customer of the technology service provider and, as such, the travel agent's skills and knowledge need to be valued as operand resources. Travel agents that add value are not simply entering customer's requests onto a computer; they co-create the sense of anticipation and excitement shared by their customers while holiday planning as an emotional value creation (Malone et al., 2018) and they reassure their customers with expertise. Travel agents will value sustainability information that empowers them to showcase their self-identity of professionalism. The "Emotional Connectedness Experience Recommender" and the "Eye-Catcher" tools proposed by the participants combined travel agent experience with blog posts and images to share experiences of only those aspects of sustainability that contributed to recommending hotels that would create value for the customers.

Travel agents wanted the reassurance of a Leaf logo to create reassurance but, when it was introduced in the mock-ups, it had a low ratio of noticing on our eye-tracking tests. This confirms evidence from both quasi experiments, which found mixed results in relation to the preference of tourism suppliers with ecolabels (Karlsson & Dolnicar, 2016; Penz et al., 2017), and actual consumer data, which showed that ecolabels had no direct impact on purchasing decisions (Chong & Verma, 2013). Although sustainability certification does not strike most participants as a core selection criterion when booking hotels, travel agents would like to know more about what value-added services sustainable hotels could offer. Moreover, including sustainability information with ecolabels could increase message trust, compared to not including such information (Atkinson & Rosenthal, 2014). Therefore, it is important that sustainable hotels learn to translate the benefits of sustainability certification into enhanced or transformed sustainable customer service. And for travel agents, this translation should not be presented as terminology or facts, but should be showcased as an emotional experience ("the most amazing thing"), thus validating the need for a travel agent by providing something that customers themselves would not easily be able to find.

The eye-tracking results showed that the pictorial information of a sustainable hotel played a gatekeeper role in attracting visual attention and stimulating further interest in processing textual information. Consequently, hotels that had behind the scenes sustainability practices that could not be showcased as a better experience (e.g. reductions in carbon footprint, water consumption or waste) did not fare well in the eye-tracking tests. Even in the 50 prototypes with enhanced sustainability messages, low photography-message congruence disempowered



travel agents from using any sort of sustainability storytelling for fear of appearing less professional to their customers. Travel agents remarked on the importance of congruence between the visualised sustainability and their pre-conceived ideas of what customers might expect. It also shows that having a sustainable product does not excuse a business from having to pay attention to the quality of the website, including visuals, text, layout and functionality (Villarino & Font, 2015). This emphasises the importance of better understanding how to communicate sustainability visually, an under-researched topic.

## 6. Conclusions

This study responds to the priority research topic of “how to successfully integrate the roles of customers, employees and technology to create value” (Ostrom et al., 2015, p. 138) and shows how S-D logic is a theoretical foundation for Design for Service (Wetter-Edman et al., 2014; Yu & Sangiorgi, 2018). Our analysis contributes to the sustainable tourism marketing literature by showing how the Design for Service approach delivers value co-creation that can help mainstream sustainability practices while creating business value (Schaltegger, Hansen, & Lüdeke-Freund, 2016). This requires organisational commitment to apply user-driven innovation principles to innovate towards achieving sustainable business models (Baldassarre et al., 2017). Our analysis also contributes to the S-D Logic literature in tourism by showing how all actors in the supply chain can be and should be viewed as value co-creators and value integrators. S-D Logic has implications for sustainability because it emphasises how to create value through exchange and, by extension, whose understanding of value is legitimised. If value co-creation is the purpose of society (Vargo & Lusch, 2017) then it makes sense to look at the whole service ecosystem as the unit of analysis for value co-creation (Vargo & Lusch, 2011). Through institutional arrangements, supply chains have the function of collective wellbeing where individual survival depends on, and contributes to, the survival of the ecosystem (Vargo & Lusch, 2016).

In addition, this study makes a methodological contribution to the literature by showing how user experience design approaches can be used to understand better the potential of introducing sustainability features in the co-creation of tourism offers (Baldassarre et al., 2017; Brown & Katz, 2011; Smit & Melissen, 2018; Tussyadiah, 2014). Improving well-being, through transformative service, is an important area for service research, and this includes the wellbeing of individuals, the collective and the ecosystem, with sustainability being the most important theme (Ostrom et al., 2015). Although it is acknowledged that 80% of all product and service related impacts are determined at the design stage, few studies have developed methodologies that incorporate sustainability in the design brief (Charter & Tischner, 2017). Extending our knowledge of how service is designed to influence, add value and incentivise both customer and employee contribution to sustainable use of resources is therefore essential (Anderson et al., 2013). Most research in sustainable innovations focuses on the strategic and conceptual levels, but doing so creates a design-implementation gap (Baldassarre et al., 2020) that this study aims to address. This study confirms how the application of user-centred design approaches to sustainability solutions provides a greater breadth of ideas, and a more systematic analysis of such ideas, than the application of consultation processes (Mitchell et al., 2016). Methodologically, UCD contributes to understanding some of the sustainable tourism attitude-behaviour gap (Juvan & Dolnicar, 2014), and suggests practical ways of supporting businesses to design, market and communicate commercially viable

products with sustainability features (Font et al., 2018).

The management implications are significant. First, sustainability experts and businesses alike need to acknowledge what sustainability means to people, in our case to customers and travel agents, and to rethink product design taking into account not only technical sustainability solutions but also people-centred value propositions (Baldassarre et al., 2017). These value propositions will need to be not technical and have more market penetration and potential for scalability, because they will need to resonate with the sales staff's beliefs, who will feel empowered to credibly put those messages across to consumers as decision-making attributes (Chen & Peng, 2014; Fu et al., 2010; Mossaz & Coghlan, 2017). The research team used this study to build internal capabilities for sustainability, user-centred service innovation in the research partner (Yu & Sangiorgi, 2018), by bridging between their service design and their corporate social responsibility units. Second, travel agents emphasised the need for quality and “hard facts” as key decision-making attributes, confirming previous evidence that sustainability is not accepted as a by-product of service failure (Gao & Mattila, 2014). These travel agents pre-empted customer's potential scepticism of trade-offs between quality and sustainability by playing down sustainability attributes. This study demonstrates how these elements could be incorporated organically with sustainability features.

### 6.1. Study limitations and future research recommendations

Finally, this study's research limitations lend themselves to making suggestions for further research. First, the functionality shortcomings in SmartSearch did not allow for more comprehensive tests therefore, this experiment remains at ‘proof of concept’ stage until the SmartSearch software is upgraded in order to allow for more meaningful and seamless co-creation of content by travel agents. As a result, the user-centred methodology used here to determine travel agent value from sustainability needs to be tested in other settings. Second, this study was limited to gaining an understanding of the role of customers as part of service co-design; future research ought to aim for a better understanding of their role as co-creators of sustainable experiences (Malone et al., 2018). Third, hoteliers were passive stakeholders in this study, unable to influence the information that SmartSearch scrapped about them or how it was shared with consumers, however the information gathered to prepare 50 prototypes of sustainability certified hotels showed that a wealth of information exists online that is not captured by online travel agents. This is typical of the limited power of suppliers to influence the way that tour operators market them (Richards & Font, 2019; Schwartz et al., 2008) and further research is needed to identify ways to empower suppliers as part of sustainable supply chain management relations. Fourth, specific research is needed to understand how photography conveys sustainability messages and how these are congruent with other marketing content. Fourth, the results may not be directly transferable to other contexts as the German market relies on travel agents more than other countries. Hence, it would be useful to test what value sustainability has across different cultures and for different customer-distribution channel relationships.

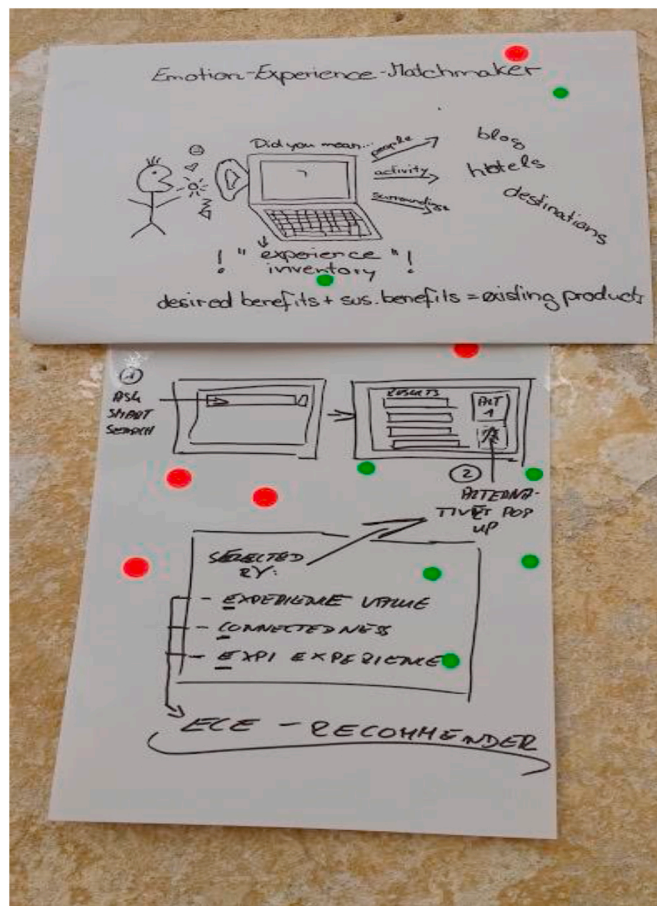
### Impact statement

Our study is the result of a collaboration with Lufthansa City Center (LCC) that have resulted in an industry report and applied research at company level, as well as this manuscript as an academic reflection on the process undertaken. Both the report and the manuscript respond to





Photograph 2. Storyboard sharing during workshop.



Photograph 3. Ideation process Emotional Connectedness experience recommender.



### The Sands Khao Lak by Katathani Collection

Domestikansuche | Suche | iAvarabe

Authentische Gerichte aus lokalen Zutaten  
Individuell für Vegetarier und Allergiker  
Energiesparende Architektur, naturnahe  
Materialien  
Engagement in lokalen Bildungsprojekten  
Auf Wunsch in nachhaltigen Projekten helfen  
Beach Clean Up, Recycling Karneval  
Umweltzertifiziert

Authentic dishes made from local ingredients  
Tailor made for vegetarians and people with allergies  
Energy efficient architecture, Natural materials  
Participation in local education initiatives and opportunities to help out in sustainable projects such as beach clean ups, a recycling carnival  
Environmental certification

**Photograph 4.** Prototype of customer-centric sustainability wording and visuals.

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**Prof Xavier Font** is professor of Sustainability Marketing at the University of Surrey, UK, and Professor II at the UiT The Arctic University of Norway Norway. He is the University of Surrey's Principal Investigator for a €23.5m Interreg project to develop sustainable forms of tourism for coastal areas in England and France (2019–2022). In 2018-19 he has evaluated the impact of the European Tourism Indicator System on policy making across European regions, and has written a manual on sustainable tourism indicators for policy making (Interreg Mitomed+). He has consulted for UNEP, UNCTAD, UNWTO, International Finance Corporation, DG ENV, DG Growth, EURAid, WWF, government agencies and international firms in multiple countries.



**Rosa English** is a free-lance consultant in sustainable tourism product design, and a former student of Dr Font.



**Dr Alkmini Gkritzali** is a Senior Lecturer in Tourism at the University of Surrey. Her current research interests include destination marketing, perceptions and communication, online and offline storytelling, and value co-creation in tourism.



**Dr Wen (Stella) Tian** is a former Research Fellow in the Digital Visitor Economy Group at the University of Surrey. She has a strong cross-disciplinary research background of studying the behavioural, managerial, technological, and societal impact brought by the development of digital technologies.