Smart Ships and the Evolution of Cruise Target. How Smart Technologies are Affecting the Relationship of Customers with Spaces and Services

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ABSTRACT

This research investigates the evolution of spaces and services for customers in the naval and nautical sectors, through the method of case study analysis. The spread of smart technologies has deeply transformed our society in every context, generating relationships based on network systems and new forms of communication among people, objects and surrounding environments. In the cruise and yacht sectors smart technologies have affected the sea travel, leading companies to rethink spaces and services for customers. The results show how smart technologies can improve the quality of travel on board, offering new opportunities than on former ships, and at the same time indicate critical factors derived by the use of these new technologies.

Keywords: Cruise vessel design, Smart technologies, Immersive spaces, Digital services, Customers

INTRODUCTION

The great development of smart systems since '90s has significantly influenced every economic field, both leading and minor sectors, and even the cruise sector, transforming cruise ships in a new generation of vessels: the 'smart ships' (Papathanassis, 2017). The cruise ship Royal Caribbean's Quantum of seas, launched in 2014, has been defined as the first smart ship. CLIA – the Cruise Lines International Association – has outlined some impacting trends for the cruise travel: instagrammable cruise travel, on-board smart tech, gen Z at sea, achievement over experiences (CLIA, 2018), cruise line apps, wearable technology, and smart homes at sea (CLIA, 2020). In the tourism context, due to the increase and the transformation of mobility, travel has blurred with some activities from everyday life, generating so new phenomena of 'bleisure tourism', which derives from the contraction of the words "business" and "leisure" (Scullica & Elgani, 2020), of 'neverending tourism', which represents the possibility of an extension of the tourism experience (both physical and digital) in space (not only at the destination) and time (before, during and after the travel experience) (Osservatorio Innovazione Digitale nel Turismo, 2022) and, due to the long periods of travel restrictions during covid pandemic time, traveller's behaviour has turned toward flexibility and last-minute

planning, expressing preference for relaxing and escapist experiences (Shadel, 2020). The target of cruise passengers has evolved over time, passing from an old and wealthy tourist with a lot of spare time to a younger and more dynamic one (Penco, 2013). In addition, the worldwide demand for cruises, traditionally occupied mainly by North American customers, is currently undergoing a process of globalization with the slow growth of the European and Asian markets (World Tourism Organization, 2003). This context poses new challenges to the cruise industry for the future of cruise travel.

THEORETICAL BACKGROUND

In the early 1970s, the first modern cruise target was represented by older people, mainly retirees, identifiable as 'baby boomers', health-conscious, adventurous and with a lot of time to spare. They sought ways to enrich their lives and they expected cruise travel to be customized, easy, exotic, exclusive, and with activities that are healthy and fun (Dowling, 2006). Slowly the target has turned from an elite rich class to a larger middle class, who was looking for a holiday that was affordable, economically viable and, of course, fun. So, the 'fun-ship' was born, making onboard entertainment the backbone of the cruise (Zaccagnino, 2014). Based on the analysis of demographic factors and cruise passenger behavior, cruise tourism analysts have developed different passenger profiles in regard to fun-ships. First CLIA identified six segments: restless baby boomers, baby boom-er enthusiasts, lovers of luxury, demanding buyers, explorers and boat enthusiasts (CLIA, 1995-2001). Later, CLIA elaborated new segments based on passenger behavior: family folks, want-it-alls, adventurers, comfortable spenders and cautious travelers (CLIA, 2003). Then Cruise Market Watch built the following segments: explorers, admirals, marines, little mermaids, escapers and souvenirs (Cruise Market Watch, 2008). Finally, and Paris provided five types of consumers on the cruising market: travelers taking part only in the voyage, travelers visiting cruise destinations, travelers keen on relaxation and respite, travelers looking for new acquaintances and friends, and travelers looking for sun and sun bathing (Teye & Paris, 2011). In more recent time, the increasing demand by passengers for more sophisticated and varied experienced has pushed cruise companies to develop new technologically advanced ships (Quartermaine & Peter, 2006), known as 'smart ships' (Papathanassis, 2017). The cruise travel has become affordable for almost all the income classes and ages, with the attraction of younger segments, coming from generations Y and Z. Though the primacy of North America, a growth of demand from Europe, with Germany as leader, and Asia have been registered in demographic statistics (Vafeidou, 2019). In the customer experience surveys elaborated by Deloitte, the new cruise passengers have been outlined as digitally connected, seekers of unique experiences, customized services and high-quality and pleasant spaces (Deloitte, 2018). In addition, the younger generations have shown a major interest and commitment toward sustainability than the older ones (Dimitrovski et al., 2021). Based on this change of the demand, cruise analysts have developed new market segments of cruise passengers, even though with very few references to the smart experiences in the cruise travel. In regard

to age generation, CLIA divided travelers in four groups: gen Y/millennial 1982-1998, gen X 1967-1981, baby Boomers 1948-1966, and traditionalists 1917-1947 (CLIA, 2017). Considering passengers as consumers, Kizielewicz differentiated three typologies of consumers: a consumer of type I, who is at the same time resident, excursionist and passenger of a ship, a consumer of type II, who is excursionist and passenger of a ship, a consumer of type III, who is tourist, excursionist and passenger of a ship (Kizielewicz, 2020). Finally, based on cruise travel motivations, Jiao et al. classified four main types of passengers: psychocentric tourist, traditional tourist, pioneer and sightseer (Jiao et al., 2021). The historical development of design research and practice has been grounded on a methodological approach known as 'user-centered' design, which aim was to guide the design process towards the development of usable artifacts designed from the features and needs of the end users (Radice, 2014). The spread of digital technologies has led ethnographers to reflect on methodologies and to redefine the fieldwork of research, including Internet as a field and object of study. The digital ethnography has become a new research method, which contemplates three different approaches: virtual ethnography or ethnographies of cyberspace, connective or online/offline ethnographies, and ethnographies of Internet in everyday life (Ardevol & Gómez Cruz, 2013). The advent of digital communication technologies has resulted in an expansion of social environments, bringing personal relationships from place-based ties to interest-based connections (Broadbent, 2012). The interactions among social actors go beyond the physical boundaries and define the new 'network society', organized around connections, in contrast to the space of places, organized around localities (Castells, 2000). Cruise line websites and social networks have become widespread, allowing companies to strengthen their relationships and communication with customers. Cruise social media offer tourist the possibility to create contents, allow peer-to-peer communication between companies and customers, and build virtual communities, which affect people's behavior (Tiago et al., 2018) (Zeng & Gerritsen, 2014). The rise of the internet and the spread of new organizations into groups has allowed new forms of 'collective intelligence' to emerge. The potential of collective intelligence is very high and goes beyond the creation of 'cool' ideas (Malone et al., 2009). The foundation and goal of collective intelligence is the mutual recognition and enrichment of people. Collective intelligence is based on culture and grows with it through ideas, languages and cognitive technologies supported by a community (Lévy, 2002). In this context, the scale and complexity of contemporary challenges can no longer be addressed by the traditional 'user-centred' design approach. Nowadays Design has been regarded to be no longer about designing products for the user, but about designing experiences, involving people, communities and cultures, connected and informed as never before (Sanders, 2008). Co-design represents the last development of a trend started with user-centered design aimed at involving end users in the design process, includes many tools from user-centered design and experience design, and is a completely transparent activity in which all participants are acknowledged about the design methodologies and its goals (Radice, 2014) (Rizzo, 2009). This research aims at providing a link among cruise passengers, spaces and
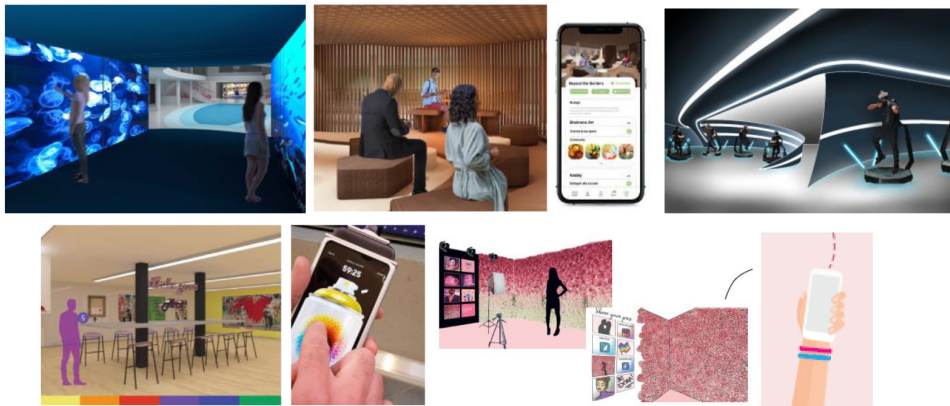
Figure 1: Selection of case studies from university projects of the Laboratorio di Sintesi of School of Design at Politecnico di Milano (a.a. 2020–21): (a) Scilla e Cariddi, (b) Beyond the borders, (c) Laserzone, (d) Art in the making, (e) Social Media Wall.

services, in order to guide cruise companies and designers to develop ships more respectful of the customers culture and identity, overcoming the concept of non-places.

METHODOLOGY

The research methodology is based on a qualitative analysis of case studies and tries to answer the following research question: how are smart technologies affecting the relationship of customers with spaces and services? The case studies collected included environments from cruise ships with smart features. This sampling has involved from 7 global cruise lines registered in CLIA (Cruise Lines International Association), 10 smart cruise ships and 25 environments, 5 of which are fictional projects from the Laboratorio di Sintesi held by Prof. S. Piardi within the BA degree course in Interior Design at the School of Design of the Politecnico di Milano. The case studies were collected between November 2019 and February 2022.

Case studies have been analyzed using several parameters, grouped in four categories: technologies, spaces, services and customers. The technological development measures the degree of complexity of electronic component assembly through the levels of low, medium/high or smart (Texas Assistive Technology Network, 2002). An adaption of the taxonomy of virtual reality systems (Muhanna, 2015) classifies technologies in no immersive, little immersive, partially immersive and fully immersive. An adaption of the technological embodiment continuum (Flavián et al., 2019) differentiates technologies in touchless or contactless stationary external device, stationary external device with need of touch, portable external device and wearable device. With the emerging experience economy, spaces have encompassed theatre as a model, so that can be set in six areas: backstage, stage, auditorium, proscenium, entrance, and exit (Pine II & Gilmore, 1999). Cruise travel is a complex and all-inclusive tourism product which includes a central service

Table 1. Collection of case studies based on environments located on smart ships.

	Context	Case study	N.	Unit of analysis	Year
INDUSTRY	Cruise company	Smart cruise ship		Environment from smart cruise ship	
	Carnival Cruise Lines	Spirit	01	Panedia Cruiseabout VR headset	2016
	Celebrity Cruises	Celebrity Edge	02	Magic Carpet	2018
			03	Le Petit Chef	2018
			04	Access Tour app for smart mobile devices	2018
	Costa Cruises	Smeralda	05	Bellavista restaurant	2019
			06	Colosseo	2019
	Disney Cruise Line	Dream	07	Magical Porthole	2011
			08	Skyline	2011
		Fantasy	09	Animators Palate	2014
	MSC Cruises	Meraviglia	10	Ocean Cay	2017
			11	Galleria Meraviglia	2017
			12	MSC for Me Wristband	2017
			13	Flight Simulator	2017
		Seaside	14	Interactive XD Cinema	2017
			15	Emotions Immersive Gallery	2017
	Princess Cruises	Caribbean Princess	16	Movies under the stars	2004
	Royal Caribbean	Oasis of the Seas	17	Digital Wayfinder	2009
		Quantum of the Seas	18	Virtual balcony	2014
			19	Expedition TW070	2014
			20	TW070° Vistarama	2014
UNIVERSITY	MSC Cruises (fictional projects 1-2-3-4-5)	Meraviglia (Odissea 2.0)	21	Scilla e Cariddi – *Corridor with Interactive Ledwalls*	2020
		Meraviglia (Greenline)	22	Beyond the borders – *A zone for sharing and communication among passengers thanks to technologies that highlight multiculturalism*	2020
		Meraviglia (Zth Sense)	23	Laser zone - *A game area with platforms with equipment for virtual multi-player experience*	2020
		Meraviglia (Fun)	24	Art in the making - *A lab area where passengers can learn how to make a work of art*	2020
		Meraviglia (It's showtime)	25	Social Media Wall - *Using a phone app, passengers can share posts on an interactive totem pole*	2020

Table 2. Parameters for the case studies analysis based on environments located on smart ships.

	Technological development		
	Low	Middle - High	Smart
Technologies	Source: Adapted from Texas Assistive Technology Network, 2002.		

	Technological embodiment continuum			
	Touchless or contactless stationary external device	Stationary external device *with need of touch*	Portable external device	Wearable device
	Source: Adapted from Flavián et al., 2019.			

	Taxonomy of virtual reality systems			
	No immersive (no digital interface)	Little immersive (e.g. hand-based, monitor-based)	Partially immersive (e.g. wall projectors, immersa-desk)	Fully immersive (e.g. vehicle simulation, cave, binocular head based)
	Source: Adapted from Muhanna, 2015.			

	Spatial strategy for layout			
Spaces	Entrance / Exit (e.g. reception, lobby, cashier's desk)	Auditorium (e.g. dining, shopping, seats)	Proscenium / Stage (e.g. bar, kitchen, screen, stage)	Backstage (e.g. store, toilets)
	Source: Pine II & Gilmore, 1999			

	Cruise related services						
Services	Itinerary and destinations	Travel arrangements and transfers	Ports and terminals	Central service: travel, accommodation, catering, entertainment.	Additional services: boutiques, casino, photography, spa.	Ship facilities: internet, lounge, laundry, sundeck, gift shop, library.	Excursions
	Source: Penco, 2013.						

+ (Customer behaviour)

	Level of participation				
	Spectating (e.g. (read/ watch/ listen)	Interaction (by voice/gesture/ movement/touch)	Contribution (share ideas, comments and/or stories)	Collaboration (operate as active partners in the creation of contents)	Co-creation (work together with the organization staff)
Customers	Source: Radice, 2014				

	Level of presence			
	Physical presence (e.g. Virtual Reality, Location-Based Entertainment, Cinema, Painting, TV)	Co-presence (e.g. Shared Virtual Environments, Videoconferencing, Videophone)	Hybrid presence (i.e. Alternative shift between physical presence and social presence)	Social presence (e.g. Email, Multi-user Dungeons, Telephone, Online chat, Letter)
	Source: Adapted from Ijsselsteijn & Riva, 2003; De Souza & Silva, 2006.			

and many peripherical services, as the ship facilities, the additional services, itinerary and destinations planning, travel arrangements and transfers, ports and terminal embarkation and disembarkation, and excursions (Penco, 2013). The levels of participation can be distinguished in spectating, interaction, contribution, collaboration and co-creation (Radice, 2014). Presence can manifest itself in three ways in relation to a mediated (through technology) environment: physical, social and co-presence (IJsselsteijn & Riva, 2003). The increasing connectivity of users with mobile technologies has led them to repeated shifts in communication and interaction between physical and digital spaces, resulting in redefining physical space and cyberspace into a new hybrid space, which can be perceived as flowing in and out of physical space, blurring the boundaries between both (De Souza e Silva, 2006).

The categories that emerged from the analysis of the case studies were translated into flood diagrams in order to examine the relationships between the various classifications and assess the specific contribution of technologies in relation to spaces and services.
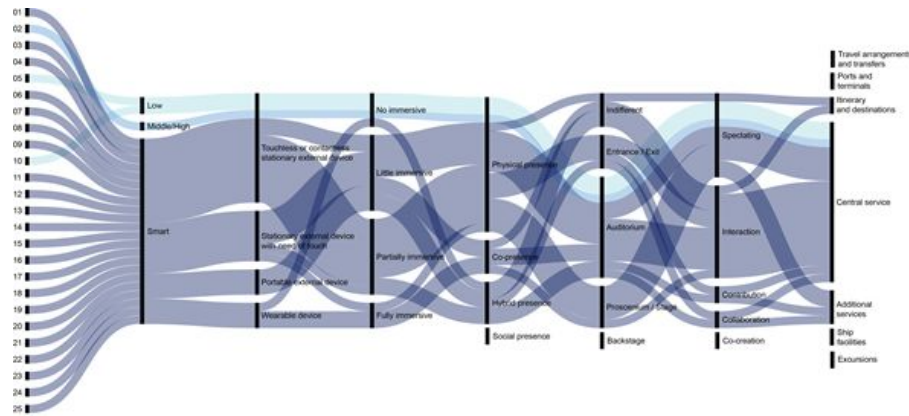
Figure 2: Diagram derived from case study analysis based on environments located on smart ships.

RESULTS

The results derived from the study diagram show a great versatility of smart technologies across the various categories and confirm the recent great interest of cruise lines in these new tools. The case studies with a low or medium-high level of technology show a similar behaviour, denoting basic properties with respect to the technological contribution: fixed external devices with no need for touch or contact by the passenger, level of virtuality generating no immersiveness, sense of physical presence by the passenger, located in a single space of layout, which is the auditorium, basic level of participation as spectating. Case studies with a smart level of technology include various levels of technological embedding, achieve all levels of immersiveness, are located in most layout areas or may be indifferent to a defined location, may achieve different levels of user participation and may offer a variety of services. The research process has highlighted how the continuous innovation provided by smart technologies is radically changing the cruise context and specifically cruise ships. The case studies coming from the university aim to fill the gaps left by the cruise industry, suggesting to cruise lines and designers further possible improvements.

CONCLUSION

The analysis of smart technologies has highlighted multiple opportunities for development in the cruise context, but, at the same time, the emergence of critical factors. Therefore, innovation in the cruise industry should not only be driven by technologies but by a responsible attitude. As emerged from the analysis of the literature, the passengers on board come from various geographical contexts, express different cultures and demographic factors, such as age and social status. Responsible development requires attention to all social declinations, age groups, gender and social origins, through greater involvement of the various players in the cruise context in the design processes of spaces and services.

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