Rui Alexandre Salgado Carreira

Designing the travel experience: identification and incorporation of passengers' experience requirements in new bus body development

Dissertation submitted to Faculdade de Engenharia da Universidade do Porto to obtain the Doctoral Degree in Leaders for Technical Industries

Advisors:
Professor Lia Martins de Lima Patrício
Professor Renato Manuel Natal Jorge
Professor Christopher Magee

Faculdade de Engenharia da Universidade do Porto
2012

Thesis co-financed by European Union funds

“Le client n'a jamais tort”

César Ritz (1850-1918)

ABSTRACT

Customer experiences have gained increased attention because customers search for value propositions in using products and services, instead of product ownership or service availability. Customer experience involves all moments of interaction with products, services, or product-service systems (PSSs), from beginning to end of the usage process. Nevertheless, the understanding of customer experience and the development of methods for systematically incorporating it into the development of new PSSs still deserve further attention. In public transportation, the travel experience involves interactions with vehicles and with transportation services. However, these components are separately designed by vehicle manufacturers and transport providers, which may create an inconsistent travel experience for the customers.

The challenges described introduce the motivation for the dissertation research which studied mid-distance bus trips. This research aimed at understanding travel experience and at developing new transport concepts from a PSS perspective. To attain these objectives, the research project involved two main stages that are part of an extension to Kansei Engineering methodology. The first stage consisted of a travel experience study that included qualitative and quantitative approaches, while the second stage enabled the incorporation of customer perceptions into new vehicle concepts that integrated product and service offerings. The qualitative study was performed to get a rich understanding of the travel experience, whereas in the quantitative approach a questionnaire was administered to the passengers to develop a travel experience multiple-item scale and assess its impact on customer attitudes and behaviors. In the second stage the Kansei Engineering methodology steps were used to explore new vehicle concepts, involving vehicle manufacturers and transport providers.

Thus, the present dissertation contributes to (1) an in-depth understanding of the customer experience, in particular associated with public transportation, (2) identify and measure the customer perceptions of the most important transport attributes, and understand how they influence customer attitudes and behaviors and (3) improve the incorporation of those customer perceptions into new public transport concept development from a PSS point of view.

This dissertation provides researchers and other transport interested parties with increased explanation of the customer experience, namely its antecedents and outcomes, and how to consistently incorporate it in public transportation offerings that associate products and services, to enable better customer experiences.

RESUMO

As experiências adquiridas pelos clientes têm vindo a ganhar maior importância porque estes procuram propostas de valor na utilização de produtos e serviços, em vez da posse de uns ou da disponibilidade de outros. Embora a experiência do cliente envolva todos os momentos de interação com produtos, serviços ou sistemas produto-serviço (PSSs), é porém, o seu entendimento e o desenvolvimento de métodos para a incorporar sistematicamente no desenvolvimento de novos PSSs que merecem ainda mais atenção. Em transportes públicos a experiência de viagem envolve a interação com veículos e serviços de transporte. No entanto esses componentes são normalmente desenvolvidos separadamente pelos fabricantes de veículos e transportadores, o que pode originar experiências de viagem inconsistentes para os clientes.

Os desafios descritos motivaram esta dissertação que se baseou na análise de viagens de médio curso em autocarro e cuja investigação teve como objetivos o entendimento da experiência de viagem e o desenvolvimento de novos conceitos de transporte a partir duma perspectiva de PSSs. Para alcançar estes objetivos, a dissertação incluiu duas fases principais que fazem parte de uma extensão ao método Kansei Engineering. A primeira fase consistiu de um estudo da experiência de viagem que incluiu abordagens qualitativas e quantitativas, enquanto a segunda fase permitiu a incorporação das perceções dos clientes em novos conceitos de veículos que integram ofertas de produtos e serviços. O estudo qualitativo foi realizado para a obtenção de um entendimento aprofundado sobre a experiência de viagem, enquanto na abordagem quantitativa foi distribuído um questionário aos passageiros para se desenvolver uma escala de medição da experiência de viagem, constituída por vários itens e para avaliar o seu impacto sobre as atitudes e comportamentos dos passageiros. Na segunda fase foram seguidas as etapas do Kansei Engineering para explorar novos conceitos de veículos, envolvendo os seus fabricantes e transportadores.

Desta forma, a presente dissertação contribui para (1) um entendimento aprofundado da experiência dos clientes, neste caso mais especificamente associada a transportes públicos, (2) identificar e medir as perceções dos atributos dos transportes que são mais importantes para os clientes, e entender como é que elas influenciam as atitudes e comportamentos dos clientes e (3) melhorar a incorporação dessas perceções no desenvolvimento de novos conceitos de transporte público numa perspectiva de PSS.

Sendo assim, esta dissertação disponibiliza uma melhor explicação da experiência dos clientes a investigadores e a outras entidades interessadas em transportes, nomeadamente no que respeita aos seus antecedentes e consequências, e de como é que ela pode ser incorporada em ofertas de transporte público que associam produtos e serviços, de forma a possibilitar melhores experiências aos clientes.

ACKNOWLEDGEMENTS

After having worked in industry for almost 8 years, the current dissertation research represented a challenge for me, both at the professional and at the personal levels. Having an industrial engineering background, I was not completely unaware of aspects related with customer quality assessment and satisfaction. Nevertheless, more than analyzing the physical response to the customer interaction with products and services, it was a great endeavor for me to explore the complexity of the customer psychological reactions to those offerings, to enable enhancing their experience. The dissertation research was thus only accomplished with the support of many people.

Therefore I am deeply grateful to my advisors at the Faculty of Engineering, Professors Lia Patrício and Renato Natal, for their thoughtful guidance through all research stages. In particular to Professor Lia Patrício, I would like to thank all the help and advice even beyond the actual dissertation experience. Only with her knowledgeable support have I decided to engage in this path towards the travel experience understanding and design. I am also grateful to Professors Chris Magee and Torres Marques, because they were involved since the research initial phases and contributed with their long experience.

I would like to thank the transport companies DouroAzul, Transdev Mobilidade and Caetanobus for their availability and active participation in crucial stages of research. I would especially like to thank mr. Mário Ferreira, mr. Alberto Aliberti, and engineers Rui Silva, João Soares, Jorge Pinto and Rui Rodrigues. Naturally I could not forget all the experience and contributions of the Kansei team members, Mariana Teixeira, João Rocha, Hugo Ferreira and Ricardo Maia.

Professor Qi Hommes was only involved in the project since 2010, but since then she has contributed very much to its results, especially in the Kansei workshops. Moreover, several other MIT-Portugal faculty or researchers were invaluable with their insights, namely the thesis advisory committee, professors Dan Whitney and Susan Silbey, and also Roberto Perez-Franco who also conducted action research during his PhD.

I must also acknowledge the funding provided by Ministério da Ciência, Tecnologia e Ensino Superior – FCT (Portugal), under grant SFRH / BD / 35234 / 2007.

Also, to my research friends, Andreia, Carla, Fabrício, Nelson, Teresa, and Thaís I would like to thank their contribution both to pertinent research discussions and personal fulfillment, extending our mutual experience further than the actual dissertation research.

Finally, I dedicate this dissertation to my family; to my parents, to my wife and especially to my sons, who I hope to grow wise and cultured.

TABLE OF CONTENTS

1. Introduction

Whenever customers contact a company, either using its products, or being provided with a service, they "always get more than they bargain for because a product or service always comes with an experience" (Carbone & Haeckel 1994, p. 9). Therefore, "an experience is inherent; a positive experience is not" (Berry & Carbone 2007, p. 27).
During the interaction with products and/or services "customers consciously and unconsciously filter a baggage of clues, in the form of experiences, and organize them into sets of impressions – some rational and others more emotional" (Berry & Carbone 2007, p. 27). Therefore companies should be very active to involve their customers, and enhance the experience they co-create while contacting their offerings, which are increasingly product-service systems (PSSs), or a "marketable set of products and services which are capable of jointly fulfilling a user's need" (Goedkoop et al. 1999, p. 18). In order to improve the customer experience with PSSs, it is necessary to incorporate the customer impressions, or perceptions, into the development of new offerings that integrate products and services, with tangible and intangible attributes.

1.1. Motivation

1.1.1. Customer experience

Over the years, mostly entertainment organizations such as amusement parks or theme restaurants have acknowledged the importance of the customer experience as a differentiating concept and have been designing their services in order to address it. On the other hand, research has contributed with various experience definitions, which have in common the customer individual physiological and psychological complex responses to the interactions with a product, a service, or a company in general. Since the idea of experience was conceptualized by Holbrook & Hirschman (1982, p. 132) as "a primarily subjective state of consciousness with a variety of symbolic meanings, hedonic responses, and aesthetic criteria", various researchers have followed the same concept. More than ten years later, Pine & Gilmore (1998, p. 99) defined experience as "inherently personal, existing only in the mind of an individual who has been engaged on an emotional, physical, intellectual, or even spiritual level". More recently, Meyer & Schwager (2007, p. 118) define experience as "the internal and subjective response customers have to any direct or indirect contact with a company". Direct contact is usually initiated by the customer and may occur during the actual use of products or

services, while indirect contact most often involves unplanned encounters with representations of a company products, services, or brands (e.g. advertising, news, etc.) (Meyer & Schwager 2007). Voss, Roth & Chase (2008) classify experience-centric services as the ones in which the customer experience is at the center of service provision (e.g. Disney theme parks or Guinness Storehouses). Nonetheless, experience is also potentially important for all kinds of services, even non experience-centric ones.

Customer experience has gained increased attention from both researchers and companies, because customers search for value propositions in using products and services, instead of the ownership of the products that create their experience (Maklan & Klaus 2011; Shehab & Roy 2006). The customer experience is holistic in nature because it involves all moments of interaction between the customer and the product(s), and all associated services, from beginning to end of the usage process, and it consists of individual customer responses, for example cognitive, emotional or sensorial (e.g. Mascarenhas et al. 2006; Verhoef et al. 2009). During that interaction the customers contact with several tangible elements, such as physical products, and interact with many intangible aspects, such as services or social relations, some of which are not controlled by a provider (Verhoef et al. 2009).

Current public transportation offerings are no longer just means of transportation through which passengers move from one point to another, but means through which users co-create travel experiences during all moments of transport services, also before and after the actual trip. Besides reaching a destination, customers also value the process of service provision and the interaction with all aspects of the vehicle, physical facilities or other passengers, which are determinant for a satisfying experience.

Transportation is a rich ground for studying this phenomenon, as the travel experience is crucial for differentiating transport services. Zomerdijk & Voss (2009, 2010) have studied experience-centric services, namely transportation providers such as Royal Caribbean cruise line and Virgin Atlantic airline and they found strong support for the designing of customer journeys and touch points for sensory design, and for the designing of a dramatic structure of events, to enable better customer experiences. In addition, they found that the engagement of employees, the management of fellow customers, and the close coupling of backstage employees and frontstage activities

represented potential ways of improving the experiences which are co-created with the customers. LeBel (2005) has specifically addressed the air travel experience based on a customer experience framework, which is illustrated with examples from British Airways' first class sleeper service development. The framework highlights the three temporal phases of the experience, which are the joining, the intensive, and the detachment phases; it identifies four key service elements which are under the airline's control, such as the procedural and convivial services, the physical evidence and the communications; and it associates the sensory, social, emotional and intellectual pleasures as outcomes of the travel experience.

Nevertheless, extant experience research is usually conceptual, while studies on travel experience are very scarce. Moreover, prior studies have not defined travel experience nor explained all its complexity from the customer point of view.

1.1.2. Product-Service System

The customer experience is nowadays mostly dependent on customer-focused combinations of products, services, knowledge, etc. Particularly in public transportation, there are vehicles, physical facilities, transit services and other intangible aspects whose combination forms a PSS with which the passengers interact to form their travel experience. Nevertheless, products and services have different natures so their combination requires adequate integration of their characteristics. While the former are manufactured according to definite specifications, the latter are intangible, their performance varies according to the service personnel, and they are produced and consumed simultaneously (Parasuraman et al. 1985). Therefore there is the need for an adequate alignment between all the PSS elements to form an efficient system that provides a satisfactory interaction experience to the customers.

PSSs are therefore increasingly becoming the offerings with which customers contact during interaction with a company. In spite of the increasing interest in a holistic view of the customer experience, the different product and service elements of the customer offering are still separately designed respectively using methods adapted to products and services. In this context, there is the risk of originating negative customer experience when the PSS combination of products, services and even other aspects are incongruent from the customer point of view because they are independently planned by different companies implicated. In relation to public transportation, there are usually many

organizations, directly or indirectly involved in the provision of the transit service, such as vehicle manufacturers, their parts' suppliers, transit providers, or even government/supervision entities, but the vehicles and services are usually designed in isolation.

Although both researchers and companies recognize the importance of customer experiences, the identification of customer perceptions of all product or service attributes that contribute to the customer experience (Patrício et al. 2004), still deserves further attention. Additionally, research is scarce in what concerns the development of methods for systematically incorporating the customer experience into the combined product and service development process, such as public transportation PSSs. The challenges described introduce the main motivation for the dissertation research which analyzed mid-distance bus trips in detail with the objective of enhancing the passenger travel experience.

1.2. Aim

The overall aim of the dissertation research is to enable the enhancement of the customer experience, by understanding and incorporating it better in the offerings that integrate products and services as in a public transportation PSS. To achieve this aim, the following two research questions are considered:

RQ1 - What are the dimensions of customer perceptions of PSSs from a holistic perspective, particularly in the case of the travel experience with bus trips?

RQ2 - How can these experience dimensions be incorporated in the development of PSSs such as public transportation?

Figure 1 details the research framework, which is essentially divided in two main stages:

1- Understanding the customer experience creation process, by identifying the customer perceptions of every attribute through all moments of public transportation and assess their impact on experience outcomes, such as experience components or loyalty behavior. The study of customer experience corresponds to the upper arrow in Figure 1.

2- Incorporating customer perceptions in the development of new public transportation PSSs, comprising various tangible and intangible elements, such

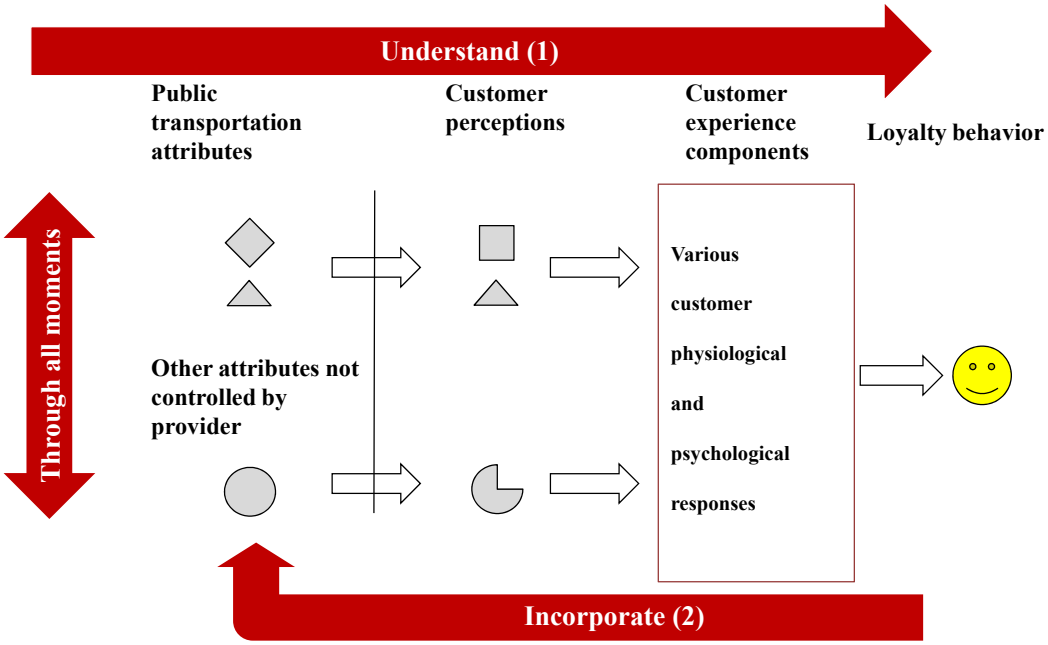

Figure 1 - Research dissertation framework

as vehicles, transport services, and even other intangible uncontrolled attributes, e.g. social environment that enhance the travel experience. The incorporation stage in the development of PSSs corresponds to the lower arrow in Figure 1.

1.2.1. Understand the travel experience

The customer experience is an intricate process which remains rather unexplored, more specifically the experience that occurs during public transportation. The experience factors (EFs) are the dimensions of customer perceptions of all product or service attributes that contribute to the customer experience (Patrício et al. 2004) such as atmosphere or comfort, while experience components (ECs) are the customer individual responses to the company offer which constitute the experience (see Figure 1). In what concerns the elicitation of customer EFs, extant research has provided insights that there are various types of factors that drive the customer experience (e.g. Patrício et al. 2008; Pullman & Gross 2004). Among these factors, the hedonic or affective ones – associated to *how* a service is provided, such as social environment or efficiency – have more potential to delight customers (Chitturi et al. 2008; Neal et al. 1999) than instrumental factors, which are associated to service functionality, or to *what* is offered.

On the other hand, Verhoef et al. (2009) argue that the customer experience is created not only by those elements which the retailer can control, such as service interface,

assortment or price, but also by elements that are outside of the retailer's control, such as the influence of others or purpose of shopping. In contrast transportation research has identified many attributes that are important for the passengers, but has basically evaluated them from a transit service quality perspective, and has focused on transportation attributes that are controlled by the transport provider during the actual trips (e.g. dell'Olio et al. 2011; Ettema et al. 2010; Herrmann et al. 2000).

Some of the prior experience studies, which are mainly found in practitioner-oriented journals or management books (e.g. Meyer & Schwager 2007; Pine & Gilmore 1998), have uncovered the possible variety of customer responses to experiences, but these publications tend to focus more on managerial actions and outcomes. Therefore, Verhoef et al. (2009) explored the customer experience in depth from a theoretical perspective and have introduced the holistic concept of experience involving the specific customer cognitive, emotional, social and physical responses (i.e. ECs) to the various moments of contact with the retailer. Traditionally, extant service research has focused on assessing service quality (e.g. Parasuraman et al. 2005; Wolfinbarger & Gilly 2003) which involves cognitive comparison between customer expectations and perceptions of service performance. Consequently the customer experience is more complex than service quality, because it is holistic, it is more extended in time and it involves other ECs than the cognitive assessment. Additionally, the experience strongly influences customer loyalty behaviors such as repeat business and promotion of the company through word of mouth to others (Chitturi et al. 2008; Heskett et al. 1990; Heskett et al. 2008).

The study of the customer experience constituted the first most relevant dissertation research stage. In the following stage of research, the EFs, or dimensions of customer perceptions, corresponded to experience requirements (ERs) that designers should take into account to design the PSS. Therefore EFs and ERs are all related with the customer perceptions of product and/or service attributes, but respectively from the clients' and designers' perspective.

1.2.2. Incorporate Experience Requirements

The second most significant dissertation research stage involved the translation of ERs into transportation PSSs. The development of new products or services can be performed

using different methodologies such as Quality Function Deployment (Hauser & Clausing 1988), which is a structured association between requirements and specifications; or Service Blueprint (Shostack 1984), which involves visual representations of the service process phases. Additionally, some development approaches adapted to product and service integration already exist (e.g. Halen et al. 2005; Maussang et al. 2009), which essentially focus either on the product specification or on the service process, respectively evolving from traditional product or service methods. Nevertheless, customer experiences are considered a distinct economic offering, as different from services as services are from goods (Mascarenhas et al. 2006; Pine & Gilmore 1998). Indeed they are associated to the overall customer value (Normann & Ramírez 1993; Vargo & Lusch 2004) and usually integrate product(s) and service(s) (Maklan & Klaus 2011; Shehab & Roy 2006) through different moments of customer contact. In particular, public transportation is an integrated offering from the customer perspective, even though it combines physical facilities, transport vehicles, multi-channel services and relational aspects with the transport personnel, or with other passengers.

Therefore the development of such a customer integrated offering, which may be considered a product-service system or PSS (Goedkoop et al. 1999), is difficult because the customer experience is a complex process. Such PSS development should be designed from the customers' perspective to provide them value-in-use, instead of embedding value in a product or in a service as traditionally (Baines et al. 2007). For that reason, the customers should be early involved in the development process (Baines et al. 2007), in order to enable the incorporation of their instrumental and hedonic requirements using design methods that are better adapted to the customer experience perspective.

These two stages of research were essential to enable better understanding the complexity of the travel experience and incorporating it into public transportation PSSs. To accomplish this, the research design undertook is described in the next chapter.

2. Research design

In order to achieve the aim and answers to the research questions defined in the previous chapter, the research design involved different steps that are connected to the research stages described. The various steps of the overall design-science research approach (Aken 2004; Hevner et al. 2004) can be depicted in Figure 2. Therefore, the scale development approach (Churchill 1979; Gerbing & Anderson 1988), which included qualitative studies (Neuman 2006; Strauss & Corbin 1998), enabled answering the first research question (RQ1) by providing the necessary travel experience understanding, namely identifying passenger experience factors (EFs) and components (ECs). Action research (Harris 2007; Herr & Anderson 2005) enabled answering the second research question (RQ2) by incorporating the travel experience requirements (ERs) into new public transportation PSS development. The use of multiple sources of evidence, i.e. triangulation (Patton 1990; Yin 2003) during the research steps provided an increased validation of the data collection.

2.1. Design-science research

A design-science approach is adequate whenever research is related with the creation of innovation artefacts that are not a result of natural laws or behavioral theories (Aken 2004; Hevner et al. 2004). This is the case of the current dissertation research, which involved the development of a design method to improve the incorporation of travel ERs into public transportation PSSs. Hevner et al. (2004) define seven design-science research guidelines which are:

Guideline 1: Design-science involves the production of a viable design artefact in the form of a construct, a model, a method, etc.;
Guideline 2: Design-science aims at developing artefacts to be used in relevant business domains;
Guideline 3: The utility of a design-science artefact must be demonstrated using adequate evaluation methodologies;
Guideline 4: Design-science provides clear and verifiable contributions in the research areas of the design artefact;
Guideline 5: Design-science applies rigorous methodologies in both the definition and representation of the design artefact;

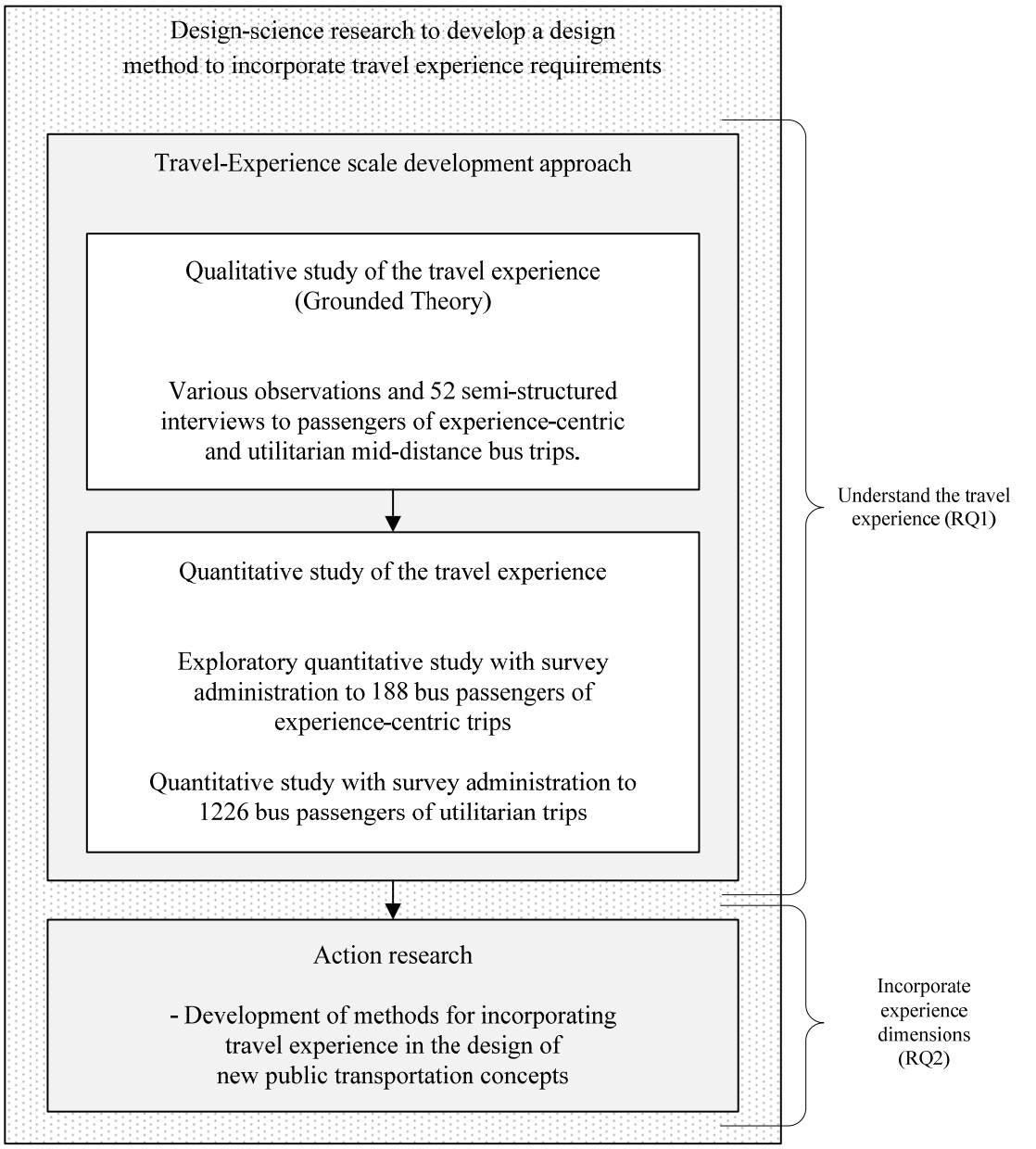

Figure 2 - Process employed in the dissertation research

Guideline 6: Design-science is an inherently iterative search process to discover an effective solution to a problem;
Guideline 7: Design-science results must be effectively communicated to technology-oriented as well as management-oriented audiences;

Therefore the current design-science research requires the creation of a purposeful new PSS design method (Guideline 1) for a specified problem in the domain of customer experience (Guideline 2). The thorough evaluation of the method (Guideline 3), first applies a grounded theory qualitative approach (Neuman 2006; Strauss & Corbin 1998),

which is part of a scale development procedure (Churchill 1979; Gerbing & Anderson 1988) to the understanding of the travel experience. Next the method's evaluation uses action research (Harris 2007; Herr & Anderson 2005) because the researcher was also a practitioner within two organizations to moderate a group of experts in the application of the design method, in order to incorporate the ERs identified into the development of new transportation PSS offers.

The design method is innovative in the way that it solves the unclear problem of incorporation of ERs into new PSS development (Guideline 4). Guideline 5 is also confirmed because the design method is carefully defined and formally represented based on the theoretical foundations and the undertaken research methodologies. Both travel experience studies and action research approaches incorporate a search process, which is complemented by the inherently iterative nature of the proposed design method, in the search for an effective, valid PSS design solution (Guideline 6). Finally, through the current dissertation research the results are communicated effectively both to a technical and to a managerial audience (Guideline 7).

The design-science research approach therefore comprises the following research stages that will be explained in the subsequent sections: the qualitative studies, to provide an in-depth and heterogeneous understanding of the most relevant travel experience concepts; the quantitative studies, to enable the development of a scale to measure the travel experience, and its relationship with other behavioural scales; and the action research to engage the different interested parties in the development of a public transport PSS.

The empirical ground of the research undertaken involved two mid-distance bus transport providers and one bus body manufacturer companies. As the customer experience is a complex process that required an in-depth understanding, transport providers from different settings were involved in research, which are experience-centric, or leisure, and utilitarian or intercity trips. Therefore the study of the travel experience was performed to passengers of both settings, in order to better acknowledge their perceptions and holistic responses. First passengers of both trips were observed and participated in in-depth interviews. Afterwards the experience-centric passengers participated in an exploratory survey, while a large sample of utilitarian customers were surveyed in order to enable the development of a scale to measure travel experience. The bus body manufacturer was also involved in research since the beginning of the studies

with passengers, however its designers and engineers had a more participatory contribution in the last action research step to enable the incorporation of ERs into new transport PSSs. A team of experts from the manufacturer's engineering department, as well as transport managers of the utilitarian trip provider were part of the Kansei team that searched for the efficient incorporation of ERs.

2.2. Travel-Experience scale development approach

Within the design-science research methodology adopted, the study of the travel experience involved a scale development approach. This methodology followed Churchill's (1979) scale development paradigm in order to identify the operational dimensions to measure the travel experience and understand their impact on experience outcomes that correspond to customer individual responses, such as satisfaction, perceived value or emotions. As suggested by the literature and other scale-development studies (e.g. Parasuraman et al. 2005) the scale was developed in the following stages: preliminary scale definition, sample design and data collection, data analysis and scale refinement, and finally reliability and validity assessment.

The scale generation and refinement involved articulating the meaning and domain of travel experience based on insights from the literature review and the comprehensive qualitative studies with the two transport providers, to define the preliminary scale. This step is critical in a scale development approach in order to specify the domain correctly (Churchill 1979). The observations and interviews performed to passengers in both transport settings were important to increase the probability of producing valid measures (Churchill 1979), as were the several pre-tests performed to the survey instrument in the scale refinement. The steps of survey administration provided the data necessary to scale purification and validation. Exploratory factor analyses (EFAs) in both types of trips enabled extracting sets of latent constructs that would be confirmed next. Finally, the scale validation stage involved the administration of the final questionnaire in the utilitarian trips, followed by confirmatory factor analysis (CFA) and structural equation modeling (SEM) to assess reliability and validity of the developed scale.

2.3. Qualitative study of the travel experience

"Experiences are inherently personal, existing only in the mind of an individual" (Pine & Gilmore 1998, p.99), therefore they are difficult to extract or learn about through conventional research methods. That way, qualitative methods based on Grounded

Theory (Neuman 2006; Strauss & Corbin 1998) were the first step used in the dissertation because they enabled the researcher to obtain an in-depth understanding of complex aspects such as feelings, thought processes, sensorial receptors and emotions. In particular, customer observations were first used to obtain insights about the passenger latent needs (e.g. Dahan & Hauser 2001; Sandén et al. 2006), while semi-structured interviews (Pawson 1996) were also used because they are appropriate for identifying factors that customers are able to verbalize (e.g. Dahan & Hauser 2001). The interview content analysis (Neuman 2006), supported by software NVivo and complemented with the observation data, contributed to a richer understanding of the customer travel EFs and ECs in the experience-centric and in the utilitarian settings. The in-depth understanding was as heterogeneous as possible, because the study involved passengers from two different settings, with various nationalities, ages, or professional occupations. The objective was to gather as complete information as possible about the passenger experience during public transportation. Using the qualitative results, the travel experience concept was defined as well as its domain from which scale items were drawn to define the preliminary scale that would be further developed in the following quantitative study.

2.4. Quantitative study of the travel experience

After the initial survey questionnaires' development adapted to each setting, the first step of scale refinement consisted of cognitive interviews (Dillman 2000) both to experience-centric and utilitarian trip passengers. Next, the survey questionnaires were administered to passengers, and the data collected was analyzed through exploratory factor analyses (EFA) using SPSS 17.0. In the case of the experience-centric setting, this was the last step of the exploratory study, because it involved only 188 valid responses, nonetheless it provided a clarification of the latent constructs (i.e. EFs) associated to the these trips. In what concerns the utilitarian setting, the initial EFA was based in 104 valid responses, which permitted further refining the wording of the questions to the following scale development steps. The final survey data analysis and the scale reduction steps in this setting consisted of exploratory (EFA) and confirmatory factor analysis (CFA), and structural equation modeling (SEM). This final sample of utilitarian passengers comprised 1226 valid responses and was randomly split into two equally sized samples, which are referred to as calibration and holdout samples. The EFA was performed using the calibration sample with the objective of providing an *a priori*

structure of the underlying dimensions of the latent constructs to be confirmed using CFA, which is important in areas where little research has been done (Gerbing & Hamilton 1996), such as travel experience. Then the dimensions obtained were subject to a CFA in AMOS 17.0 using the holdout sample to assess the reliability and validity of the latent constructs extracted in the previous EFA. Afterwards SEM analyzed the relationships between those constructs in the overall final sample data, as well as the relationships with the experience outcomes, such as passenger satisfaction, perceived value, emotions, and loyalty. All the refinement, purification and validation stages involved the necessary reliability, validity and fit assessments (e.g. Hair et al. 2009). The quantitative results therefore allowed for identifying the main travel EFs, as well as to understand which ones have the strongest impact on travel experience outcomes. Moreover, the results enabled performing an importance-performance analysis (Martilla & James 1977) to the EFs, in order to focus first on the ones with a combination of relatively high importance and low performance in the next research stage.

2.5. Action research

As the customer experience is complex and it involves cognitive assessments and feelings, traditional structured product or service design methodologies need to evolve to better incorporate the ERs into the development of new PSSs. This research stage involved the development and application of an extension to Kansei engineering design method for incorporating the travel ERs into the development of new public transportation solutions that enable enhancing the passenger experience. Therefore action research was chosen, in order to engage a multidisciplinary team of experts into a semi-structured PSS design method. Action research is more adequate when research involves an “inquiry done by or with insiders to an organization or community, but never to or on them” (Herr & Anderson 2005, p. 13). This was the case of the design method application, as "an informed investigation into a real management issue in an organization by a participating researcher, resulting in an actionable solution to the issue” (Harris 2007, p.11).

The extension consists of using the travel experience study results as input for the Kansei engineering application, which is usually based on an *ad hoc* analysis of the customer needs. Additionally, that method traditionally involved only members from a single product or service company, while this action research approach brought together experts both from a bus body manufacturer and a mid-distance transport provider

companies with the aim of developing new public transportation PSS solutions. The participating researcher was involved with the multidisciplinary team, showed them the qualitative and quantitative results of the travel experience study and also presented them Kansei engineering that was to be used. Thus, even though the participating researcher was not involved in the design process, he possessed reasonable control over the team's motivation and activities in relation to the design method implementation.

The traditional Kansei engineering aims at quantifying the impact a certain product or service attribute has on the customer impressions and affective reactions. The method consists of different techniques such as affinity and pareto diagrams (Bergman & Klefsjo 1994), and category identification technique (Nagamachi 1997), which the team used through the various phases to associate transport PSS attributes to passenger affect. Finally, based on the results of those techniques, a questionnaire was developed and distributed to the passengers to quantify the relationships between PSS attributes and customer affective perceptions. The 68 survey valid responses were analyzed using Hayashi's quantification theory type I (Ishihara et al. 1995), which is a variant of the multivariate linear regression analysis that can deal with non-metric scale values as predictor variables. Therefore the transport PSS attributes were associated to the customer perceptions, and thus it would be possible to develop innovative transportation solutions that enhance the passenger travel experience from a holistic perspective.

2.6. Triangulation

Triangulation strengthens a study by extending and validating the data collection through the use of multiple sources of evidence (Patton 1990; Yin 2003). Therefore the dissertation research involved different methods and approaches to enable triangulation of the results, among the types of triangulation synthesized by Patton (1990): (1) Methodological triangulation was based in the qualitative and quantitative studies. The former enabled achieving a deeper understanding of the travel experience process and to define the adequate domain for the latter ones to be defined, analyzed and validated using several multivariate data analysis techniques; (2) Data triangulation combined multiple sources of data such as from the passenger interviews and observations, and from different types of samples and interested parties. In particular, the transcription of the interviews and the observation notes were very helpful in clarifying the passenger verbalized and latent EFs and ECs, while the experience-centric and utilitarian samples complemented each other in explaining the overall travel experience. In addition, the

collaboration of bus manufacturer designers and transport provider managers contributed to the validity of the data obtained in the whole design-science approach; and finally, (3) Theory triangulation involved the use of different theoretical perspectives, such as transport quality and service quality, customer experience, new product (NPD) and service development (NSD), and product-service system (PSS) literatures. The different perspectives provided a diversified understanding of the customer experience within generic services and specific transport ones, and also of their incorporation into products, services or PSSs.

In summary, the dissertation research used an overall design-science approach to attain the aim of enabling the enhancement of the customer experience in mid-distance public transportation from a holistic perspective. The in-depth interviews and observations in two types of transportation settings provided a comprehensive qualitative understanding of the customer experience, and a solid basis for the next quantitative studies. Consecutively, developing and validating a scale to measure the travel experience enabled a quantified understanding of travel EFs and their relationships with ECs and behavioral intentions. Finally, the incorporation of ERs into new public transportation PSS was enabled by a semi-structured design method that actively engaged a team of bus and transport experts in new PSS development.

3. Thesis outline

3.1. Organization of the dissertation

Chapter 1 introduced the dissertation research and explained its main motivations, research questions and overall aim. Some of the theoretical foundations were briefly discussed in order to introduce the most relevant concepts associated to the customer experience. The research framework was also established and the two most significant research stages were presented.

Chapter 2 described the research design undertaken, starting by the overall design-science approach that included a scale development procedure, which in turn consisted of an initial grounded theory study. Afterwards, the participating researcher was involved through action research with a multidisciplinary team in the development of new public transportation PSSs.

The papers that are part of this dissertation are included in chapter 4. The articles are organized according to the research stage they correspond to as can be depicted in Figure 3. The first phase of research involved the study of the travel experience, starting with qualitative and followed by quantitative approaches. In the qualitative stage were performed observations and interviews to the passengers, while in the quantitative one the previous data was used to develop questionnaires adapted and administered to each of the two mid-distance bus transport services, and thus develop and validate a scale to measure the travel experience. The second phase consisted of the customer requirements' incorporation into new public transportation PSS, by involving a multidisciplinary team of designers, engineers and managers. Thus, paper I reports the results of the qualitative study performed in the two settings: experience-centric and utilitarian trips. Paper II combines a qualitative analysis followed by an exploratory quantitative study of the experience-centric travel experience. Paper III presents the results of the quantitative study of utilitarian travel experiences, based on the survey administered to the passengers of mid-distance bus transportation. Finally paper IV reports the process and results from the application of an extended Kansei engineering design method to the incorporation of travel ERs in the development of new transportation PSSs.

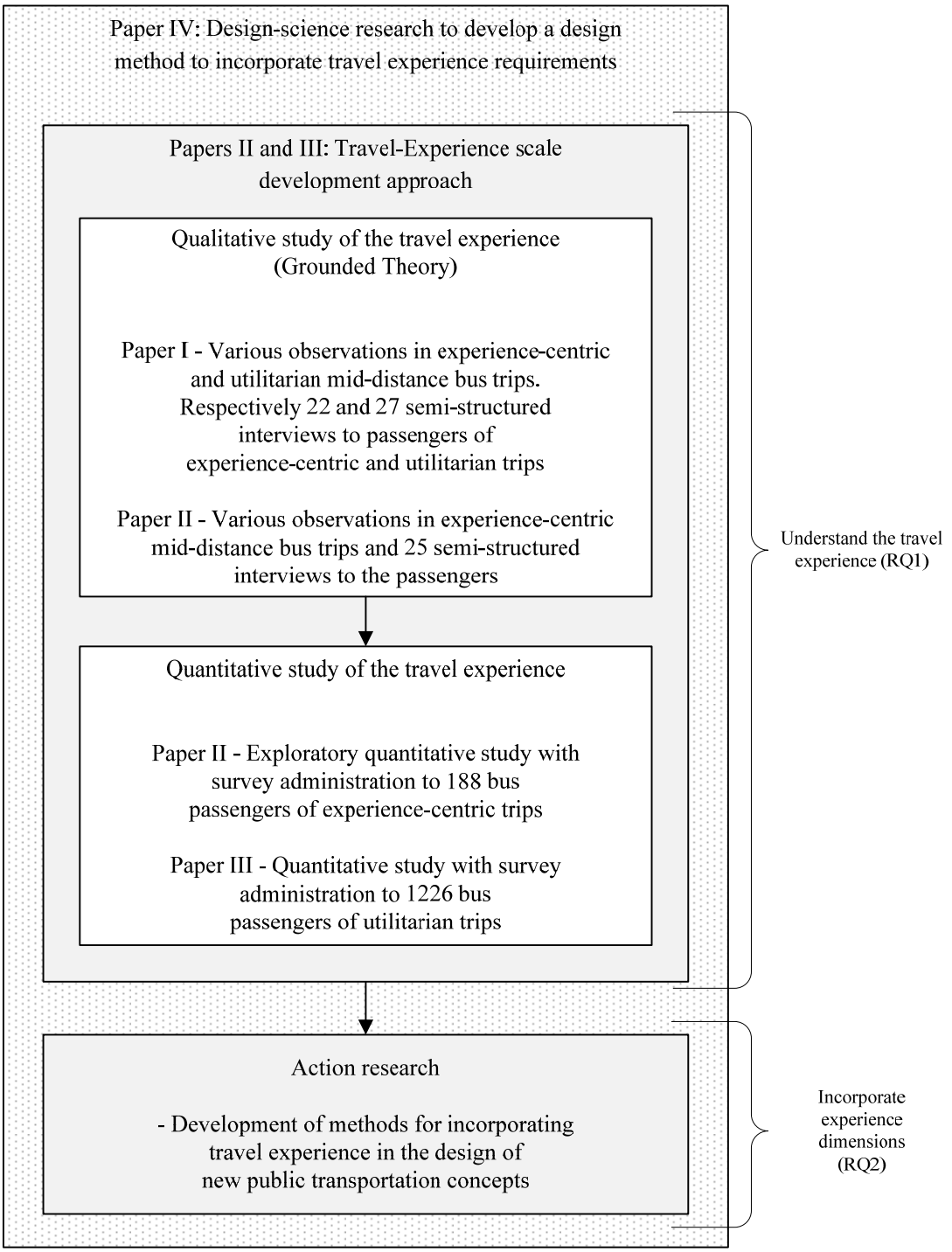

Figure 3 - Process employed in the dissertation research and papers' organization

The overall results are discussed in chapter 5, taking in consideration the two mais research phases and questions identified in chapter 1 and highlighted in Figure 3. The research and managerial contributions associated to each question are detailed, taking in consideration the complexity of understanding the customer experience process and enabling the incorporation of customer experience requirements into new public transportation offerings.

To finalize, dissertation conclusions, limitations and future research directions are associated to increase the applicability of the methodologies, in transportation or other business areas.

3.2. Summary of papers

In this section, all papers are briefly described by presenting the main objectives, methodology undertook and the contributions of each one of them. The four papers are intimately connected as they are all part of the overall research design, because the experience factors (EFs) respectively identified in each setting, were combined in the qualitative study presented in paper I. In turn, the EFs associated to each setting were used as input for the development of the survey questionnaire versions that were respectively used in the quantitative studies in papers II and III. Both of these questionnaire versions consisted of the same four parts. Parts 1 and 2 of each questionnaire version addressed the EFs respectively identified in the qualitative studies; while part 1 concerned questions about the importance attributed by the passengers to the EFs and items, part 2 included their performance evaluation of the same EFs and items during actual trips. Part 3 included the assessment of positive and negative emotions, travel satisfaction, overall value, and loyalty associated to the bus trips. Finally part 4 concerned the respondents' socio-demographics. Paper II therefore reports the results of an exploratory quantitative study of travel EFs, which builds upon the qualitative results reported in paper I, specifically associated with the experience-centric sample. Paper III presented a scale development approach applied to the utilitarian setting. Finally, paper IV incorporates the ERs identified in the previous papers in the development of new public transportation PSS.

Paper I - "Towards a holistic approach to the travel experience: a qualitative study of bus transportation"

A preliminary version of this article was presented at the first international conference on Integration of Design, Engineering and Management for Innovation (IDEMI) in Porto, Portugal in September 2009.

In this paper a qualitative study is performed using two samples, one leisure or experience-centric, and the other one inter-city or utilitarian transportation. This study aimed at gaining an in-depth understanding of the travel experience of mid-distance bus transportation passengers. The methodology consists of observations and semi-

structured interviews based on specific protocols and on grounded theory (Neuman 2006; Strauss & Corbin 1998). A total of 49 interviews were performed, of which 22 were performed to the experience-centric while 27 were made to the utilitarian trip passengers. All interviews were digitally recorded and literally transcribed, while observation notes were taken throughout the different periods during the study. The process of data preparation and collection contributed to a better understanding of the passenger verbal comments and actions, which facilitated the interview content analysis (Neuman 2006). The software NVivo was a valuable tool to help in the researcher's data coding, which was essentially open, but as the coding was refined, attempts were made of concept-driven coding (Strauss & Corbin 1998).

Study results showed that the passenger travel experience involved all moments of contact with the transportation service. Overall, eleven ERs were identified: (1) cleanliness, (2) comfort, (3) easy accessibility, (4) safety, (5) visibility of the scenery, (6) waiting time, (7) information provision, (8) off-board services, (9) on-board entertainment, (10) social environment, and (11) staff's skills. Moreover, the EFs were organized into four categories: (1) trip conditions, (2) supplementary services, (3) social environment and (4) staff's skills.

The results also showed that some of these factors were aspects that were not in direct control of the transportation provider, such as the social environment or the off-board services which should be better controlled. The results additionally revealed that a transportation service generated a holistic set of customer experience responses that went beyond cognitive assessments, also involving sensorial and emotional components. The study of the two transportation settings showed that both experience-centric and utilitarian passengers had a holistic view of the travel experience, although focusing on different EFs and ECs.

Paper II – "Incorporating customer experience factors in new product development: Understanding bus travel experiences"

This paper was presented at the seventeenth IPDMC (International Product Development Management Conference) in Murcia, Spain in June 2010.

An in-depth study is presented, which consists of a qualitative phase followed by an exploratory quantitative one involving only leisure passengers in experience-centric trips. The qualitative phase involved the same sample and grounded theory (Neuman 2006; Strauss & Corbin 1998) as paper I, but in this one the responses of three tour

escorts, who accompanied the tourists during the bus trips, were also taken in consideration. The quantitative study involved the development of a questionnaire using a scale development approach (Churchill 1979; Gerbing & Anderson 1988). The survey was administered to 188 tourists and was then subject to an exploratory factor analysis (EFA) to identify the most relevant EFs that were extracted from the data.

Study results allowed for a better understanding of the travel experience based on the observation and interview data, which included nine EFs: (1) service, (2) accessibility, (3) safety, (4) cleanliness, (5) visibility, (6) time, (7) social environment, (8) atmosphere, and (9) comfort. This qualitative phase enabled the selection of the items to be included in the development of the questionnaire, which was distributed to the tourists. The analysis of quantitative data enabled the extraction of the most relevant seven travel EFs that were most significant for the experience-centric passengers, which were: (1) seat comfort, (2) clean interior space, (3) calm and quick trips, (4) easy accessibility awareness, (5) information, (6) social environment, (7) safety. This exploratory study allowed for an in-depth understanding of the travel experience within experience-centric trips.

Paper III - "Understanding the travel experience and its impact on attitudes, emotions and loyalty towards the transportation provider. A quantitative study with mid-distance trips"

This article uses a scale development approach (Churchill 1979; Gerbing & Anderson 1988), building upon the results obtained in paper I, to develop a questionnaire to design and validate a scale to measure the travel experience within utilitarian trips. The questionnaire included a group of questions about the importance attributed by the passengers to the EFs and items. Nevertheless, this part is not mentioned in the paper because it was not relevant to the development of the travel experience scale. The questionnaire was subject to several pre-tests, namely a qualitative pre-test and a pilot study to be further refined (Dillman 2000). The final survey was administered to a sample of 1226 bus passengers. Quantitative approaches of exploratory (EFA) and confirmatory factor analysis (CFA) were performed in order to refine and validate the Travel-Experience scale. Additionally structural equation modeling (SEM) was applied to analyze the relationships between travel EFs, which are travel experience operational dimensions, and passenger experience responses or outcomes (e.g. ECs).

The Travel-Experience scale demonstrated good psychometric properties and consisted of 28 items aggregated into seven constructs (i.e. EFs): (1) individual space, (2) information provision, (3) staff's skills, (4) social environment, (5) vehicle maintenance, (6) off-board facilities, (7) ticket line service. The Travel-Experience items had a more representative impact on the passenger emotional response, even though the new scale also revealed significant statistical relationships with other cognitive assessments and with future loyalty behavior. The study results indicated that EFs related with the traditional core trip conditions, such as individual space and vehicle maintenance had the most significant impacts on the various latent constructs, followed by additional services, for instance information provision, and staff's skills. EFs that are not in direct control of the transportation provider, such as social environment, off-board facilities and ticket line service did not have such a significant impact. However, the results indicated that transport providers should nevertheless pay attention to these EFs, as they might influence emotions and indirectly influence loyalty, such as in the case of social environment. Furthermore, study results also contributed to the finding that positive emotions, overall value and travel satisfaction all have very significant mediating relationship between Travel-Experience items and passenger loyalty intentions.

Paper IV - "Incorporating experience requirements in the design of product-service systems through an extended Kansei engineering method"

A preliminary version of this article was presented at the eighteenth IPDMC in Delft, The Netherlands in June 2011.

On its turn, this paper built on the other papers' results to incorporate the EFs previously identified, which can be viewed by the design team as experience requirements (ERs), in the development of new public transportation PSS. The research process undertaken followed design-science according to Hevner et al. (2004) and more specifically used an action research approach (Harris 2007; Herr & Anderson 2005). Following action research, the researcher was also a practitioner within the companies involved, taking in consideration that he moderated a team of experts in the application of a design method. This extension first involved using the in-depth study results of the travel experience in order to facilitate the following phases of domain analysis, definition and identification of emotional words and affective related trip properties, because Kansei engineering is usually based on an *ad hoc* analysis. Namely the importance-performance analysis of the passenger importance and performance assessment of EFs respectively performed in

parts 1 and 2 of the utilitarian trip questionnaire was very relevant to identify the main PSS areas for potential improvements. The emotional words and properties were then associated in relation to new public transportation PSS development using Kansei Engineering methodology with the collaboration of a multidisciplinary team of experts from the various companies involved in the transport PSS. The inter-company collaboration is the other extension proposed because the traditional method only involves members from one organization.

The extended method reveals the association of aesthetic appealing properties to customer semantic and sensorial perceptions. The development process takes a PSS approach to public transportation, because the passengers of medium range bus trips perceive transportation provision as an integrated offering. The design of new public transportation is thus improved by the use of extended Kansei engineering methodology complemented with a better systemic approach to the development of transport solutions. The paper generically contributes to (1) the better incorporation of ERs in new customer offer development due to the customer involvement in the prior structured study of their experience, and also to (2) new PSS development involving multidisciplinary team members, who take on the customer experience perspective through all stages of development.

4. Papers

PAPER I

Towards a holistic approach to the travel experience: a qualitative study of bus transportation.

Rui Carreira[a], Lia Patrício[a], Renato Natal[a], Chris Magee[b], Qi Hommes[b]

a - Faculty of Engineering, University of Porto, rua Dr. Roberto Frias, s/n, 4200-465 Porto, Portugal

b - Engineering Systems Division, Massachusetts Institute of Technology, 77 Massachusetts Avenue, Cambridge, Massachusetts 02139, USA

Email: ruicar@fe.up.pt, lpatric@fe.up.pt, rnatal@fe.up.pt, cmagee@mit.edu, qhommes@mit.edu

Abstract

The importance of customer experience has been growing in specific transportation services like cruises, historical trains and particular airlines, as it is considered key to customer loyalty. Transport providers and planners in general are also recognizing the need for a holistic understanding of the passenger experience, to improve transport companies' competitiveness and better define transportation policies. However, extant research in public transport has focused on passenger cognitive assessments of trips, especially service quality. The travel experience is broader than the concept of transit service quality as it considers every moment of contact with the transportation service, comprising different experience drivers and complex customer responses. The customer travel experience starts before the actual trip and does not necessarily stop after arriving at the destination. Moreover the travel experience results from customer interactions with both tangible (e.g. vehicle) and intangible (e.g. service, social) aspects which should be designed in an integrated way.

This article contributes to a more holistic understanding of the travel experience, both in terms of travel experience factors, which are transportation attributes that drive the customer experience; and of travel experience components, which are customer cognitive, sensorial and emotional responses to the transportation service.

The article presents the results of a qualitative study with 49 bus passengers which explores the travel experience operational dimensions in two types of journeys: (1) experience-centric trips (touristic), and (2) utilitarian trips (mid-distance intercity transportation). Study results show that passenger travel experience encompasses all moments of contact with the transportation service, as well as aspects that are not in direct control of the transportation provider, such as the social environment or the off-

board services, which should be carefully designed and managed. The results also reveal that the travel experience involves a holistic set of customer responses that go beyond cognitive assessments, also comprising sensorial and emotional components. The study of the two transportation settings shows that both experience-centric and utilitarian passengers have a holistic view of the travel experience, although focusing on different experience factors and components.

These results have important implications for transportation providers and planners, as they indicate they should pay attention to a richer set of factors to enhance the customer travel experience from a holistic view. The study also shows that an integrated conception and management of overall travel experience is not only important for experience centric-trips, but is also crucial for more utilitarian modes of transport.

Keyword(s): travel experience, holistic, qualitative, cognitive, sensorial, emotional

1. Introduction

Customer experience can be defined as "the internal and subjective response customers have to any direct or indirect contact with a company" (Meyer & Schwager, 2007, p. 118). Voss, et al. (2008) classify experience-centric services as the ones in which the customer experience is at the center of service provision (e.g. Disney theme parks or Guinness Storehouses). Customer experience has received increased attention since Pine and Gilmore (1998) advocated that a new era of Experience Economy was starting, and its focus has also evolved to a more multi-dimensional and holistic view (e.g. cognitive, sensorial and emotional responses) (Gentile, et al., 2007; Hekkert, 2006; Verhoef, et al., 2009). The total experience (Mascarenhas, et al., 2006) therefore encompasses every kind of customer responses through all moments of contact with a company. As a result, the customer experience is important for all kinds of services, even non experience-centric ones, such as utilitarian or public transportation. Therefore, transport researchers, policymakers, vehicle designers, providers and even other interested parties are urged to better understand the factors that affect public transport demand in different travel settings (Paulley, et al., 2006), in order to plan transportation policy, vehicle design and service management that improve the passenger travel experience.

Verhoef et al. (2009) argue that experiences have a holistic nature involving different Experience Components (ECs), which are customer's cognitive, affective, social and physical responses to the service. The total experience is formed through the search, purchase, consumption, and after-sale phases, and may involve multiple service channels. These authors have developed a generic experience creation model (which is adapted in Figure 1), through which perceptions of the service provided (i.e. *Experience Factors* or EFs) such as social environment, service interface, retail atmosphere, assortment and price, drive customer responses (i.e. *Experience Components* or ECs), which form the customer experience.

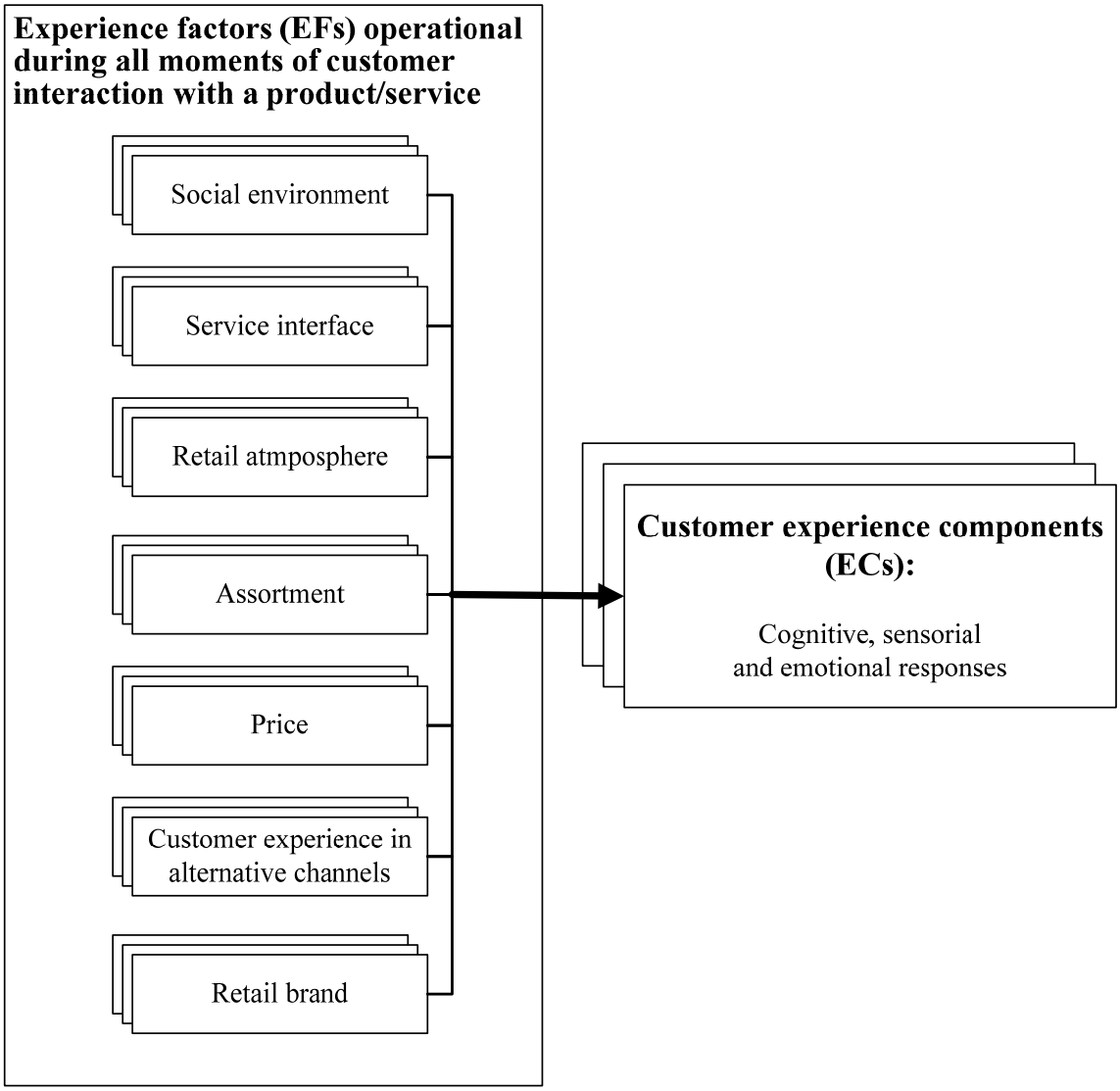

Figure 1 - Conceptual model of customer experience creation (adapted from Gentile, et al., 2007; Verhoef, et al., 2009)

Transport related studies have essentially evaluated transit service quality based on passenger cognitive expectations and perceptions of transportation attributes which are controlled by the transport provider (e.g. dell'Olio, et al., 2011; Herrmann, et al., 2000). On the other hand, some studies already addressed some of the uncontrolled factors, such as social aspects (e.g. Abou-Zeid & Ben-Akiva, 2011) but a holistic view of the travel experience was still missing, since the first until the last moment of passenger contact with a provider. In fact, when compared to traditional transit service quality, the travel experience is more complex, being influenced by various EFs, i.e. perceptions of the service provided that drive experience, some of which are not directly controlled by the transport provider or are dependent on technologic advancements that the passengers demand, such as information provision (Carreira, et al., 2010). Moreover, the travel experience complexity involves other ECs or customer responses to the service than the cognitive assessment, that result from a complex physical and psychological individual process (Oliver, 1993).

Additionally the travel experience is extended in time, and it concerns all the interaction moments through multiple channels (e.g. ticket line or internet). In this context, further research is needed to address transportation experience from a holistic approach. This paper contributes to a more comprehensive understanding of the travel experience, addressing the following questions:

(i) What travel Experience Factors (EFs) drive the customer experience through the different moments of contact with the transport provider?

(ii) What Experience Components (ECs) form the travel experience, i.e. what are customer responses to the provision of such transport?

(iii) Is the customer travel experience only relevant during leisure trips, or is it also applicable in other types of transportation? How do experience drivers and responses change across the different transportation services?

To provide an in-depth understanding of the travel experience, a qualitative study was undertaken in two different bus transportation settings: one tourism service in the North of Portugal considered as an experience-centric trip, and one mid-distance transportation service between Portuguese cities designated as a utilitarian trip.

The following section summarizes the literature review related to travel experience, covering extant research on three relevant areas. The methodology used in the study is described in section 3. The study results are presented in section 4, with the identification of EFs and ECs in general, and for each of the two transportation settings, followed by the research and managerial implications in section 5.

2. State of the art

Service research has evolved from a focus on quality perceptions and cognitive assessments (Parasuraman, et al., 1988), to experience quality evaluation (Klaus & Maklan, 2007) and finally to a holistic view of customer experience (Gentile, et al., 2007; Mascarenhas, et al., 2006; Verhoef, et al., 2009). Service quality is a cognitive comparison between customer expectations and perceptions of service performance (Parasuraman, et al., 1988). Transportation research in particular has focused on service quality assessment (e.g. Herrmann, et al., 2000).

Some of the customer needs are identified in the literature as instrumental factors, i.e. associated to service functionality, while others are hedonic, i.e. associated to how a service is provided or is affect related, such as social environment or feeling in control (e.g. Anable & Gatersleben, 2005; Patrício, et al., 2009; Stradling, et al., 2007). However, hedonic factors have more potential to delight customers (Chitturi, et al., 2008; Neal, et al., 1999) and enhance their experience. Even though some hedonic factors beyond the transportation quality approach, such as feeling free and in control, have been studied (e.g. Anable & Gatersleben, 2005; Stradling, et al., 2007), a holistic approach to the travel experience is still missing. A broader understanding of the more complex customer experience can provide insights useful to transport interested parties, namely transit providers in enhancing customer loyalty and improving their competitive position.

Building upon Meyer and Schwager's (2007) experience definition, travel experience can be adapted to the transportation context as the holistic individual response arising from the passenger interactions with all aspects (e.g. tangible aspects, multi-channel services, or other passengers) and across all moments of transportation provision. Taking Voss, et al.'s (2008) research into consideration, the bus tourism service in the North of Portugal was considered as an experience-centric one in the current research study. On

the other hand, intercity or regional trips were considered as essentially having a utilitarian value of reaching a destination, following Guiver et al.'s (2007) definition.

Based on the conceptual model presented in Figure 1, the literature review is structured around EFs and ECs. As research on travel experience is still scarce, the literature review covers related research on transport quality, service quality/ satisfaction and customer experience fields that identify potential EFs and ECs that may be relevant for the travel experience context. Extant transportation and service research is mostly empirical and based on quantitative assessments of service quality and satisfaction. On the other hand, research on experience is essentially conceptual, and even though it identifies EFs and ECs for generic service provision, it has not specifically addressed the travel experience from a holistic perspective.

2.1. Experience Factors (EFs)

EFs are customer perceptions of all aspects of a product or service that contribute to the customer experience (Patrício, et al., 2004). Figure 2 synthesizes factors found in the literature that can be potentially associated with travelling. These are grouped according to the research areas in which they were previously studied. The overall set of EFs and the specific studies in which they were identified is detailed in Appendix A.

As can be concluded from Figure 2 and from Appendix A, research in transportation has focused on transport quality factors such as comfort, cleanliness, information and safety (Anable & Gatersleben, 2005; dell'Olio, et al., 2011; Eboli & Mazzulla, 2011; Nathanail, 2008; Stradling, et al., 2007). These factors are also shared by customer experience literature in general. Other factors such as environmental protection, itinerary and number of stops, or not having to drive have been exclusively addressed in transport research (e.g. Beirão & Cabral, 2007) due to their specificity, but again from a transit quality perspective. These studies on transportation (e.g. Herrmann, et al., 2000) and on service quality (e.g. Neal, et al., 2004) represented in Appendix A have identified a large set of potential EFs that may be relevant for the travel context. However, they concentrate on the quality assessment of the service attributes which are controlled by the transport provider and typically focus on the actual trip, instead of examining the more extended customer experience perspective. Therefore a holistic study of the travel experience is still missing.

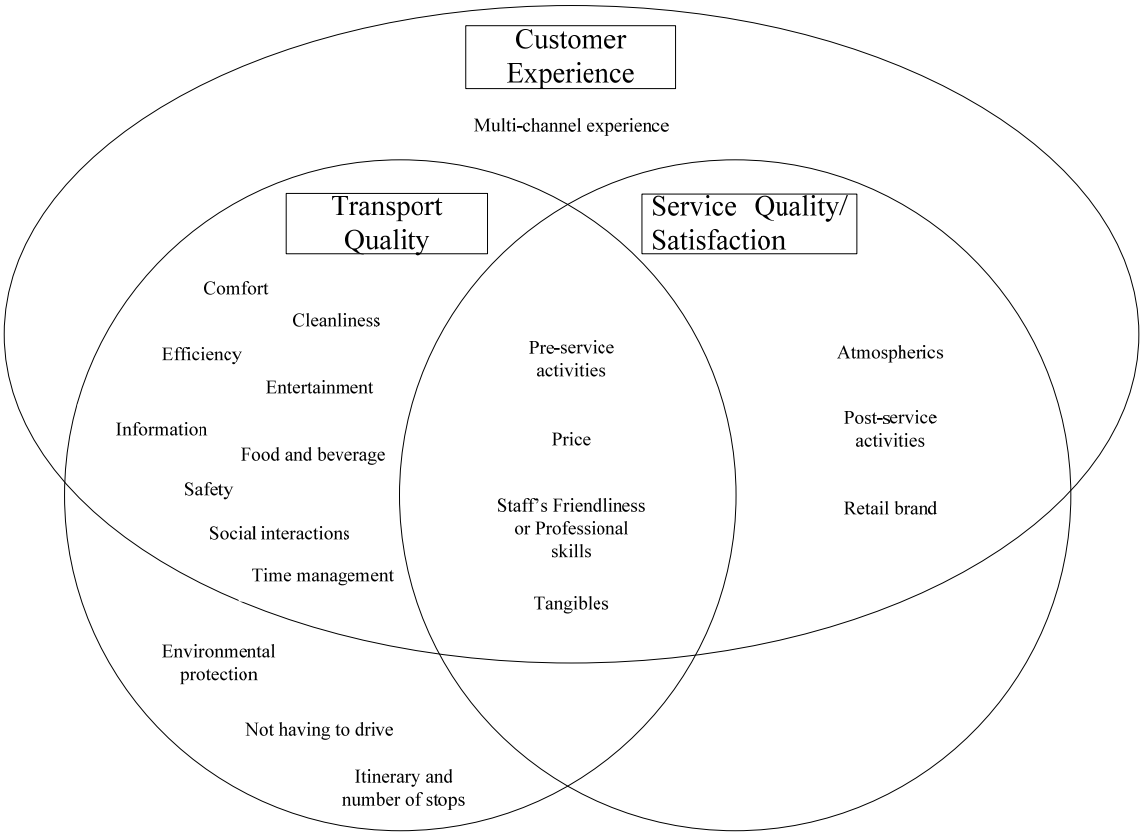

Figure 2 - Extant research on transport quality, service quality/ satisfaction and customer experience related with experience factors

Moreover, even though prior empirical studies consider to some extent EFs that are not in direct control of the service provider, such as atmospherics or the social interactions (e.g. Abou-Zeid & Ben-Akiva, 2011) they do not analyze the customer experience from a holistic perspective. This paper therefore contributes to a more in-depth understanding of the travel experience from a holistic view and through all moments of customer interaction with public transportation.

2.2. Experience Components (ECs)

ECs can be defined as customer internal responses to the service provided and are driven by customer perceptions of EFs. Extant experience research (Gentile, et al., 2007; Hekkert, 2006; LeBel, 2005; Verhoef, et al., 2009) conceptualized three types of ECs associated with generic service provision. In the scope of this research travel ECs are defined as customer responses to every contact with the transportation service:

- *Cognitive*: customer individual response connected with thinking or conscious mental processes.
- *Sensorial*: customer sensorial response to the service provided.
- *Emotional*: customer affective response involving the generation of moods, feelings or emotions.

These ECs are found in studies about customer cognitive responses, sensorial receptors and emotions related to the research areas highlighted in Figure 3 (see Appendix B for more detail on these studies). Nevertheless, those studies address each of the ECs in isolation. Only recent experience research has advocated a more holistic conceptualization of customer experience, but empirical studies are still scarce and have not been adapted to the transportation context to identify the passenger holistic ECs as responses to the service provided.

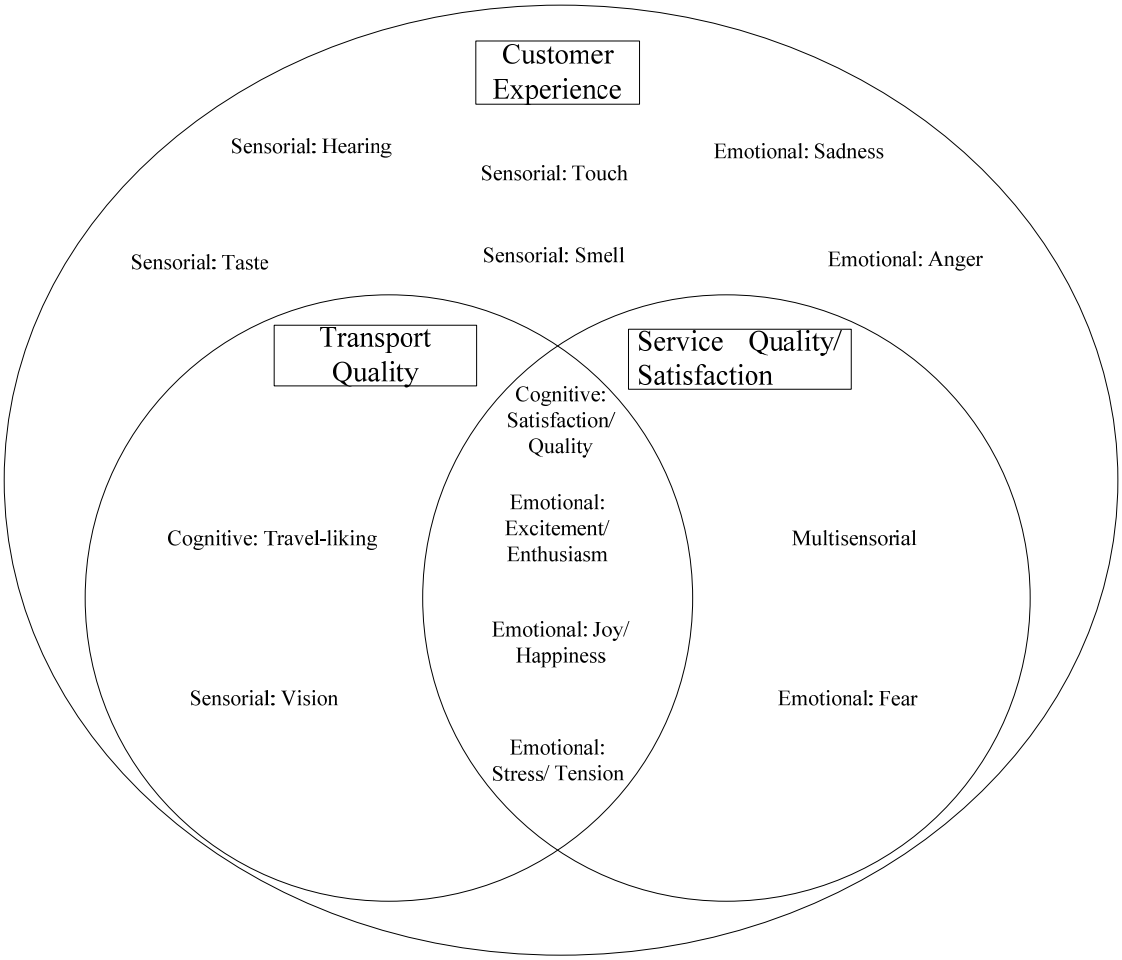

Figure 3 - Extant research on transport quality, service quality/ satisfaction and customer experience related to the experience components

2.2.1.Cognitive Component

The cognitive component of the customer experience has been more extensively studied in the literature than the other components. It involves customer mental processes such as satisfaction or quality assessment of a service or product (Parasuraman, et al., 1988). Transportation researchers (e.g. Ettema, et al., 2010) advocate that customer accumulated satisfaction reveals a progressive cognitive adaptation to transport services. Ory & Mokhtarian (2005) contest the view that transport is strictly a cost to be minimized, arguing that, in some instances, transport can be the desired activity in itself. According to these authors, this travel-liking attitude also represents a rationalization process, in which the desired choice an individual must make to travel "just for fun is mentally positioned as one s/he likes to make" (Ory & Mokhtarian, 2005, p. 111).

2.2.2.Sensorial component

Based on Figure 3 and on the studies listed in Appendix B, public transportation vehicles may provide a hyper sensuous experience of seeing to the customers, so vision comes to dominate all the other senses (Larsen, 2003). Aesthetics is also related with the human senses based on the sensory interpretation of an object or environment (Hekkert, 2006). However, passengers use all sensory systems during transportation, and the aesthetic concept is not limited to the visual domain; things can also be aesthetic or pleasant to listen to, touch, smell, or taste (Hekkert & Leder, 2008). The sensory stimulants should however be coherent, and also support and enhance the experience's theme in order for it to be more effective and memorable (Pine & Gilmore, 1998; Schifferstein & Spence, 2008). Therefore the multisensory aesthetic response is considered fundamental for the passenger travel experience, and should be studied in more detail because empirical research in this area is still scarce.

2.2.3.Emotional component

The studies detailed in Appendix B have assessed the customer generic service and experience emotional responses (e.g. Price, et al., 1995; Pullman & Gross, 2004). On the other hand, transport literature rarely identifies specific customer emotions, and has instead been based in the service affective assessment (e.g. Anable & Gatersleben, 2005; Stradling, et al., 2007) using the pleasure-arousal-dominance (PAD) scale (Mehrabian &

Russell, 1974). The Consumption Emotion Set (CES) (Richins, 1997) synthesizes the most frequent emotions associated with consumption situations like Excitement, Joy or even Nervousness and Fear that may be associated with travel experiences. Even though the PAD scale constitutes a relevant source of affective assessment, it is important to identify the specific passenger emotional responses to public transportation, in order to obtain a holistic understanding of travel experiences. As can be concluded from from the studies listed in Appendix B, emotions, in particular the negative ones have been poorly addressed by prior research.

In summary, further research is needed for a more in-depth understanding of the travel experience from a holistic perspective, both in terms of travel EFs and ECs. Moreover, as extant research has focused on experience-centric services, it is important to understand whether the travel experience is only relevant within experience-centric trips or if and how it is relevant for more utilitarian travel contexts. Additional studies in this area can enable a better understanding of travel experiences and provide insights for both research and business to enhance the design and management of transportation provision.

3. Methods

An in-depth understanding of customer perceptions and responses is needed to address the complex nature of the travel experience. One of the major trade-offs between quantitative and qualitative methods is between breadth and depth (Strauss & Corbin, 1998). Qualitative methods based on Grounded Theory (Neuman, 2006; Strauss & Corbin, 1998) can be used to obtain the intricate details about phenomena such as feelings, thought processes, and emotions that are difficult to extract or learn about through quantitative methods. This research aimed at gaining an in-depth understanding of the travel experience and as such a qualitative approach was chosen.

Several researchers (e.g. Dahan & Hauser, 2001; Sandén, et al., 2006) advocate that interviews and focus groups are more appropriate for identifying factors that customers are able to verbalize, whereas customer observation and experimental trials are considered more appropriate for obtaining their latent needs. This study involved both observation and interviews to gain a more complete understanding of the travel

experience. The researcher travelled as a regular passenger, both observing and registering relevant facts, and undertaking interviews with passengers. The study aimed at understanding a comprehensive set of travel EFs, and ECs, comprising their cognitive, sensorial and emotional responses during all moments of contact with a transportation provider.

3.1. Sample Design

Following grounded theory, the sample was defined according to the theoretical relevance of cases and until the sample was saturated (Strauss & Corbin, 1998). To get a richer understanding of the experience, two different trip purposes were studied: experience-centric and utilitarian. The experience-centric trip sample comprised tourists who were taking a one-week river cruise in the north of Portugal and travelled by bus to several ground destinations (an average of one hour per trip and approximately a total of ten hours during the week). Therefore, the researcher also participated in the cruise, and travelled in all of the associated bus trips. The utilitarian trip passengers were travelling between different Portuguese cities in a regular bus service that took an average of two hours.

The experience-centric trip sample comprised 22 tourists with an average age of 60 years, coming from different countries: United Kingdom, Finland, France, and Switzerland. The utilitarian trip sample comprised 27 passengers; 25 of them were interviewed inside the bus while the remaining 2 were interviewed in the bus terminal after arriving at the destination. Among the utilitarian trip passengers, 70% were frequent bus users, travelling at least once a month, while 25% even travelled twice a week. They were 40 years old on average and were 92% Portuguese and 8% Brazilian. Both samples had 40% males and 60 % females.

3.2. Data collection

Following Chiseri-Strater and Sunstein's (1997) procedure, the observation of passengers inside the buses and in the companies' facilities followed the observation guidelines given in Appendix C, which involved registering information that concerned all moments of the trips. The observations were performed on two trips of each setting before undertaking the interviews to notice happenings relevant to the research study, to

understand the passenger behavior and also to help structure the interview guide (see Appendix D), which included questions that covered the passenger trip from the first moment of trip planning until the post-trip phases.

With the objectives of the project in mind, the interviews were semi-structured (Pawson, 1996) and took 30 minutes on average. The open-ended questions (Foddy, 1993) were created to consider all the phases of the passenger journey and to enable them to express a comprehensive perspective regarding travel EFs, as well as their cognitive assessment, senses and emotions.

Observation notes continued to be made even during the interviews, in order for the researcher to notice every relevant aspect (e.g. the estimated interviewee's age or their stature, which could influence their body comfort) and the non-verbal behavior of the interviewees or other passengers. Other information that was gathered included the facilities' and vehicle's interior and exterior environments (e.g. the weather), the places where the bus traveled, or any unusual event that could influence the interviewees' point of view. In the experience-centric trips, the interviews were performed in English and inside the ship, after the bus trips, while the utilitarian trip passengers were interviewed either during or immediately after their trip, and these interviews were made in Portuguese.

3.3. Data analysis

All interviews were digitally recorded and literally transcribed. The process of data preparation and collection contributed to a better understanding of passengers' verbal comments and actions, which facilitated the interview content analysis (Neuman, 2006). The initial coding of the interviews was essentially open, but as the coding was refined, attempts were made of concept-driven coding (Strauss & Corbin, 1998), building upon some of the EFs and ECs obtained in the literature. On the other hand, the observation notes clarified the data coding, since some of the interviewees' verbal comments were associated to different EFs than the literature would suggest. The software NVivo was a valuable tool to help in the data coding, but also in its refinement based in the de-contextualization (Gibbs, 2002) and afterwards re-contextualization of the text.

In the first stage the interview texts were analyzed line by line, and pertinent excerpts were assigned provisional conceptual codes (i.e. EFs or ECs). The next stage involved an iterative search for relationships between the codes and their aggregation into

categories. The goal was to systematically develop codes and categories consistent with both the literature and qualitative data. This process allowed for the theory to emerge from the data in order to enhance the understanding of the travel experience in what concerns EFs and ECs in all moments and modes of contact with the transportation providers in both settings.

4. Results

The study results showed that the travel experience is formed through many contacts with the transport provider, from the planning of the trip or ticket purchase using different service channels, through the actual transportation and interaction with other passengers or the staff, and until after the trip when the passengers need support or information about the place where they arrived at. The qualitative data analysis and the coding process enabled the identification of a comprehensive set of travel EFs and ECs, which go beyond traditional service quality factors and outcomes. Section 4.1 describes the travel EFs for the aggregate sample, while in section 4.2 the ECs are detailed in a similar manner. The cross-sample comparison of the EFs and ECs results is presented in section 4.3, focusing on the differences found.

4.1. Travel Experience Factors (EFs)

Based on data analysis of observations and interviews, most of the travel EFs associated with overall transportation characteristics were grouped into two higher-level categories, as shown in Table 1: *trip conditions*, and *supplementary services*. Besides these two higher-level categories, two other factors emerged, more related with the human interaction during the trips: *social environment*, and *staff's skills*. All EFs (and categories) were explored in more detail based on transcriptions of the passengers' comments.

4.1.1. Trip conditions

As can be depicted in Table 1, the *trip conditions* were considered the fundamental core aspect of the overall transport service, including the moments before and after the actual trip, which were spent by the passengers in facilities that were not always directly

Table 1 - Percentage of passengers that mentioned each EF in each and in the aggregate sample

	aggregate sample (n= 49)	**experience-centric trip (n=22)**	**utilitarian trip (n=27)**
- EF:			
Trip conditions	*100%*	*100%*	*100%*
- Cleanliness (e.g. overall facilities, restrooms' maintenance and availability, vehicles and seats)	35%	36%	34%
- Comfort (e.g. thermal, sonorous, seat adjustability and body support, aesthetic appeal of the bus trip, bus interior adequate maintenance)	100%	100%	100%
- Easy accessibility (e.g. easy walking access during the trip, and also to and from the bus)	51%	100%	11%
- Safety (e.g. seatbelts, bus maintenance, road maintenance, weather conditions)	96%	95%	96%
- Visibility of the scenery (e.g. widest and clearest view outside, photo shooting, people's activities outside the bus)	70%	86%	45%
- Waiting Time (e.g. punctuality, frequency of bus departures, waiting for other passengers, traffic)	65%	50%	85%
Supplementary services	*90%*	*91%*	*89%*
- Information provision (e.g. schedules, rules on board, comprehensive destination displays, clear bus identification, touristic description)	76%	50%	89%
- On-board entertainment (e.g. bus sound system, music, movies, MP3 player, laptop, book, etc.)	71%	45%	90%
- Off-board services (e.g. quickness, friendliness, professionalism in the different service channels such as telephone, internet or physical facilities)	37%	32%	44%
Social environment (e.g. interaction with other people)	*62%*	*50%*	*70%*
Staff's skills (e.g. bus personnel's awareness, friendliness and professionalism)	*68%*	*64%*	*70%*

managed by the transport provider. This category involved EFs essentially associated with tangible characteristics such as physical facilities or equipment, which were previously identified in extant research (e.g. Herrmann, et al., 2000; Lu & Ling, 2008; Parasuraman, et al., 1988). Comfort and safety were considered as especially relevant, and were mentioned by almost all interviewees, but a rich set of other EFs also emerged. Cleanliness, comfort, safety and waiting time have been widely studied in the transport literature, however the passengers mentioned various new characteristics related with these EFs from a holistic perspective (see Appendix E for further details and passenger citations).

In addition to the extant literature on comfort, the passengers even mentioned other aspects as related to overall comfort like the aesthetic appeal of the bus trip, or the bus interior adequate maintenance: *"I also consider the bus as more comfortable when its interior is aesthetically appealing". [M, 50s, Portuguese, utilitarian trip]*

The broader perspective of customer experience adopted in this study highlighted the importance of the EFs safety and waiting time related with external aspects to the trip *per se*, respectively such as road maintenance or the weather conditions, and waiting for other passengers or traffic, which could not be fully managed by the transportation provider. Safety was also associated to other EFs, such as the safe accessibility to and from the bus, the provision of information related with safety procedures, or trusting the driver, which was related with staff's skills: *"That is the reason why I prefer to travel by bus, a person feels safe because the bus is well maintained and is driven consciously." [M, 60s, English, experience-centric trip]*. Data analysis also showed that passengers who occupied their time somehow got the perception that their travel waiting time was shorter: "*The trip has been very quick so far! I have been able to read this magazine that I bought in the bus terminal, and now I am distracted by the landscape which is new to me!*" *[F, 40s, Portuguese, utilitarian trip]*

Having easy accessibility has been rarely addressed in extant research, and from a holistic perspective it involves the different moments of the trip: *"I liked the idea that it had two doors you can go on and off, because it facilitates getting on and off." [F, 70s, English, experience-centric trip]*

Finally, the visibility of the scenery was further detailed when compared to prior research, where it was rarely mentioned as a potential factor for passenger valuing travel for its own sake (Salomon & Mokhtarian, 1998). Data analysis and passenger observation showed that watching the landscape is an activity that was performed by a

great majority, if not by all the passengers: *"The scenery is very pleasant…. all the surroundings covered with snow are extraordinary! The trip is already worthwhile!" [M, 60s, Portuguese, utilitarian trip]*

4.1.2.Supplementary services

Trip conditions comprised EFs traditionally addressed in transport literature such as comfort, safety or time. However, the qualitative results also revealed other factors related with *supplementary services* that went beyond the core *trip conditions*. This category was not only related with basic transport service characteristics but with additional aspects that added value to the passenger total experience in different service channels, such as off-board services, on-board entertainment or information before, during and after the bus trip. The emergence of this category showed that transportation was not just moving from an origin to a destination, the passengers also looked for other services, usually based on new technologies that could enhance their experience during the overall trip. Namely the EFs information provision and on-board entertainment were further clarified when compared to the transport literature, because the passengers requested better conditions to be informed, or to do new things during all moments of a trip and even before it: *"The information provided should be improved, by informing the passengers of the programmed schedule and eventual delays, not only in the bus terminal, but also during the trip in the bus, and even before it through the internet or telephone." [M, 30s, Portuguese, utilitarian trip]*. On-board entertainment involved activities in which the passengers engaged, either using the equipment available in the bus or their own, such as MP3 player, laptop or a book: *"Sometimes I take the laptop and work, which I haven't opened today. I would like to use it more frequently if there would be an electrical plug or wireless internet available in the buses." [M, 50s, Portuguese, utilitarian trip]*

In what concerns the off-board services provided before or after the actual trip (e.g. ticketing, check-in), they have been seldom addressed in the transportation literature and were usually considered external to the customer experience, i.e. pre- or post-trip services which might not be directly managed by the transport provider: *"When I arrived at the bus terminal, I bought the ticket, and the service was very quick and professional. In other occasions, I had to wait for a while, because there were other*

people at the line buying tickets for this and also for other bus companies, and I could have missed my bus!" [F, 30s, Portuguese, utilitarian trip]

4.1.3.Social environment

Social environment has been considered in the literature, however with this study it appeared as a more clarified experience driver before, during and after transportation because it potentially had profound effects on the passenger experience, even though it was not fully controlled by transportation providers. Communicating and interacting with others was a way for the passengers to be entertained and even for them to co-create a travel experience, but it could also influence the trip negatively.

"I like the contact with the other passengers… usually nice people, who don't know us, and simply talk with us!" [F, 30s, Portuguese, utilitarian trip]

The interaction with the staff could also be associated to this EF, mostly based on the information gathered during the passengers' observations, because sometimes either the driver or the tour guides were mediators of the inter-customer conversations. Other social aspects mentioned by passengers were related with the negative impact (i.e. noise, disturbance) of other passengers, and as a consequence, with their frequent need of having increased privacy.

4.1.4.Staff's skills

The bus driver's or tour guide's service provision and social abilities were considered very relevant for the passengers, because they were the human face with whom the passengers contacted directly during the bus trip. This EF was related with the other categories and EFs because of the staff's different facets: their awareness and their professional skills were both related to *trip conditions* and *supplementary services*, while their friendliness was associated to the *social environment*.

"The drivers actually go slowly so you can see things. And I really take my hat off to them, because they're driving these massive big buses in the narrow and steep mountain roads!" [M, 50's, English, experience-centric trip]

The concept of awareness (Endsley, 1995) was a new aspect that had not been previously addressed in transport or service literatures, because it also deals with aspects traditionally outside of the transport providers' control. Relative to staff awareness, the passengers expected that the bus driver (or tour guide) were conscious of all the trip

events that could affect the passenger experience in the bus internal or external environments, and also had adequate preventive control capability over those events. This introduced new demands to the staff's abilities but also to the vehicle's equipment necessary to enable the staff to be aware at all times. The following citation of a Portuguese female utilitarian trip passenger in her 60s exemplifies the need for driver's awareness of the passengers' safety: *"In double-decker buses the driver cannot see the passengers in the upper deck, so the driver cannot assure the passenger safety when someone is standing, because there is the risk that s/he might fall or get hurt while the bus is moving or stopping!"*

4.2. Travel Experience Components (ECs)

Based on data analysis, the ECs were organized in three categories: *cognitive*, *sensorial* and *emotional*. These three categories reflected the intricate activities associated with the customer experience.

4.2.1. Cognitive assessment

To address cognitive assessments, passengers were asked to evaluate their specific trip, since the beginning of the global journey, and including every mode of contact with the transportation service. Most of the passengers related the overall transport quality assessment (see Table 2) to the comparison of expectations and performance of various EFs. In addition, other cognitive evaluations were mentioned by most of the passengers, based on the other items listed in Table 2, and comments such as the following one: *"I am actually rather satisfied with the overall transportation service so far!" [M, 40s, Finnish, experience-centric trip]*

The halo effect between the trip and the activities conducted at the destination was one travel-liking attitude (Ory & Mokhtarian, 2005) here reported in the following cognitive comment of a utilitarian trip Portuguese passenger in his 60s: *"The trip has been very good and relaxing and so I am satisfied because I am travelling to visit family who I haven't seen for a long time!"*

Table 2 – Percentage of passengers that mentioned each cognitive assessment

	aggregate sample (n=49)	experience-centric trip (n=22)	utilitarian trip (n=27)
Cognitive component			
-Satisfaction (e.g. overall assessment of the trips)	51%	23%	70%
-Transport quality (e.g. comparison of expectations and perceptions of trip performance)	74%	55%	85%
-Travel-liking (i.e. situations in which the passenger values the trip *per se*)	24%	23%	26%

4.2.2.Sensorial component

All the senses were mentioned by the passengers as being activated during their trips, due to their strong interdependency (see Table 3). For instance the passengers respectively declared to have visual and sound responses to different aspects of the trips: *"I loved going round there, and I was looking out and seeing those little narrow alleys on the top. It was absolutely fascinating! And seeing the different styles of architecture. And that's what I like!" [F, 60s, Swiss, experience-centric trip]*

Table 3 - Passengers' senses citations in each and in the aggregate sample

	aggregate sample (n=49)	experience-centric trip (n=22)	utilitarian trip (n=27)
Sensorial component			
-Vision (e.g. scenery, other people, entertainment alternatives)	71%	86%	55%
-Sound (e.g. music, information, mechanical noises or conversations)	45%	41%	48%
-Touch (e.g. bus interior materials and entertainment objects)	20%	23%	19%
-Smell (e.g. seat's leather scent or undesired smell associated to trash bins or lack of cleanliness)	20%	23%	19%
-Taste (e.g. other people's food)	10%	9%	15%
-Multisensory (e.g. association of two or more senses, and also with aesthetic aspects of trip or vehicle)	30%	32%	29%

"And so, I think I always get a seat in front of passengers that talk and talk during the whole trip (laughs), so there's no way of sleeping!" [F, 20s, Portuguese utilitarian trip]

The multisensory aspect of the trips was also mentioned as very relevant from a holistic perspective: *"During the trip, sometimes I watch the landscape, and although not being new to me, there are always some details that catch my attention….one of the things I like, is seeing the persimmon trees. The leaves fall, but the orange fruits don't, and thus it is very beautiful …. What really catches my attention are the bright fruit colors, but as I like to eat the fruits, I almost get the sensation that I can also smell them inside the bus!" [F, 60s, French, experience-centric trip]*

4.2.3.Emotions

During the interviews, it was difficult for the passengers to identify and express the emotions they had throughout the trips, even when asked specifically about them. The observation of bus trips was therefore important to better understand passenger emotions, because they were usually unaware of them. Using an iterative process of data analysis and literature review, emotions were aggregated into the affective groups listed in Table 4, which are based on the Consumption Emotion Set (CES) (Richins, 1997, 2008). The identification of specific positive and negative emotions, instead of the perceived pleasure, arousal or dominance (PAD) scale, provided a better understanding of the complex travel experience.

A 60 year old Swiss female tourist was excited by one of the trips in a windy road: *"Last night I didn't even feel any scare at all while I was up there! I was just caught by the landscape, and I forgot about the road!"*

Moreover, many interviewees described having at least one of the positive emotions that fit in the "Joy Descriptor Set" (Richins, 1997) such as happiness, pleasure, and cheerfulness either related with the pleasantness of the overall trip, the scenery or with the social interaction with others: *"….because when you travel, you're happy, and you enjoy everything…" [F, 30s, Portuguese, utilitarian trip]*

In what concerns negative emotions, the passengers frequently described feeling annoyed as a consequence of anything that disturbed them significantly: *"I get annoyed by all the cameras,(…) and this man next to me had a camera, and he was leaning across me…." [M, 70s, English, experience-centric trip]*

Table 4 - Passengers' emotions citations in each and in the aggregate sample

	aggregate sample (n=49)	experience-centric trip (n=22)	utilitarian trip (n=27)
Emotional component			
Positive	*82%*	*91%*	*73%*
-Excitement (e.g. related with overall trip or visibility of the scenery)	50%	32%	64%
-Joy (e.g. related with the trip or with other passengers)	36%	68%	9%
Negative	*85%*	*73%*	*95%*
-Annoyance (in relation to other customers' actions)	55%	23%	82%
-Discontentment (e.g. related with difficult accessibility, lack of information or comfort)	45%	50%	40%
-Nervous (e.g. not to wake up to get off the bus, being late, etc.)	N.A.	N.A.	68%
-Fear (associated with unsafe feelings such as the driving or the bus mechanical noises)	N.A.	N.A.	14%

The interviewees also mentioned discontentment when they complained about issues such as the off-board services: *"If I get to the bus terminal ticket-line, and the personnel are not able to provide me information about every bus connections available, I get very discontent and I actually complain to the transport company's representatives!" [M, 60s, Portuguese, utilitarian trip]*.

4.3. Cross-sample comparison

In both samples the passengers pointed out a rich variety of EFs and ECs, which provided a better generic understanding of travel experiences from a holistic perspective. As described in sections 4.1 and 4.2, several EFs and ECs were relevant in bus transportation for the aggregate sample. For example cleanliness is an EF which basically had the same meaning and relevance for both samples. Nevertheless, this study also revealed that there were differences between the two samples in the passenger perceptions and responses (see Table 1, Table 2, Table 3 and Table 4 for further details), demonstrating that transportation services should be differently managed according to the type of trip. Experience-centric passengers essentially focused their touristic

experience on the core *trip conditions* and revealed positive emotions, while the utilitarian trip passengers had a broader perspective involving the overall EFs and ECs. Thus, each type will be described focusing on the differences found.

4.3.1.Experience-centric trip

From the tourists' point of view, a positive experience started by having pre-trip information about the tour and by having easy and safe access to and from the bus in all moments of the trip.

During the actual journey, the experience was essentially determined by the bus interior and seat comfort, and by a conscientious driver. Additionally, the visibility of the outside world was especially relevant for these passengers, since they wanted to see the local people outside, and to film and take photographs very frequently. Moreover, both touristic information and regional music provision in the bus were ways for the tourists to be entertained on-board and were pleasant complements for the passengers to watching the scenery.

In these trips the staff comprised a driver and a tour guide. In this context, the driver was basically associated by the tourists with the *trip conditions*, and was moreover involved in the enhancement of adequate visibility of the scenery, when s/he slowed down or stopped according to the touristic attractions. On the other hand, in order to enhance the customer experience, the tour guide was essentially related by the passengers with the *supplementary services* and *social environment*, as an extension of his/her performance in the off-board services. Establishing social contacts in the bus was apparently less relevant for the tourists, because they wanted to enjoy the trips as much as possible without distractions.

For the tourists the travel experience was essentially sensorial and emotional, even though they also performed cognitive evaluations, which were mostly related with transport quality assessment. The sensorial and emotional component of the travel experience can be illustrated by the following comment of a Swiss male tourist in his 70s: *"It is absolutely fascinating to leave the boat, and afterwards to return to it from a different place or with a different landscape as, or even more beautiful than the previous one…. Especially because today we wouldn't have seen new things, different from the ones we already knew on our way to the monastery! And can't do that by boat!"*

As the tourists were on holidays with an overall cheerful mood, they usually evaluated the transportation mostly by positive emotions such as excitement and joy. Among negative emotions, in particular discontentment was present in the touristic trips associated with difficult accessibility.

4.3.2. Utilitarian trip

For the intercity passengers the travel experience was firstly driven by having prior access to adequate trip information both by telephone or internet channels, and also by having a high frequency of bus departures to their intended destination.

After arriving at the bus terminal, the most relevant EFs were comfort, information and off-board services provided in the physical facilities, even though they were usually managed by various transportation companies. The service provided at the ticket-line or other off-board services should be seamless, while the waiting rooms, or other physical facilities must be well maintained. The spoken or written information provided about trip delays or about the identification of the buses' destinations and intermediate stops should be clear and easily available during all moments. Moreover, there should be safe and easy accessibility from the waiting room to the bus, which should be clearly identified. The driver should be friendly and professional when handling the passengers' luggage, so that it was not damaged during the trip.

In addition to extant research on comfort, it was found that the passengers considered that having adequate conditions to sleep during the trip influenced their overall comfort conditions, beyond mere physical support. These passengers had the unsafe perception that the first row seats were apparently more dangerous than the other ones, even though during the observations it was acknowledged that the ones who sat there, frequently wanted to talk more amongst them and even with the driver, who sometimes mediated their conversations. Additionally they showed concern in relation to potential unsafe objects inside the bus (e.g. laptop computer, or personal bags) that might harm someone in case of an unexpected sudden stop. On-board entertainment might not be fully controlled by the transportation provider, especially when frequent passengers took their own entertainment equipment because they knew there were no others available during the trips. Additionally, the *social environment* was also an extension of the on-board entertainment as a way of occupying the passenger travel (i.e. waiting) time. Talking was an easy way to occupy their time and sometimes they did it with passengers they already

knew from previous trips. On the other hand, the passengers who sat further in the back of the bus usually preferred to be silent and to do something else during the trip.

The role of the bus driver was at the center of the travel experience, since s/he was the only staff member during the actual trip. In what concerned the visibility of the scenery, as some of the passengers travelled frequently, they were accustomed to the landscape, and thus declared no relevant interest in looking outside. Nevertheless, it was possible to observe that they also watched the scenery, especially when they had nothing else to do.

In the end of the trip the driver might also be again involved in the luggage handling or provision of information about directions or other trips, because sometimes the end of a trip did not mean that the passengers arrived at their final destination. Thus the travel experience was again driven by the conditions available in the bus terminal to which the passengers arrived.

The utilitarian trip passenger cognitive assessment was closely associated with the evaluation of the overall transportation and service quality. The study results contributed to the finding that, as some of the passengers did not have their own vehicle, they assessed the trips positively with a sense of belongingness (Mael & Ashforth, 1992) to the transportation provision. Passengers revealed belongingness when they identified with the service provider, and took on and accepted the provider's interests as his or her own, thus creating loyalty behavior. This cognitive concept has not been addressed by transport literature and was also reflected in the social interactions created by some of the frequent passengers with others or even with the driver. Additionally, the utilitarian frequent passengers revealed being naturally influenced by their previous trips originating progressive satisfaction with the transport service: *"It's funny! When I started travelling by bus to come to University, I was worried thinking what to do during the 1,5 hours of trip. And it was very difficult in the beginning! As the scenery isn't very beautiful, we get used to it very fast….But after some journeys, we get used to the trip and it is quick and useful to study or to plan our week." [F, 20s, Portuguese, utilitarian trip]*

The results also revealed that the cross-sample differences found in emotions was related with the utilitarian trip's purpose (i.e. frequently to work or study), which negatively influenced the passengers' state-of-mind concerning the assessment of the journey.

"Usually I couldn't sleep during the trip because I was always nervous to check when the bus would arrive at my stop!" [F, 60s, Portuguese, utilitarian trip]

"When I sit in these seats, I feel a little bit frightened watching the road ahead and

having no seat in front of me!" [F, 70s, Portuguese, utilitarian trip]

Nevertheless, the utilitarian trip passengers also revealed positive emotions, mostly excitement with the overall trip or with some extraordinary aspect of the scenery, such as snow.

In summary, the cross-sample comparison showed that tourists mostly mentioned the core *trip conditions*. Nevertheless, the overall *supplementary services* were relevant to both samples in all moments of the trips, even though the related EFs were more intricate when mentioned by the intercity passengers. The ECs results indicated that the experience-centric and utilitarian trip passengers activated their multiple senses in a similar way and felt the same positive emotions. However, passengers of both samples evaluated their trips cognitively with a positive perspective.

These results show that a holistic perspective of the travel experience is crucial for both experience-centric and utilitarian transport services, but different EFs and ECs come into play in these two contexts. Therefore transport companies should have a more holistic management of the customer experience for transportation in general, but also for specific settings.

5. Research and managerial implications

The results of this qualitative study reveal that the travel experience is more complex than traditional transit service quality. This article contributes to a broader understanding of the passenger experience in terms of both EFs and ECs, deriving relevant implications for the design and management of public transportation.

The current study addressed the transport experience from a holistic perspective, covering all moments of contact, i.e. including before and after the actual transportation service, in two types of trips. This holistic perspective allowed for an understanding of the broad categories of EFs, i.e. *trip conditions*, *supplementary services*, and also of the interaction factors *social environment*, and *staff's skills*. This study also introduced novel EFs, such as accessibility conditions, visibility of the scenery, and services provided through different channels before, during or after a trip. Some of these factors may have been addressed in previous transport research studies, but so far there has not been an integrated view of the overall travel EFs. These results therefore show that the travel

experience is formed by all moments of contact with the transport provider and that a rich set of EFs should be considered beyond traditional transit quality factors. Transport interested parties should also consider elements that they may not completely control but influence the travel experience considerably, such as road conditions, on-board entertainment, off-board services or social environment. Transport interested parties should therefore have a broader understanding and management of the travel experience, taking into account this rich set of EFs and considering the travel experience as a whole for enhancing customer loyalty and drive usage of public transportation.

This study also covered a holistic set of experience responses to the transportation, defined as ECs. The study identified ECs that go beyond cognitive assessments to also include sensorial and emotional components associated with the intricate customer experience process. These holistic ECs include multisensory responses, and specific positive and negative emotions, for instance excitement and annoyance evolving from previous studies that have concentrated on the PAD scale. These results highlight the need for transport providers to manage all ECs, considering the cognitive assessments, but also taking into account the emotional and sensorial aspects that are crucial for the travel experience.

The results also reveal that the customer travel experience is relevant for both experience-centric and utilitarian trips. The results show that utilitarian passengers mention a broader set of EFs when compared to the tourists in terms of *trip conditions* and *supplementary services*, such as waiting time and on-board entertainment. This may be due to the fact that intercity passengers are mostly frequent travelers and therefore spend much more time traveling when compared to experience-centric passengers. On the other hand, the tourists are much more stimulated by aspects beyond the trip itself, such as outside views and places to visit, and therefore the EFs they mentioned are more focused on core *trip conditions*. Previous customer experience literature has focused on experience-centric services, but these results show that a holistic view of the travel experience is important for all kinds of trips, although the type of EFs and ECs that customers consider may differ according to each setting. These results highlight the need for transport interested parties to carefully design and manage the travel experience for transit in general from a holistic perspective, but taking into account the nuances of the different settings.

Overall, the study provides insights for transport providers, vehicle manufacturers and policymakers to assure an integrated design and management of all components that contribute to the travel experience. The travel experience is influenced by the core transport service provided, the vehicle, the waiting physical facilities, and even the road conditions. Improving usage of public transport therefore requires an integrated approach to all the aspects that drive the travel experience as a whole. In this context, the collaboration between transport interested parties such as providers, manufacturers and policymakers can enable better designing and managing the entire transport service ecosystem.

6. Concluding remarks and future research

The current research project performed a qualitative empirical analysis of alternative transportation settings based on observations and interviews to provide an in-depth understanding of customer travel experiences in terms of both experience factors (EFs) and experience components (ECs) from a holistic perspective. Study results showed that traditional factors identified in extant research are important for the travel experience, but also sheds light into other EFs and ECs that are crucial for a more complete understanding of the travel experience. This study shows that travel experiences are more complex and extended in time than traditional transit service quality. For the passengers, the experience is extended in the way that events before or after the actual trip influence their overall satisfaction with the transportation.

The present study involves a qualitative approach, focused on an in-depth understanding of the meaning of experience factors and components, to better understand the travel experience. The bus travel environment was found to be especially relevant for this study, as it is perceived by passengers as an integrated whole that involves the physical products, the intangible service dimensions, and the staff's and other passengers' participation during different moments of a trip. Nevertheless, it would be interesting to replicate the current study with different trip purposes, alternative modes, or multi-modal transportation, to understand which EFs and ECs are shared and which change.

The results provided an in-depth understanding of travel EFs and ECs and the study may be complemented with a quantitative study for the measurement and analysis of the impact of EFs (i.e. drivers of the travel experience) on ECs (i.e. outcomes of the travel experience).

Finally, the study highlights the need for a holistic design and management of all aspects of the travel experience, requiring the collaboration of the different transport interested parties. Further research should explore the integrated development of public transportation as product-service systems, defined as marketable set of products and services capable of jointly fulfilling the users' needs (Goedkoop, et al., 1999).

Overall, this study contributes to a better understanding and management of the passenger experience, and will hopefully motivate further research on a more holistic approach to the design and management of travel experiences.

Appendix A - Table A.1 - Expanded results of the EFs identified in the literature (listed in alphabetical order)

Travel EFs	Study	Theme
Atmosphere (e.g. music, lights)	Bitner (1992)	Service quality/satisfaction
	Fottler & Ford (2000), Klaus & Maklan (2007), Pullman & Gross (2004)	Customer experience
Cleanliness	Dell'Olio, et al. (2011), Eboli & Mazzulla (2011), Guiver, et al. (2007), Nathanail (2008), Tsaur, et al. (2002)	Transport quality
	Fottler & Ford (2000)	Customer experience
Comfort (e.g. temperature, vibration, seat)	Beirão & Cabral (2007), Dell'Olio, et al. (2011), Eboli & Mazzulla (2011), Guiver, et al., (2007), Lee, et al. (2009), Nathanail (2008), Stradling, et al. (2007), Tsaur, et al. (2002)	Transport quality
	Fottler & Ford (2000), Pullman & Gross (2004), Vink & de Looze (2008)	Customer experience
Efficiency	Chen & Chang (2005)	Transport quality
	Patricio, et al.(2009)	Customer experience
Entertainment (e.g. occupying time)	Anable & Gatersleben (2005), Guiver, et al., (2007), Herrmann et al. (2000), LeBel (2005), Mokhtarian & Salomon (2001), Tsaur, et al. (2002)	Transport quality
	Pullman & Gross (2004)	Customer experience
Environmental protection	Anable & Gatersleben (2005), Eboli & Mazzulla (2011), Guiver, et al. (2007)	Transport quality
Food and beverage	Herrmann, et al. (2000), Tsaur, et al. (2002)	Transport quality
	Pullman & Gross (2004)	Customer experience
Information	Beirão & Cabral (2007), Chen & Chang (2005), Eboli & Mazzulla (2011), Guiver, et al. (2007), Nathanail (2008)	Transport quality
	Patricio, et al.(2009)	Customer experience
Itinerary and number of stops	Eboli & Mazzulla (2011), Nathanail (2008)	Transport quality
Multi-channel experience	Patricio, et al. (2008)	Customer experience
Not having to drive	Anable & Gatersleben (2005), Beirão & Cabral (2007), Guiver, et al. (2007)	Transport quality
Pre-service activities	Nathanail (2008), Tsaur, et al. (2002)	Transport quality
	Neal et al. (2004)	Service quality/satisfaction
	LeBel (2005)	Customer experience
Post-service activities	Neal et al. (2004)	Service quality/satisfaction
	LeBel (2005), Pullman & Gross (2004)	Customer experience

Table A.1 (continued)

Travel EFs	Study	Theme
Price (i.e. value for money)	Anable & Gatersleben (2005), Beirão & Cabral (2007), Eboli & Mazzulla (2011), Guiver, et al. (2007), Herrmann et al. (2000), Lu & Ling (2008), Nathanail (2008), Stradling, et al. (2007), Tsaur, et al. (2002)	Transport quality
	Neal et al. (2004)	Service quality/satisfaction
	Verhoef, et al. (2009)	Customer experience
Retail brand	Ostrom, et al. (2010)	Service quality/satisfaction
	Klaus & Maklan (2007)	Customer experience
Safety	Eboli & Mazzulla (2011), Guiver, et al. (2007), Lu & Ling (2008), Nathanail (2008), Stradling, et al. (2007), Tsaur, et al. (2002)	Transport quality
	Fottler & Ford (2000)	Customer experience
Social interactions	Abou-Zeid & Ben-Akiva (2011), Beirão & Cabral (2007)	Transport quality
	Arnould & Price (1993), Klaus & Maklan (2007), Pullman & Gross (2004), Verhoef, et al. (2009)	Customer experience
Staff's friendliness or professional skills	Chen & Chang (2005), Dell'Olio, et al. (2011), Eboli & Mazzulla (2011), Guiver, et al. (2007), Lu & Ling (2008), Nathanail (2008), Stradling, et al. (2007), Tsaur, et al. (2002)	Transport quality
	Parasuraman, et al. (1988)	Service quality/satisfaction
	Klaus & Maklan (2007), LeBel (2005), Patricio, et al.(2009), Price, et al. (1995), Pullman & Gross (2004), Verhoef, et al. (2009)	Customer experience
Tangibles (e.g. equipment, physical facilities)	Herrmann et al. (2000), Lu & Ling (2008), Tsaur, et al. (2002)	Transport quality
	Bitner (1992), Parasuraman, et al. (1988)	Service quality/satisfaction
	LeBel (2005), Pullman & Gross (2004)	Customer experience
Time management	Beirão & Cabral (2007), Chen & Chang (2005), Dell'Olio, et al. (2011), Eboli & Mazzulla (2011), Friman (2010), Guiver, et al. (2007), Herrmann et al. (2000), Nathanail (2008), Petit (2002), Tsaur, et al. (2002)	Transport quality
	Price, et al. (1995), Vink & de Looze (2008)	Customer experience

Appendix B - Table B.1 - Expanded results of the ECs identified in the literature

Travel ECs	Category	Study	Theme
Cognitive	Satisfaction evaluation, quality assessment	Abou-Zeid et al. (2012), Anable & Gatersleben (2005), Beirão & Cabral (2007), Chen & Chang (2005), Dell'Olio et al. (2011), Eboli & Mazzulla (2011), Ettema et al. (2010), Friman (2010), Guiver, et al., (2007), Herrmann et al. (2000), Nathanail (2008), Stradling, et al. (2007), Tsaur, et al. (2002)	Transport quality
		Oliver (1993), Parasuraman, et al. (1988; 2005), Neal et al. (1999)	Service quality/satisfaction
		LeBel (2005), Patricio, et al. (2009), Price et al., (1995), Wolfinbarger & Gilly (2003)	Customer experience
	Travel-liking	Anable & Gatersleben (2005), Ory & Mokhtarian (2005)	Transport quality
		Zomerdijk & Voss (2009)	Customer experience
Sensorial	Multisensory	Bitner (1992)	Service quality/satisfaction
		Hekkert (2008), LeBel (2005), Pine & Gilmore (1998), Schifferstein & Spence (2008)	Customer experience
	Hearing	van Egmond (2008)	Customer experience
	Vision	Larsen (2003)	Transport quality
		Hill (2001), Nefs (2008)	Customer experience
	Smell	Beirão & Cabral (2007)	Transport quality
		Berry et al. (2002), Carbone & Haeckel (1994), Cardello & Wise (2008), Hekkert (2008)	Customer experience
	Taste	Berry et al. (2002), Carbone & Haeckel (1994), Cardello & Wise (2008)	Customer experience
	Touch	Sonneveld & Schifferstein (2008)	Customer experience

Table B.1 (continued)

Travel ECs	Category	Study	Theme
Positive Emotions	Excitement/ Enthusiasm	Anable & Gatersleben (2005)	Transport quality
		Richins (2008)	Service quality/ satisfaction
		Bloemer & de Ruyter (1999), Hanefors & Mossberg (2003), Price et al., (1995)	Customer experience
	Joy/ Happiness	Anable & Gatersleben (2005), Guiver et al. (2007), Herrmann et al (2000), Lumsdon (2006), Mokhtarian & Salomon (2001), Ory & Mokhtarian (2005)	Transport quality
		Richins (2008)	Service quality/ satisfaction
		Barksy & Nash (2002), Desmet (2008), Hill (2001), Hanefors & Mossberg (2003), Price et al. (1995), Pullman & Gross (2004)	Customer experience
Negative Emotions	Stress/ Tension	Anable & Gatersleben (2005), Gatersleben & Uzzell (2007)	Transport quality
		Richins (2008)	Service quality/ satisfaction
	Fear	Richins (2008)	Service quality/ satisfaction
		Hill et al. (2001)	Customer experience
	Sadness	Price et al. (1995)	Customer experience
	Anger	Price et al. (1995)	Customer experience

Appendix C - Observation guide used for both settings

- Date, time, and place of observation
    - In what part of the trip? (beginning/ mid/ end)
    - Weather (Sunny/ Cloudy/ Raining)
    - Temperature (Outside: / Inside:)
- Specific facts, numbers, details of what happens at the site
    - Nº of persons
    - Passengers' estimated bodies' dimensions (height, weight, etc.) compared with seats' dimensions
    - 1st. trip or frequent passenger?
    - Bus driver/ tour guide performance?
- Sensory impressions: sights, sounds, textures, smells, tastes
- Specific words, phrases, summaries of conversations, and insider language
- Activities performed
    - Seating (with or without seatbelt?)/ Using armrests:
    - Reading
    - Sleeping
    - Talking (lateral passengers/ front or rear passengers)
    - Sightseeing and photo shooting
    - Interaction with bus driver/ tour guide?

Appendix D - Interview guide used for both settings

- Questions related with the preparation of the trip:
    - How often do you travel with this company?
    - Why did you choose this transportation company?
    - How did you plan this journey?
    - What is important to you when travelling by bus?
    - What could make the bus trips more pleasant?

- Questions related with the trip since the first moment of contact with the transport provider:
    - What are the most positive issues related with the trip?
    - What are the most negative issues related with the trip?
    - What sensorial responses did you have during the trip?
    - What emotions were elicited during the trip?

- Assessment of the trip:
    - What is your evaluation of the overall trip?

Appendix E – Table E.1 - Citations of the passengers concerning each EF

EF	Transcription
Trip conditions	
Cleanliness	*"This is a short trip, so I don't feel the need for the existence of an on-board restroom. But on longer trips that might be important." [F, 40s, Portuguese, utilitarian trip]*
Comfort	*"...it´s not too hot, nor too cold! I think it is a positive thing to be able to adjust the temperature, to provide more comfort!" [F, 50s, Finnish, experience-centric trip]*
Easy accessibility	*"One of the most important things is the access for people like me, or even for handicapped people, which have almost the impossible task of entering or exiting these high mid-distance buses!" [M, 70s, Brazilian, utilitarian trip]*
Safety	*"Occasionally, while I am waiting in the bus terminal I find myself observing the buses' exterior conditions and their license plates, and acknowledge in which year they were constructed…I think that even being old, if they are well maintained, they are still adequate to make this kind of trip!" [F, 20s, Portuguese, utilitarian trip]*
Visibility of the scenery	*"I wonder if it's possible to have these panoramic buses, where you have all glass? In Switzerland we have these panoramic trains. Of course we feel like a total freedom…." [F, 60s, Swiss, experience-centric trip]*
Waiting time	*"It's good to have small groups, because you wait too much if you have 2 buses, and you have to count people..." [M, 70s, Swiss, experience-centric trip]*
Supplementary services	
Information provision	*"The only thing I would say is, that most people thought there would be more walking than there was in this city tour today. So I think it would be better for the staff to make it clear before coming to the trip." [F, 60s, English, experience-centric trip]*
On-board entertainment	*"And sometimes is also nice to have a TV, like here, in which you can see typical dances, or you can listen to music, typical music and so on." [F, 50s, Finnish, experience-centric trip]*
Off-board services	*"I think the overall trip is very well organized and everyone is professional, for instance when I reserved the trip I already knew what would be the detailed program and the tour circuit. They were even kind enough to pick our group at the airport." [F, 60s, French, experience-centric trip]*
Staff's skills	*"I think the bus driver is the most important element during a trip, because s/he needs to help everyone with their luggage, has to assure that every passenger has their ticket, has to be nice even if s/he is has been working for a long day, while at the same time s/he has to drive the bus safely!" [M, 50s, Portuguese, utilitarian trip]*
Social Environment	*"Inside the bus you can just lean over and talk to a person. Can't you? And lean back that's also easy!" [M, 70s, English, experience-centric trip]*

References

Abou-Zeid, M., & Ben-Akiva, M. (2011). The effect of social comparisons on commute well-being. *Transportation Research Part A: Policy and Practice, 45*, 345-361.

Abou-Zeid, M., Witter, R., Bierlaire, M., Kaufmann, V., & Ben-Akiva, M. (2012). Happiness and travel mode switching: Findings from a Swiss public transportation experiment. *Transport Policy, 19*, 93-104.

Anable, J., & Gatersleben, B. (2005). All work and no play? The role of instrumental and affective factors in work and leisure journeys by different travel modes. *Transportation Research Part A: Policy and Practice, 39*, 163-181.

Arnould, E. J., & Price, L. L. (1993). River Magic - Extraordinary Experience and the Extended Service Encounter. *Journal of Consumer Research, 20*, 24-45.

Barksy, J., & Nash, L. (2002). Evoking emotion: Affective keys to hotel loyalty. *Cornell Hospitality and Restaurant Administration Quarterly, 43*, 39–46.

Beirão, G., & Cabral, J. A. S. (2007). Understanding attitudes towards public transport and private car: A qualitative study. *Transport Policy, 14*, 478–489.

Berry, L. L., Carbone, L. P., & Haeckel, S. H. (2002). Managing the Total Customer Experience. *MIT Sloan Management Review, 43*, 85-89.

Bitner, M. (1992). Servicescapes: The Impact of Physical Surroundings on Customers and Employees. *The Journal of Marketing, 56*, 57-71.

Bloemer, J., & de Ruyter, K. (1999). Customer loyalty in high and low involvement service settings: The moderating impact of positive emotions. *Journal of Marketing Management, 15*, 315-330.

Carbone, L. P., & Haeckel, H. S. (1994). Engineering Customer Experiences. *Marketing Management, 3*, 8-19.

Cardello, A., & Wise, P. (2008). Taste, Smell And Chemesthesis In Product Experience. In H. Schifferstein & P. Hekkert (Eds.), *Product Experience* (pp. 91-131).

Carreira, R., Patrício, L., Natal, R., Marques, A., & Magee, C. (2010). Incorporating Customer Experience Requirements In New Product Development: Understanding Bus Travel Experiences. In *Proceedings of the 17th International Product Development Management Conference* (pp. 51-63). Murcia University, Spain.

Chen, F. Y., & Chang, Y. H. (2005). Examining airline service quality from a process perspective. *Journal of Air Transport Management, 11*, 79-87.

Chiseri-Strater, E., & Sunstein, B. S. (1997). *FieldWorking: Reading and Writing Research.* (Prentice Hall-Blair Press: Upper Saddle River, NJ ed.): Prentice Hall.

Chitturi, R., Raghunathan, R., & Mahajan, V. (2008). Delight by Design: The Role of Hedonic Versus Utilitarian Benefits. *Journal of Marketing, 72*, 48-63.

Dahan, E., & Hauser, J. R. (2001). Product Development - Managing a Dispersed Process. In B. W. a. R. Wensley (Ed.), *Handbook of Marketing*.

dell'Olio, L., Ibeas, A., & Cecin, P. (2011). The quality of service desired by public transport users. *Transport Policy, 18*, 217-227.

Desmet, P. M. A. (2008). Product Emotion. In H. Schifferstein & P. Hekkert (Eds.), *Product Experience* (pp. 377-395).

Eboli, L., & Mazzulla, G. (2011). A methodology for evaluating transit service quality based on subjective and objective measures from the passenger's point of view. *Transport Policy, 18*, 172-181.

Endsley, M. R. (1995). Toward a theory of situation awareness in dynamic systems. *Human Factors, 37*, 32–64.

Ettema, D., Gärling, T., Eriksson, L., Friman, M., Olsson, L. E., & Fujii, S. (2010). Satisfaction with travel and subjective well-being: Development and test of a

measurement tool. *Transportation Research Part F: Traffic Psychology and Behaviour, 14*, 167-175.

Foddy, W. (1993). Constructing Questions for Interviews and Questionnaires: Theory and Practice in Social Research. In: Cambridge University Press.

Fottler, M. D., & Ford, R. C. (2000). Creating a healing environment: The importance of the service setting in the new ConsumerOriented Healthcare System. *Journal of Healthcare Management, 45*, 91-106.

Friman, M. (2010). Affective dimensions of the waiting experience. *Transportation Research Part F: Traffic Psychology and Behaviour, 13*, 197-205.

Gatersleben, B., & Uzzell, D. (2007). Affective Appraisals of the Daily Commute. *Environment and Behavior, 39*, 416-431.

Gentile, C., Spiller, N., & Noci, G. (2007). How to Sustain the Customer Experience:: An Overview of Experience Components that Co-create Value With the Customer. *European Management Journal, 25*, 395-410.

Gibbs, G. R. (2002). *Qualitative data analysis - Explorations with NVivo* (1st ed.).

Goedkoop, M., Van Halen, C., & Te Riele, H. (1999). *Product service systems, ecological and economic basics* (pré Consultants ed.). Amersfoort, The Netherlands.: The Hague : Ministry of Housing, Spatial Planning and the Environment, Communications Directorate.

Guiver, J., Lumsdon, L., Weston, R., & Ferguson, M. (2007). Do buses help meet tourism objectives? The contribution and potential of scheduled buses in rural destination areas. *Transport Policy, 14*, 275-282.

Hanefors, M., & Mossberg, L. (2003). Searching for the extraordinary meal experience. *Journal of Business and Management, 9*, 249–270.

Hekkert, P. (2006). Design aesthetics: principles of pleasure in design. *Psychology Science, 48*, 157 - 172.

Hekkert, P., & Leder, H. (2008). Product Aesthetics. In H. Schifferstein & P. Hekkert (Eds.), *Product Experience* (pp. 259-285).

Herrmann, A., Huber, F., & Braunstein, C. (2000). Market-driven product and service design: Bridging the gap between customer needs, quality management, and customer satisfaction. *International Journal of Production Economics, 66*, 77-96.

Hill, R., Pine Ii, B. J., Gilmore, J. H., Betts, P. J., Houmann, L., & Stubblefield, A. (2001). Welcome to the experience economy. *Health Forum Journal, 44*, 10-16.

Klaus, P., & Maklan, S. (2007). The role of brands in a service-dominated world. *The Journal of Brand Management, 15*, 115-122.

Larsen, J. (2003). Tourism Mobilities and the Travel Glance:Experiences of Being on the Move. *Scandinavian Journal of Hospitality and Tourism, 1*, 81-98.

LeBel, J. L. (2005). Beyond the friendly skies: an integrative framework for managing the air travel experience. *Managing Service Quality, 15*, 437 - 451.

Lee, J. H., Jin, B. S., & Ji, Y. (2009). Development of a Structural Equation Model for ride comfort of the Korean high-speed railway. *International Journal of Industrial Ergonomics, 39*, 7-14.

Lu, J. L., & Ling, F. I. (2008). Cross-cultural perspectives regarding service quality and satisfaction in Chinese cross-strait airlines. *Journal of Air Transport Management, 14*, 16-19.

Lumsdon, L. M. (2006). Factors Affecting The Design Of Tourism Bus Services. *Annals of Tourism Research, 33*, 748-766.

Mael, F., & Ashforth, B. (1992). Alumni and their alma matter: A partial test of the reformulated model of organizational identification. *Journal of Organizational Behavior, 13*, 103–123.

Mascarenhas, O., Kesavan, R., & Bernacchi, M. (2006). Lasting customer loyalty: a total customer experience approach. *Journal of Consumer Marketing, 23*, 397-405.

Mehrabian, A., & Russell, J. A. (1974). *An approach to environmental psychology*. Cambridge, MA: MIT Press.

Meyer, C., & Schwager, A. (2007). Understanding Customer Experience. *Harvard Business Review, February*, 117-126.

Mokhtarian, P., & Salomon, I. (2001). How Derived is the Demand for Travel? Some Conceptual and Measurement Considerations. *Transportation Research Part A: Policy and Practice, 35*, 695-719.

Nathanail, E. (2008). Measuring the quality of service for passengers on the hellenic railways. *Transportation Research Part A: Policy and Practice, 42*, 48-66.

Neal, J. D., Sirgy, M., & Uysal, M. (1999). The Role of Satisfaction with Leisure Travel/ Tourism Services and Experience in Satisfaction with Leisure Life and Overall Life. *Journal of Business Research, 44*, 153-163.

Neal, J. D., Sirgy, M. J., & Uysal, M. (2004). Measuring the Effect of Tourism Services on Travelers' Quality of Life: Further Validation. *Social Indicators Research, 69*, 243-277.

Nefs, H. (2008). On the visual appearance of objects. In H. Schifferstein & P. Hekkert (Eds.), *Product Experience* (pp. 11-39).

Neuman, W. L. (2006). Field Research. In *Social Research Methods - Qualitative and Quantitative Approaches* (6th ed.): Pearson International Edition.

Oliver, R. (1993). Cognitive, Affective, and Attribute Bases of the Satisfaction Response. *Journal of Consumer Research, 20*, 418-430.

Ory, D. T., & Mokhtarian, P. L. (2005). When is getting there half the fun? Modeling the liking for travel. *Transportation Research Part A: Policy and Practice, 39*, 97-123.

Ostrom, A. L., Bitner, M. J., Brown, S. W., Burkhard, K. A., Goul, M., Smith-Daniels, V., Demirkan, H., & Rabinovich, E. (2010). Moving Forward and Making a Difference: Research Priorities for the Science of Service. *Journal of Service Research, 13*, 4-36.

Parasuraman, A., Zeithaml, V. A., & Berry, L. L. (1988). SERVQUAL: A Multiple-Item Scale for Measuring Consumer Perceptions of Service Quality. *Journal of retailing, 64*, 12-40.

Parasuraman, A., Zeithaml, V. A., & Malhotra, A. (2005). E-S-QUAL - A multiple-item scale for assessing Electronic Service Quality. *Journal of Service Research, 7*, 213-233.

Patrício, L., Cunha, J. F., & Fisk, R. P. (2009). Requirements engineering for multi-channel services: The SEB method and its application to a multi-channel bank. *Requirements Engineering, 14*, 209-227.

Patrício, L., Cunha, J. F., Fisk, R. P., & Nunes, N. J. (2004). Customer experience requirements for multi-platform service interaction: bringing services marketing to the elicitation of user requirements. In N. Maiden (Ed.), *12th IEEE International Requirements Engineering Conference* (pp. 26-35). Kyoto, Japan: IEEE.

Patrício, L., Fisk, R. P., & Cunha, J. F. (2008). Designing Multi-Interface Service Experiences: The Service Experience Blueprint. *Journal of Service Research, 10*, 318-334.

Paulley, N., Balcombe, R., Mackett, R., Titheridge, H., Preston, J., Wardman, M., Shires, J., & White, P. (2006). The demand for public transport: The effects of fares, quality of service, income and car ownership. *Transport Policy, 13*, 295-306.

Pawson, R. (1996). Theorizing the interview. *The British Journal of Sociology, 47*, 295-314.

Petit, J. (2002). Characterizing travel behaviour as a social experience. *Éditions scientifiques et médicales Elsevier SAS et INRETS., 76*, 190-207.

Pine, B. J., & Gilmore, J. H. (1998). Welcome to the experience economy. *Harvard Business Review, July-August*, 97-105.

Price, L. L., Arnould, E. J., & Tierney, P. (1995). Going to Extremes - Managing Service Encounters and Assessing Provider Performance. *Journal of Marketing, 59*, 83-97.

Pullman, M. E., & Gross, M. A. (2004). Ability of experience design elements to elicit emotions and loyalty behaviors. *Decision Sciences, 35*, 551-578.

Richins, M. (1997). Measuring emotions in the consumption experience. *Journal of Consumer Research, 24*, 127-146.

Richins, M. (2008). Consumption Emotions. In H. Schifferstein & P. Hekkert (Eds.), *Product Experience* (pp. 399-422).

Salomon, I., & Mokhtarian, P. L. (1998). What happens when mobility-inclined market segments face accessibility-enhancing policies? *Transportation Research Part D: Transport and Environment, 3*, 129-140.

Sandén, B., Matthing, J., & Edvardsson, B. (2006). New Service Development: Learning from and with Customers. In B. Edvardsson, A. Gustafsson, P. Kristensson, P. Magnusson & J. Matthing (Eds.), *Involving Customers in New Service Development* (Vol. Series on Technology Management - Vol.11, pp. 99-126): Imperial College Press.

Schifferstein, H., & Spence, C. (2008). Multisensory Product Experience. In H. Schifferstein & P. Hekkert (Eds.), *Product Experience* (pp. 133-156).

Sonneveld, M., & Schifferstein, H. (2008). The tactual experience of objects. In H. Schifferstein & P. Hekkert (Eds.), *Product Experience* (pp. 41-68).

Stradling, S., Carreno, M., Rye, T., & Noble, A. (2007). Passenger perceptions and the ideal urban bus journey experience. *Transport Policy, 14*, 283-292.

Strauss, A., & Corbin, J. (1998). *Basics of Qualitative Research* (2nd ed.): SAGE Publications.

Tsaur, S.-H., Chang, T.-Y., & Yen, C.-H. (2002). The evaluation of airline service quality by fuzzy MCDM. *Tourism Management, 23*, 107-115.

van Egmond, R. (2008). The experience of product sounds. In H. Schifferstein & P. Hekkert (Eds.), *Product Experience* (pp. 69-86).

Verhoef, P. C., Lemon, K. N., Parasuraman, A., Roggeveen, A., Tsiros, M., & Schlesinger, L. A. (2009). Customer Experience Creation: Determinants, Dynamics and Management Strategies. *Journal of retailing, 85*, 31-41.

Vink, P., & de Looze, M. (2008). Crucial elements of designing for comfort. In H. Schifferstein & P. Hekkert (Eds.), *Product Experience* (pp. 441- 460).

Voss, C., Roth, A. V., & Chase, R. B. (2008). Experience, Service Operations Strategy, and Services as Destinations: Foundations and Exploratory Investigation. *Production & Operations Management, 17*, 247-266.

Wolfinbarger, M., & Gilly, M. C. (2003). eTailQ: dimensionalizing, measuring and predicting etail quality. *Journal of retailing, 79*, 183-198.

Zomerdijk, L. G., & Voss, C. (2009). Service Design for Experience-Centric Services. *Journal of Service Research, 13*, 67-82.

PAPER II

Incorporating Customer Experience Factors In New Product Development: Understanding Bus Travel Experiences

Rui Carreira[1], Lia Patrício[1], Renato Natal[1], António Torres Marques[1], Chris Magee[2]

1- Department of Mechanical Engineering, Faculty of Engineering, University of Porto, Portugal

2- Massachusetts Institute of Technology, Department of Mechanical Engineering and Engineering Systems Division, USA

Email: ruicar@fe.up.pt, lpatric@fe.up.pt, rnatal@fe.up.pt, marques@fe.up.pt, cmagee@mit.edu

Keyword(s): Travel experience design, tourism vehicle, experience-centric service, emotion

ABSTRACT

Providing Experiences has been growing in services like restaurants, theme parks and other innovative commercial areas. The present work contributes to a better understanding of the travel experience before, during and after the actual trip, and involving elements that transport providers may not control directly, such as influence of other passengers and technology enhancements. The study presents an in-depth analysis consisting of a qualitative phase and an exploratory quantitative one with passengers of tourism buses. Study results allowed for the identification of the most important travel experience factors (EFs) and positive and negative emotions, which are related with the passengers' satisfaction and their future travel intentions. Building upon study results, the customer EFs are aggregated into relevant factors that are most significant for the design of the buses and of the travel experience.

INTRODUCTION

Some researchers (e.g. Fisk et al. 2008) advocate that it is no longer sufficient to merely satisfy customers because they expect to be delighted in return for their loyalty. The hedonic or affective factors are considered to have more capability than others to help moving a customer from the zone of mere satisfaction to the zone of delight (Neal et al. 1999). Therefore, service experience design should be improved to address latent customer needs and emotions, and thus increase the customers' value.

Bus passenger transportation fits in the tangible actions according to the nature of the

service act and services directed at people's bodies (Lovelock 1983). Although differing from products, passenger transportation does not differ in nature as much as from services directed at intangible assets like accounting or banking. Therefore passenger transportation can be considered as a service that incorporates many "physical" cues like the vehicle itself, the individual seats, the company facilities and others.

However, unlike goods quality, which can be measured objectively by such indicators as durability and number of defects, service assessment is an "abstract and elusive construct because of three features unique to services: intangibility, heterogeneity, and inseparability of production and consumption" (Parasuraman et al. 1988). Although the intangible nature of services increases the difficulty for customers to evaluate quality, extensive studies have shown that perceived service quality has a strong impact on customer patronage decisions (Fisk et al. 2008).

Even though trips are usually considered as a derived demand, there is an emerging literature which is pertinent to this discussion. Ory and Mokhtarian (2005) contest the view that transport is strictly a cost to be minimized, arguing that, in some instances, transport can be the desired activity in itself. Zomerdijk and Voss (2009) studied the performance of Royal Caribbean and Virgin Atlantic as experience-centric service transportation providers, and concluded that there are alternative ways of designing travel service offerings to include attractiveness in the trip itself.

Whilst there is already much information regarding instrumental or functional factors related to travelling (e.g. Herrmann et al. 2000), further research is still needed to better understand the customer EFs in trips and their relationship with the customers' assessment and emotions in a holistic approach. On the other hand, hedonic or non-functional factors are considered less explored than other needs (Dahan & Hauser 2001; Patrício et al. 2004).

During the current study it was considered important to use the most adequate approach to identify the EFs and the associated emotional aspects, which motivate people to select a transport provider and from that interaction build brand loyalty and commitment. Therefore qualitative (e.g. Neuman 2006) and quantitative (e.g. Churchill 1979) methods were chosen.

The main purpose of the qualitative phase, was to determine directly from the passengers and other bus users (e.g. tours escorts and bus drivers) their most relevant EFs, and in turn, the related emotions that they usually originate.

Concerning the quantitative phase, its main objective was to statistically validate the EFs identified in the previous phase, and to obtain the set of latent constructs through Exploratory Factor Analysis (EFA), surveying a large sample of passengers.

As such, the results of this study contribute to new product development (NPD) for tourism vehicles.

ARTICLE OUTLINE

The following section summarizes the main conclusions obtained from the literature review about experiences, experience-centric services and emotions.

The sample, methodology and study results are described in the subsequent section for the qualitative phase, whilst for the quantitative one, they are detailed in the section that follows.

Finally, the main conclusions are listed in the last section with a focus on the EFs and the factors obtained from the overall study.

LITERATURE REVIEW

In order to better understand the design of experiences, Verhoef et al. (2009) have developed a conceptual model that reveals the holistic influence of antecedents and moderators in the customer experience. Some of those antecedents (e.g. influence of others) are beyond the control of the retailer (Verhoef et al. 2009). Meyer and Schwager (2007, p. 118) define customer experience as "the internal and subjective response customers have to any direct or indirect contact with a company". In the research performed by Gentile, Spiller et al. (2007), they identified six dimensions of the customer experience, i.e. or Experience Components (ECs), which were Sensorial, Emotional, Cognitive, Pragmatic, Lifestyle and Relational. These ECs were pertinent for the present study and also to Verhoef et al.'s (2009) holistic customer experience constructs. Additionally, in what concerns the design of experience-centric services, Zomerdijk and Voss (2009) developed several propositions, such as sensory design, employees' engagement or managing the presence of fellow customers, as having a relevant impact on the overall customer experience. These and other researchers (Mascarenhas et al. 2006) advocate that the customer experience is global as a consequence of all the contacts of the customers with a company, from the search until after-sale phases.

Therefore, service experience is one way for companies to differentiate from

competitors in NPD. Nevertheless, most companies, unlike the VIP tent (Pullman & Gross 2004) or other leading companies, do not yet charge a premium price for the exclusivity, so in Pine and Gilmore's (1998) opinion they are not selling an experience , i.e. instead they could be still charging for a service that comes along with a couple of experience clues. On the contrary, Gentile, Spiller et al. (2007) advocate that the creation of value for the customers is not so much in selling memorable experiences but specially in enabling the customer to live all the moments of the relationship with a company in an excellent way.

In order to enable that sort of customer experience design, the "perishability" of services, (i.e. they cannot be produced and stored before consumption) (Fisk et al. 2008) increase the possibility that services may be customized to fit to an individual customer's needs or desires. Heterogeneity and inseparability can also be interpreted as having a positive contribute to the customization of a service, through the adequate preparation of the provider, namely employees' empowerment, emotional intelligence and positive attitude to deliver a favorable emotional response to the customers (Fisk et al. 2008; Zomerdijk & Voss 2009). Hill et al. (2001, p. 14) argue that "mass customizing your services is a great way to shift into the Experience Economy". They describe the case of the Healthcare Support Services division of the managed services company Aramark, which created a program that provides standardized modules that can be "built" into customized, integrated, nonclinical support services to hospitals.

Some researchers even propose that there should be left some initiative to the customers as co-creators of their own experiences through customers' empowerment to co-produce their own experiences (Fisk et al. 2008; Gentile et al. 2007; Klaus & Maklan 2007). In order to co-create the best experiences, the customers should receive information concerning the service rules in advance or that the presence of fellow customers is carefully managed by the experience-centric service provider (Zomerdijk & Voss 2009).

Several methods and techniques are used for identifying customer factors. Researchers can perform qualitative methods (involving interviews, surveys, focus groups), and also customer-advisory panels, customer observations, customer-manufacturer mixers to identify customers' needs (Alam 2006).

Many authors (Dahan & Hauser 2001; Kristensson 2006; Sandén et al. 2006b) argue that it is very difficult (if not impossible) to obtain customers' latent and emotional needs by simply asking them. They propose "see" methods or, preferably "make" methods

(Kristensson 2006) for that objective, respectively like customer's observation and customer experimental trials (Sandén et al. 2006a). The main difficulty is that "make" methods are relatively unknown and complex.

The components of the physical/ social environment of a bus trip are the means from which the passengers experience the service provided. To contact with the products available inside a bus, to enjoy the travel service provided by the bus company, or to interact with other persons, the passengers do it through their sensory systems (Schifferstein & Spence 2008). With their eyes, nose, ears, skin and mouth, they "feel" their surroundings and are able to build a perceptual process of the overall environment.

Emotion is, however, a term for which it is difficult to achieve a consensual definition. Clore, et al. (1987, p. 756) define it as a "valenced affective reaction to perceptions of situations". Valence should be understood as perceived goodness or badness, pleasantness or unpleasantness (Desmet 2008). The Consumption Emotion Set (CES) (Richins 1997, 2008) synthesizes the most frequent emotions associated to consumption situations.

QUALITATIVE PHASE

To achieve the objective of getting an in-depth understanding based on varied opinions, a qualitative approach was chosen for the first phase of the current study (Neuman 2006; Strauss & Corbin 1998). Interviews are more adequate to identify factors that customers are able to verbalize, whereas customers' observations are considered more adequate to obtain their latent needs (Dahan & Hauser 2001; Kristensson 2006; Sandén et al. 2006b).

Sample

The participants in the interviews were 22 bus passengers and 3 tour escorts that performed a one-week river cruise and travelled by bus to several destinations during the week. The tours escorts are accompaniers to the group, and have a relevant background in bus tours. However, the contact with them was established from the tourist's point-of-view (i.e. their needs as regular passengers) and not as tourism professionals.

The overall 25 chosen interviewees were from different countries: United Kingdom (namely from England and Scotland), Finland, France, Switzerland and Portugal, with a wide range of professions, which constituted a heterogeneous sample of participants. Their average age was 60 years, while 9 were males (36%) and 16 were females (64%).

Data collection

The bus tourists and tour escorts were observed during various bus trips and 25 of them participated in in-depth interviews afterwards.

The observation of passengers was performed between July and November 2008, while the interviews were concentrated in April 2009, during the participation in one of the weekly river cruises. In this trip, the interviewer had the chance to perform participant observation in all the bus tours and acknowledge all relevant happenings to the research study.

With the objectives of the project in mind, the interviews were semi-structured (Pawson 1996), based on a predefined interview guide that allowed the interviewees to express their point-of-view regarding their needs and emotions, and took 30 minutes on average. The open-ended questions (Foddy 1993) were created with the intention of obtaining the tourists' opinion in two phases, one related with the preparation of the cruise, and the other related to the perceptions of the overall bus trips.

Before the trip:

- How often do you travel with this company?
- Why did you choose this transportation company?
- How did you plan this journey?
- What is important to you when travelling by bus?
- What could make the trips more pleasant?

During the bus trips:

- What are the most positive issues related with the trips?
- What are the most negative issues related with the trips?
- What sensorial responses did you have during the trips?
- What emotions were elicited during the trips?

Assessment of the trips:

- What is your evaluation of the overall trips?

After the interview data collection (digital recording) its content analysis was performed (Neuman 2006), including the full transcription of the interviews using the software NVivo, that fits in the category usually referred as "theory builders" (Gibbs 2002). This software was a valuable tool to help in the initial coding of the data, but also in its refinement based in the de-contextualization (i.e. "the extraction of text from its original document and its comparison with other like passages" (Gibbs 2002) coded in the same node) and afterwards re-contextualization of the text. The initial coding of the interviews was essentially open, but as the coding was being refined, attempts were made of concept-driven coding (Strauss & Corbin 1998), based in some of the customers' factors obtained in the literature.

Results

The data analysis allowed for the identification of 9 EFs (see Table 1) associated with the passengers' global travel needs through all moments of the trip. Service (Parasuraman et al. 1988), Accessibility, Safety and Cleanliness are the constructs mostly related to instrumental variables (e.g. the availability of drinks, the distance to walk to the bus, the availability of seatbelts or the good appearance of the bus) while Visibility, Time (Solomon et al. 2006), Social Environment (Verhoef et al. 2009), Atmosphere (Verhoef et al. 2009), Comfort are the ones that reflect more non-functional aspects (e.g. the breath-taking appeal of the scenery, the perceived waiting time for other passengers, the social, sound, ergonomic or thermal ambiance of the bus interior). Therefore most of these hedonic EFs may not be directly controlled by the transport provider, what originates that the customer experience is strongly influenced by uncontrolled EFs to some extent.

As can be seen in Table 1, two of the EFs (Accessibility and Comfort) were mentioned by all of the interviewees. Three other (Service, Visibility and Safety) were mentioned by the majority of them. Concerning the remaining EFs, they were not mentioned at all by some of the interviewees. Overall, the EFs identified in this phase are related with the moments before and after the trip, e.g. Accessibility to the bus or Time waiting for other passengers, or during the actual journey, such as Visibility outside.

Emotions

The interviewees mentioned many emotions related with the bus trips in which they participated. The spectrum of referred emotions is wide, and varies from intense positive to other negative ones, revealing that they are present and relevant for the passengers.

The emotions that are included in the "Joy Descriptor Set" (Richins 1997) such as Joy, Happiness, Pleasure, and Cheerfulness were by far the most referred by all interviewees.

Some of the interviewees revealed difficulties in communicating their emotions related with the trips, especially negative ones. Even being less mentioned than positive ones, some negative emotions like Annoyance and Discontentment are also a concern for half of the passengers.

Table 1 - EFs mentioned by the passengers according to their nationalities

Country of origin:	UK	Switzerland	Finland	France	Portugal
EF:					
Service (e.g. staff's skills, touristic information, previous knowledge of the details of each trip)	86%	100%	66%	100%	100%
Accessibility (e.g. easy access, few steps)	100%	100%	100%	100%	100%
Safety (e.g. seatbelts, driver's ability, bus maintenance and knowledge of the safety procedures)	100%	100%	66%	100%	100%
Cleanliness (e.g. bus interior and exterior, availability of trash bins and of toilet)	34%	50%	0%	0%	0%
Visibility (e.g. widest and clearest view outside, photo shooting, and also decreasing outdoors brightness)	86%	100%	66%	100%	100%
Time (e.g. punctuality, waiting for others, traffic, etc.)	71%	100%	0%	0%	0%
Social Environment (e.g. interaction of the employees with the customers, and also among customers)	57%	100%	33%	0%	0%
Atmosphere (e.g. sound system, music, movies)	29%	0%	66%	100%	100%
Comfort (e.g. seats, temperature, suspension)	100%	100%	100%	100%	100%

After the analysis of the interviews, and specifically of the interviewees' emotions transcriptions, there were relationships that seem to exist between some EFs and emotions. The interviewees felt highly intense emotions (e.g. Excitement, Joy) as a consequence of the Visibility of a beautiful natural scenery or may feel opposite emotions like Joy and Annoyance while being with other passengers (e.g. respectively by being able to speak to them, or by being disturbed by another passenger leaning over them to take photographs).

QUANTITATIVE PHASE

Based on the qualitative study results, a questionnaire was developed and administered to the passengers after their bus trips. The domain of each construct was specified, trying to generate items and variables that completely defined that domain.

Sample

The survey was administered in October and November 2009, during 11 weekly cruises with a target sample of 632 tourists, due to time and other resource constraints. The questionnaires were delivered to them at the last day of the cruise, and 188 (30 %) were returned to the ship reception after being completed at their leisure.

The participants came from 10 different European countries, as well as the USA, Australia, Canada and South Africa, with a wide range of professions. Their minimum age was 25 and the maximum 87, with 84% of the tourists being between 60 and 80 years old. Thirty-nine participants did not declare their age.

Concerning this phase, the 188 questionnaires were returned by 80 males (42.5%) and 108 females (57.5%).

Data collection

A cognitive interview pre-test (Dillman 2000) was performed with 10 passengers, and after reviewing the questionnaire (i.e. wording was adjusted on some questions, while other were even substituted) it was self-administered at the end of their trips. This phase involved a scale development approach (Churchill 1979) to measure the travel experience.

As a consequence, the final version of the questionnaire included 53 EFs and the 6 most mentioned emotions that were evaluated in 7-point itemized scales (Churchill & Iacobucci 2002). The structure of the questionnaire was divided into 4 parts:

Part 1 – Importance assessment of each EF when travelling by bus

The respondents were asked to respond to each question: "What do you consider most important when you travel by bus?" according to the scale 1 (Not important) to 7 (Very important).

Part 2 – Performance evaluation of each EF during the bus trips

The respondents were asked: "How satisfied were you during these week's bus trips?". Each question should be answered according to the scale 1 (Not at all satisfied) to 7 (Completely satisfied).

Part 3 – Assessment of positive and negative emotions, travel satisfaction, overall value, and loyalty associated to the bus trips

The respondents were asked to respond to the 7-point scale (1 = Strongly disagree to 7 = Strongly agree) with their level of agreement to statements of emotional (adapted from Pullman & Gross 2004; Richins 1997), travel (adapted from Oliver 1980, 1993) and loyalty (adapted from Zeithaml et al. 1996) assessment, such as "Overall, the bus trips made me joyful", "My choice to make this trip was a wise one", or "I say positive things about the transportation company to other people".

In what concerns overall value (adapted from Parasuraman et al. 2005), the respondents rated the trips using a scale of 1 (*Poor*) to 7 (*Excellent*) in relation to items such as "The overall value you get from this trip for your money and effort is…".

The "Don't know" option was an alternative for each item

Part 4 – Socio-demographics

Gender, country, age, income, reason for the trip, school level and professional occupation.

As the data from the survey is multivariate in nature, SPSS software was used to perform the data analysis.

First, the data were examined for missing data patterns and for normality of the variables. It was concluded that the majority of missing information was not ignorable and was unknown to the researcher, because it was due to incomplete questionnaires.

After diagnosing the randomness of the missing data process, it was chosen the EM imputation method (Hair et al. 2009) as the most robust for estimating the remaining missing values.

An EFA (Hair et al. 2009) was used to examine the underlying interrelationships (correlations) for the variables in the imputed data set for part 2 of the questionnaire. The purpose of this multivariate technique is to determine whether the group of variables can be summarized in a smaller set of factors, by defining sets of variables that are highly interrelated.

Table 2 - Composite measures extracted by factor analysis

Factor	Description
1-Seat Comfort	Seat adjustability and support provided to different body parts
2-Clean interior space	Cleanliness and available space in individual seat and bus interior
3-Calm and quick trips	Short trips and not disturbed by other passengers
4-Easy accessibility awareness	Bus staff's awareness of the easy access to and visibility from the seat for all passengers (i.e. including the ones with mobility difficulties)
5-Information	Having access to clear information in understandable language during all moments of the trip (e.g. previous access to the details of each trip, information about the places where the bus goes by, either using the bus sound system, wireless internet, etc.)
6-Social environment	Easy access to talking or socializing with other passengers and being driven by the same driver throughout the entire cruise
7-Safety	Adequate individual safety equipment, conscientious driver and smooth driving, overall safety through all moments of the trip

Results

The seven factors (i.e. EFs) obtained were the ones included in Table 2. These EFs account for 67 % of the variance explained in the analysis. The EFs are numbered and ordered because the variance of the variables is redistributed to achieve a simpler factor pattern when the initial factor solution was extracted with principal component analysis and rotated with the Varimax method. Therefore, the first extracted EFs account for higher explained variance than the following ones.

It is worth mentioning that there was the need to perform different trial rotations, either using the other extraction method (i.e. common factor analysis), different rotation techniques (oblique methods).

The EFs were named according to the significance of each variable (i.e. higher loadings), and based on the appropriateness for representing the underlying dimensions of a particular factor.

The loadings of each variable on the EFs are represented in Table 3. The items were deleted if they did not exhibit significance, which are items that (1) do not load greater than .50 on any variable, or items that (2) cross-load on two or more EFs with loadings greater than .30. Taken in consideration that this was an exploratory study, the Cronbach's Alpha test was used to verify if the lower limit for acceptable reliability would be greater than .60, while the item to total correlation was controlled to be above .50 for each EF (Hair et al. 2009).

Although some variables (for instance "Easy access to your allocated or chosen seat" and "Experienced and conscientious driver") "loaded" significantly on more than one factor, they were kept because of their overall contribution to the research (i.e. importance for the passengers based on their mean values) as well as their acceptable communality index. Some of the EFs narrowed their scope after the quantitative analysis (e.g. Comfort or Safety) when compared to the qualitative results. Other remaining qualitative factors (e.g. Accessibility, Visibility or Cleanliness) were merged in a different one.

Comfort is at this phase strictly related to the seat, while for the interviewees it was an overall assessment like the thermal, riding and spatial comfort. "Clean interior space" is related to the overall "Cleanliness" qualitative dimension but also with the comfort associated with the available space. "Calm and quick trips" is now associated to some aspects of the "Time" dimension previously identified, and additionally to one of the social negative consequences mentioned when travelling with other passengers. "Easy

Table 3 - Varimax rotated factor loading matrix

	EF						
	Seat Comfort	Clean interior space	Calm and quick trips	Easy Accessibility	Information	Social environment	Safety
Adequate arm support	.733						
Adequate leg support	.730						
Being able to adjust the seat	.718						
Adequate foot support	.641						
A clean seat		.809					
Enough space on board for all passengers		.748					
A clean bus interior		.596					
No delays caused by car parking			.809				
No traffic delays			.801				
Not being disturbed by other passengers' activities (e.g. taking photos)			.713				
Having short bus trips	.306		.545				
Easy access for disabled passengers				.889			
Passengers with mobility difficulties (e.g. neck pain) being able to enjoy the scenery				.701			
Feeling that the bus staff (driver. tour escort) is aware of the passengers' needs at all times				.579			
Easy access to your allocated or chosen seat	.352	.406		.496			
Hearing the touristic and other information clearly					.851		
Having access to touristic information in relation to the places where the bus goes by					.830		
Being provided with information about the trip in a language you understand well					.750		
Socializing with other passengers while remaining in your seat						.872	
Easy access to other passengers so as to have a conversation						.865	
Being driven by the same driver throughout the entire cruise	.357			.330		.495	
Feeling safe during all moments of the trip							.693
An experienced and conscientious driver		.490					.685
A good suspension on board	.315						.600
Cronbach's Alpha	.793	.713	.765	.780	.802	.774	.639

Note: Loadings < .30 were excluded

accessibility awareness" on one side reduces the scope of the original "Accessibility", and on the other merges it with "Visibility" and the staff's awareness of those specific passengers' needs. "Information" was one of the aspects of the "Service" dimension in the qualitative phase, and it became an independent factor as a consequence of the survey results in relation with its provision before, during and after the actual trip, and with technology advancements such as wireless internet availability. The "Social environment" maintains approximately the same meaning as in the qualitative study and is an EF which is mostly influenced by the other passengers. "Safety" is now limited to the individual safety and driver's ability, merged with the qualitative "riding comfort" associated to the suspension of the vehicle, but this EF still comprises all the moments related with the trip.

Additionally, some of the dimensions identified in the qualitative phase changed their relative statistical significance in the quantitative one. At least one aspect of "Accessibility" was mentioned by all the interviewees, while the results of the EFA reveal that the fourth EF only accounts for 6 % of the variance explained by the rotated factor solution. "Safety" was also very important for almost all the interviewees, but in the rotated matrix it is only associated to 5 % of the variance explained.

Nevertheless, the EFs are understood from a holistic perspective, during all moments of the trip.

The last row in Table 3 reveals the Cronbach's Alphas for the reliability analysis of each extracted factor, what leads to the conclusion that all EFs have acceptable levels.

CONCLUSIONS

Some studies acknowledge that there are tourist and leisure providers that already try to create memorable experiences (Arnould & Price 1993; Pullman & Gross 2004) that will hopefully result in loyalty behaviors.

Thus, it is important for transportation companies to know how customers evaluate the services and experiences they provide. In other words, even unintentionally, customers always perform a cognitive evaluation of a service experience so, it is crucial that it is possible to understand the process of customer assessment in order to perform NPD. The results of data analysis showed that the customers' overall experience ranged from the instrumental to the more hedonic needs and with a holistic perspective (i.e. before, during and after the bus trips). Additionally, the interviewees stated the importance of

aspects concerning their actions in the bus (e.g. seating comfort and body support or ease of access to the bus and seat), but on the other side also the importance of aspects related with the perceived service provision (e.g. that facilitate the staff's tasks) and attributes that are beyond the control of the transport provider to some extent (talking to other passengers or requiring technology improvements such as wireless internet).

The better understanding of the tourism passengers' EFs and their aggregation in significant dimensions is the most relevant contribution of the current study to the NPD area.

FUTURE RESEARCH

One of the limitations of the current study is the high average age of the sample of interviewees. The EFs obtained might be influenced by that limitation, so further research might consider the study of the needs of other bus users (e.g. other age ranges and even other bus segments).

After having identified the most important EFs, and their factor aggregation it is important to estimate their impact on positive emotions, which in turn generate high satisfaction. This may be performed in future research using other multivariate data analysis methods.

Concerning methods for specification of requirements, some already include the "voice of the customer" in NPD, such as Quality Function Deployment (Hauser & Clausing 1988) or try to address the incorporation of emotions such as Kansei Engineering (Nagamachi 1995), but further research is still needed to incorporate customer EFs and associated emotions in NPD, especially in the travel business.

REFEFENCES

Alam, I. (2006). Process of Customer Interaction in New Service Development. Involving Customers in New Service Development. B. Edvardsson, A. Gustafsson, P. Kristensson, P. Magnusson and J. Matthing, Imperial College Press. Series on Technology Management - Vol.11**:** 15-32.

Arnould, E. J. & Price, L. L. (1993). "River Magic - Extraordinary Experience and the Extended Service Encounter." Journal of Consumer Research 20(1): 24-45.

Churchill, G. A. (1979). "Paradigm for Developing Better Measures of Marketing Constructs." Journal of Marketing Research 16(1): 64-73.

Churchill, G. A. & Iacobucci, D. (2002). Marketing Research - Methodological Foundations, Harcourt College.

Clore, G. L., Ortony, A. & Foss, M. A. (1987). "The Psychological Foundations of the Affective Lexicon." Journal of Personality and Social Psychology 53(4): 751-766.

Dahan, E. & Hauser, J. R. (2001). Product Development - Managing a Dispersed Process. Handbook of Marketing. B. W. a. R. Wensley.

Desmet, P. M. A. (2008). Product Emotion. Product Experience. H. Schifferstein and P. Hekkert**:** 377-395.

Dillman, D. A. (2000). Mail and Internet Surveys - The Tailored Design Method, John Wiley & Sons, Inc.

Fisk, R. P., Grove, S. J. & John, J. (2008). Interactive Services Marketing. Boston New York, Houghton Mifflin Company.

Foddy, W. (1993). Constructing Questions for Interviews and Questionnaires: Theory and Practice in Social Research, Cambridge University Press.

Gentile, C., Spiller, N. & Noci, G. (2007). "How to Sustain the Customer Experience:: An Overview of Experience Components that Co-create Value With the Customer." European Management Journal 25(5): 395-410.

Gibbs, G. R. (2002). Qualitative data analysis - Explorations with NVivo.

Hair, J. F. J., Black, W. C., Babin, B. J. & Anderson, R. E. (2009). Multivariate Data Analysis, Pearson.

Hauser, J. R. & Clausing, D. (1988). "The House of Quality." Harvard Business Review 3: 63-73.

Herrmann, A., Huber, F. & Braunstein, C. (2000). "Market-driven product and service design: Bridging the gap between customer needs, quality management, and customer satisfaction." International Journal of Production Economics 66(1): 77-96.

Hill, R., Pine Ii, B. J., Gilmore, J. H., Betts, P. J., Houmann, L. & Stubblefield, A. (2001). "Welcome to the experience economy." Health Forum Journal 44(5): 10-16.

Klaus, P. & Maklan, S. (2007). "The role of brands in a service-dominated world." The Journal of Brand Management 15: 115-122.

Kristensson, P. (2006). Managing Ideas That are Unthinkable in Advance: A Matter of How and Where You Ask. Involving Customers in New Service Development. B. Edvardsson, A. Gustafsson, P. Kristensson, P. Magnusson and J. Matthing, Imperial College Press. Series on Technology Management - Vol.11**:** 127-142.

Lovelock, C. H. (1983). "Classifying Services to Gain Strategic Marketing Insights." Journal of Marketing 47(3): 9-20.

Mascarenhas, O., Kesavan, R. & Bernacchi, M. (2006). "Lasting customer loyalty: a total customer experience approach." Journal of Consumer Marketing 23(7): 397-405.

Meyer, C. & Schwager, A. (2007). "Understanding Customer Experience." Harvard Business Review February: 117-126.

Nagamachi, M. (1995). "Kansei Engineering: A new ergonomic consumer-oriented technology for product development." International Journal of Industrial Ergonomics 15(1): 3-11.

Neal, J. D., Sirgy, M. & Uysal, M. (1999). "The Role of Satisfaction with Leisure Travel/ Tourism Services and Experience in Satisfaction with Leisure Life and Overall Life." Journal of Business Research 44(3): 153-163.

Neuman, W. L. (2006). Field Research. Social Research Methods - Qualitative and Quantitative Approaches, Pearson International Edition.

Oliver, R. (1980). "A Cognitive Model ofthe Antecedents and Consequences of Satisfaction Decisions." Journal of Marketing Research 17(November): 460-469.

Oliver, R. (1993). "Cognitive, Affective, and Attribute Bases of the Satisfaction Response." Journal of Consumer Research 20(3): 418-430.

Ory, D. T. & Mokhtarian, P. L. (2005). "When is getting there half the fun? Modeling the liking for travel." Transportation Research Part A: Policy and Practice 39(2-3): 97-123.

Parasuraman, A., Zeithaml, V. A. & Berry, L. L. (1988). "SERVQUAL: A Multiple-Item Scale for Measuring Consumer Perceptions of Service Quality." Journal of retailing 64(1): 12-40.

Parasuraman, A., Zeithaml, V. A. & Malhotra, A. (2005). "E-S-QUAL - A multiple-item scale for assessing Electronic Service Quality." Journal of Service Research 7(3): 213-233.

Patrício, L., Cunha, J. F., Fisk, R. P. & Nunes, N. J. (2004). Customer experience requirements for multi-platform service interaction: bringing services marketing to the elicitation of user requirements. 12th IEEE International Requirements Engineering Conference, Kyoto, Japan, IEEE.

Pawson, R. (1996). "Theorizing the interview." The British Journal of Sociology 47(2): 295-314.

Pine, B. J. & Gilmore, J. H. (1998). "Welcome to the experience economy." Harvard Business Review July-August(4 Vol. 76): 97-105.

Pullman, M. E. & Gross, M. A. (2004). "Ability of experience design elements to elicit emotions and loyalty behaviors." Decision Sciences 35(3): 551-578.

Richins, M. (1997). "Measuring emotions in the consumption experience." Journal of Consumer Research 24(2): 127-146.

Richins, M. (2008). Consumption Emotions. Product Experience. H. Schifferstein and P. Hekkert**:** 399-422.

Sandén, B., Gustafsson, A. & Witell, L. (2006a). The Role of the Customer in the Development Process. Involving Customers in New Service Development. B. Edvardsson, A. Gustafsson, P. Kristensson, P. Magnusson and J. Matthing, Imperial College Press. Series on Technology Management - Vol.11**:** 33-56.

Sandén, B., Matthing, J. & Edvardsson, B. (2006b). New Service Development: Learning from and with Customers. Involving Customers in New Service Development. B. Edvardsson, A. Gustafsson, P. Kristensson, P. Magnusson and J. Matthing, Imperial College Press. Series on Technology Management - Vol.11**:** 99-126.

Schifferstein, H. & Spence, C. (2008). Multisensory Product Experience. Product Experience. H. Schifferstein and P. Hekkert**:** 133-156.

Solomon, M., Bamossy, G., Askegaard, S. & Hogg, M. K. (2006). Consumer Behaviour - A European Perspective.

Strauss, A. & Corbin, J. (1998). Basics of Qualitative Research, SAGE Publications.

Verhoef, P. C., Lemon, K. N., Parasuraman, A., Roggeveen, A., Tsiros, M. & Schlesinger, L. A. (2009). "Customer Experience Creation: Determinants, Dynamics and Management Strategies." Journal of retailing 85(1): 31-41.

Zeithaml, V. A., Berry, L. L. & Parasuraman, A. (1996). "The Behavioral Consequences of Service Quality." Journal of Marketing 60(2): 31-46.

Zomerdijk, L. G. & Voss, C. (2009). "Service Design for Experience-Centric Services." Journal of Service Research 13(1): 67-82.

PAPER III

Understanding the travel experience and its impact on attitudes, emotions and loyalty towards the transportation provider. A quantitative study with mid-distance trips.

Rui Carreira[a], Lia Patrício[a], Renato Natal[a], Chris Magee[b]

a - Faculty of Engineering, University of Porto, rua Dr. Roberto Frias, s/n, 4200-465 Porto, Portugal

b - Engineering Systems Division, Massachusetts Institute of Technology, 77 Massachusetts Avenue, Cambridge, Massachusetts 02139, USA

Email: ruicar@fe.up.pt, lpatric@fe.up.pt, rnatal@fe.up.pt, cmagee@mit.edu

Abstract

Enhancing the travel experience has become a crucial consideration for transportation companies to promote differentiation and customer loyalty. Therefore, transport planners, providers and manufacturers in general are becoming aware of the significance of understanding the passenger experience better, in order to improve transit policies, management and vehicles. The travel experience is conceptualized as a holistic set of passenger internal responses (e.g. cognitive and emotional) that are driven by experience factors. These experience factors involve customer perceptions of a broad set of transportation attributes, before, during and after the trip, and also aspects that are not in complete control of the transportation provider, such as waiting areas or the social environment. Although transportation research has studied the different aspects of transportation quality, empirical studies with a holistic approach to the travel experience and its impact on loyalty are still scarce.

This article takes a scale development approach to conceptualize, develop and test a multiple-item scale for measuring the travel experience from a holistic perspective, analyzing its perceptual dimensions and outcomes based on a quantitative study with 1226 passengers of a mid-distance bus transportation service. The Travel-Experience scale demonstrates good psychometric properties and consists of 28 items aggregated into seven dimensions or experience factors: Individual space, Information provision, Staff's skills, Social environment, Vehicle maintenance, Off-board facilities, and Ticket line service.

The study shows that all seven experience factors have a significant impact on customer cognitive, emotional and behavioral responses to the transportation service,

highlighting the importance of a holistic approach to the study and management of the travel experience. The classical dimensions of individual comfort and vehicle maintenance are the ones with the strongest impact on experience outcomes, showing that transportation providers should maintain a strong focus on providing a good core service. However, other factors such as the social environment have an influence on emotions, which in turn affect loyalty to the transportation provider. These results show the need for a careful study and management of the different aspects of the travel experience, and an integrated design and management of the transport system as a whole.

Keyword(s): cognitive, emotional, holistic travel experience, loyalty, scale development

1. Introduction

Enabling superior customer experience in general has become a key factor for companies to promote differentiation and customer loyalty (Berry et al., 2002; Carbone and Haeckel, 1994; Pine and Gilmore, 1998). Meyer and Schwager (2007) define customer experience as "the internal and subjective response customers have to any direct or indirect contact with a company". According to Verhoef et al. (2009), the customer experience is formed by customer internal responses (i.e. Experience Components or ECs such as emotional and cognitive), that are driven by perceptions of the service provided (i.e. Experience Factors or EFs) such as service interface, or retail atmosphere. Additionally, the customer experience influences customer loyalty behaviors such as repeat business and promotion of the company through word of mouth to others (Heskett et al., 2008).

The travel experience has been scarcely researched, although previous studies (Zomerdijk and Voss, 2009) of leading transport companies such as Royal Caribbean and Virgin Atlantic have shown that the customer experience is considered central to the transport service provision. These operators focus on the careful sensory design of the vehicle physical environment, and especially focus on the interaction of customers with service employees through all service encounters. The current study reveals that the travel experience can be a powerful differentiator of transportation services.

Transport research has most often evaluated transit service quality based on passenger cognitive expectations and perceptions of transportation attributes (e.g. Nathanail, 2008;

Stradling et al., 2007b). However, when compared to traditional service quality, the customer experience is more complex and holistic. On one hand, it involves not only cognitive, but also emotional components and it is extended in time from the first until the last contact between the customer and the transportation provider. On the other hand, the customer experience is influenced by a wide set of EFs (Patrício et al., 2009; Price et al., 1995; Pullman and Gross, 2004). Some of these EFs are not directly controlled by the provider (e.g. social environment) or are dependent on technology advancements (e.g. information provision) (Carreira et al., 2010). These EFs involve both *what* is offered, such as functionality, and *how* it is offered, such as the social environment (Patrício et al., 2008). Understanding the customer travel experience therefore requires a holistic approach that addresses its different aspects in an integrated way.

Loyal customers are a key success factor for service providers, particularly to those in the transport sector, but satisfaction, as an outcome measure, does not necessarily indicate that the customer will be loyal to the company (Oliver, 1999). Thus, taking a holistic perspective to study the travel experience can provide a more complete view of how to design the vehicles and the transportation systems, and specifically how to manage public transportation policies and services in order to promote passenger loyalty behaviors. Following a scale development approach (Churchill, 1979; Gerbing and Anderson, 1988), this paper develops and tests a scale to measure the travel experience, based on a quantitative study with 1226 bus passengers. This study identifies the travel EFs, and analyzes their impact on ECs (i.e. passenger cognitive and emotional responses) that influence loyalty behaviors.

The Travel-Experience conceptual model depicted in Figure 1 proposes the relationships between the Travel-Experience scale evaluation levels and its antecedents and consequences. The antecedents of Travel-Experience are the specific service attributes – such as actual travel time from origin to destination – that originate customer perceptions. In turn perceptions, such as perceived travel time, are aggregated into more abstract perceptual dimensions (i.e. Experience Factors). The grey area in Figure 1 represents the perceptual levels at which the Travel-Experience evaluation happens, as advocated by Parasuraman et al. (2005). The direct outcomes of the EFs evaluation are ECs, such as cognitive or emotional responses that in turn may originate behavioral or loyalty intentions.

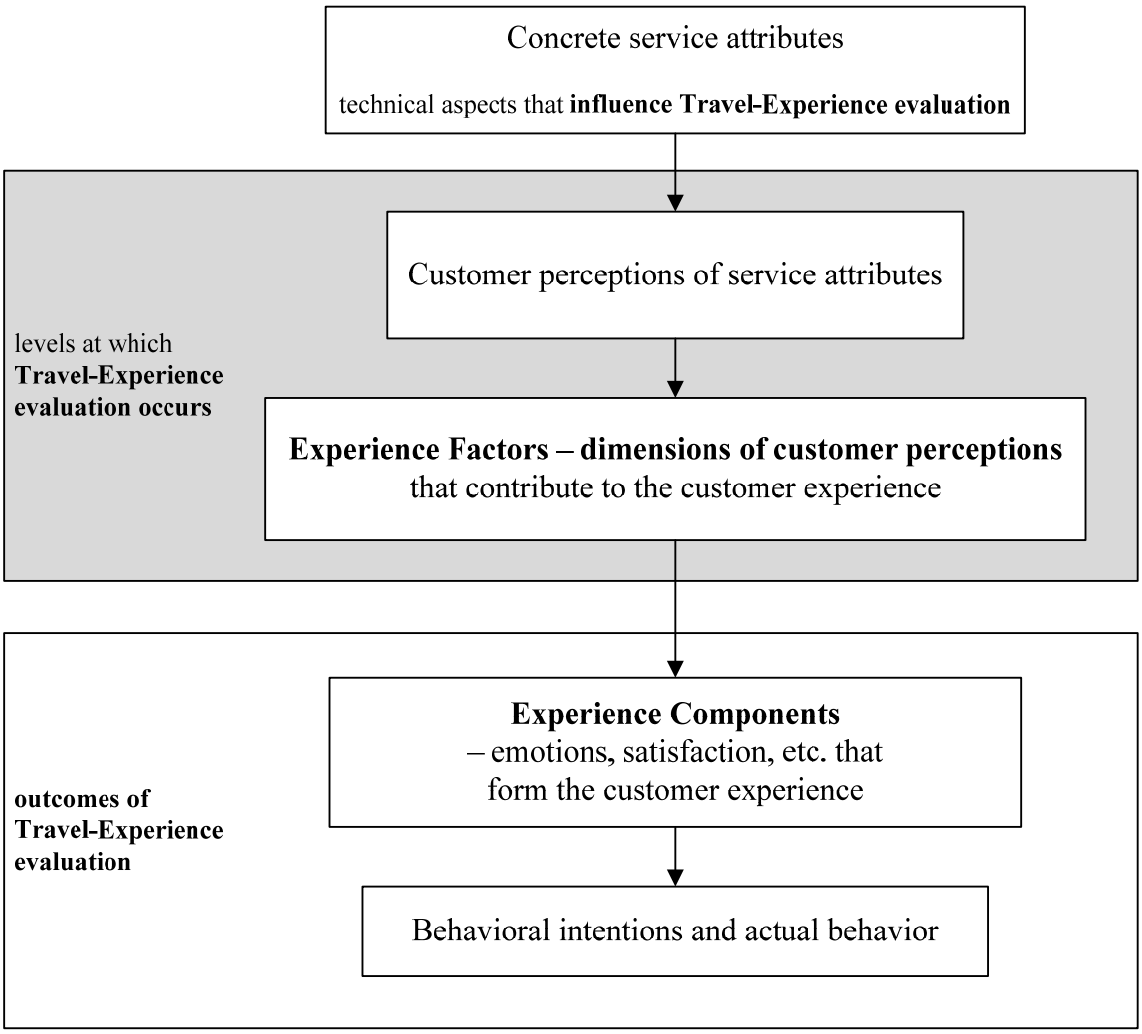

Figure 1 – Travel experience conceptual model (adapted from Parasuraman et al. (2005))

The next section of the paper presents the background literature on transportation quality, service quality and customer experience. As travel experience research is still scarce, the literature review covers extant transportation research, which is mostly empirical and based on quantitative assessments of service quality and satisfaction. The literature review also covers research on experience, which is essentially conceptual, and has not specifically addressed the travel experience. The method undertaken to develop and refine a scale through empirical research and multivariate data analysis is described next, followed by the detailed presentation of the results obtained. Finally the main research and managerial implications are discussed.

2. State of the art

Extensive research on transportation has been conducted during recent years, taking a service quality perspective, i.e. cognitive comparison between customer expectations and perceptions of service performance (Parasuraman et al., 1988). In contrast, only few studies analyze the service experience from a more holistic angle as depicted in Figure 1, and most of them are conceptual and not adapted to transportation. As research on travel experience is still scarce (e.g. Carreira et al., 2010), the literature review covers the related concepts of transportation quality and service experience and is organized into experience factors (EFs) and experience components (ECs).

2.1. Experience Factors (EFs)

Experience Factors (EFs) are customer perceptions of all attributes of a product or service that contribute to the customer experience (Patrício et al., 2004). From a holistic perspective, EFs comprise not only what is provided, but also how the service is provided. The customer experience is also driven by EFs that are not directly controlled by the service provider, such as the influence of others or purpose of shopping (Verhoef et al., 2009). Finally, the customer experience occurs before, during and after consumption, which in transportation means that the travel experience is formed by passenger interactions with vehicle(s), service provider(s) and other aspects in the moments beyond the actual trip.

The travel experience has been scarcely addressed in previous transportation research, but several studies identify transport attributes that may be relevant in the travel experience context. Various studies in transportation (Anable and Gatersleben, 2005; Eboli and Mazzulla, 2011; Mokhtarian and Salomon, 2001; Nathanail, 2008) have identified comfort, cleanliness, information and safety as passenger perceptions of transport service attributes that drive their attitude and behavior towards transport modes. While these attributes are normally controlled by transport providers during actual trips, others such as social interactions (Abou-Zeid and Ben-Akiva, 2011; Beirão and Cabral, 2007; Sunitiyoso et al., 2011), or pre-trip activities, such as ticketing or check-in (Nathanail, 2008; Tsaur et al., 2002) are usually not directly controlled, and are also expected to have a strong influence on the passenger experience. However, these studies do not address the travel experience from a holistic view.

Service experience studies have also identified a broader set of EFs that go beyond the attributes directly controlled by the service provider, such as atmosphere (Fottler and

Ford, 2000; Pullman and Gross, 2004), inter-personal relational elements (Klaus and Maklan, 2007; Pullman and Gross, 2004), or multi-channel services (Patrício et al., 2008; Patrício et al., 2011). In addition, concerning the different moments of contact between customer and service provider, studies of service satisfaction (Neal et al., 2004) and service experience (Pullman and Gross, 2004) have already addressed customer EFs from a more holistic perspective, taking into account all the different moments of contact between customer and service provider, before, during or after actual service provision. However, although customer experience literature has already provided a holistic conceptualization of EFs, empirical studies are still scarce.

This holistic view of EFs requires an approach to public transportation experience that includes attributes which go beyond the influence of transport providers, and also considers travel experience from the first and until the last moment of passenger contact. However, in spite of extensive study of transport quality, most studies address only part of the EFs, and they have not taken a holistic travel experience approach that involve both controlled and uncontrolled EFs during all moments, even beyond the actual trips.

Studies of customer experience are still fairly rare, and are mostly conceptual (Gentile et al., 2007; Klaus and Maklan, 2007; Verhoef et al., 2009). Extant research on travel experience is even more limited. LeBel (2005) has undertaken one of the few studies with a broader perspective of the air transportation experience, which goes beyond the actual trip, involving three phases: (1) the "joining" phase, which marks the beginning of the customer experience, e.g. by obtaining information about a provider; (2) the "intensive" phase, which involves the actual trip; and (3) the "detachment" phase, during which customer and provider bring closure to the exchange and part. On the other hand, Carreira et al.'s (2010) study identified a rich set of travel EFs, including social environment and atmosphere as relevant factors, which are more difficult for providers to design and control.

Literature review showed that customer experience is gaining increased attention, with a thorough conceptualization of its drivers and outcomes, but empirical studies are still scarce. On the other hand, there is extensive research on transport quality, but further research is still needed to develop a holistic view of the travel experience that integrates EFs which involve the aspects that are not directly controlled by transportation providers, and that operate from the first until the last moment of customer contact with

a company. This holistic understanding is important for transport companies and decision makers to enhance customer loyalty and usage of public transportation.

2.2. Experience Components (ECs)

Experience Components (ECs) can be defined as customer internal responses to all the interactions with the service provided, which are direct outcomes of EFs as depicted in Figure 1. Extant experience research (e.g. Gentile et al., 2007; LeBel, 2005; Verhoef et al., 2009) conceptualized different types of ECs associated with generic service provision, such as cognitive and emotional responses. Nonetheless, few studies (e.g. Price et al., 1995) have addressed the customer experience to empirically identify a holistic set of ECs, involving both cognitive and emotional outcomes.

Customer cognitive assessments involve aspects such as service quality or customer satisfaction. Service quality has been extensively addressed in studies from the transport and service areas, and is a perceived global judgment, which differs from objective or goods quality, and it is related but not equivalent to satisfaction (Parasuraman et al., 1988). While service quality is an attitude and relates with the overall superiority of the service, satisfaction is related with a specific transaction. In turn, transit quality evaluation and passenger satisfaction with the transport service have been more widely studied in the transport literature than the other ECs (Friman et al., 2001; Friman and Gärling, 2001; Nathanail, 2008; Stradling et al., 2007b; Stuart et al., 2000). In addition, Ettema et al., (2010) argue that customer accumulated satisfaction reveals a progressive cognitive adaptation to transport services.

Concerning the emotional responses, various transport studies (e.g. Anable and Gatersleben, 2005; Stradling et al., 2007a) have analyzed emotions through the service affective assessment using the pleasure-arousal-dominance (PAD) scale (Mehrabian and Russell, 1974). On the other hand, building on the customer experience literature (e.g. Bloemer and de Ruyter, 1999; Price et al., 1995; Pullman and Gross, 2004), Carreira et al. (2010) identified specific passenger emotional responses to bus transportation, such as joy, excitement, annoyance or discontentment, which may influence customer loyalty behaviors. In spite of these efforts, empirical experience studies are still rare and have seldom been adapted to the transportation context in order to identify specific customer emotions that may have a significant impact on customer loyalty (Chitturi et al., 2008).

In summary, even though there has been extensive transportation research on the identification of service quality factors and on passenger cognitive assessments of trips, emotions are less studied and previous studies have not adopted a holistic approach to the travel experience, considering both cognitive and emotional ECs. Further research is needed on the travel experience to understand the different customer responses to public transportation, so transport interested parties can develop better strategies to foster passenger loyalty behaviors.

3. Research design

Taking into account the increasing importance and the need for a more holistic understanding of customer experience in the transportation context, the research involved a quantitative study to develop a measurement scale for the travel experience. This study involved 1226 passengers from a Portuguese mid-distance bus transportation company. This study of the travel experience considered a holistic set of EFs and analyzed their impact on ECs and behavior, according to the conceptual model presented in Figure 1.

In order to develop and validate the Travel-Experience scale, the methodology followed a sequence of steps consistent with conventional guidelines for scale development (Churchill, 1979; Gerbing and Anderson, 1988). Figure 2 provides an overview of these steps.

Step 1 involved the definition of the travel experience concept as well as its domain from which scale items would be drawn. This step is critical in a scale development approach in order to specify the domain correctly (Churchill, 1979). Step 1 involved insights from a comprehensive literature review and an in-depth study (Carreira et al., 2012), which consisted of observations and 49 semi-structured interviews to mid-distance bus passengers. These observations and interviews (Pawson, 1996) were important to increase the probability of producing valid measures, as they explored a large set of potential EFs that were later on used to develop the survey questionnaire. The customer perceptions of service attributes associated with the core evaluation process (see Figure 1) therefore represented the domain of items for the new scale, following Parasuraman et al. (2005).

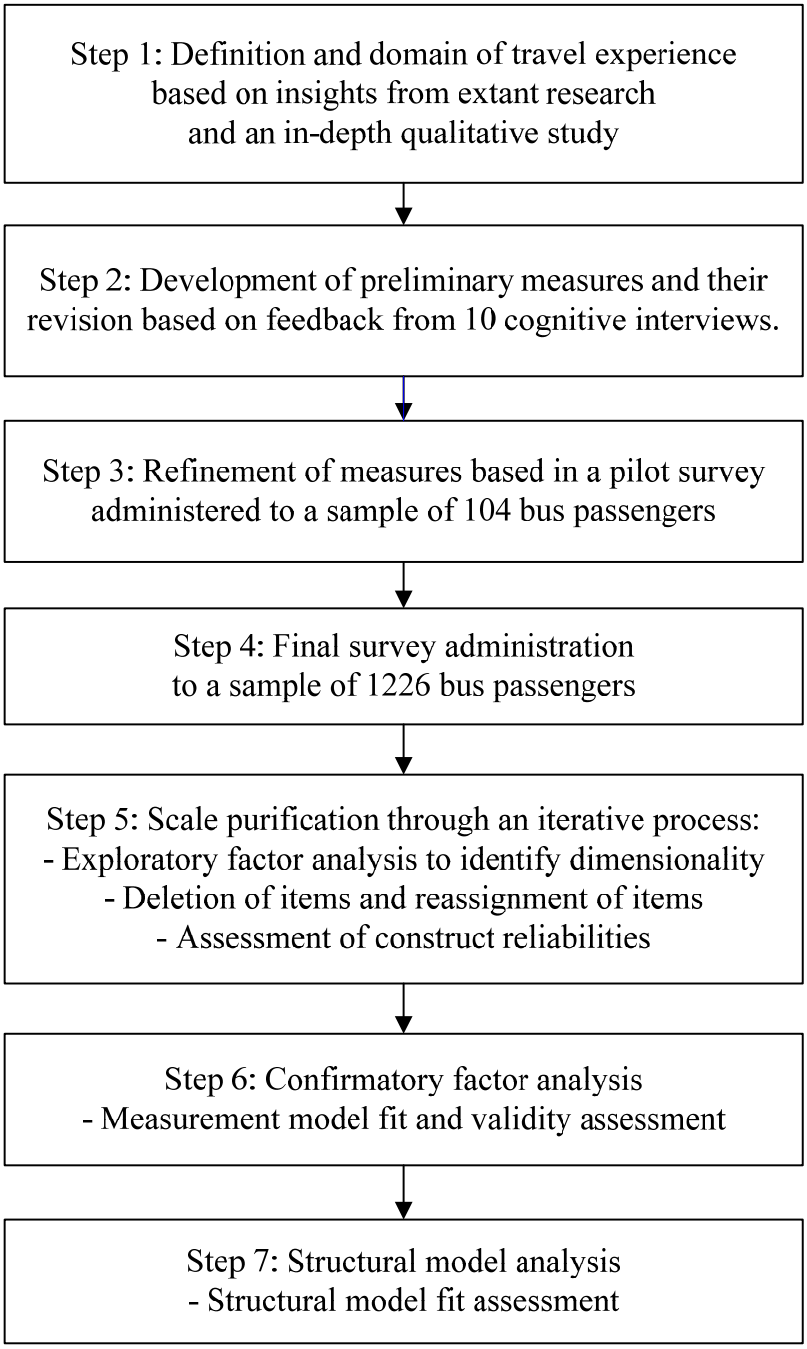

Figure 2 - Process employed in developing the scale to measure travel experience

The survey questionnaire was built upon the rich set of EFs identified in the qualitative study and literature review. The survey instrument was subject to several pre-tests in order for further refine and improve its final validity, such as the cognitive interviews with 10 passengers (Dillman, 2000) performed in Step 2. Step 3 involved a quantitative pre-test based on a sample of 104 passengers during actual bus trips and allowed further refinement of question wording. The final survey was performed in step 4 with a sample of 1226 passengers in similar mid-distance trips.

Data analysis and the scale purification occurred in steps 5, 6 and 7 in a process consistent with scale development procedures (Hair et al., 2009) in order to measure travel experience and assess its relationships to other constructs. The analysis involved exploratory factor analysis (EFA), confirmatory factor analysis (CFA) and structural equation modeling (SEM). In areas where little research has been done, such as travel experience, EFA is normally required to provide an *a priori* structure of the latent constructs' underlying dimensions to be finalized using CFA (Gerbing and Hamilton, 1996). The final survey sample was divided into two equal samples, defined as calibration and holdout samples, respectively used in the EFA and in the CFA. Afterwards SEM was used to analyze the relationships between the EFs and the ECs and loyalty intentions in the overall final sample data. All pre-tests and quantitative surveys contributed to the scale purification, with the objective of progressively defining the measures for the Travel-Experience.

4. Development and refinement of a scale to measure Travel-Experience

4.1. Definition and domain of travel experience (step 1)

The literature review on transport quality, service quality and customer experience indicated that a holistic assessment of the travel experience is important for customer loyalty. Thus, prior research, namely the travel EFs identified by Carreira et al. (2012) served as the basis for the definition of travel experience and for the development of its conceptual domain. As such, travel experience was defined as the holistic individual response originated from the passenger interactions with the transportation service and across all moments of transportation provision. Conversely, the conceptual domain of the travel experience was categorized into the following 11 dimensions:

- *Cleanliness* was related with the hygiene and maintenance of the vehicle and facilities, involving hygiene of overall facilities, vehicles and seats, restrooms' maintenance and availability during the trips.
- *Comfort* was related with the overall and individual comfort conditions of the trips, and it involved aesthetic appeal of the vehicle interior, thermal and sound comfort or the seat's physical support.
- *Easy accessibility* was related with the passenger facilitated access to and from the vehicles during all moments of the trip, involving walking access when entering, exiting and moving around in the vehicle.

- *Information provision* concerned all the information available through different means or service channels (e.g. internet, telephone, bus terminal ticket line), such as access to schedules, delays, rules on board, etc.
- *Off-board services* were related with the intangible nature of the services provided in the physical facilities, involving the promptness, friendliness and professionalism of the services provided before or after the actual trip.
- *On-board entertainment* on the other hand related with the activities performed during the actual trip such as reading, using the vehicle sound system, seeing films, and others based in technology advancements (e.g. wireless internet access).
- *Safety* was related with every aspect of passenger physical wellbeing involving the easy and efficient use of the seatbelts, vehicle or road adequate maintenance, weather conditions and driver carefulness.
- *Social environment* concerned all the interaction with other people, which could have profound effects on the passenger experience, even though it was not fully controlled by the transportation provider, such as talking with other passengers or having the possibility of seating close to the people the passenger knows.
- *Staff's skills* were related with the personnel's (e.g. driver or tour guide) performance during transportation, and it comprised awareness, friendliness and professionalism.
- *Visibility of the scenery* was concerned with seeing the vehicle surroundings during a trip, such as widest and clearest view outside, photo shooting, reduction of outdoors luminosity.
- *Waiting time* was related with trip schedules such as frequency of departures and punctuality; additionally it also involved waiting time related with external aspects to the trip *per se* (e.g. waiting for other passengers or traffic) that could not be fully managed by the transportation provider.

The dimensions and indicators that formed the travel experience domain provided a rich source of data from which items were drawn for the Travel-Experience scale in the following step.

4.2. Development of preliminary measures and their revision (step 2)

The survey questionnaire for the quantitative study was developed by generating items that covered the domain identified in step 1. However, it was also necessary to balance between domain specification and questionnaire length. As a consequence, the questionnaire had three parts. Part 1 addressed EFs, which are passenger perceptions of the travel experience and are the level at which Travel-Experience is evaluated, as depicted in Figure 1. This part included 70 questions that measured passenger performance assessment of the travel experience in a set of EFs using itemized rating scales (Churchill and Iacobucci, 2002). Part 2 assessed the ECs and loyalty, i.e., the outcomes of Travel-Experience evaluation, as shown in Figure 1. Emotional and cognitive assessments, and loyalty had been previously studied and as such the survey questionnaire used previously developed measures, also using itemized rating scales. This enabled the analysis of the impact of travel EFs on three ECs and also on loyalty. EC dimensions included emotional (i.e. positive and negative) (addapted from Pullman and Gross, 2004; Richins, 1997), travel satisfaction (Oliver, 1980, 1993), overall value (Parasuraman et al., 2005) and loyalty (Zeithaml et al., 1996) scales. Finally, part 3 of the questionnaire consisted of socio-demographic information. These scales were incorporated into the survey instrument, which was elaborated in Portuguese and qualitatively pre-tested with 10 passengers in the mid-distance trips (Dillman, 2000). This first pre-test led to revision of the questionnaire items, i.e. some questions were rephrased, while two other were eliminated in part 1 for lack of clarity.

4.3. Refinement of measures based in a pilot survey (step 3)

The pilot survey was performed during four trips to Portuguese cities, in which the questionnaires were distributed and self-administered to 116 passengers, with 104 valid responses from 60 females and 44 males, 70% of which were younger than 30. The data collected were examined for missing data patterns, outliers and for normality of the variables. The questionnaire items were further refined by clarifying or eliminating problematic items, which in this step were essentially the ones included in part 2 of the questionnaire due to passenger misinterpretation of some of the negative emotions (see Appendix A for the final structure of the questionnaire).

4.4. Final survey administration (step 4)

The final survey was administered to 1486 bus passengers travelling on more than 40 mid-distance bus trips. The sample details can be seen in Table 1. Missing value analysis revealed no significant problems. After diagnosing the randomness of the missing data as not Missing Completely At Random (non-MCAR), the EM imputation method (Hair et al., 2009) was chosen as the most robust for estimating the remaining missing values. After missing value analysis, the final sample comprised 1226 respondents (response rate 83%). The participants in the final survey were essentially Portuguese, but nearly 7% came from various countries such as Brazil, Cape Verde, France, Germany, Venezuela, Switzerland, and others. Most passengers were travelling to study in a

Table 1 - Profile of the final sample [a]

		Final survey N=1486
Gender	Female	777 (61%)
	Male	484 (39%)
Frequency of travel	Twice a week	468 (39%)
	2 to 4 times/ month	328 (27%)
	once/ month	139 (11%)
	Less than once/ month	278 (23%)
Age	10-20	473 (38%)
	20-30	506 (41%)
	30-50	160 (13%)
	50-80s	94 (8%)
Earnings per month	No earnings	663 (61%)
	Less than 500 €	92 (8%)
	Between 500 € e 1000 €	208 (19%)
	Between 1000 € e 2000 €	99 (9%)
	More than 2000 €	33 (3%)
Reason for this trip	Work	143 (12%)
	University	654 (54%)
	Visit to relatives	250 (21%)
	Other	155 (13%)
School degree	High school	257 (22%)
	Professional diploma	63 (5%)
	University attendee	563 (47%)
	University Diploma	178 (15%)
	Master/ PhD	96 (8%)
	Other	37 (3%)

a – In some cases the numbers do not add to the total amount of respondents because of non-responses in each question.

University, but others were also on their way to work, in leisure trips or had other reasons to travel. These sample characteristics, with a high number of students and ages below 30 was consistent with the transport provider's customer base.

For the purpose of data analysis and the scale development process, the overall sample obtained in this final survey was randomly split into two equally sized samples, respectively designated as calibration and holdout samples. This splitting allowed using the calibration sample in an exploratory factor analysis to identify the underlying structure of factors in the data. Based on the latent constructs and respective indicators that emerged from the data in the exploratory analysis, the measurement model reliability and validity was then assessed through confirmatory factor analysis using the holdout sample. These analyses are described in the next steps.

4.5. Scale purification through an iterative process (step 5)

The scale purification step involved an Exploratory Factor Analysis (EFA) using SPSS 17.0 with the calibration sample, on the 68 EF items included in part 1 of the questionnaire. This EFA enabled identifying and purifying the latent constructs (i.e. EF dimensions) through an iterative process. The initial number of factors to retain was determined using the breaks-in-eigenvalues criterion and principal component analysis with varimax rotation. Different trial rotations were performed, also using common factor analysis and oblique rotation methods that originated less satisfactory factor solutions. During this iterative process, variables were deleted if they (1) did not load more than .50 on any factor, or (2) cross-loaded on two or more factors with loadings higher than .30 (Hair et al., 2009) (see Table 2). Concerning reliability analysis, all extracted EFs exceeded the Cronbach's α conventional minimum of .7 (Nunnally and Bernstein, 1994) and indicated an item-to-total correlation of more than .50 (Hair et al., 2009).

This exploratory process resulted in the re-arrangement of the remaining 29 items in new or revised latent constructs, compared to the dimensions hypothesized in the preliminary scale. The seven EFs extracted were the following:

- *Individual space* concerned the passenger physical support and room available.
- *Information provision* was related with all the information provided before or during the actual trip.
- *Staff's skills* related with the personnel's overall performance.

Table 2 – EFA results for the Travel-Experience scale

	EFA Loadings [a]						
EF	IS	IP	SS	SE	VM	OF	TS
Individual space (IS)							
1. Adequate arm support	.79						
2. Adequate head support	.75				.30		
3. Available room in my seat	.72						
4. Adequate foot support	.71						
5. Adjustable seats	.72						
Construct reliability (Cronbach's α)	*.89*						
Information provision (IP)							
6. Information of the on-board services		.76					
7. Information about the vehicle characteristics before the trip		.80					
8. Information about the travel rules		.84					
9. Information about delays or other exceptions		.78					
10. Information available during the trip		.70					
Construct reliability (Cronbach's α)		*.89*					
Staff's skills (SS)							
11. Professionalism			.84				
12. Trust in driving			.83				
13. Empathy			.72				
14. The staff is aware and can control the best travel conditions for all			.68				
Construct reliability (Cronbach's α)			*.87*				
Social environment (SE)							
15. Socialize with other people				.87			
16. Meet passengers with the same interests as me				.83			
17. Talk with other passengers				.79			
18. Help other people (providing them information)				.68			
Construct reliability (Cronbach's α)				*.86*			
Vehicle maintenance (VM)							
19. Vehicle interior maintenance					.84		
20. Vehicle exterior conservation					.79		
21. The vehicle has an adequate overall preservation					.72		
22. Clean seat					.72		
23. Comfortable temperature on-board					.71		
24. Not to hear strange noises in the vehicle					.65		
Construct reliability (Cronbach's α)					*.89*		
Off-board facilities (OF)							
25. Maintenance of the terminal						.80	
26. Waiting room conditions						.80	
27. Access to the vehicle in the terminal						.57	
Construct reliability (Cronbach's α)						*.73*	
Ticket line service (TS)							
28. Empathy at the ticket line							.81
29. Not having to wait to buy ticket							.85
Construct reliability (Cronbach's α)							*.72*

a. After orthogonal rotation (varimax) with Kaiser normalization; loadings < .30 not shown; total variance extracted by the seven factors = 74%.

- *Social environment* concerned the interaction with other people, either known passengers or the ones with the same interests.
- *Vehicle maintenance* related with cleanliness of the individual seat and overall mechanical soundness of the vehicle.
- *Off-board facilities* were related with the overall conditions available in the physical terminal.
- *Ticket line service* concerned the empathy and speed of the service provided in the physical facilities.

All EFs except ticket line service included three or more items as suggested by Hair et al. (2009) as a good practice to proceed to CFA. Ticket line service was retained due to its adequate reliability, high loadings, low cross-loadings and especially to its theoretical significance, as it represents an EF that is related with the pre-trip travel experience.

4.6. Confirmatory Factor Analysis (step 6)

Based on the EFs derived from the EFA, the measurement model was assessed through Confirmatory Factor Analysis (CFA) using the final survey holdout sample. In the confirmatory approach, AMOS 17.0 software was used with maximum likelihood estimation (MLE). In this process, the item information available during the trip (item 10 in Table 2) was excluded from the final scale because it produced large standardized residuals with various items (Anderson and Gerbing, 1988).

The final Travel-Experience scale consisted of the 28 items shown in Table 3. Following Hair et al.'s (2009) suggestion, a more adequate construct reliability value than Cronbach's α was computed. The CFA results demonstrated that the scale presented acceptable reliability, as well as convergent and discriminant validity. All EFs revealed high internal consistency and reliability with construct reliability that exceeded .7 (Nunnally and Bernstein, 1994) (see Table 3). The model also showed good convergent validity as item loadings on their respective constructs all exceeded the .7 cut-off value and the average variance-extracted of each construct was higher than .5 (Fornell and Larcker, 1981) (see Table 4). Considering Fornell and Larcker's (1981) conservative test to analyze the scale's discriminant validity, the variance-extracted estimates for any two constructs were greater than the squared correlation estimate between those two constructs, as shown in Table 4.

Table 3 – Mean rating values, CFA standardized loadings and fit statistics for the Travel-Experience scale

Factor	Mean (max = 7) Performance	CFA Standardized Loadings
Individual space		
1. Adequate arm support	4.2	.82
2. Adequate head support	4.5	.79
3. Available room in my seat	4.6	.72
4. Adequate foot support	3.9	.71
5. Adjustable seats	5.1	.66
Construct reliability		*.86*
Information provision		
6. Information of the on-board services	3.0	.91
7. Information about the vehicle characteristics before the trip	2.9	.83
8. Information about the travel rules	3.1	.78
9. Information about delays or other exceptions	3.5	.69
Construct reliability		*.84*
Staff's skills		
10. Professionalism	5.7	.87
11. Trust in driving	5.8	.85
12. Empathy	5.0	.75
13. The staff is aware and can control the best travel conditions for all	5.4	.73
Construct reliability		*.88*
Social environment		
14. Socialize with other people	4.3	.90
15. Meet passengers with the same interests as me	4.2	.88
16. Talk with other passengers	4.5	.63
17. Help other people (providing them information)	5.1	.63
Construct reliability		*.85*
Vehicle maintenance		
18. Vehicle interior maintenance	5.3	.86
19. Vehicle exterior conservation	5.5	.80
20. The vehicle has an adequate overall preservation	5.0	.75
21. Clean seat	5.5	.73
22. Comfortable temperature on-board	5.3	.71
23. Not to hear strange noises in the vehicle	4.8	.68
Construct reliability		*.89*
Off-board facilities		
24. Maintenance of the terminal	4.2	.78
25. Waiting room conditions	3.5	.78
26. Access to the vehicle in the terminal	5.1	.59
Construct reliability		*.77*
Ticket line service		
27. Empathy at the ticket line	5.9	.88
28. Not having to wait to buy ticket	5.5	.71
Construct reliability		*.81*
Goodness-of-fit statistics		
χ^2=983.76		
df=329		
GFI=.89		
CFI=.93		
NNFI=.92		
RMSEA=.06		

All loadings are significant at $p < .001$

Table 4 - Squared correlations between Travel-Experience constructs, standard errors and *t*-values, average variance extracted on diagonal

	Individual space	Information provision	Staff's skills	Social environment	Vehicle maintenance	Off-board facilities	Ticket line service
Individual space	.55						
Information provision	.20	.65					
	(.10)						
	8.05						
Staff's skills	.20	.17	.64				
	(.07)	(.07)					
	7.75	7.96					
Social environment	.20	.26	.13	.59			
	(.09)	(.10)	(.07)				
	8.38	9.20	7.13				
Vehicle maintenance	.46	.11	.27	.09	.57		
	(.09)	(.07)	(.06)	(.07)			
	10.75	6.55	9.38	6.14			
Off-board facilities	.26	.30	.20	.18	.19	.52	
	(.11)	(.11)	(.09)	(.10)	(.08)		
	8.63	9.02	7.97	7.86	7.96		
Ticket line service	.15	.07	.16	.02	.23	.12	.68
	(.10)	(.09)	(.08)	(.08)	(.09)	(.10)	
	6.76	5.23	7.03	3.07	8.40	6.14	

All correlations are significant at $p < .001$

According to scale development guidelines, several fit indices were used to assess measurement model fit (see bottom of Table 3) (Hair et al., 2009; Hu and Bentler, 1999). Goodness-of-fit indices - GFI, CFI, NNFI - globally approached or exceeded .9, which indicated that the model satisfactorily fit the data. Regarding "badness-of-fit measures", RMSEA presented an acceptable value. Additionally the χ^2 values obtained were significant, but as expected they were strongly influenced by the large sample and number of indicator variables (Hair et al., 2009). In short, the CFA results showed that the measurement model had an acceptable fit.

4.7. Structural Model Analysis (step 7)

After assessing the measurement model convergent and discriminant validity (Fornell and Larcker, 1981; Gerbing and Anderson, 1988), four structural models were built

using AMOS 17.0. The first three models analyzed the impact of EFs on each EC dependent latent construct: emotions (positive and negative), overall value, and travel satisfaction which in turn were mediators of the loyalty dependent latent construct. The fourth model analyzed the direct impact of EFs on the loyalty latent construct. These SEM analyses were performed with the overall final sample data (calibration and holdout).

The SEM results for the four models showed good fit, assessed through the same measures as described in step 6 (see the results in Table 5). In addition, the R^2 (i.e. Coefficient of Determination) was also analyzed to understand the structural models' explanatory power. Even though it is somewhat low in negative emotions, the explanatory power is acceptable taking in consideration the sample size and number of independent variables, according to conventional measures (Hair et al., 2009).

In addition to the validity assessment performed in step 6, it was also necessary to evaluate how well the latent constructs related with theoretical relevant ones, which is referred to as nomological validity (Churchill and Iacobucci, 2002). In this case, the Travel-Experience scale constructs presented nomological validity, as the EFs were significantly related with the variables from the well-established scales borrowed from the literature (e.g. Parasuraman et al., 2005; Pullman and Gross, 2004; Wolfinbarger and Gilly, 2003). The results of the SEM analyses summarized in Table 5 provided further confirmation of the psychometric soundness of the Travel-Experience scale.

4.8. Impact of Travel Experience Factors on Experience Outcomes

The results presented in Table 5 show that all travel EFs generally reveal a significant impact on each of the ECs. Nevertheless, some of those relationships are stronger or statistically more significant than others. The structural models have good explanatory power, which means that the rich set of EFs adequately estimate the different ECs, either emotional or cognitive. Additionally, passenger loyalty, which is a fundamental variable for transport providers, is also directly and indirectly influenced by the set of travel EFs. Negative emotions are the least explained experience outcome, but this may be related with the fact the travel experience scale explored more the EFs that drive positive experiences, and not so much the drivers of negative experiences, which may be different factors according to Kano's model (1984) of satisfiers and dissatisfiers. Overall, these results highlight the importance of addressing the travel experience from a

Table 5 – SEM relationships of Travel-Experience factors to emotions (positive and negative), overall value, travel satisfaction, and loyalty towards the trip

Construct		Dependent construct				
		Emotions		Overall	Travel	
		Positive	Negative	value	satisfaction	Loyalty
Individual space		.48***	- .13**	.34***	.33***	.31***
Information provision		.14***	.29***	.11**	.10***	.10**
Staff's skills		.09***	- .12**	.08*	.12***	.16***
Social environment		.10***	.02	.03	.04	.04
Vehicle maintenance		.11***	- .22***	.23***	.28***	.21***
Off-board facilities		.06	.18***	.14*	.06	.08*
Ticket line service		.07*	- .01	.06*	.03	-.02
R^2		*.64*	*.16*	*.56*	*.56*	*.48*
Mediating latent construct [a]						
Emotions	Positive					.71***
	Negative					-.05*
R^2						*.50*
Overall value						.81***
R^2						*.66*
Travel satisfaction						.82***
R^2						*.67*
Goodness-of-fit statistics						
χ^2		3118		1958	2166	1766
Df		742		466	531	406
GFI		.88		.91	.90	.91
CFI		.93		.94	.94	.94
NNFI		.92		.93	.93	.93
RMSEA		.05		.05	.05	.05

a – these values represent the direct impact of each mediating latent construct on loyalty

* Significant at p < .05

** Significant at p < .01

*** Significant at p < .001

holistic perspective, involving all moments of a trip, to better understand the drivers and outcomes of the passenger experience and their influence on loyalty behaviors.

The study shows that traditional on-board controlled transportation EFs like individual space and vehicle maintenance have the most significant impact on the various ECs and loyalty behaviors, while staff's skills and information provision have somewhat lower impacts. This reveals that the passenger experience is still focused on fundamental aspects associated with travelling comfort and safety, which transport operators and

vehicle manufacturers should provide. In addition, the staff should be professional and attentive during the actual trip, and the information provided should be adequately managed, because it has a mixed influence on emotions. These results may indicate that an adequate balance of information is needed, i.e., relevant information should be available during bus trips, but not so much that it becomes a burden to the passengers.

On the other hand, the off-board aspects of ticket line service and physical facilities present lower impacts which are only significant on a few of ECs. Social environment does not have statistically significant impact, except on positive emotions. These results may indicate that the moments beyond the concrete trip, and the relational aspects outside the provider control, do not influence the travel experience as much as core transportation factors. This may occur because passengers acknowledge that these EFs are outside the transport provider control, and as such they do not consider them as much when evaluating the transport service experience. Nevertheless companies should take these EFs in consideration because they influence the emotional and the overall value components to some extent, and in turn, indirectly influence passenger loyalty. In a competitive environment where companies offer the same basic service, these additional EFs may be a differentiating aspect.

Two EFs (information provision and off-board facilities) present an unexpected positive influence on negative emotions. The descriptive analysis of the passenger responses (see Table 3) to those items also shows that they have the lowest performance among all EFs. Regarding information, these results may indicate the need for balancing the amount of information provided: not too much, nor too little. Additionally, as the overall sample included 70% frequent passengers who travelled at least once per month, they may have already received the same information repeatedly. Regarding off-board facilities, as passengers perceive that this EF is outside the transport provider control, it may happen that better off-board conditions, by comparison, lead to negative emotions in reaction to the core transport service. These unexpected results deserve further studies to understand in more detail these mixed effects.

5. Research and managerial implications

This article develops a multiple-item scale (Travel-Experience) for evaluating the transportation experience. Previous transport research has addressed most of the experience factors (EFs), but a holistic view integrating the different EFs and ECs in a travel experience measure was lacking. When compared with traditional transit quality,

this study shows that a holistic perspective is important to understand and manage the travel experience, comprising all moments of transportation and factors beyond the providers' control. The study also shows that it is important to comprehend emotional and cognitive components of the travel experience, as they both have a significant impact on passenger loyalty.

The study results indicate that EFs related with the core transportation conditions are still the most important for enhancing the travel experience, followed by on-board supplementary services such as information provision and staff's skills. These results corroborate extant transport research, which has extensively studied these factors. However, this study also shows that other EFs that are not in direct control of the transportation provider, such as ticket line service, off-board facilities and social environment have a weaker but significant impact on some ECs, and indirectly on loyalty. In an environment characterized by fierce competition, these factors may be an additional way to differentiate the service and enhance the travel experience.

Overall, these results highlight the importance of a global view and management of the travel experience to increase passenger loyalty, taking into account a holistic set of EFs and ECs.

The Travel-Experience dimensions and their impact on travel experience outcomes disclose how transport operators can improve their service by adopting a more holistic management of the customer experience through all the moments of a trip. The core factors related with individual space and bus maintenance should still be the main focus of companies, but information provision and staff performance are also important factors for differentiating the transport service. Information should be carefully addressed, as it is important to balance its relevance with quantity and frequency.

The study also indicates that transport operators should pay attention to the attributes that they not control completely, such as off-board services or social environment, in spite of their moderate influence on ECs and loyalty behaviors. The mixed influence of some of these factors on ECs may result from the fact that passengers do not attribute full responsibility to the transport provider. However, in a highly competitive environment, these factors may be an additional way to differentiate the transport service.

Addressing the EFs that are not in complete control also raises additional challenges for the coordination with other transport interested parties. Building on Guihaire and Hao's (2008) transportation network design and scheduling review, transit agencies need to collaborate with other entities, in order to improve the entire transport service ecosystem with which the passengers interact along the travel experience. In this context, the collaboration between transport providers, transport policy planners and vehicle constructors can enable better designing and managing the entire product-service transport system to enhance the passenger experience. Globally, these results highlight the need for a more integrated and holistic design and management of the overall transportation system.

6. Concluding remarks and future research

The study develops and validates the Travel-Experience scale, showing that, when compared with traditional transit service quality, the travel experience is more complex and extended in time, and involves both cognitive assessments and emotions towards transportation services. The study results show that a holistic view of the travel experience is important for understanding passenger loyalty behaviors and derives important implications for the management of transport services and systems.

This study addresses mid-distance bus trips, but implications for other transportation sectors can also be made, such as the importance of addressing the passenger experience throughout every moment of contact with the transport providers. However, it would be interesting to apply the same methodology to other transport settings, such as railway and air transportation, to understand which EFs are maintained and which ones change. Studying multimodal transportation would be particularly interesting, as the travel experience is created along different interactions with different travel modes.

The mixed influence of some EFs on experience outcomes also deserves further study. With constant technology development, it would be interesting to explore how new information technologies can enhance the emotional and cognitive components of the travel experience.

Addressing EFs not in complete control of the transport provider also raises challenges that need further research. A closer collaboration between public transportation interested parties such as transport providers, vehicle manufacturers and even policy

planners can enable a more integrated design and management of the transport ecosystem to enhance the travel experience.

Goedkoop, et al. (1999) have introduced the concept of product-service system as “a marketable set of products and services capable of jointly fulfilling a user’s need”. Taking in consideration that the travel experience results from customer interactions with both tangible (e.g. vehicle) and intangible (e.g. service, social) transport aspects, they should be designed in an integrated way in a product-service system approach, involving the transport service, the bus and the physical facilities.

Overall, this research offers a holistic perspective of the travel experience and shows how it is important for managing transport services, as it has a strong influence on passenger attitudes and loyalty behaviors towards transportation services. This study contributes to a better understanding of the travel experience, but also identifies new challenges that will hopefully lead to further research in this emergent area.

Appendix A - Structure of the questionnaire used in the survey

Part 1 – Performance evaluation of each EF during the bus trips

The respondents were asked: "How satisfied are/were you during this bus trip?", in relation to the 68 items. Each question should be answered according to the scale 1 (*Not at all satisfied*) to 7 (*Completely satisfied*).

Part 2 – Assessment of positive and negative emotions, travel satisfaction, overall value, and loyalty associated to the bus trips

Emotions (adapted from Pullman and Gross, 2004; Richins, 1997)

The respondents were asked to answer to the scale 1 (*Strongly disagree*) to 7 (*Strongly agree*) with their level of agreement to the statements:

1 - "Overall, the bus trips made me comfortable", 2 - "Overall, the bus trips made me joyful", 3 - "Overall, the bus trips made me satisfied", 4 - "Overall, the bus trips made me entertained", 5 - "Overall, the bus trips made me relaxed", 6 - "Overall, the bus trips made me discontent", 7 - "Overall, the bus trips made me nervous", 8 - "Overall, the bus trips made me concerned", 9 - "Overall, the bus trips made me irritated", 10 - "Overall, the bus trips made me frighten".

Travel satisfaction (Oliver, 1980, 1993)

The respondents were asked to answer to the scale 1 (*Strongly disagree*) to 7 (*Strongly agree*) with their level of agreement to the statements:

1 - "I have truly enjoyed travelling with this bus transportation provider", 2 - "My choice to make this trip was a wise one", 3 - "I am satisfied with my most recent decision to travel with this transportation provider", 4 - "I am happy I made my most recent trip with this transportation provider".

Overall value (Parasuraman et al., 2005)

The respondents rated the trips on each of the following items using a scale of 1 (*Poor*) to 7 (*Excellent*):

1 - "The overall value you get from this trip for your money and effort", 2 - "The overall convenience of travelling with this company".

Loyalty (Zeithaml et al., 1996)

The respondents were asked to answer to the scale 1 (*Strongly disagree*) to 7 (*Strongly agree*) with their level of agreement to the statements:

1 – "I will travel more with the transportation company in the next few weeks", 2 – "I say positive things about the transportation company to other people", 3 – "I consider this company to be my first choice to travel to my destination".

The "Don't know" option was an alternative for each item.

Part 3 – Socio-demographics

Origin and destination of the trip, frequency of bus travels, number of travel companions and relationship to them, gender, country, age, income, reason for the trip, school level and professional occupation.

References

Abou-Zeid, M., Ben-Akiva, M. (2011) The effect of social comparisons on commute well-being. *Transportation Research Part A: Policy and Practice* 45, 345-361.

Anable, J., Gatersleben, B. (2005) All work and no play? The role of instrumental and affective factors in work and leisure journeys by different travel modes. *Transportation Research Part A: Policy and Practice* 39, 163-181.

Anderson, J.C., Gerbing, D.W. (1988) Structural equation modeling in practice: A review and recommended two-step approach. *Psychological Bulletin* 103, 411–423.

Beirão, G., Cabral, J.A.S. (2007) Understanding attitudes towards public transport and private car: A qualitative study. *Transport Policy* 14, 478–489.

Berry, L.L., Carbone, L.P., Haeckel, S.H. (2002) Managing the Total Customer Experience. *MIT Sloan Management Review* 43, 85-89.

Bloemer, J., de Ruyter, K. (1999) Customer loyalty in high and low involvement service settings: The moderating impact of positive emotions. *Journal of Marketing Management* 15, 315-330.

Carbone, L.P., Haeckel, H.S. (1994) Engineering Customer Experiences. *Marketing Management* 3, 8-19.

Carreira, R., Patrício, L., Natal, R., Magee, C., Hommes, Q. (2012) Towards a holistic approach to the travel experience: a qualitative study of bus transportation. *Working paper*.

Carreira, R., Patrício, L., Natal, R., Marques, A., Magee, C. (2010) Incorporating Customer Experience Requirements In New Product Development: Understanding Bus Travel Experiences. *Proceedings of Proceedings of the 17th International Product Development Management Conference*, Murcia University, Spain, pp. 51-63.

Chitturi, R., Raghunathan, R., Mahajan, V. (2008) Delight by Design: The Role of Hedonic Versus Utilitarian Benefits. *Journal of Marketing* 72, 48-63.

Churchill, G.A. (1979) Paradigm for Developing Better Measures of Marketing Constructs. *J Marketing Res* 16, 64-73.

Churchill, G.A., Iacobucci, D. (2002) *Marketing Research - Methodological Foundations*, 8th ed. Harcourt College.

Dillman, D.A. (2000) *Mail and Internet Surveys - The Tailored Design Method*, 2nd ed. John Wiley & Sons, Inc.
Eboli, L., Mazzulla, G. (2011) A methodology for evaluating transit service quality based on subjective and objective measures from the passenger's point of view. *Transport Policy* 18, 172-181.
Ettema, D., Gärling, T., Eriksson, L., Friman, M., Olsson, L.E., Fujii, S. (2010) Satisfaction with travel and subjective well-being: Development and test of a measurement tool. *Transportation Research Part F: Traffic Psychology and Behaviour* 14, 167-175.
Fornell, C., Larcker, D.F. (1981) Evaluating Structural Equations Models with Unobservable Variables and Measurement Error. *J Marketing Res* 18, 39-50.
Fottler, M.D., Ford, R.C. (2000) Creating a healing environment: The importance of the service setting in the new ConsumerOriented Healthcare System. *Journal of Healthcare Management* 45, 91-106.
Friman, M., Edvardsson, B., Gärling, T. (2001) Frequency of negative critical incidents and satisfaction with public transport services. I. *Journal of Retailing and Consumer Services* 8, 95-104.
Friman, M., Gärling, T. (2001) Frequency of negative critical incidents and satisfaction with public transport services. II. *Journal of Retailing and Consumer Services* 8, 105-114.
Gentile, C., Spiller, N., Noci, G. (2007) How to Sustain the Customer Experience:: An Overview of Experience Components that Co-create Value With the Customer. *European Management Journal* 25, 395-410.
Gerbing, D.W., Anderson, J.C. (1988) An updated paradigm for scale development incorporating unidimensionality and its assessment. *J Marketing Res* 25, 186–192.
Gerbing, D.W., Hamilton, G.J. (1996) Validity of exploratory factor analysis as a precursor of confirmatory factor analysis. *Structural Equation Modeling* 3, 62-72.
Goedkoop, M., Van Halen, C., Te Riele, H. (1999) *Product service systems, ecological and economic basics*, pré Consultants ed. The Hague : Ministry of Housing, Spatial Planning and the Environment, Communications Directorate, Amersfoort, The Netherlands.
Guihaire, V., Hao, J.-K. (2008) Transit network design and scheduling: A global review. *Transportation Research Part A: Policy and Practice* 42, 1251-1273.
Hair, J.F.J., Black, W.C., Babin, B.J., Anderson, R.E. (2009) *Multivariate Data Analysis*, 7th ed. Pearson.
Heskett, J.L., Jones, T.O., Loveman, G.W., Sasser, J.W.E., Schlesinger, L.A. (2008) Putting the Service-Profit Chain to Work. *Harvard Business Review* 86, 118-129.
Hu, L., Bentler, P.M. (1999) Cutoff Criteria for Fit Indexes in Covariance Structure Analysis: Conventional Criteria versus New Alternatives. *Structural Equation Modeling* 6, 1-55.
Kano, N., Seraku, N., Takahashi, E. (1984) Attractive quality and must be quality. *Journal of the Japanese Society for Quality* 14, 39-44.
Klaus, P., Maklan, S. (2007) The role of brands in a service-dominated world. *The Journal of Brand Management* 15, 115-122.
LeBel, J.L. (2005) Beyond the friendly skies: an integrative framework for managing the air travel experience. *Managing Service Quality* 15, 437 - 451.
Mehrabian, A., Russell, J.A. (1974) *An approach to environmental psychology*. MIT Press, Cambridge, MA.
Meyer, C., Schwager, A. (2007) Understanding Customer Experience. *Harvard Business Review* February, 117-126.
Mokhtarian, P., Salomon, I. (2001) How Derived is the Demand for Travel? Some Conceptual and Measurement Considerations. *Transportation Research Part A: Policy and Practice* 35, 695-719.
Nathanail, E. (2008) Measuring the quality of service for passengers on the hellenic railways. *Transportation Research Part A: Policy and Practice* 42, 48-66.
Neal, J.D., Sirgy, M.J., Uysal, M. (2004) Measuring the Effect of Tourism Services on Travelers' Quality of Life: Further Validation. *Social Indicators Research* 69, 243-277.
Nunnally, J.C., Bernstein, I.H. (1994) *Psychometric theory*. McGraw-Hill, New York.

Oliver, R. (1980) A Cognitive Model ofthe Antecedents and Consequences of Satisfaction Decisions. *J Marketing Res* 17, 460-469.
Oliver, R. (1993) Cognitive, Affective, and Attribute Bases of the Satisfaction Response. *Journal of Consumer Research* 20, 418-430.
Oliver, R.L. (1999) Whence Consumer Loyalty? *Journal of Marketing* 63, 33-44.
Parasuraman, A., Zeithaml, V.A., Berry, L.L. (1988) SERVQUAL: A Multiple-Item Scale for Measuring Consumer Perceptions of Service Quality. *Journal of retailing* 64, 12-40.
Parasuraman, A., Zeithaml, V.A., Malhotra, A. (2005) E-S-QUAL - A multiple-item scale for assessing Electronic Service Quality. *Journal of Service Research* 7, 213-233.
Patrício, L., Cunha, J.F., Fisk, R.P. (2009) Requirements engineering for multi-channel services: The SEB method and its application to a multi-channel bank. *Requirements Engineering* 14, 209-227.
Patrício, L., Cunha, J.F., Fisk, R.P., Nunes, N.J. (2004) Customer experience requirements for multi-platform service interaction: bringing services marketing to the elicitation of user requirements. *Proceedings of 12th IEEE International Requirements Engineering Conference*, Kyoto, Japan, pp. 26-35.
Patrício, L., Fisk, R.P., Cunha, J.F. (2008) Designing Multi-Interface Service Experiences: The Service Experience Blueprint. *Journal of Service Research* 10, 318-334.
Patrício, L., Fisk, R.P., Cunha, J.F., Constantine, L. (2011) Multilevel Service Design: From Customer Value Constellation to Service Experience Blueprinting. *Journal of Service Research* 14.
Pawson, R. (1996) Theorizing the interview. *The British Journal of Sociology* 47, 295-314.
Pine, B.J., Gilmore, J.H. (1998) Welcome to the experience economy. *Harvard Business Review* July-August, 97-105.
Price, L.L., Arnould, E.J., Tierney, P. (1995) Going to Extremes - Managing Service Encounters and Assessing Provider Performance. *Journal of Marketing* 59, 83-97.
Pullman, M.E., Gross, M.A. (2004) Ability of experience design elements to elicit emotions and loyalty behaviors. *Decision Sciences* 35, 551-578.
Richins, M. (1997) Measuring emotions in the consumption experience. *Journal of Consumer Research* 24, 127-146.
Stradling, S., Carreno, M., Rye, T., Noble, A. (2007a) Passenger perceptions and the ideal urban bus journey experience. *Transport Policy* 14, 283-292.
Stradling, S.G., Anable, J., Carreno, M. (2007b) Performance, importance and user disgruntlement: A six-step method for measuring satisfaction with travel modes. *Transportation Research Part A: Policy and Practice* 41, 98-106.
Stuart, K.R., Mednick, M., Bockman, J. (2000) A structural Equation model of consumer satisfaction for the New York City subway system. *Transportation Research Record* 1735, 133–137.
Sunitiyoso, Y., Avineri, E., Chatterjee, K. (2011) The effect of social interactions on travel behaviour: An exploratory study using a laboratory experiment. *Transportation Research Part A: Policy and Practice* 45, 332-344.
Tsaur, S.-H., Chang, T.-Y., Yen, C.-H. (2002) The evaluation of airline service quality by fuzzy MCDM. *Tourism Management* 23, 107-115.
Verhoef, P.C., Lemon, K.N., Parasuraman, A., Roggeveen, A., Tsiros, M., Schlesinger, L.A. (2009) Customer Experience Creation: Determinants, Dynamics and Management Strategies. *Journal of retailing* 85, 31-41.
Wolfinbarger, M., Gilly, M.C. (2003) eTailQ: dimensionalizing, measuring and predicting etail quality. *Journal of retailing* 79, 183-198.
Zeithaml, V.A., Berry, L.L., Parasuraman, A. (1996) The Behavioral Consequences of Service Quality. *Journal of Marketing* 60, 31-46.
Zomerdijk, L.G., Voss, C. (2009) Service Design for Experience-Centric Services. *Journal of Service Research* 13, 67-82.

PAPER IV

Incorporating experience requirements in the design of product-service systems through an extended Kansei engineering method.

Rui Carreira[1], Lia Patrício[1], Renato Natal[1], Chris Magee[2]

1- Faculty of Engineering, University of Porto, Rua Dr. Roberto Frias s/n, 4200-465 Porto, Portugal

2- Engineering Systems Division, Massachusetts Institute of Technology, 77 Massachusetts Avenue, Cambridge, Massachusetts 02139, USA

Email: ruicar@fe.up.pt, lpatric@fe.up.pt, rnatal@fe.up.pt, cmagee@mit.edu

The customer experience is increasingly important for differentiating and adding value to a firm's offerings, but two challenges arise: the customer experience is increasingly created through interactions with product-service systems (PSSs), and it is formed through all moments of interaction with the firm. Incorporating customer experience requirements into the design of PSSs is therefore a complex task.

To address such challenges, this paper presents an extension of the Kansei engineering methodology. The extension consists of a prior in-depth study of the customer experience that informs the design process, and of the involvement of a multidisciplinary team of experts from the different companies related to the PSS offering. An application of the new extension is performed for mid-distance bus trips, involving passengers, a vehicle manufacturer and a transport provider companies.

The research followed design-science guidelines using an action research approach to collaborate with the multidisciplinary design team to develop new public transportation PSS concepts. The study results reveal that the customer experience in-depth study enables the team to better incorporate experience requirements along the development process, and the joint work of the inter-company team enables better integration of the different PSS elements into a holistic solution to enhance the travel experience.

Keyword(s): travel experience, transportation vehicle, Kansei Engineering, cognitive, emotional

1. Introduction

Customers buy or use goods and services not as an end, but as a means to fulfil deeper affective, sensory and hedonic aspirations (Maklan & Klaus 2011). Nowadays these aspirations are mostly dependent on customer-focused combinations of goods, services, support, self-service, and knowledge. This trend has been defined as servitization (Vandermerwe & Rada 1988, p. 316) because of the importance for manufacturing companies to add value to their core corporate offerings through services. More recently, a product-service system (PSS) has been defined as a "marketable set of products and services capable of jointly fulfilling a user's need" (Goedkoop et al. 1999, p. 18). Additionally the fulfilment of such customer aspirations is formed through all moments of interaction with a brand or company.

Customer experience

Customer experience is increasingly important and can be defined as "the internal and subjective response customers have to any direct or indirect contact with a company" (Meyer & Schwager 2007, p. 118). This concept has received increased attention since Pine and Gilmore (1998) advocated that a new era of Experience Economy was starting. Since then, customer experience evolved to a holistic perspective resulting from all moments of contact with a company and comprising customer cognitive, social, sensorial, or emotional internal responses (Gentile et al. 2007; Hekkert 2006; Verhoef et al. 2009). The experience factors (EFs) are the dimensions of customer perceptions of all product or service attributes that contribute to the customer experience (Patrício et al. 2004) such as atmosphere or comfort. On the other hand, experience components (ECs) are the customer internal responses to the company offer which constitute the experience, such as cognitive or emotional responses (see Figure 1).

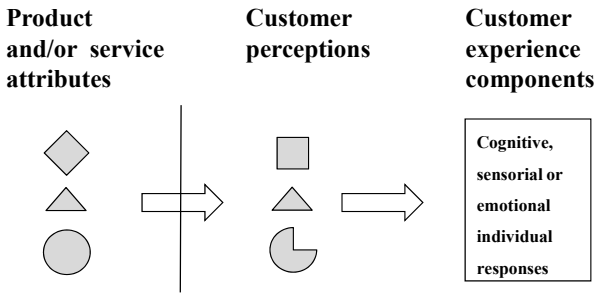

Figure 1 – Customer experience creation framework with product(s) and/or service(s)

The customer experience is therefore extended from the first until the last moment of customer contact with the firm; it is driven by various EFs, some of which are not controlled by the company (e.g. the influence of other people) (Pullman & Gross 2004; Verhoef et al. 2009); and it consists of diverse ECs such as cognitive and emotional responses (e.g. Gentile et al. 2007). Within EFs, affective or hedonic factors such as being in control or efficiency have more potential than instrumental or functional ones to delight customers (Chitturi 2003; Neal et al. 1999). From the engineers' and designers' perspective, EFs (see Figure 1) are considered experience requirements (ERs), i.e., the EFs that drive the customer experience, such as comfort, are used by engineers as customer ERs that should be incorporated into the design of the PSS. Therefore EFs and ERs are both related with the customer perceptions of product and/or service attributes, from respectively the clients' and designers' perspective. As this paper focuses on methodologies for the design of PSSs, we will use the term experience requirement or ER. The complexity of the customer experience process through all moments of customer interaction with various ERs is a challenge to their incorporation in the development of PSS offerings.

Product-service systems

The economy is evolving to the combined offering of products and services, such as in the case of Xerox or Canon with their "pay per copy" lease and take-back program. This subject of PSSs has also deserved the attention of several researchers (e.g. Baines et al. 2007; Doultsinou et al. 2009; Maklan & Klaus 2011). Due to the different nature of products and services, their combination requires adequate integration of their characteristics. Services differ from products because they are intangible, they have heterogeneous performance, and they are produced and consumed simultaneously (Parasuraman et al. 1985). Moreover, while service providers usually shape the service with their customers, who also participate in its delivery process, many product manufacturers do not yet have contact with the customers during the design phases (Fisk et al. 2008; Morelli 2002). Therefore, offerings that consist of product(s) and service(s) may be incongruent and may not adequately meet customer requirements (Morelli 2002). Extant research, which was synthesized by Baines et al. (2007), identifies three types of PSSs:

(1) Product-oriented PSS: involves providing the product(s) in a traditional manner, while adding supplementary services to it (e.g. after-sales service);

(2) Use-oriented PSS: selling the use or availability instead of the ownership of a product (e.g. leasing, sharing);

(3) Result-oriented PSS: selling a result or capability of the combined offering (e.g. web information replacing directories, or laundering clothes instead of a washing machine).

Incorporating ERs into the development of PSSs is therefore a challenge, as it requires an integrated design of their different product and service elements to enhance the customer experience. For such an offering to be effectively designed, its elements have to be integrated from the client perspective into a coherent system, which requires early involvement of the customer with the providers of the different product and service elements that constitute the PSS (Baines et al. 2007).

Design methods

New Product Development (NPD) and New Service Development (NSD) methodologies used for the incorporation of customer requirements are well established research areas (e.g. Cooper 1990; Shostack 1984; Ulrich & Eppinger 2007). Conversely, methodologies used in new PSS development (NPSSD) (e.g. Halen et al. 2005; Maussang et al. 2009) typically focus on the detailed specification of products or alternatively on the service process parts. This usually reveals inconsistencies in either part of the PSS. With another focus, Kansei Engineering has been used (e.g. Kuang & Jiang 2009; Nagamachi 1995; Schütte et al. 2004) in the development of new products but also of new services by associating their respective properties to affective and sensorial requirements. Even though this method has the potential to be used in NPSSD to enhance the customer experience, additional efforts are needed for a better identification of ERs and for inter-company collaboration in order to enable the incorporation of ERs in PSSs.

Travel experience

Public transport is a pertinent ground to study the customer experience, as previous studies have shown that the travel experience is formed through all moments of contact between the customer and the firm, including interactions before and after the actual trip

(Carreira et al. 2012b; Carreira et al. 2010). These studies have also disclosed that the travel experience is influenced by a rich set of ERs, some of which go beyond the control of transport providers such as social environment or atmospherics. Moreover, Carreira et al. (2012b) found that the travel experience comprises a holistic set of customer responses such as cognitive, sensorial or emotional. On the other hand, transportation is a rich setting for the study of PSSs, as transport solutions are enabled by a mix of products and services, such as the core transportation service, the vehicle, the ticketing service, on-board entertainment, or the physical facilities in waiting areas.

Similarly to result-oriented PSSs, in public transportation the customer pays for the provision of agreed results, such as being transported to a destination. Nevertheless, vehicle manufacturers usually design their vehicles separately from transport providers, who then adapt their transport service to the vehicle in case. Additionally, the whole transportation development process is done with scarce collaboration of passengers, which often causes a misfit between the customer desired experience and the service provided.

Contribution

To address the aforementioned challenges, this article extends the Kansei Engineering method to better incorporate ERs into the design of PSSs, with an application to the design of new bus interior and bus transportation service concepts. The extension of the method comprises an in-depth study of the customer experience and the involvement of an inter-company multidisciplinary team along the design process. The customer experience study results feed the work of the multi-company team of experts, who use Kansei Engineering related tools to perform the association of emotional words to PSS properties and to complete the subsequent stages of the process. The proposed extension of the Kansei Engineering method contributes to a better incorporation of customer ERs into the design of PSS, and to an integrated development of PSSs by involving both product and service companies in all phases of the process.

Outline

Most customer experience studies are conceptual, and extant research is limited in methodologies for the incorporation of customer ERs into PSSs. Therefore, section 2 covers extant literature on customer experience, PSSs and methodologies traditionally used in NPD, NSD, and NPSSD, and the Kansei engineering method is explained.

Section 3 presents the research methodology and section 4 explains the extended Kansei engineering method, focusing on the two extensions: the in-depth study of the customer experience and the involvement of an inter-company multidisciplinary team along the different stages of the Kansei process. Section 5 describes the application of the extended Kansei engineering to mid-distance bus trips, and is followed by discussion in section 6.

2. Literature review

Customer experience

Customers always have an experience, good or bad, when using a product or a service (Berry et al. 2002; Carbone & Haeckel 1994). Thus it depends on a company's ability for originating positive experiences by involving the various ECs, such as cognitive, sensorial or emotional responses through all moments of contact with the company's offer (Gentile et al. 2007; Hekkert 2006; Mascarenhas et al. 2006; Verhoef et al. 2009). To reach a high level of customer satisfaction, companies need to understand the customer perspective (e.g. Patrício et al. 2008; Pullman & Gross 2004), in order to design and incorporate the experience requirements (ERs) in their offering. Consequently the understanding of customer requirements is considered a fundamental part of design in general (Engelbrektsson 2002; Luchs & Swan 2011; Rosenthal & Capper 2006; Zhang et al. 2011), and more concretely of user-centred design (Kouprie & Visser 2009; Kristensson et al. 2004). In addition, Hekkert & Leder (2008) argue that an in-depth understanding of the customer experience is a necessary step to better incorporate it in innovative offerings that enable affective and sensorial responses.

However, according to Ulwick (2002, p. 92), "customers should not be trusted to come up with solutions, as they are not expert or informed enough for that part of the innovation process". From this perspective, it should be the engineer's or designer's job to define the technical specifications based on customer expected outcomes. However, doing that effectively depends on the ability of the company to know how to study customers, and to use adequate methods to identify their stated or latent expected outcomes, and then to "translate" this knowledge into concrete solutions. Thus, the design activity must be projected on new dimensions because customers experience the extended process of searching, acquiring, using or remembering company offers as a consequence of instrumental and especially of hedonic or affective requirements (Chitturi et al. 2008). Moreover, an experience can be more effective and memorable

when it engages more senses (Pine & Gilmore 1998), while the sensory perception of an object or environment is defined as aesthetics (Hekkert & Leder 2008). Consequently, the aesthetic concept is not limited to the visual domain; things can also be aesthetic or pleasant to listen to, touch, smell, or taste (Hekkert & Leder 2008).

An experience is inherent in every customer interaction with a company. Nevertheless there is still incomplete understanding of the customer experience creation process, in particular associated to public transportation. Extant research on customer experience has been mostly conceptual, and research on the translation of ERs into NPD and NSD is still scarce.

Product-service systems

Designing for the customer experience is crucial for developing new offerings, but providing new products or services alone is no longer enough. More than product ownership or service provision, customers always look for desired outcomes and value-in-use (e.g. Maklan & Klaus 2011; Shehab & Roy 2006). The importance of adding services to manufactured goods has been increasingly noted since Vandermerwe & Rada (1988) published their study on the servitization of businesses. Both economy evolution and product design research reflect this trend of providing offers that aim at enhancing customer satisfaction by combining products and services. On the one hand, benchmark providers (e.g. Disney theme parks or Hard Rock Cafes) (see left side of Figure 2) already shifted their emphasis from traditional product selling, to service provision, and finally to enable unique and personal experiences to their customers that increasingly make use of products and services (e.g. Berry et al. 2002; Carbone & Haeckel 1994; Pine & Gilmore 1998). The product design literature has also followed this trend (see right side of Figure 2), evolving from developing isolated products, to developing products with supplementary services, and more recently to designing systemic solutions that combine product(s) and service(s) (e.g. Maussang et al. 2009).

Companies have considered products separately from services for a long time. However, around two decades ago (Vandermerwe & Rada 1988), the "servitization" of products has grown in the economy, while in recent years the "productization" of services has also become relevant. Within this paradigm, companies have to be able to provide more complex combinations of products and services, i.e. systems that allow customers to co-create the experience they want without requiring them to own the products involved in the co-creation (Normann & Ramírez 1993; Vargo & Lusch 2004).

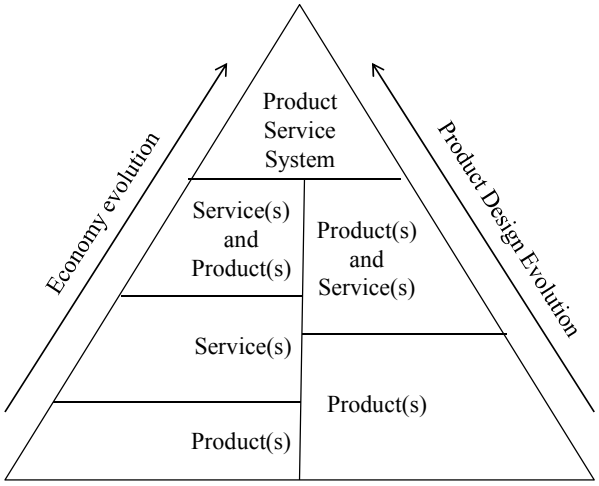

Figure 2: Evolution of economy offers and product design (adapted from Baines et al. (2007))

The challenge is then for companies to sell and deliver PSSs that customers will readily pay for.

From the customer point-of-view, a PSS is an integrated offering, even though it results from a combination of product and service elements. In particular, mid-distance bus transportation originates a holistic travel experience based on vehicles, physical facilities, services and other attributes outside of the provider control, such as the social environment or waiting time (e.g. Carreira et al. 2010). The product and service elements are usually separately designed by different companies, such as vehicle manufacturers and transport providers, while the other uncontrolled attributes are dependent on external aspects such as other passengers' behaviour or traffic. In addition, customers are rarely involved in that design process. This frequently results in an incoherent PSS that is not able to support a smooth customer experience. Further research is therefore needed for a more integrated design of PSSs that effectively enhance the customer experience.

Design methods

Traditionally, NPD methods have focused on product design and are therefore centred on requirements associated to product functionality. Quality Function Deployment (QFD) (Hauser & Clausing 1988) is probably the most used NPD management approach in industries around the globe, having many variations (e.g. Kuo et al. 2009; Zhang et al.

1996). QFD consists of gathering the "voice of the customer" in logical groups and in trading-off between those customer requirements according to their relative importance. Moreover, it involves performing concurrent analysis, choosing the adequate technical specifications and how they relate to the customer requirements and finally assessing the correlation between each of the specifications. The house of quality is a kind of conceptual map that provides the means for inter-functional planning and communication. Ulrich and Eppinger's (2007) needs-metrics and competitive benchmark matrixes constitute a simpler approach than the house of quality, which starts with the list of customer requirements and results in the elaboration of a list of correspondent metrics, or technical specifications, each having ideal and marginally acceptable values. Axiomatic design (Suh 2001) is more concerned with mapping, and maintaining the independence of functional requirements while converting them into design parameters in order to minimize the information content of the design artefact. This method aims at optimizing product design to eliminate design attributes which are not related with any function. NPD methods are therefore focused on the translation of customer functional requirements into product technical specifications, and are limited to incorporating functionality in physical goods.

Despite the fact that some of the methods just described are also applied in the service development context (e.g. QFD applications by Miyoung & Haemoon (1998) or Herrmann et al. (2000)), the specificities of services such as intangibility, inseparability of "production" and "consumption", or variability in the service performance require different approaches (Menor et al. 2002). Therefore, mapping the customer journey using Service Blueprinting (Shostack 1984) or metaphors often related to theatre or film (e.g. Grove et al. 1992) are found in the literature as possible process-based methods used in the NSD context. More recently, associated with more complex services and experiences, Service Experience Blueprinting (Patrício et al. 2008) uses methods such as Goal Oriented Analysis, Conceptual Modeling, and also Service Blueprinting. These methods were developed in different fields such as interaction design and service marketing, and when used in association enable the incorporation of customer experience requirements in the design of new technology enabled multi-channel service systems. Nevertheless these methods still take a process approach.

Servitization extends the traditional functionality of a product by incorporating additional services and by adding value to the tangible goods provided (Vandermerwe &

Rada 1988). Miles (2008) considers that the addition of services to a physical product is an increasingly important innovation element from the customer point of view.

Some specific NPSSD methods already exist, which are essentially based on the definition of alternative PSS use scenarios. For instance Maussang et al.'s (2009) method evolved from NPD methods to also address services, because it focuses on the detailed specification of physical products, as well as on the interactions with the service units of the PSS or other objects or services outside the PSS. Nevertheless, as the method only specifies the product properties and uses an external functional analysis to explore the different scenarios of the service provision process it is still better adapted to product-oriented PSSs. Even though the use of predictable scenarios enables a better understanding of the PSS use process, it only highlights expected elements of PSS solutions and may neglect new or unexpected events.

The methods proposed by Halen et al. (2005) and Morelli (2003) also consist of using hypothetical alternative scenarios in order to understand what the customer would do in each stage of the PSS service provision while interacting with the physical product(s) involved. Halen et al's (2005) method consists of several steps, such as (1) strategic analysis, (2) exploration of opportunities, (3) PSS idea development, (4) PSS development and (5) preparation for implementation, to detail the characteristics of the product and service elements of the system based on the scenarios. On the other hand Morelli's (2003) approach enables developing a PSS on the basis of product and service functional performance requirements selected by the designer in association with the pre-defined scenarios. Using this method the customer interaction with a PSS is not just mediated by the physical product because organisational and social aspects of the PSS are also considered, but from the alternative scenarios' perspective. Halen et al.'s (2005) and Morelli's (2003) methods for PSS development originate definitions for its general requirements but do not provide enough detail to inform subsequent stages of the development process. For example, in a concrete NPSSD case these methods may define that specific equipment is required or that personnel training is needed, but they do not define how many equipment units are required, or what personnel skills are considered necessary. With those approaches, engineering designers are able to understand the whole functioning of the PSS but cannot obtain specific technical criteria to develop the products involved in the PSS. Therefore these PSS methods are more tailored for use-oriented PSSs because they are focused on the service process and stages.

Customer ERs comprise both instrumental and affective attributes associated to product and service elements of a PSS. These ERs should be understood from a holistic perspective and should also be effectively incorporated into an integrated design of the PSS. The review of previous literature shows that existing methods do not fully address the customer experience from a holistic perspective, taking into account the rich set of ERs, as well as the cognitive, sensorial and emotional components of the experience. In addition existing methods do not adequately incorporate ERs into PSSs because they evolved either from NPD or NSD methods and they still focus on product specification or on service process, without an effective integration of all the different PSS elements.

Kansei Engineering method

The Kansei engineering (Kansei) or emotional engineering method (Nagamachi 1995) constitutes a different approach from the previous methods. Kansei is a Japanese word which translated into English might mean "consumer's psychological feeling and image" (Nagamachi 1995, p. 4). Kansei specially aims at incorporating affective requirements in new products or services by associating Kansei or emotional words to specific product or service properties, usually involving a group of experts, engineers or designers of a company. This method has been successfully used in the development of different products such as cars (Jindo & Hirasago 1997), bottles (Barnes & Lillford 2009) or mobile phones (Kuang & Jiang 2009). However, studies conducted on internet-services showed that Kansei has a much wider applicability than only in tangible artefacts (Nishino et al. 1999). Therefore, in Kansei the term product should hereafter be understood in its broadest sense, involving not only artefacts/ goods but also services (Schütte et al. 2004).

The main phases of the Kansei method are the (1) Choice of domain, (2a) Semantic description, (2b) Description of properties, (3) Synthesis, and (4) Test of validity. Kansei has different variants that go from pure qualitative data analysis to complex computational modelling approaches (Schütte et al. 2004). Frequently, category classification and computer aided system variants are combined to define which product attributes to test and then to specify what variations of those attributes to include in a final model. Different tools and statistical methods support the use of Kansei to test a set of variations of the product through carefully designed experiments to identify their contributions to the overall affective quality of the product.

Choice of domain

In this stage the group of experts, who usually belong to the same organization, defines *ad hoc* the Kansei domain or the boundaries of the analysis. The experts collect images, possible concepts or even innovative ideas from various sources such as magazines, reviews and user opinions that cover the domain as much as possible (e.g. Roy et al. 2009).

Semantic description

After the choice of domain, the experts brainstorm on it, and identify and write down Kansei or emotional adjectives, verbs or small expressions on cards associated not only with existing solutions, but ideally to new ideas and visions related with customer impressions of the product. Even though this stage represents a critical step, it is usually also performed *ad hoc*, which means that any idea that is not elicited and written down might not be explored in further analysis. These low-level Kansei words or expressions can then be grouped into high-level ones using tools such as the Affinity diagram (Bergman & Klefsjo 1994).

Description of properties

The existing, innovative and company image related product properties associated with the chosen domain are identified by the experts according to Figure 3, taking into consideration the customer determination of relative importance for each existing property, and the expert assessment for the innovative and company image properties. To contribute as much as possible to novel offerings, the selection of properties should reflect as many innovative attributes as possible, which is symbolized by the thicker arrow in Figure 3. Afterwards the experts evaluate each property among the three groups

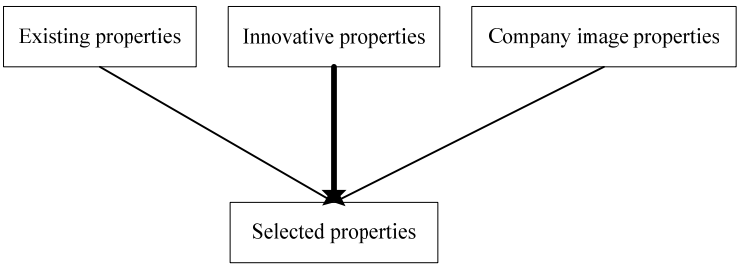

Figure 3. Selection of most relevant product properties (adapted from Schütte et al. (2008))

and select and order them into a single list using tools such as Pareto diagrams (Bergman & Klefsjo 1994).

Synthesis

Subsequently the selected product properties are synthesized with the high-level Kansei words to define which properties evoke which semantic impact using Nagamachi's (1997) category identification technique. In this stage the experts additionally identify each Kansei word most relevant sensorial impact taking in consideration that the term Kansei is the multi-sensorial impression somebody gets from a certain artefact, environment or situation (Schütte et al. 2008).

Test of validity

The validation phase involves the choice of representations (e.g. images) that symbolize different combinations of the most relevant product properties described in the previous stage. The representations are then shown to customers in order for them to evaluate each one on a semantic differential scale associated with each of the Kansei words. Hayashi's quantification theory type I (Ishihara et al. 1995) is used to analyze the customer evaluation of representations to find Kansei words-properties relations. Depending on the significance of the results obtained in this step, the description of the two semantic and property spaces may need to be updated and the synthesis stage run again until the results from this iteration process are satisfactory in order for a model to be built.

In summary, as Kansei Engineering engages the experts and takes on the customer perspective through the whole process, it intrinsically consists of a systemic approach to the potential association of ERs to properties, but it does not yet address the development of new PSSs. Additionally, the further validation with customers may contribute to their experience enhancement. However, this method relies on experts to explore *ad hoc* the Kansei domain and properties, as well as the customer sensorial and affective impacts. Moreover, as the method is traditionally used within a single product/organization, it makes it difficult to develop PSSs, because that would require the involvement of a multi-company team. New evolutions are needed to better incorporate the customer perspective into an integrated development of PSSs.

Literature review summary

From the customer point of view, the experience is developed from the first until the last contact with a company, and it is driven by a rich set of ERs that originate cognitive, sensorial or emotional responses. On the other hand, customers perceive a PSS as a whole offering, although it may result from a complex combination of products and services. Design methods should therefore evolve to better incorporate this holistic perspective of the customer experience into integrated PSS solutions.

Traditional NPD methods are structured and essentially focused on the association of requirements to specifications, while NSD methodologies mostly involve visual representations of the service process phases. Some NPSSD approaches already enable designers and engineers to understand the systemic product and service integration, but they provide incomplete design solutions because they essentially focus either on the product specification or on the service process, respectively evolving from NPD or NSD methods. Additionally they are not adapted to incorporate ERs that involve both instrumental and affective attributes.

Therefore a semi-structured method like Kansei Engineering has the potential to incorporate ERs in NPSSD, because it is implemented from the customer perspective. However, the choice of domain and the description of semantic and properties space is usually performed *ad hoc* in Kansei Engineering by experts that belong to a single company. This paper contributes to fulfil these gaps by extending Kansei Engineering with (1) a prior structured study of customer ERs in order to incorporate a holistic experience perspective into PSS specification; and (2) the involvement of a multi-company team of experts along all stages of the development process for an integrated design of the different PSS elements.

3. Research methodology

The research process followed design-science guidelines according to Hevner et al. (2004). Those guidelines are intimately associated with problem solving procedures and have their roots in engineering and the sciences of the artificial (Simon 1996). Hevner et al. (2004) propose a design-science approach whenever research is related with the creation of innovations that define the ideas, practices, technical capabilities, or artefacts, which are not a result of natural laws or behavioural theories. Therefore this article developed an extension to the Kansei engineering method, by incorporating a diverse set of experience requirements (ERs) in the design of new PSS, combining

product (e.g. vehicles, physical facilities) and service (e.g. the actual transport provision, or the off-board services) elements of the company offering. According to these guidelines, the extended Kansei engineering method was developed in two phases, (1) the initial exploration and understanding of the customer experience process, in particular ERs and experience components (ECs), and (2) the incorporation of ERs into new PSS solutions.

The first phase was the study of the customer experience that consisted of an extensive literature review and also qualitative (Neuman 2006; Strauss & Corbin 1998) and quantitative (Churchill 1979; Gerbing & Anderson 1988) approaches. This study enabled a more efficient incorporation of the customer ERs because it provided a better understanding of the customer experience affective realm and of the product or service properties associated to it. Observations and semi-structured interviews (Pawson 1996) offered qualitative in-depth information that was used to develop a survey questionnaire, which was self-administered to the customers and the data quantitatively analyzed.

In the second phase, the Kansei engineering steps were applied using action research (Harris 2007; Herr & Anderson 2005), through which the researchers were also practitioners within the organizations involved. Harris (2007, p. 11) defines action research as "an informed investigation into a real management issue in an organization by a participating researcher, resulting in ....new knowledge to organizational members....which may also inform the research community". The participating researchers led a group of experts in the application of Kansei and thus had reasonable control over the other participant activities in relation to its implementation. Additionally other quantitative analysis (e.g. Hair et al. 2009) were performed to validate the extended method after testing its results with the customers.

The extended method was evaluated taking Hevner et al.'s (2004) design-science generic guidelines into consideration, and its contribution to new design methods assessed according to Forlizzi et al. 's (2008) criteria, which are: process detail, invention, relevance, and extensibility. First, the extended Kansei is described in detail so that the design process can be replicated and the rationale for method selection can be understood. Second, the specific application of the method demonstrates that it addresses a novel approach for incorporating ERs into PSSs, which was not offered by other design methods. Finally, the application of extended Kansei to the development of public transportation PSSs, involving bus manufacturers and transport providers demonstrates its relevance and suggests that it can be extended to other transport settings or even other PSS contexts.

The theoretical extension to the Kansei method is described in the next section and is followed by the concrete one applied to mid-distance bus transportation, which reveals its significance and validity for generic experience and also for specific travel experience incorporation into NPSSD.

4. Extended Kansei engineering

With the research objectives in mind, the Kansei engineering methodology was enhanced as shown in Figure 4 by extending it with two new aspects. Firstly, the model involved an in-depth study of the customer experience to elicit a holistic set of experience requirements (ERs) and enable their incorporation in the design of a PSS, taking the customer responses or experience components (ECs) into consideration. Secondly, the extension was used to share and discuss the study results with the companies interested in the development of a new PSS in order for them to understand the customer experience creation process; a multidisciplinary inter-company team was engaged to support the development of such integrated offering from the customer holistic perspective. Compared with traditional Kansei Engineering (1) the in-depth study provided a better understanding of the customer experience realm, especially related with affective attributes, through all moments of the customer experience; (2) the involvement of inter-company team members in the extended method through all its stages enabled the alignment between the product and the service elements of the PSS because the customer extended experience was better acknowledged, and the different team members' perspectives were brought together.

Study of the customer experience

To achieve an in-depth understanding of the customer experience, the extended Kansei method consisted of both qualitative and quantitative studies. The first stage of the study used qualitative methods (e.g. Neuman 2006), which involved both interviews, which are considered more adequate for identifying requirements that customers are able to verbalize, and observations, which are considered more appropriate for discovering customer latent needs (e.g. Dahan & Hauser 2001; Sandén et al. 2006). The proposed extended Kansei engineering method involved the elaboration of specific protocols for the qualitative activities undertaken, to provide guidance for the identification of a holistic set of customer ERs and ECs. All the process of qualitative data preparation and

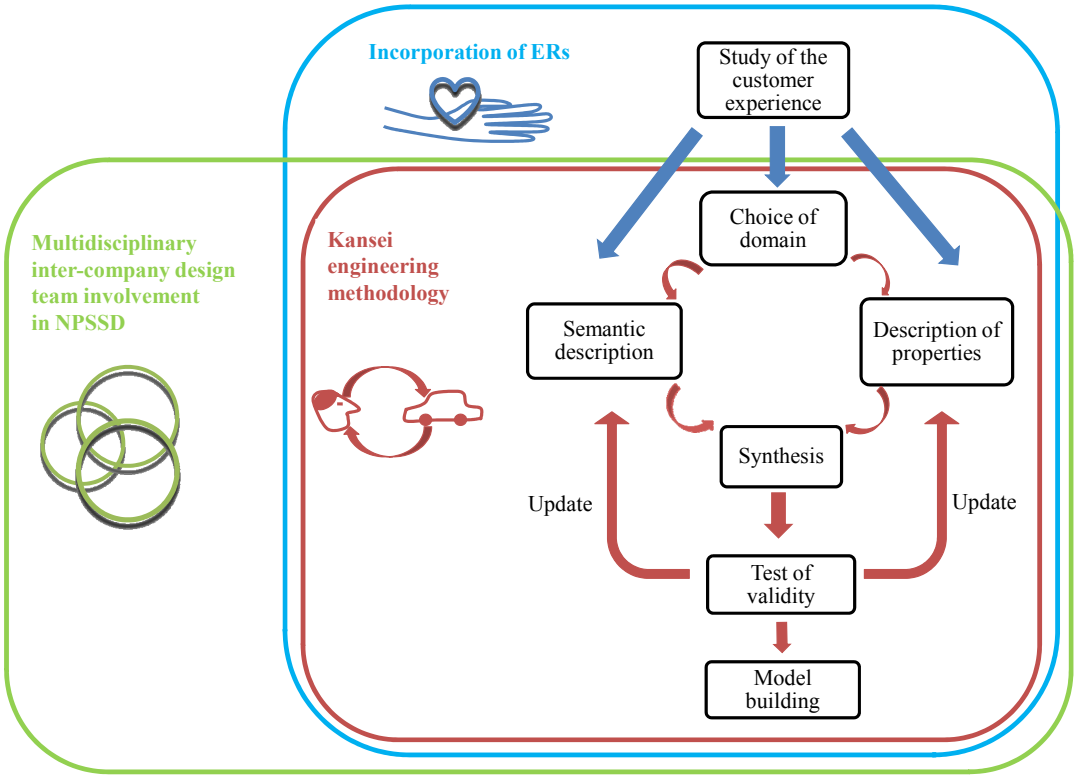

Figure 4. Extended Kansei experience development model (adapted from Schütte et al. (2004))

collection contributed to better understanding customer verbal comments and actions, which facilitated their content analysis (Neuman 2006).

Based on the qualitative results, a questionnaire was developed in the second stage of the study involving a sequence of steps in a scale development approach (Churchill 1979; Gerbing & Anderson 1988), and was then administered to customers. Survey data was then subject to quantitative analysis (Hair et al. 2009) to identify the most relevant customer ERs needing further improvements.

Qualitative methods were a powerful tool to understand the complexities of phenomena that were considered insufficiently studied (Parasuraman & Zinkhan 2002), as their more open nature allowed the researcher to explore unexpected patterns and issues. On the other hand, the quantitative approach enabled the identification of customer satisfaction determinants, through exploratory and confirmatory factor analysis, and also structural equation modelling. With this Kansei method extension the customer experience perspective was better understood because the study provided in-depth information related to the semantic and property domain during all the phases of

customer interaction with a PSS, which enabled a more thorough and easier data analysis in the following development phases. The multidisciplinary team was also indirectly involved in this study of the customer experience, especially contributing to the elaboration of the qualitative protocols, and also of the questionnaire.

Kansei engineering methodology

After the previous new phase involving the customer experience study, the method continued with the stages of Kansei engineering described in section 2 and depicted in the inner square of Figure 4. However, differently from the typical Kansei approach, which usually involved engineers and designers from a single product manufacturer or from a service provider, the current extension engaged experts from more than one organization. These experts worked in the companies that were respectively involved in the product and service elements of the PSS, but they were asked to take on the "systemic" or customer perspective as they collaborated in the multidisciplinary team. The preliminary qualitative and quantitative study results were shown and discussed with the team of experts and also provided them with a more holistic perspective of the customer experience, based on the elicitation of the customer expressed or latent ERs.

During this inter-company collaborative phase it was crucial that all the team members were actively involved and genuinely committed in generating a complete and innovative data analysis, in relation to the Kansei domain under study through each step of the method. While brainstorming on the semantic and property spaces, the experts should be open-minded and should try not to be influenced by current manufacturing or technological limitations, in order to facilitate the future development of breakthrough PSS solutions. As a result, the proposed extended method enabled the incorporation of customer ERs, by establishing relationships between specific innovative PSS properties, Kansei words, and customer sensorial responses.

Finally the results of the multitasked team analysis were shown to the customers for validation of the relationships established. Further multivariate data analyses in this stage provided assessment of the method rigor and reliability, by quantifying the impact of PSS properties on Kansei words. In the next section, a concrete application of the generic extension to Kansei engineering is presented in detail.

5. Application of the extended Kansei engineering to mid-distance bus transportation

The extended Kansei method was applied to the development of new bus transportation concepts and involved a bus body manufacturer and a regional transport provider. The new concepts were developed from a PSS perspective, taking in consideration that mid-distance bus transportation involves product elements such as the vehicle or the bus terminal facilities, and also service elements such as the transportation itself or the on-board entertainment. The application included the formation of a Kansei team which engaged members from both bus constructor and transportation companies, comprising bus body engineers and designers and mid-distance transport managers. The team consisted of four permanent experts and other ones who were not present during all meetings, but were also involved in the vehicle and transportation service development.

Following the extended Kansei engineering approach described in the previous section, the first phase involved an in-depth study of the customer experience. The data was gathered in two phases, one qualitative and the other one quantitative, involving the passengers in the search for a holistic perspective of travel experiences, which enabled identifying a rich set of experience requirements (ERs) and experience components (ECs), before, during and after a trip.

In the second phase, the study results were shared with the Kansei team. The qualitative and quantitative results enabled the team to brainstorm on the most relevant ERs associated to public transportation and to assess the travel experience offered by the transport provider involved in the project. Throughout this process, the team discussed the travel experience study overall results to analyze the broad customer perspective and also to identify which ERs should be improved in the short, and in the longer term, also taking in consideration the companies' operational and strategic objectives. A previous analysis of the development departments of the participating companies revealed that neither of them used formal methods in their NPD or NSD processes. Therefore the overall Kansei method, its specific techniques and objectives were explained in detail to all the team members. The study results were used for applying all the principles of Kansei Engineering in weekly meetings, several workshops, and bus trips (see Figure 5), which were moderated by the researchers, with the objective of enhancing public transportation in the Kansei domain(s) chosen. Finally, the passengers were again involved through administration of a questionnaire to validate specific associations

Figure 5. Images of the multidisciplinary team meetings

between bus trip properties and Kansei words, which resulted from the Kansei team meetings.

Study of the travel experience

This study aimed at gathering a rich understanding of the passenger experience, with a comprehensive identification of travel ERs to inform the design of the PSS. The passengers were travelling between different Portuguese cities in a regular bus service that took 2 hours on average. During the qualitative phase passengers were observed inside buses and in bus terminals, and 27 of them were interviewed (see Carreira et al. (2012b) for further details of the qualitative phase). Observation of bus passengers facilitated interview content analysis (Neuman 2006). The qualitative study allowed for a better understanding of the passenger experience from a holistic perspective, both in terms of expressed and latent ERs, and also of ECs such as passenger cognitive, sensorial or emotional responses to the interaction with all product and service elements of the bus trips. This phase showed that an integrated conception and management of the overall trip is important for the passengers, who mentioned diverse products, such as the vehicle or the individual seat, and various services aspects, like the information provided or the staff's professionalism during all moments of transportation.

Building upon the qualitative study, the survey questionnaire was then developed and distributed to obtain and validate a scale to measure the travel experience. After pre-testing it, the survey was administered during the bus trips to 116 passengers, who were asked to evaluate the importance of each item and the respective performance (using a seven-point Likert scale between 1 and 7) in relation to the specific trip they were having. The questionnaire also assessed passenger emotions, travel satisfaction, overall value and loyalty intentions in relation to the transportation provider. Taking into account scale development guidelines, the analysis of survey data comprised exploratory and confirmatory factor analysis to identify the dimensions of ERs and ECs, and was followed by structural equation modelling to analyze the impact of the different ERs (experience drivers such as individual comfort or on-board entertainment), on ECs (experience components such as emotions or satisfaction) (Hair et al. 2009). Factor analysis originated the aggregation of the questionnaire items into eight travel ERs (see Table 1 and also Carreira et al (2012a) for further quantitative details). These requirements comprised both products, such as vehicles or off-board facilities, and services, such as information provision or on-board entertainment aspects, covering the different stages of the customer travel experience in the bus terminals or during a trip.

Table 1. Travel ERs and associated items identified in the quantitative study

- *Overall comfort* (e.g. comfortable interior temperature and sound, being able to sleep, aesthetic appeal of the bus trip),
- *Body comfort* (e.g. individual space and body seating support),
- *Safety* (e.g. access to and from the bus, easy-to-use seatbelts, bus maintenance and knowledge of the safety procedures),
- *Social environment* (e.g. ability to talk to other passengers or knowing new people),
- *Staff's skills* (e.g. friendliness, professionalism or driving ability),
- *Information provision* (e.g. pertinent information availability, adequate identification of the bus and stops, departure times),
- *On-board entertainment* (e.g. having good conditions to read, use a laptop or hearing music) and
- *Waiting time* (e.g. punctuality, available schedules, fast trip).

The quantitative study identified the mains dimensions of ERs, and also allowed the analysis of importance and performance of attributes. This analysis was performed and discussed with the Kansei team to identify the main PSS areas for potential improvements. Following Martilla and James‘s (1977) importance-performance analysis, each point on Figure 6 displays the mean value for the importance (horizontal axis) and performance (vertical axis) for the questionnaire items of the eight ERs. The horizontal and vertical black bold lines represent the overall mean for all the items in terms of importance (vertical line) and performance (horizontal line). These lines help visualize the ERs' relative position to the overall mean in terms of importance and performance, and the lines divide the figure in four quadrants. The lower-right quadrant depicts the attributes that had relatively high importance and low performance. The upper-right quadrant depicts the attributes that had relatively both high importance and performance. Taking this analysis into consideration, improvement efforts should be first concentrated in the lower-right quadrant, because the ER overall comfort revealed high importance for the passengers and also low performance during current trips. Efforts on upper-right and lower-left quadrants could also produce interesting results in terms of enhancing the customer experience. ERs that had both high importance and performance, such as waiting time or safety, should still be managed in order to maintain their current performance. On the other hand, ERs with low importance and performance for the global passengers, such as on-board entertainment might have the potential to increase the travel experience of specific passenger profiles, e.g. passengers of longer trips. Therefore overall comfort was selected as the ER to be improved in the following stages of the extended Kansei.

The qualitative study enabled an in-depth understanding of the travel experience, with the identification of a rich set of ERs. The quantitative study enabled the identification of the main dimensions of ERs and the analysis of their impact on the experience outcomes such as emotions and satisfaction. Finally, the importance-performance analysis also helped better identifying the areas in need of further improvement. Globally, the studies of the customer experience enabled the project team to have a deeper understanding of ERs to better incorporate them into the development of new bus interiors and transportation service concepts, as integrated PSSs.

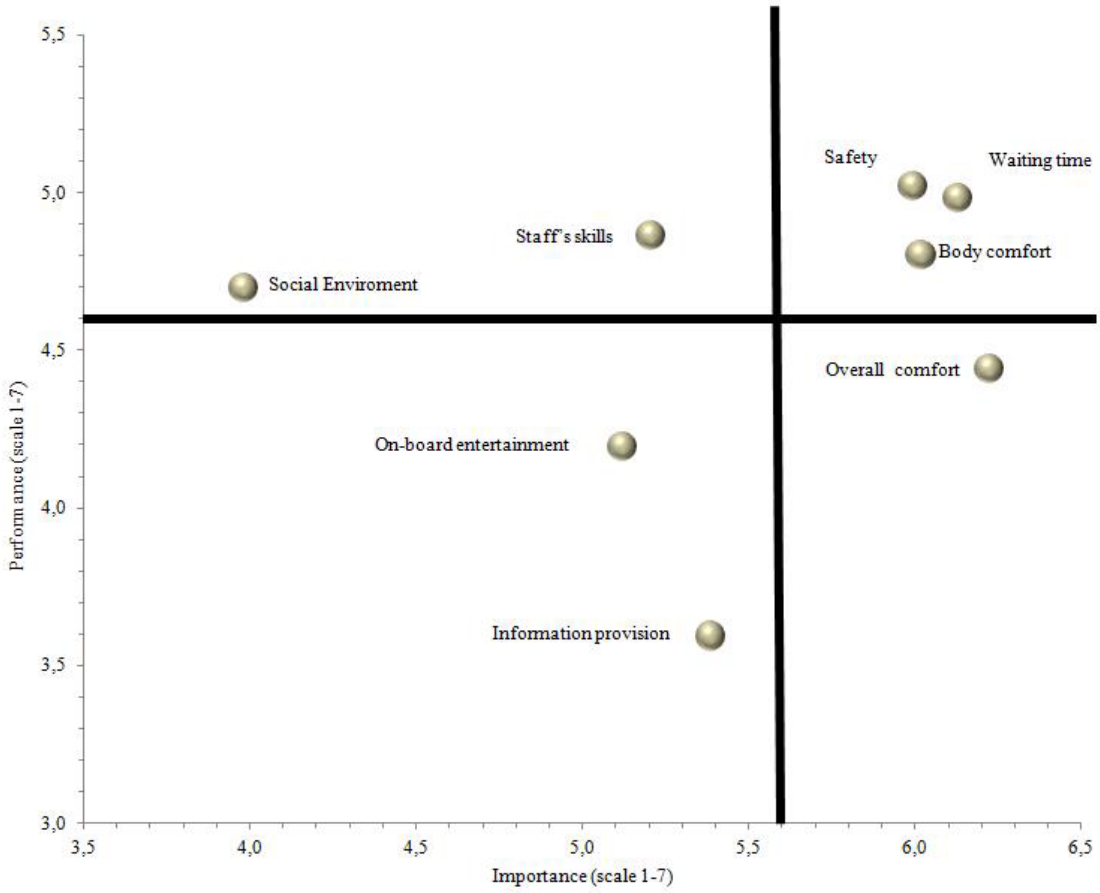

Figure 6. Importance-performance analysis for travel ERs

Kansei engineering methodology

The results obtained in the preliminary travel experience study served as input for the application of Kansei Engineering, which involved both bus designers and transport managers. Among the Kansei variants, some are more tailored to integrate qualitative data, while others require high computational efforts that originate a complex development process. Therefore, in order to enable the use of the qualitative and quantitative travel experience data, the current analysis combined category classification and computer aided system variants because of their applicability and proven success in industry and service case studies.

Choice of domain

All the Kansei team members reflected on the significance of the travel experience study results and chose the Kansei domain to be better analyzed. Therefore, the domain initially chosen for the application of the method was the ER dimension overall comfort. After several brainstorming sessions it was acknowledged that overall comfort involved

many product and service attributes, and it was a domain too broad to be analyzed without decomposing it. Therefore, taking into account the companies' strategic priorities, the item aesthetic appeal of the bus trip, which was associated to the ER overall comfort, was chosen as the domain for proceeding with the application of Kansei Engineering. In particular, the multisensory aesthetic appeal of the bus trip involved overall comfort conditions related with both product and service elements of transportation, respectively such as the ones associated to the vehicle and to the transport provision.

Semantic description

The Kansei or emotional words/ expressions were generated for the domains mentioned in the previous step, and reflected the passenger affective response associated to the ERs identified in the travel experience study. Taking in consideration that this is a critical step in implementing this method, the Kansei word generation for each domain was performed until there was no more word suggestion from any of the team members. In a first step, words were written down on post-it cards, and in a second step they were aggregated into logical groups (see Figure 7).

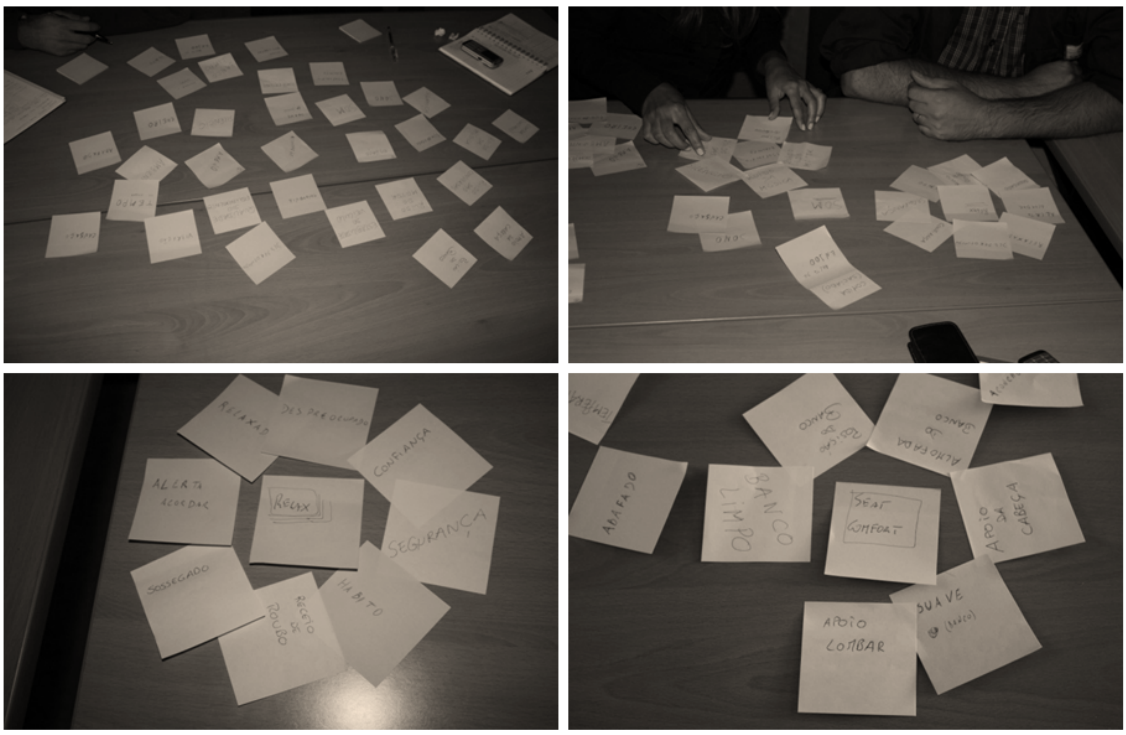

Figure 7. Kansei word generation and aggregation examples

In the exploratory semantic description approach, nearly 40 high and low level Kansei words were associated to the ER dimension overall comfort (see Table 2). Even though this contributed to a better understanding of the affective assessment associated to the global comfort conditions provided during the trips, this complex domain involved too many product and service trip elements with which the passengers contacted.

Table 2 – Kansei words for domain: overall comfort

Kansei words	
Level 0	Level 1
Infotainment	Information
	Entertainment
Interior appearance	Visual appearance
	Aesthetic Design
	Stuffy/sluggy
Quietness	Disturbing noises
	Silence
Ambient conditions	Temperature
	Fresh air
	Cleanliness
Visibility	Visibility outside
	Visibility across bus
	Spacious
	Claustrophoby
	Excess luminosity
Seating ergonomics	Ergonomic seating
	Soft touch
	Rest my head
	Strech legs
	Support my head
	Adjustable
	Arm support
	Easy to use
	Seat support
	Soft cushion
	Rigid seat
	Hard seat
Ride Smoothness	Ability to work
	Bouncing
	Motion sick
	Vibration
	Trembling

Thus, the Kansei or emotional words/ expressions were also generated for the more specific domain aesthetic appeal of the bus trip, which was an overall comfort item to which both companies involved in the Kansei team attributed a strong significance. More than 40 Kansei words were associated with this domain, which were then aggregated in four high-level emotional words that were *Functional layout, Visual Aesthetics, Well-being*, and *Overall sensorial perceptions*. These words were organized in multiple, hierarchical levels as can be seen in the Kansei words columns in Table 3.

Description of trip properties

After identifying the emotional expressions that were related with the Kansei domain in the previous step, the stage of description of trip properties followed. This stage dealt with the identification of the most relevant trip properties (see the Trip properties column in Table 3) associated with the domain aesthetic appeal of the bus trip, either from existing transportation solutions, new ideas or corporate image that potentially caused an impact on the Kansei words. The information obtained during the travel experience study and presented to the Kansei team was very valuable at this phase, specifically in assessing the passenger relative importance of the already existing trip properties. Additionally, the presence of the transport provider managers in the team provided further information about the passenger perspective (e.g. associated to hedonic or affective trip requirements) and about the service within which the bus would be employed.

In order for the method to originate novel transportation offerings, the selection of properties should reflect as many innovative trip properties as possible (see Figure 3), namely the ones which relate product and service elements of the public transportation PSS. Therefore the relative importance attributed to the innovative trip properties, i.e. which were still unavailable in the current trips, was mostly based on the Kansei team experts' knowledge and vision, while the importance related with existing properties was based on the passengers' feedback from the previous study of their travel experience. In respect to the company image related properties, it was found that neither of the companies had nor planed to have aesthetic appeal properties that distinguished their respective product and service offerings from the competition. As a consequence, there were no trip properties included that reflected the bus manufacturer and transport provider brands. In turn, the experts selected and ordered the most relevant trip

Table 3 (1). Synthesis results for domain aesthetic appeal of the bus trip

Kansei words			**Senses**	**Trip properties**
Level 0	Level 1	Level 2		
Pleasant sensorial perceptions	Safety perception		Vision, Audition	Driving ability; Driver not speaking at the mobile phone while driving; Luggage-rack design and finishing; Characteristics of decency-screens
	Tactile perception		Touch,Vision	Materials' finishing, coatings and colors
	Sound perception	Silence	Audition, Vision	Luggage-rack design and finishing; Other passengers' conversations or noise; Music on the sound system
	Smell perception		Smell, Vision	Other passengers' food; Shapes; Coatings and colors overall coherence (e.g. bus garbage bin)
Functional layout	Quality of the materials		All	Materials' finishing, coatings and colors; Characteristics of decency-screens (e.g. soft, robust); Seats' softness; "Hidden" bus interior mechanical parts
	Design		All	All
		Ergonomics		
		Accessibility		
		Functionality		
		Organized		
		Stowage		
		Minimalist		
		Simplicity (less is more)		
		Space		
		Involvement		
		Wideness perception		

Table 3 (continued) (2). Synthesis results for domain aesthetic appeal of the bus trip

Kansei words				**Senses**	**Trip properties**
Level 0	Level 1	Level 2	Level 3		
Visual aesthetics	Visual feelings			Vision	Material coating and color overall combinations; Shapes; Luminosity control; Indirect illumination; Clear and reflective colors of the bus roof interior; Illuminated bus roof interior; Staff's appearance
	Aesthetic coherence			All	Material coating and color overall combinations; Shapes
	Modern	Shapes		Vision, Touch	Rounded shapes
		Patterns		Vision, Touch	Material coating and color overall combinations; Shapes
		Color combinations	Warm	Vision	Material coating and color overall combinations; Shapes
			Neutral	Vision	Material coating and color overall combinations; Shapes
			Cold	Vision	Material coating and color overall combinations; Shapes
				All (especially vision and touch)	Material coating and color overall combinations; Shapes (e.g. rounded shapes); Other types of curtains or alternative ways of reducing outdoors luminosity
	Nice illumination (sources of light)			Vision	Clear, indirect illumination; Illuminated bus roof interior and gangway; Daylight transmittance of the windows; Not being sun blinded
	Luminous (materials)			Vision	Material coating and color overall combinations; Shapes; Reflective colors of the bus roof interior

Table 3 (continued) (3). Synthesis results for domain aesthetic appeal of the bus trip

Kansei words			**Senses**	**Trip properties**
Level 0	Level 1	Level 2		
Well being	Nice ambiance		All	Material coating and color overall combinations (e.g. soft seats); Shapes; Luminosity control; Illuminated bus roof interior and gangway; Staff's awareness and control of the passengers' comfort; Pleasant and relaxing music
	Airy		Vision, Smell	Rounded shapes; High-roof buses; Luminosity control; Fresh air renovation (but not cold air flow)
	Pleasant	Inviting	All	Material coating and color overall combinations; Shapes; Accessibility (e.g. stairs' low height, few stairs, telescopic stairway); Stairway and bus interior luminosity; Staff's friendliness and professionalism
	Tranquility	Atractive	All	Material coating and color overall combinations (e.g. materials' finishing); Shapes
		Cozy	Touch, Vision, Smell	Soft seats' appearance; Luminosity control; Materials' finishing; Right air flow (not too cold nor too hot)
			Audition	Insonorization (possibility of choosing the level of noise); Separation from other passengers to some extent; Pleasant and relaxing music
	Beauty		Vision	Material coating and color overall combinations (e.g. bus interior luminosity); Shapes

properties, which essentially reflected existing and innovative public transportation properties associated with the overall products or with the actual transportation service provision. For example, the three most significant properties chosen were (1) *shapes*, (2) *material coating and color combinations* and (3) *gangway floor lighting*. In the following stage the overall selected trip properties were synthesized with the Kansei words associated with the domain aesthetic appeal of the bus trip.

Synthesis

The association of the high and low level Kansei words to each of the trip properties and to sensorial perceptions was thoroughly performed by the multidisciplinary team in a word by word synthesis with the selected trip properties and senses, which is represented in Table 3. Firstly, each aggregated Kansei word or expression was selected, and then the trip properties and sensorial impacts that were related with it were identified. As in previous stages of the method, the collaboration of vehicle and transportation experts enabled a PSS perspective of the synthesis performed, instead of one only focused on the vehicle or on the transportation service. The synthesis stage enabled understanding the association between trip properties, and semantic and sensorial impacts, in order for those relationships to be tested with the passengers in the following stage.

Test of validity

The previous Kansei steps led to the identification of the trip properties that potentially caused an impact on the passenger affective response. Taking the three most relevant trip properties previously selected in consideration, i.e. *shapes, material coating and color combinations* and *gangway lighting*, the team identified the Kansei words, which were more frequently associated with those properties: *Nice ambiance, attractive, pleasant sensorial perceptions, high-quality materials, modern* and *luminous*.

Afterwards public transportation representations were selected that were associated to different combinations of the three most relevant trip properties. Considering that the Kansei team members included bus body design experts and transport managers, and also that the vehicle is the essential product part of transportation, they selected bus interior photographs as PSS representations that combined the selected trip properties.

To test the experts' association of trip properties to Kansei words, the photographs were then shown to 73 customers in order for them to evaluate each one on

a seven-point semantic differential scale associated with each of the related Kansei words. This stage included the generation of dummy variables according to the trip properties and categories (see Table 4). Given the four dummy variables involved in the analysis, a high variety of possible combinations might be obtained. To overcome combinatorial explosion, the orthogonal experiments were designed using the Orthogonal Design Tool provided by SPSS software as depicted in Table 5. The passengers answered the question "How does the interior look to you?" to evaluate each of the eight bus interior images on each Kansei using the scales represented in Table 6.

Table 4. Trip properties and respective categories associated to each regression explanatory variable

Trip property	**Category**	**Regression dummy variable**	
		Name	**Value**
Shapes	Rounded	Shapes	1
	Straight		0
Material coating and color combinations	Warm	CC_Warm	1
	Neutral		0
	Cold		0
	Warm		0
	Neutral	CC_Neutral	1
	Cold		0
Gangway lighting	Yes	Gang_light	1
	No		0

Table 5. Combination of the trip properties associated by the Kansei team to each photograph

	1	2	3	4	5	6	7	8
Variables:								
Shapes	0	0	0	1	1	0	1	1
CC_Warm	1	0	0	0	0	0	0	1
CC_Neutral	0	1	1	1	0	0	0	0
Gang_light	0	0	1	0	0	0	1	1

Note: As an example, images #5, #6 and #7 are perceived by the team as having a cold combination of Material coating and color (because CC_Warm=0 and CC_Neutral=0).

Table 6. Semantic differential scales used to evaluate each image on each Kansei

Nasty Ambiance	1 --- 2 --- 3 --- 4 --- 5 --- 6 --- 7	Nice Ambiance
Not Attractive	1 --- 2 --- 3 --- 4 --- 5 --- 6 --- 7	Attractive
Unpleasant sensorial perceptions	1 --- 2 --- 3 --- 4 --- 5 --- 6 --- 7	Pleasant sensorial perceptions
Low-quality materials	1 --- 2 --- 3 --- 4 --- 5 --- 6 --- 7	High-quality materials
Old	1 --- 2 --- 3 --- 4 --- 5 --- 6 --- 7	Modern
Not luminous	1 --- 2 --- 3 --- 4 --- 5 --- 6 --- 7	Luminous

The quantification theory type I (Ishihara et al. 1995) was performed using the trip properties dummy variables as predictor variables and each of the six Kansei words in turn as a predicted variable. Taking in consideration that 68 valid questionnaires were obtained, and that each one had 8 parts (i.e. one part for each bus interior image) consisting of the same 6 questions, a total sample of 68*8=544 cases were obtained.

The regression results presented in Table 7 showed that the trip properties *shapes* and *gangway lighting* had a stronger impact on all of the Kansei words. The results presented for the Kansei word *luminous* revealed differences when compared to the other ones, since the existence of *gangway lighting* had the strongest impact on it, followed by *warm combination of material coating and color*. The *shapes* had only a residual impact, while the *neutral combination of material coating and color* caused a negative impact on that Kansei word.

The regression had statistical power (significant at the .01 level) and the adjusted coefficients of determination were above 3%, which was considered significant based on the number of cases obtained (Hair et al. 2009). Therefore the extended Kansei engineering approach was specifically useful in relation to the three most relevant trip properties, because the passengers quantified their impact on each of the Kansei words, which had been associated by the expert team to the passenger affective assessment.

Contributions of extended Kansei engineering to mid-distance bus transportation

The application of the extended Kansei method showed how it provides a better understanding of customer ERs and enables their incorporation into new public transportation concepts to enhance the passenger travel experience. In this case the in-depth study provided a rich set of travel ERs and ECs, and the passenger importance and performance assessment of each ER and associated items, such as overall comfort or aesthetic appeal of the bus trip. In the current application, bus body designers and

transport managers collaborated through all the phases of the method, which was essential to provide a development process centred in the customer perspective. The experts chose the specific Kansei domain aesthetic appeal of the bus trip, whose emotional words/ expressions, e.g. *Visual Aesthetics* or *Well-being*, were associated to the customer multisensory perception of transportation PSSs, instead of to the specific product or service elements. Even though that domain selected more trip properties associated to the product part such as the *material coating and color combinations*, many service attributes were also identified, such as *safe driving* (see Table 3-part 1), *interior luminosity control* (see Table 3-parts 2 and 3), or *staff's awareness and performance* in general (see Table 3-part 3). Additionally, for instance *gangway lighting* is a property that relates with both product (e.g. light bulb) and service (e.g. illumination adjustment by the staff) elements of the bus trip. Therefore, the ERs' elicitation and the collaboration of all parties through every phase of the method were essential to better associate the trip properties to passenger sensorial and affective reactions. Additionally, the test of validity quantified the relationships between the most relevant trip properties, e.g. rounded *shapes,* and the associated Kansei words, e.g. *modern* or *attractive*, which provided bus body designers and transport managers with the ability to develop public transportation PSSs that enhance the travel experience. In the following section the research and managerial implications are discussed for the incorporation of customer ERs into generic NPSSD process.

Table 7. Standardized regression coefficients, coefficients of determination and adjusted coefficients of determination

Predictors	**Nice ambiance**	(P-value)	**Attractive**	(P-value)	**Pleasant sensorial perceptions**	(P-value)	**HQ materials**	(P-value)	**Modern**	(P-value)	**Luminous**	(P-value)
Constant term	4,099	,000	3,667	,000	3,887	,000	4,287	,000	3,910	,000	4,310	,000
Regression variables:												
Shapes	,298	,000	,373	,000	,344	,000	,380	,000	,423	,000	,095	,024
CC_Warm											,117	,014
CC_Neutral											-,155	,001
Gang_light	,125	,000	,159	,000	,130	,010	,124	,020	,177	,000	,330	,000
R^2 (coeff. of determination)	,104		,165		,135		,160		,210		,123	
Adj. R^2	,101		,162		,132		,157		,207		,117	

6. Research and managerial implications

This paper presents an extension of the Kansei engineering methodology, with a detailed application to mid-distance bus trips. Firstly, by involving customers in the initial study of their experience, the results disclose the elicitation of experience requirements (ERs), or customer perceptions such as overall comfort or staff's skills, and of experience components (ECs), which are customer individual responses, e.g. cognitive or emotional. The ERs identified concern all moments of service provision, such as the information provided in the bus terminals before the trip, the on-board entertainment during the actual trip and the safe access from the bus at the end of the trip. Secondly, the initial study contributes to understand the Kansei domain better, to facilitate the semantic and the properties space analysis, and specifically to associate aesthetic appealing properties to various semantic and multi-sensorial perceptions. The test of validity results show the precise estimated impact of selected properties, e.g. *shapes* or *gangway lighting*, on Kansei words, such as *modern* or *luminous*. Compared to extant research the extended Kansei engineering therefore enables a better incorporation of ERs into new customer offer development.

The current article also contributes to a systemic approach to NPSSD by involving an inter-company multidisciplinary team in the development process of solutions that combine products and services. Product manufacturers and service providers are brought together in the various phases of NPSSD to collaborate in the development of a PSS, which in the current case is public transportation that potentially enhances the customer experience. The multidisciplinary team members respectively possessed extensive knowledge related with product specification and service processes, however lacked comprehension of the customer experience during all moments of transport provision. Design experts were accustomed to think in product and service specification terms, but were not used to think in the customer perspective, which in this situation was enabled by the various meetings, workshops and bus trips. The team involvement since the preliminary study of the customer experience provides them clarification about the customer verbalized and latent ERs and ECs, which are associated with mid-distance bus trips in the present paper. Therefore the inter-company multidisciplinary team adopts the customer perspective in NPSSD, as opposed to extant design research that usually evolves either from product specification or service process methodologies.

Even though Kansei engineering enables the incorporation of affect and emotions in products and services, it traditionally contains too much subjectivity in dealing with customer perceptions and designer interpretations of data (Schütte et al. 2008). In Kansei the team members are usually experts either in a product or in a service and the choice of domain, and the description of semantic and properties space is performed *ad hoc*. The extended method still remains fairly semi-structured, which in fact is one of its advantages compared to other methods, because it facilitates the incorporation of instrumental and especially of affective requirements such as aesthetics. Therefore the NPSSD process becomes more robust using extended Kansei engineering because the inter-company team of experts is engaged since the beginning in the development of the integrated offering, and is better informed by the structured and holistic study of the customer experience. The extension facilitates all the process of (1) experience understanding through the identification of ERs and ECs, (2) domain selection, e.g. based on the ERs importance-performance analysis, (3) Kansei word generation, for example facilitated by the in-depth qualitative data, (4) properties' description, taking the multidisciplinary team practice and their customer perspective approach into consideration, (5) determination of relative properties' importance, based on the passengers' importance assessment of ERs in the survey, and (5) association of properties to the Kansei words and senses, because of the combined contribution of the teams' expertise and the experience study results.

The specific application undertaken enabled bus body and service designers to better acknowledge the passenger ERs and also to facilitate their incorporation into new public transportation development. The findings of the extended Kansei application were discussed with the multidisciplinary team during the several meetings and workshops in order to identify future bus transportation developments. In summary, the extended Kansei enables translating customer ERs, such as overall comfort or aesthetic appeal of the bus trip, to PSS properties, e.g. *shapes* or *material coating and color combinations*, that cause customer sensorial and affective impact, which can also be applied in other sectors than public transportation.

The inter-company meetings and workshops contributed to a better collaboration between the companies involved in developing new PSSs, which in the current paper consisted of mid-distance public transportation. The study of the travel experience reveals that product and service trip elements should be consistent with each other in

order for the passengers to have a satisfactory experience. The discussion of all the qualitative and quantitative results presented the engineers, designers and managers with the customer feedback about the travel experience. In particular, the exploratory Kansei word generation for the domain overall comfort and also the complete extended Kansei analysis for the domain aesthetic appeal of the bus trip enabled a more direct incorporation of the customer experience into new public transportation development. Taking these results into consideration, as the transport providers are in direct contact with the passengers, they should better adapt existing transport provision to the products or services involved in public transportation in the short term, to make them as coherent as possible. The studies give the companies rich information about the passenger generic ERs, and more concretely of overall comfort, which has enabled the companies to improve their offerings beyond the Kansei results described in the current paper. These results also provide insights for both vehicle manufacturers and transport operators to improve their combined offers in the long term, by adopting a more collaborative NPSSD, taking into account a holistic view of the customer experience through all the moments of contact related with the trip.

7. Concluding remarks and future research

Customer experience is increasingly important for companies, and more specifically for the ones involved in public transportation, because it involves vehicles, facilities, transportation services, and other aspects. However, these holistic considerations require innovative design methods to enable customer ER incorporation into NPSSD.

The customer experience is created through all moments of interaction between the customer and the product and service elements of a company offer. Kansei Engineering is a method that aims at grasping the customer affective reactions, and it is extended by a prior structured study of the customer experience and by the participation of experts from different companies involved in a PSS. The Kansei words are generated by the team and are associated to specific PSS properties, based on the affective value given by the customers to the ERs. Finally, the customer experience assessment, and the multidisciplinary team involvement through all phases of the extended Kansei Engineering indicate that it is applicable to other combinations of products and services.

Future possible research can use the extended Kansei Engineering to repeat the process with other ERs obtained in the travel experience study, in order to cover the totality of

public transportation ERs, namely the ones which are beyond the control of the companies, such as social environment. Then, it would be interesting to build a model such as a physical prototype to represent how the semantic and the space of properties are associated, and test it within the same type of bus trips. The method was applied in mid-distance bus trips, but it could be used in other types of public transportation settings, such as airplanes or trains, or even other systemic customer offerings, in order to generalize its application.

Overall, this study contributes to a better understanding and incorporation of the customer experience in the design of PSSs using extended Kansei Engineering. The current study will hopefully motivate further research related with the design of PSSs that enhance the customer experiences.

RERERENCES

Baines, T. S., Lightfoot, H. W., Evans, S., Neely, A., Greenough, R., Peppard, J., Roy, R., Shehab, E., Braganza, A., Tiwari, A., Alcock, J. R., Angus, J. P., Bastl, M., Cousens, A., Irving, P., Johnson, M., Kingston, J., Lockett, H., Martinez, V., Michele, P., Tranfield, D., Walton, I. M. & and Wilson, H. (2007). "State-of-the-art in product-service systems." Proceedings of the Institution of Mechanical Engineers, Part B: Journal of Engineering Manufacture 221(10): 1543-1552.

Barnes, C. & Lillford, S. P. (2009). "Decision support for the design of affective products." Journal of Engineering Design 20(5): 477 - 492.

Bergman, B. & Klefsjo, B. (1994). Quality: From customer needs to customer satisfaction. Lund, Sweden, McGraw-Hill.

Berry, L. L., Carbone, L. P. & Haeckel, S. H. (2002). "Managing the Total Customer Experience." MIT Sloan Management Review 43(3): 85-89.

Carbone, L. P. & Haeckel, H. S. (1994). "Engineering Customer Experiences." Marketing Management 3(3): 8-19.

Carreira, R., Patrício, L., Natal, R. & Magee, C. (2012a). "Understanding the travel experience and its impact on attitudes, emotions and loyalty towards the transportation provider. A quantitative study with mid-distance trips." Working paper.

Carreira, R., Patrício, L., Natal, R., Magee, C. & Hommes, Q. (2012b). "Towards a holistic approach to the travel experience: a qualitative study of bus transportation." Working paper.

Carreira, R., Patrício, L., Natal, R., Marques, A. & Magee, C. (2010). Incorporating Customer Experience Requirements In New Product Development: Understanding Bus Travel Experiences. Proceedings of the 17th International Product Development Management Conference, Murcia University, Spain.

Chitturi, R. (2003). Design For Affect: Emotional and Behavioral Consequences of the Tradeoffs between Hedonic and Utilitarian Attributes. Austin, The University of Texas at Austin.

Chitturi, R., Raghunathan, R. & Mahajan, V. (2008). "Delight by Design: The Role of Hedonic Versus Utilitarian Benefits." Journal of Marketing 72(3): 48-63.

Churchill, G. A. (1979). "Paradigm for Developing Better Measures of Marketing Constructs." Journal of Marketing Research 16(1): 64-73.

Cooper, R. G. (1990). "Stage-gate systems: A new tool for managing new products." Business Horizons 33(3): 44-54.

Dahan, E. & Hauser, J. R. (2001). Product Development - Managing a Dispersed Process. Handbook of Marketing. B. W. a. R. Wensley.

Doultsinou, A., Roy, R., Baxter, D., Gao, J. & Mann, A. (2009). "Developing a service knowledge reuse framework for engineering design." Journal of Engineering Design 20(4): 389-411.

Engelbrektsson, P. (2002). "Effects of product experience and product representations in focus group interviews." Journal of Engineering Design 13(3): 215 - 221.

Fisk, R. P., Grove, S. J. & John, J. (2008). Interactive Services Marketing. Boston New York, Houghton Mifflin Company.

Forlizzi, J., Zimmerman, J. & Evenson, S. (2008). "Crafting a Place for Interaction Design Research in HCI." Design Issues 24(3): 19-29.

Gentile, C., Spiller, N. & Noci, G. (2007). "How to Sustain the Customer Experience:: An Overview of Experience Components that Co-create Value With the Customer." European Management Journal 25(5): 395-410.

Gerbing, D. W. & Anderson, J. C. (1988). "An updated paradigm for scale development incorporating unidimensionality and its assessment." Journal of Marketing Research 25(May): 186–192.

Goedkoop, M., Van Halen, C. & Te Riele, H. (1999). Product service systems, ecological and economic basics. Amersfoort, The Netherlands., The Hague : Ministry of Housing, Spatial Planning and the Environment, Communications Directorate.

Grove, J., Fisk, R. P. & Bitner, M. J. (1992). Dramatizing the service experience: A managerial approach. Advances in Services Marketing and Management. T. A. Swartz, Bowen, David E. and Stephen W. Brown, JAI Press. 1**:** 91-121.

Hair, J. F. J., Black, W. C., Babin, B. J. & Anderson, R. E. (2009). Multivariate Data Analysis, Pearson.

Halen, C., Vezzoli, C. & Wimmer, R. (2005). Methodology for product service system innovation: how to develop clean, clever and competitive strategies in companies. Assen, The Netherlands, Koninklijke Van Gorcum.

Harris, E. (2007). Action Research. The Sage Dictionary of Qualitative Management Research. R. H. R. Thorpe. Thousand Oaks, Sage Publications.

Hauser, J. R. & Clausing, D. (1988). "The House of Quality." Harvard Business Review 3: 63-73.

Hekkert, P. (2006). "Design aesthetics: principles of pleasure in design." Psychology Science 48(2): 157 - 172.

Hekkert, P. & Leder, H. (2008). Product Aesthetics. Product Experience. H. Schifferstein and P. Hekkert**:** 259-285.

Herr, K. & Anderson, G. L. (2005). The action research dissertation - A guide for students and faculty, Sage Publications.

Herrmann, A., Huber, F. & Braunstein, C. (2000). "Market-driven product and service design: Bridging the gap between customer needs, quality management, and customer satisfaction." International Journal of Production Economics 66(1): 77-96.

Hevner, A. R., Ram, S., March, S. T. & Park, J. (2004). "Design Science In Information Systems Research." MIS Quarterly 28(1): 75-105.

Ishihara, S., Ishihara, K., Nagamachi, M. & Matsubara, Y. (1995). "An automatic builder for a Kansei Engineering expert system using self-organizing neural networks." International Journal of Industrial Ergonomics 15(1): 13-24.

Jindo, T. & Hirasago, K. (1997). "Application studies to car interior of Kansei engineering." International Journal of Industrial Ergonomics 19(2): 105-114.

Kouprie, M. & Visser, F. S. (2009). "A framework for empathy in design: stepping into and out of the user's life." Journal of Engineering Design 20(5): 437 - 448.

Kristensson, P., Gustafsson, A. & Archer, T. (2004). "Harnessing the Creative Potential among Users." Journal of Product Innovation Management 21(1): 4-14.

Kuang, J. & Jiang, P. (2009). "Product platform design for a product family based on Kansei engineering." Journal of Engineering Design 20(6): 589 - 607.

Kuo, T.-C., Wu, H.-H. & Shieh, J.-I. (2009). "Integration of environmental considerations in quality function deployment by using fuzzy logic." Expert Systems with Applications 36(3, Part 2): 7148-7156.

Luchs, M. & Swan, K. S. (2011). "Perspective: The Emergence of Product Design as a Field of Marketing Inquiry." Journal of Product Innovation Management 28(3): 327-345.

Maklan, S. & Klaus, P. (2011). "Customer Experience: Are We Measuring the Right Things?" International Journal of Market Research 53(6): 771-792, .

Martilla, J. A. & James, J. C. (1977). "Importance–performance analysis." Journal of Marketing 41: 77–79.

Mascarenhas, O., Kesavan, R. & Bernacchi, M. (2006). "Lasting customer loyalty: a total customer experience approach." Journal of Consumer Marketing 23(7): 397-405.

Maussang, N., Zwolinski, P. & Brissaud, D. (2009). "Product-service system design methodology: from the PSS architecture design to the products specifications." Journal of Engineering Design 20(4): 349-366.

Menor, L. J., Tatikonda, M. V. & Sampson, S. E. (2002). "New service development: areas for exploitation and exploration." Journal of Operations Management 20(2): 135-157.

Meyer, C. & Schwager, A. (2007). "Understanding Customer Experience." Harvard Business Review February: 117-126.

Miles, I. (2008). "Patterns of innovation in service industries." IBM Systems Journal 47(1): 115-128.

Miyoung, J. & Haemoon, O. (1998). "Quality function deployment: An extended framework for service quality and customer satisfaction in the hospitality industry." International Journal of Hospitality Management 17(4): 375-390.

Morelli, N. (2002). "Designing Product/Service Systems: A Methodological Exploration." Design Issues 18(3): 3-17.

Morelli, N. (2003). "Product-service systems, a perspective shift for designers: A case study: the design of a telecentre." Design Studies 24(1): 73-99.

Nagamachi, M. (1995). "Kansei Engineering: A new ergonomic consumer-oriented technology for product development." International Journal of Industrial Ergonomics 15(1): 3-11.

Nagamachi, M. (1997). Kansei Engineering: The framework and methods. Kansei Engineering 1. M. Nagamachi. Kure, Kaibundo Publishing.

Neal, J. D., Sirgy, M. & Uysal, M. (1999). "The Role of Satisfaction with Leisure Travel/ Tourism Services and Experience in Satisfaction with Leisure Life and Overall Life." Journal of Business Research 44(3): 153-163.

Neuman, W. L. (2006). Field Research. Social Research Methods - Qualitative and Quantitative Approaches, Pearson International Edition.

Nishino, T., Nagamachi, M., Ishihara, K., Ishihara, S., Ichitsubo, M. & Komatsu, K. (1999). Internet Kansei Engineering system with basic Kansei database and

genetic algorithm. Proceedings of TQM and Human Factors, Linköping, Sweden: Centre for Studies of Humans, Technology and Organization.

Normann, R. & Ramírez, R. (1993). "From Value Chain to Value Constellation: Designing Interactive Strategy." Harvard Business Review 71(4): 65-77.

Parasuraman, A., Zeithaml, V. A. & Berry, L. L. (1985). "A Conceptual-Model of Service Quality and Its Implications for Future-Research." Journal of Marketing 49(4): 41-50.

Parasuraman, A. & Zinkhan, G. (2002). "Marketing to and serving customers through the internet: An overview and research agenda." Journal of the Academy of Marketing Science 30(4): 286-295.

Patrício, L., Cunha, J. F. e., Fisk, R. P. & Nunes, N. J. (2004). Customer Experience Requirements for Multi-platform Service Interaction: Bringing Services Marketing to The Elicitation of User Requirements. 12th IEEE International Requirements Engineering Conference (RE'04), Kyoto, Japan, IEEE Computer Society.

Patrício, L., Fisk, R. P. & Cunha, J. F. (2008). "Designing Multi-Interface Service Experiences: The Service Experience Blueprint." Journal of Service Research 10(4): 318-334.

Pawson, R. (1996). "Theorizing the interview." The British Journal of Sociology 47(2): 295-314.

Pine, B. J. & Gilmore, J. H. (1998). "Welcome to the experience economy." Harvard Business Review July-August(4 Vol. 76): 97-105.

Pullman, M. E. & Gross, M. A. (2004). "Ability of experience design elements to elicit emotions and loyalty behaviors." Decision Sciences 35(3): 551-578.

Rosenthal, S. R. & Capper, M. (2006). "Ethnographies in the Front End: Designing for Enhanced Customer Experiences." Journal of Product Innovation Management 23(3): 215-237.

Roy, R., Goatman, M. & Khangura, K. (2009). "User-centric design and Kansei Engineering." CIRP Journal of Manufacturing Science and Technology 1(3): 172-178.

Sandén, B., Matthing, J. & Edvardsson, B. (2006). New Service Development: Learning from and with Customers. Involving Customers in New Service Development. B. Edvardsson, A. Gustafsson, P. Kristensson, P. Magnusson and J. Matthing, Imperial College Press. Series on Technology Management - Vol.11**:** 99-126.

Schütte, S., Ishihara, S., Eklund, J. & Nagamachi, M. (2008). Affective meaning: The Kansei Engineering Approach. Product Experience. H. Schifferstein and P. Hekkert, Elsevier**:** 474-496.

Schütte, S. T. W., Eklund, J., Axelsson, J. R. C. & Nagamachi, M. (2004). "Concepts, methods and tools in Kansei engineering." Theoretical Issues in Ergonomics Science 5(3): 214 - 231.

Shehab, E. & Roy, R. (2006). Product–service systems: issues and challenges. The 4th international conference on manufacturing research, Liverpool John Moores University.

Shostack, G. L. (1984). "Designing services that deliver." Harvard Business Review 62(1): 133-139.

Simon, H. A. (1996). The Sciences of the Artificial - Chapter 8, The MIT-Press.

Strauss, A. & Corbin, J. (1998). Basics of Qualitative Research, SAGE Publications.

Suh, N. P. (2001). Axiomatic design: Advances and applications. New York.

Ulrich, K. T. & Eppinger, S. D. (2007). Product design and development. Boston, McGraw-Hill/Irwin.

Ulwick, A. W. (2002). "Turn customer input into innovation." Harvard Business Review 80(1): 91-97.

Vandermerwe, S. & Rada, J. (1988). "Servitization of business: Adding value by adding services." European Management Journal 6(4): 314-324.

Vargo, S. & Lusch, R. (2004). "Evolving to a New Dominant Logic for Marketing." Journal of Marketing 68(1): 1-17.

Verhoef, P. C., Lemon, K. N., Parasuraman, A., Roggeveen, A., Tsiros, M. & Schlesinger, L. A. (2009). "Customer Experience Creation: Determinants, Dynamics and Management Strategies." Journal of retailing 85(1): 31-41.

Zhang, D., Hu, P. & Kotabe, M. (2011). "Marketing–Industrial Design Integration in New Product Development: The Case of China." Journal of Product Innovation Management 28(3): 360-373.

Zhang, X., Bode, J. & Ren, S. (1996). "Neural networks in quality function deployment." Computers & Industrial Engineering 31(3-4): 669-673.

5. Discussion and contributions of the dissertation

This dissertation starts by a citation from the beginning of the twentieth century, allegedly by César Ritz, the well known Swiss hotelier and founder of several hotels, which means that the customer is never wrong. Through time, it has evolved to "the customer is always right", which basically has the same meaning. Even though neither of these sentences should be taken literally, they reveal the efforts that both academia and businesses should put up to develop customers' offerings, which are tailored for their needs, so they feel "as if" the reason is actually on their side. As the customer interaction with a "product or service always comes with an experience" (Carbone & Haeckel 1994, p.9), it depends on the ability of companies to enable positive customer experiences. Therefore, based on both research questions and on the dissertation framework presented in chapter 1, this thesis contributes to a better understanding of the travel experience from a holistic perspective and to its incorporation in the development of transportation PSSs, in order to enhance the customer experience.

Extant experience research is mostly conceptual, and the transportation literature on customer experience is limited, thus many of the dissertation contributions are related with the broader understanding of the passenger experience detailed in the next section. Conversely, overall research is limited in what concerns the incorporation of customer experience perceptions into the development of PSSs, and more specifically of public transportation offerings. Therefore the contributions of the dissertation concerning PSS design methods and incorporation of customer perceptions are discussed afterwards.

5.1. Understand the travel experience

Even though extant experience research had provided various definitions of experience (e.g. Carbone & Haeckel 1994; Holbrook & Hirschman 1982; Meyer & Schwager 2007), it had not adapted it to transportation. Additionally, there was not knowledge whether or not customer travel experience is only relevant during leisure trips. In particular, the results of paper I reveal that the customer travel experience is operative in different settings, and not only during leisure or experience-centric trips, as could be expected. The travel experience is better understood from a holistic perspective because it involves various customer perceptions (i.e. experience factors or EFs) of public transportation attributes and it originates complex individual responses (i.e. experience components or ECs) in both settings.

Therefore, the dissertation contributes with a definition of travel experience and with the confirmation that all passengers have an experience while travelling, and that it involves all the moments of the trip, and various EFs and ECs. Another contribution is related with the definition, refinement and validation of a scale to measure the travel experience in paper III.

5.1.1. A holistic view of experience

Several researchers (e.g. Mascarenhas et al. 2006; Verhoef et al. 2009) argue that customer experiences are holistic in nature as they include all moments of contact with a company and they involve various customer individual responses. During the travel experience study, the passenger perceptions of and responses to transportation attributes during all moments of bus trips were explored from qualitative and quantitative perspectives in two settings. Consequently, these results contribute over extant research as they reveal that the travel experience is indeed an extended and complex process of passenger contact with a transport provider, beyond the core trip, which in turn has been extensively studied. The travel experience may start at the passenger's home when s/he obtains information about the trip schedules over the internet or telephone, and it may lengthen until the passenger returns home after the journey. In addition to the trip itself, the passengers consider attributes that transport providers do not usually directly control, such as the social environment, the services provided through different channels before the trip, or the overall conditions provided in the physical facilities, as driving the travel experience.

5.1.2. Experience Factors

The dissertation provides a better understanding of travel EFs, with a detailed identification of the different attributes that drive the customer experience, which naturally vary according to different settings as reflected in papers I and II. Nevertheless, paper I shows that both experience-centric and utilitarian trip passengers globally consider the same EFs that involve tangible and intangible aspects of transportation. Among those experience drivers, paper I reveals that both passengers of experience-centric and utilitarian trips identify comfort, safety and staff's skills as all being relevant during transportation provision. Staff's skills go beyond professionalism and friendliness, extensively addressed previously, to also include awareness and control abilities, i.e. the need for the transport personnel to permanently monitor customer

behavior and respond accordingly. Except cleanliness, all the other EFs identified in papers I, II and III introduce novel experiential perspectives when compared to extant transportation research. Namely EFs such as safety, off-board services, and waiting time, they may not be completely controlled by the transport provider to some extent. In the case of information provision and on-board entertainment they are mostly associated with requested technology advancements, what should originate further efforts from the providers. Additionally, social environment, which is very consistent in papers I, II and III, is another uncontrolled EF that typically depends on the behavior of other customers, therefore requiring increased control. This detailed understanding of EFs contributes over extant research by explaining better the travel experience drivers in all moments before, during or after the actual trips, and by revealing that uncontrolled EFs may originate undesired passenger experiences. Moreover, public transportation is revealed as an integrated offering from the customer perspective, even though it results from a combination of tangible and intangible attributes, such as the vehicles, the services or the social relations.

Even though paper II only represents an exploratory scale development study in an experience-centric sample, it clarifies with which EFs tourists associate more importance. In addition, the comparison with the utilitarian trip scale development in paper III, reveals once again the most significant differences between experience-centric and utilitarian trip passengers, which is also clear from the qualitative data in papers I and II. While the tourists mostly focus on the actual core trip conditions, such as individual comfort and safety, the inter-city passengers also consider the service aspects provided before, during and after the bus trips as very important.

Among all EFs qualitatively identified in paper I, only two are not included in the Travel-Experience scale defined in the quantitative study in paper III, and these are on-board entertainment and visibility of the scenery. Some of the others are practically unchanged, while others are only residually included with one or two items, and are then combined to form a new EF, which globally reveals good consistency. The Travel-Experience provides then a new valid measure of the travel experience based on 28 items aggregated into seven EFs that enable understanding the drivers of the customer experience during mid-distance public transportation. Finally, both paper I and paper III results reveal that passengers focus on travel EFs that apparently aggregate into four categories related with (1) core trip conditions, (2) supplementary services, (3) social environment, and (4) staff's skills, the latter which relates to the other three. In the case

of paper II, these categories are not so salient, because the supplementary services are only associated to the information provision, while the staff's skills are essentially related to the awareness of the passengers' easy accessibility to and from the bus.

Compared to prior research, all this information, either isolated or aggregated EFs, provides a better understanding of what is on the customers' mind (Pine & Gilmore 1998) in order to explain the travel experience. Moreover, it is developed the Travel-Experience scale for measuring the passenger experience from a holistic perspective, analyzing its perceptual dimensions and outcomes. The contributions specifically associated to the experience outcomes are described in the next section.

5.1.3. Experience Components

The improved understanding of the travel experience previously discussed shows it is more complex than traditional transit service quality. The results show that, compared to service quality which is essentially a cognitive assessment, the customer travel ECs also include sensorial and emotional components. This set of ECs provides a more holistic view of the customer experience process. Compared to extant research, the dissertation contributes to the identification of interdependent sensory aesthetic responses, involving various senses during transportation, and of specific emotions (e.g. excitement, joy, discontentment or fear) as opposed to the PAD scale in extant transport literature.

The final contributions that relate to the comprehension of the travel experience concern its antecedents (i.e. EFs) and consequences (i.e. loyalty), that is to say, how the ECs are influenced by the EFs and in turn originate loyalty intentions, such as repurchase or recommendation to others. Therefore paper III contributes to research by quantifying the relationships of the Travel-Experience scale with each of the ECs, and directly and indirectly with loyalty. The customer emotional responses are more strongly predicted than cognitive assessments, which is consistent with extant experience literature (Chitturi et al. 2008; Neal et al. 1999). On the contrary, the mediating effect of overall value and travel satisfaction between EFs and loyalty intentions is slightly higher than that of emotions, even though they are all statistically significant.

Consistent with transit quality theory is the fact that EFs involved in the category core trip conditions, which are individual space and vehicle maintenance, are globally still the most significant for the passengers because they reveal the highest impacts on the ECs. Supplementary services such as staff's skills and information provision also have moderate impacts. Conversely, the EFs that are outside the transportation provider

control to some extent, such as social environment and the supplementary services provided in the ticket-line, and in the off-board terminal, have a low impact on passenger assessments and potential loyalty. These results contribute over extant research as they validate the core trip conditions as the most relevant for the passenger travel experience and loyalty during mid-distance bus trips, and also because they reveal that uncontrolled EFs have a weaker but significant impact on emotions and indirectly on loyalty. Thus, a holistic perspective and management of the travel experience may differentiate the transport service provided and increase passenger loyalty, if there is adequate incorporation of ERs into new public transportation PSSs, which is discussed next.

5.2. Incorporate Experience Requirements

The understanding of the customer needs is considered as a fundamental part of design, especially in user-centered design (Kouprie & Visser 2009; Kristensson et al. 2004) and in customer experience research (Patrício et al. 2008; Pullman & Gross 2004). Therefore, all the contributions related with the previously discussed understanding of the customer experience holistic view were essential to better explain how it develops during extended customer interaction with a PSS. Moreover, the dissertation research enables the incorporation of ERs in public transportation PSSs, in order to enhance the passenger experience.

5.2.1. Public transportation Product-Service System

During the travel experience study research stage, it was uncovered that public transportation is an integrated offering from the point of view of customers, who want to travel from one place to another. Therefore, the results contribute to better explain a transport product-service system (PSS) as a mix of vehicles, physical facilities, on-board and off-board transport services, staff's skills and other intangible attributes. The ER's importance-performance analysis also enabled further clarification of customer assessments of public transportation PSSs, in order to define priority improvement areas. Therefore, the development of new public transportation solutions was done from a combined PSS perspective.

These results contribute over extant research as they enable identifying the elements of a PSS associated to public transportation, and they also allow improving them, namely the ones that are important but have low performance during the trips. Most ERs were better understood as experience drivers, because they revealed different tangible and intangible

attributes when compared to previous studies. Therefore, the transport PSSs may be enhanced as integrated offerings.

5.2.2. Development of a method for incorporating Experience Requirements into a Product-Service System

The extension to Kansei engineering described in paper IV consists of using the travel experience studies in papers I, II and III as a structured first phase of this design method to perform all domain and data analysis, as opposed to the traditional *ad hoc* approach in Kansei. Still compared with the typical Kansei approach, which involves members from a single company, the extended method engages an inter-company multidisciplinary team in all phases of the method to develop new public transportation PSSs involving products, services and other intangible aspects.

Besides participating in the application of the method, the team discussed the detailed in-depth qualitative data, as well as the factor analyses and structural equation modelling results. The better understanding of the ER overall comfort allowed for the incorporation of its different aspects into new public transportation development. In particular, the item aesthetic appeal of the bus trip was chosen as the domain for the complete application of the Kansei stages. This extended method associates relationships, and even estimates specific impacts between aesthetic appealing PSS trip properties, and passenger semantic and sensorial perceptions.

Compared to extant research the extended Kansei engineering therefore enables incorporating a holistic set of ERs into a PSS, especially taking in consideration the in-depth study of the travel experience and the extended collaboration with product and service experts.

Nevertheless, the contributions to new public transportation development may also be extended to generic new PSS development, due to the multidisciplinary team involvement. As the product designers and service managers are involved in the different moments of the Kansei extension, the PSS perspective is adopted in the whole development process, instead of specifying product properties or detailing service process stages.

5.3. Managerial implications

In the short term, the dissertation research results globally help transport providers to improve their service by adopting a more holistic management of the customer

experience through all the moments of contact related with the trip, and taking into account factors they do not control completely. In the longer term, the results provide bus manufacturers and transport operators with the information needed to design better public transportation PSSs that enhance the passenger travel experience. Additionally, by improving product and service transport design, it is enabled a better management of the intangible aspects that service providers may not completely control (e.g. off-board services or social environment). Even though these aspects only have a low impact on few ECs and loyalty, they may differentiate the transport service provision. Furthermore, the quantitative results of importance-performance assessment and also of structural equation modelling enable manufacturer and transport companies to focus on the incorporation of the most relevant ERs into transportation PSSs.

Taking a broader perspective, the dissertation research discloses that only by knowing the customer perspective it is possible for companies to treat their customers as if they are "always right", and thus enhance their satisfaction and loyalty intentions. In what concerns transportation related companies, they need to "travel as a passenger" in order to understand how does the travel experience unfold. From the dissertation research, it was acknowledged that neither vehicle manufactures, nor transport providers usually contact the passengers directly from the systemic offering perspective. On the contrary, vehicle manufacturers focus on the vehicle's performance, to which transport providers have to adapt their service, which is usually centered on the financial results. This unravels the need for closer collaboration between the interested parties in developing public transportation PSSs, by taking on the customer perspective through all stages of the development process to enable the incorporation of the most relevant customer ERs. Therefore the multidisciplinary team involvement in the different moments of the Kansei extension would enable the development of better transport systems combining products, services and other intangible aspects.

6. Conclusions and future research

The dissertation research has undertaken an innovative approach to the study of public transportation, with the aim of improving the customer travel experience. The project started with a study of the passenger experience with existing vehicles, mapping their interaction process, from the moments before the actual trip, to the initial awareness, purchase decision, usage, and even post-service perceptions. A scale for measuring the travel experience was developed, which enabled assessing the impact of customer perceptions on the experience outcomes. Study results were then applied to incorporate experience requirements (ERs) into public transportation PSS specifications.

The customer experience may be enhanced by its better understanding and incorporation into new PSSs. Better vehicles, physical facilities, transportation services and relational elements may be designed or managed to address the passenger declared and latent needs from a holistic perspective, and thus enhance their travel experience with public transportation PSS offerings. In turn, the passengers will feel that their expectations are satisfied, and thus will have loyalty behaviors such as repurchase or recommendation of the service to others. Even though the dissertation has focused on two specific public bus transport settings, implications can be taken to other settings or even different sectors, in which the same customer experience methodology may be applied with the necessary adaptations.

Although the current dissertation provides a better explanation of the customer experience and enables its incorporation into public transportation, it has some limitations. The qualitative study in paper I involved the experience-centric and utilitarian samples, while paper II in addition performed an exploratory factor analysis to the results of survey administration in the experience-centric trips. However, only the utilitarian trips were further analyzed in the complete quantitative and incorporation studies in papers III and IV. The qualitative studies indicated that the EFs in the two segments vary, but further quantitative studies in the experience-centric setting would shed light into how these EFs and their impact on travel experience outcomes vary.

Another limited aspect is concerned with the time-span of the studies involving the passengers. All of them were conducted within a short period of time each (i.e. weeks or few months) what limits the scope of the results obtained in terms of the weather conditions during the trips or the occurrence of school holidays. Therefore a longer

period of data collection, or a longitudinal study during different seasons or school periods could contribute to an even wider perspective of the travel experience.

The qualitative and quantitative studies were administered during the actual bus trips, or immediately after them. In the experience-centric trips, all the interviews and surveys were made within a few days after the trips, while in the case of the utilitarian trips, all questionnaires were administered and practically all interviews were performed during the bus trips. Thus, it would be also interesting to collect information on each passenger's experience before the trip and sometime after his/her trips (e.g. days or weeks), to have a more holistic perspective of the different moments of contact that form the customer experience.

Concerning the incorporation of ERs undertaken in paper IV, it involved only a small part of the data obtained in the previous studies of customer experience, related with aesthetic comfort. Therefore future research can address other associations of bus trip properties and emotional assessment using extended Kansei engineering. Additional applications to bus and transportation service design would allow further development and validation of the extended method, for instance by developing and testing new public transportation concepts and prototypes, such as bus interiors or transport services.

The same research methodology could also be applied to other transport settings, such as railway and air transportation, or even multimodal transportation to understand what drives the travel experience along different interactions with various travel modes, and to develop new public transport solutions that increase the passenger experience.

Involving the customers in the development of company offerings to create a positive customer experience is a hard process that, in the words of Pine & Gilmore (1998, p. 99) requires exploring what exists "only in the mind of an individual". This dissertation research therefore contributes to a better holistic understanding of the customer experience and to its incorporation into public transportation PSS development, but also identifies new challenges that will hopefully originate further research in this emergent area in order to enhance further the customer experience with PSSs.

7. Glossary

aesthetics: multisensory interpretation of an object or environment

comparative fit index (CFI): assumes a non-central χ^2 distribution for the baseline model discrepancy

concept-driven coding: creation of a collection of nodes based in the literature

confirmatory factor analysis (CFA): use of a multivariate technique to test (confirm) a pre-specified relationship

consumption emotion set (CES): synthesizes the most frequent emotions associated to consumption situations

convergent validity: measure of construct validity and extent to which each measure correlates with others of the same latent construct

customer experience: internal and subjective response customers have to any direct or indirect contact with a company

degrees of freedom (df): the number of nonredundant correlations or covariances in the input matrix minus the number of estimated coefficients. The researcher attempts to maximize the degrees of freedom available while still obtaining the best-fitting model. Each estimated coefficient "uses up" a degree of freedom. A model can never estimate more coefficients than the number of nonredundant correlations or covariances, meaning that zero is the lower bound for the degrees of freedom for any model.

dependent construct: outcome latent construct, which is estimated by predictor constructs in SEM

discriminant validity: refers to the extent to which the measure of a construct does not correlate with the measures of other constructs

design-science research: is adequate whenever research is related with the creation of innovation artefacts that are not a result of natural laws or behavioral theories

EDAM focus area: engineering design and advanced manufacturing

experience-centric service: service in which the customer experience is at the center of service provision

experience-centric trip: bus tourism service in the North of Portugal

experience components (ECs): customer internal cognitive, sensorial and emotional responses to the service

> cognitive component: customer individual response connected with thinking or conscious mental processes such as the overall assessment of a trip, or service quality.
>
> emotional component: customer affective response involving the generation of moods, feelings or emotions; a company can enable emotional experience in order to create an affective relation with its brand or products.
>
> sensorial component: customer sensorial response to the service provided, involving each of the five senses with different relevance for each person.

experience factors (EFs): customer perceptions of the service that drive the customer experience

experience requirements (ERs): the same as EFs, but from the designers' perspective

grounded theory: systematic methodology in the social sciences involving the generation of theory from data

exploratory factor analysis (EFA): analysis defining possible relationships in only the most general form and then allowing the multivariate technique to estimate

relationship(s). The opposite of CFA, the researcher is not looking to confirm any relationships specified prior to the analysis, but instead lets the method and the data define the nature of the relationships. An example is stepwise multiple regression, in which the method adds predictor variables until some criterion is met

goodness of fit index (GFI): an absolute fit index that estimates the proportion of variability explained by the model (similar to R^2 in regression models)

holistic experience: cognitive, sensorial and emotional customer responses through all moments of contact with a company

independent variables: observed or directly measured variables

latent construct: latent variable which cannot be observed directly

maximum likelihood estimation (MLE): estimation method commonly employed in structural equation models. An alternative to ordinary least squares in multiple regression, MLE is a procedure that iteratively improves parameter estimation to minimize a specified fit function.

measurement model: a model that (1) specifies the indicators for each construct, and (2) enables all assessment of construct validity. The first of the two major steps in a complete structural model analysis.

nomological validity: test of validity that examines whether the correlations between the constructs in the measurement theory make sense

non-normed fit index (NNFI): the proportion of baseline (independence) model explained by the model of interest

new product development (NPD): engineering and design process undertaken to develop new products

new service development (NSD): engineering and design process undertaken to develop new services

new product-service system development (NPSSD): engineering and design process undertaken to develop new systems of products and services

open coding: the analytic process through which concepts are identified and their properties and dimensions are discovered in data, i.e. creation of a collection of nodes based in the data

pleasure-arousal-dominance (PAD) scale: pleasure, arousal, and dominance customer reactions related with service affective assessment

product-service system (PSS): integrated combination of product(s) and service(s) that fulfills a customer's need

R^2 (i.e. coefficient of determination): measure of the proportion of the variance of the dependent variable about its mean that is explained by the independent, or predictor variables.

reflective measurement theory: theory based on the assumptions that (1) latent constructs cause the measured variables, and (2) the measurement error results in an inability to fully explain these measures

root mean square error of approximation (RMSEA): estimates the amount of error of approximation per model degree of freedom, correcting for sample size and penalizing model complexity

service quality: cognitive comparison between customer expectations and perceptions of service performance

structural equation modeling (SEM): multivariate technique combining aspects of factor analysis and multiple regression that enables the researcher to simultaneously examine a series of interrelated dependence relationships among the measured variables

and latent constructs as well as between several latent constructs

structural model: set of one or more dependence relationships linking the hypothesized model's constructs. The structural model is most useful in representing the interrelationships of variables between constructs. The second of the two major steps in a complete structural model analysis

text de-contextualization: extraction of text from its original document and its comparison with other like passages

text re-contextualization: process of taking a text passage back to its document to see its surrounding context

travel experience: the holistic individual response arising from the passenger interactions with all aspects and across all moments of transportation provision

travel-liking: cognitive component related with the desired choice an individual must make to travel just for fun

utilitarian trip: medium range transportation service between Portuguese cities

References

Aken, J. E. v. (2004). "Management Research Based on the Paradigm of the Design Sciences: The Quest for Field-Tested and Grounded Technological Rules." Journal of Management Studies 41(2): 219-246.

Baines, T. S., Lightfoot, H. W., Evans, S., Neely, A., Greenough, R., Peppard, J., Roy, R., Shehab, E., Braganza, A., Tiwari, A., Alcock, J. R., Angus, J. P., Bastl, M., Cousens, A., Irving, P., Johnson, M., Kingston, J., Lockett, H., Martinez, V., Michele, P., Tranfield, D., Walton, I. M. & and Wilson, H. (2007). "State-of-the-art in product-service systems." Proceedings of the Institution of Mechanical Engineers, Part B: Journal of Engineering Manufacture 221(10): 1543-1552.

Bergman, B. & Klefsjo, B. (1994). Quality: From customer needs to customer satisfaction. Lund, Sweden, McGraw-Hill.

Berry, L. L. & Carbone, L. P. (2007). "Build loyalty through experience management." Quality Progress 40(9): 26-32.

Carbone, L. P. & Haeckel, H. S. (1994). "Engineering Customer Experiences." Marketing Management 3(3): 8-19.

Chitturi, R., Raghunathan, R. & Mahajan, V. (2008). "Delight by Design: The Role of Hedonic Versus Utilitarian Benefits." Journal of Marketing 72(3): 48-63.

Churchill, G. A. (1979). "Paradigm for Developing Better Measures of Marketing Constructs." Journal of Marketing Research 16(1): 64-73.

Dahan, E. & Hauser, J. R. (2001). Product Development - Managing a Dispersed Process. Handbook of Marketing. B. W. a. R. Wensley.

dell'Olio, L., Ibeas, A. & Cecin, P. (2011). "The quality of service desired by public transport users." Transport Policy 18(1): 217-227.

Dillman, D. A. (2000). Mail and Internet Surveys - The Tailored Design Method, John Wiley & Sons, Inc.

Ettema, D., Gärling, T., Eriksson, L., Friman, M., Olsson, L. E. & Fujii, S. (2010). "Satisfaction with travel and subjective well-being: Development and test of a measurement tool." Transportation Research Part F: Traffic Psychology and Behaviour 14(3): 167-175.

Gerbing, D. W. & Anderson, J. C. (1988). "An updated paradigm for scale development incorporating unidimensionality and its assessment." Journal of Marketing Research 25(May): 186–192.

Gerbing, D. W. & Hamilton, G. J. (1996). "Validity of exploratory factor analysis as a precursor of confirmatory factor analysis." Structural Equation Modeling 3: 62-72.

Goedkoop, M., Van Halen, C. & Te Riele, H. (1999). Product service systems, ecological and economic basics. Amersfoort, The Netherlands., The Hague : Ministry of Housing, Spatial Planning and the Environment, Communications Directorate.

Hair, J. F. J., Black, W. C., Babin, B. J. & Anderson, R. E. (2009). Multivariate Data Analysis, Pearson.

Halen, C., Vezzoli, C. & Wimmer, R. (2005). Methodology for product service system innovation: how to develop clean, clever and competitive strategies in companies. Assen, The Netherlands, Koninklijke Van Gorcum.

Harris, E. (2007). Action Research. The Sage Dictionary of Qualitative Management Research. R. H. R. Thorpe. Thousand Oaks, Sage Publications.

Hauser, J. R. & Clausing, D. (1988). "The House of Quality." Harvard Business Review 3: 63-73.

Herr, K. & Anderson, G. L. (2005). The action research dissertation - A guide for students and faculty, Sage Publications.

Herrmann, A., Huber, F. & Braunstein, C. (2000). "Market-driven product and service design: Bridging the gap between customer needs, quality management, and customer satisfaction." International Journal of Production Economics 66(1): 77-96.

Heskett, J., Reichheld, F. & Sasser, W. (1990). "Zero defections: Quality comes to services." Harvard Business Review 68(5): 105–112.

Heskett, J. L., Jones, T. O., Loveman, G. W., Sasser, J. W. E. & Schlesinger, L. A. (2008). "Putting the Service-Profit Chain to Work." Harvard Business Review 86(7/8): 118-129.

Hevner, A. R., Ram, S., March, S. T. & Park, J. (2004). "Design Science In Information Systems Research." MIS Quarterly 28(1): 75-105.

Holbrook, M. B. & Hirschman, E. C. (1982). "The experiential aspects of consumption: consumer fantasies, feelings, and fun." Journal of Consumer Research 9(2): 132-142.

Ishihara, S., Ishihara, K., Nagamachi, M. & Matsubara, Y. (1995). "An automatic builder for a Kansei Engineering expert system using self-organizing neural networks." International Journal of Industrial Ergonomics 15(1): 13-24.

Kouprie, M. & Visser, F. S. (2009). "A framework for empathy in design: stepping into and out of the user's life." Journal of Engineering Design 20(5): 437 - 448.

Kristensson, P., Gustafsson, A. & Archer, T. (2004). "Harnessing the Creative Potential among Users." Journal of Product Innovation Management 21(1): 4-14.

LeBel, J. L. (2005). "Beyond the friendly skies: an integrative framework for managing the air travel experience." Managing Service Quality 15(5): 437 - 451.

Maklan, S. & Klaus, P. (2011). "Customer Experience: Are We Measuring the Right Things?" International Journal of Market Research 53(6): 771-792, .

Martilla, J. A. & James, J. C. (1977). "Importance–performance analysis." Journal of Marketing 41: 77–79.

Mascarenhas, O., Kesavan, R. & Bernacchi, M. (2006). "Lasting customer loyalty: a total customer experience approach." Journal of Consumer Marketing 23(7): 397-405.

Maussang, N., Zwolinski, P. & Brissaud, D. (2009). "Product-service system design methodology: from the PSS architecture design to the products specifications." Journal of Engineering Design 20(4): 349-366.

Meyer, C. & Schwager, A. (2007). "Understanding Customer Experience." Harvard Business Review February: 117-126.

Nagamachi, M. (1997). Kansei Engineering: The framework and methods. Kansei Engineering 1. M. Nagamachi. Kure, Kaibundo Publishing.

Neal, J. D., Sirgy, M. & Uysal, M. (1999). "The Role of Satisfaction with Leisure Travel/ Tourism Services and Experience in Satisfaction with Leisure Life and Overall Life." Journal of Business Research 44(3): 153-163.

Neuman, W. L. (2006). Field Research. Social Research Methods - Qualitative and Quantitative Approaches, Pearson International Edition.

Normann, R. & Ramírez, R. (1993). "From Value Chain to Value Constellation: Designing Interactive Strategy." Harvard Business Review 71(4): 65-77.

Parasuraman, A., Zeithaml, V. A. & Berry, L. L. (1985). "A Conceptual-Model of Service Quality and Its Implications for Future-Research." Journal of Marketing 49(4): 41-50.

Parasuraman, A., Zeithaml, V. A. & Malhotra, A. (2005). "E-S-QUAL - A multiple-item scale for assessing Electronic Service Quality." Journal of Service Research 7(3): 213-233.

Patrício, L., Cunha, J. F., Fisk, R. P. & Nunes, N. J. (2004). Customer experience requirements for multi-platform service interaction: bringing services marketing to the elicitation of user requirements. 12th IEEE International Requirements Engineering Conference, Kyoto, Japan, IEEE.

Patrício, L., Fisk, R. P. & Cunha, J. F. (2008). "Designing Multi-Interface Service Experiences: The Service Experience Blueprint." Journal of Service Research 10(4): 318-334.

Patton, M. Q. (1990). Qualitative research and evaluation methods. Newbury Park, California, SAGE Publications.

Pawson, R. (1996). "Theorizing the interview." The British Journal of Sociology 47(2): 295-314.

Pine, B. J. & Gilmore, J. H. (1998). "Welcome to the experience economy." Harvard Business Review July-August(4 Vol. 76): 97-105.

Pullman, M. E. & Gross, M. A. (2004). "Ability of experience design elements to elicit emotions and loyalty behaviors." Decision Sciences 35(3): 551-578.

Sandén, B., Matthing, J. & Edvardsson, B. (2006). New Service Development: Learning from and with Customers. Involving Customers in New Service Development. B. Edvardsson, A. Gustafsson, P. Kristensson, P. Magnusson and J. Matthing, Imperial College Press. Series on Technology Management - Vol.11**:** 99-126.

Shehab, E. & Roy, R. (2006). Product–service systems: issues and challenges. The 4th international conference on manufacturing research, Liverpool John Moores University.

Shostack, G. L. (1984). "Designing services that deliver." Harvard Business Review 62(1): 133-139.

Strauss, A. & Corbin, J. (1998). Basics of Qualitative Research, SAGE Publications.

Vargo, S. & Lusch, R. (2004). "Evolving to a New Dominant Logic for Marketing." Journal of Marketing 68(1): 1-17.

Verhoef, P. C., Lemon, K. N., Parasuraman, A., Roggeveen, A., Tsiros, M. & Schlesinger, L. A. (2009). "Customer Experience Creation: Determinants, Dynamics and Management Strategies." Journal of retailing 85(1): 31-41.

Voss, C., Roth, A. V. & Chase, R. B. (2008). "Experience, Service Operations Strategy, and Services as Destinations: Foundations and Exploratory Investigation." Production & Operations Management 17(3): 247-266.

Wolfinbarger, M. & Gilly, M. C. (2003). "eTailQ: dimensionalizing, measuring and predicting etail quality." Journal of retailing 79(3): 183-198.

Yin, R. K. (2003). Case study research: Design and Methods. Thousand Oaks, SAGE Publications.

Zomerdijk, L. G. & Voss, C. (2009). "Service Design for Experience-Centric Services." Journal of Service Research 13(1): 67-82.

Zomerdijk, L. G. & Voss, C. (2010). "NSD Processes and Practices in Experiential Services." Journal of Product Innovation Management 28: 63–80.