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CUSTOMER JOURNEY MAPS FOR PHYSICAL EXPERIENCE DESIGN: CONCEPTUAL DESIGN CASE OF A GAS STATION

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Abstract. In the era of experience, spatial design is no more the design of the form or function of the building, but rather is the design of user experience (UX) in the physical space. Welcoming innovation in the design processes, designers have integrated multidisciplinary UX research to create human-centric spaces. This article explores how architects and interior designers as members of Physical Experience Design (PXD) teams welcome and integrate alternative UX research methods from other disciplines into their workflows. In the case study, the adoption of the customer experience (CX) approach, which is a cornerstone of the marketing discipline, during conceptual design development of gas stations of a reputable fuel company in Turkey, is described with real-life data. The findings reveal the potential of customer journey maps for creating better servicescapes that make companies more competitive. Multidisciplinary perspectives and methodologies are opening the frontiers for innovation in design processes in all fields that value the users and their experiences. UX in human-computer interaction, CX in marketing and PXD in spatial design can all be used jointly to improve the user experience in the digital, social and physical realms.

Keywords: *User experience, physical experience design, customer experience, innovation in design process, customer journey maps.*

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1. Introduction

Companies are seeking new strategies, technologies and creative design approaches to gain a competitive advantage. To compete effectively, they need to focus on the customer experience. Shaw and Ivens (2002) support this idea by stressing that in a world where technology, prices, marketing messages and products become so similar, the highest potential for a company is to enhance the customer experience. This brings the notion of managing customer experiences professionally (Bijay & Mojumder, 2020). Translating brand ideas, stories and customer journeys into a spatial layout requires user experience (UX) design knowledge. Although UX has lately become a synonym for the interactions that humans have with digital products and services, indeed it is more comprehensive. Rather than technical implementations, UX designers follow certain principles and apply a range of techniques that focus on people (Lindgaard, 2009). This is called the 'human-centered design process' (HCD) in UX, where people are the heart of the design process.

According to Dalsgaard (2017), tools that designers employ, guide their perception and understanding of design problems and solutions besides improving their design capabilities. This article explores how architects and interior designers as members of

Physical Experience Design (PXD) teams welcome and integrate alternative UX research methods into their workflows (Figure 1).

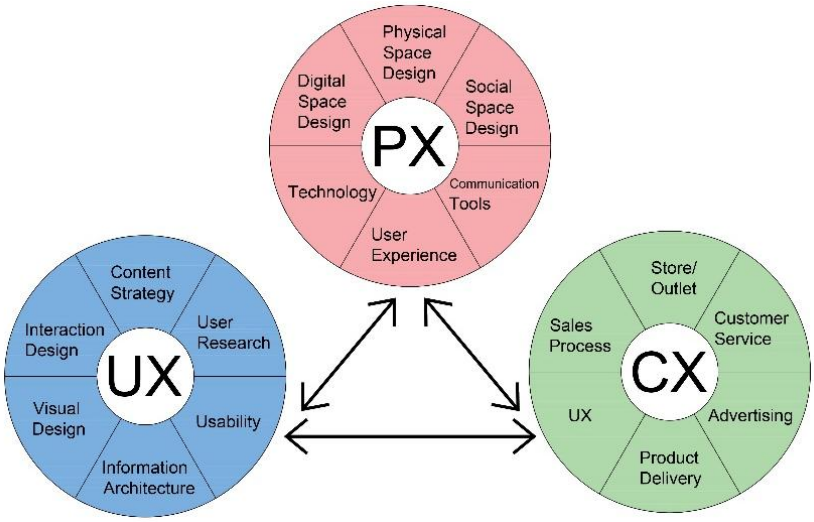


Figure 1. UX, CX and PXD for human-centric servicescapes
(By authors)

In the case study, the adoption of the customer experience (CX) approach, which is a cornerstone of the marketing discipline, during conceptual design development of gas stations for a reputable fuel company in Turkey, is described with real-life data. The findings reveal the potential of customer journey maps. The final part discusses the need for innovation in the design process and the adoption of multidisciplinary UX approaches for PXD of user environments that respond better to the needs and expectations of users and companies.

2. Literature review

UX has a multidisciplinary character with technology, business and design dimensions. This article will focus on PXD (physical experience design) as an innovative design thinking process for spatial design.

2.1. UX from the Spatial Design Perspective: HCD Approach

Spatial design can serve businesses via designing the space of experience with its physical and nonphysical (emotional, mental and spiritual) dimensions. Tailoring interiors to satisfy the users requires a deep understanding of their varying motivations, behaviors, needs and desires. Norman (2013, p.8) defines HCD as an approach that puts human needs, capabilities and behavior first, then designs to accommodate those needs, capabilities and ways of behaving.

User feedback and expectations are incorporated into all stages of design and following maintenance phases in the building/project lifecycle. At the pre-design and programming phase, architects and interior designers make research about the physical and social environment of the project area to define the design problem. They conduct on-site visits and field surveys as well as user interviews which deliver open-ended

questions to the users about their opinions and preference, lifestyles and habits, satisfaction and expectations. The site and user data are then represented in architectural diagrams and maps that use data visualization and creative mapping techniques. In the schematic design phase, alternative concepts and preliminary schemes that are likely to satisfy the “must” user requirements are developed and the most promising one is determined according to the taste of the client. In the design development phase, the comfort conditions, energy performance, as well as smartness of the design, are improved to guarantee the health and well-being of the users (BPIE, 2018). Finally, construction drawings and tender documents are prepared in line with the budget, timing constraints and legal rights of the users. The design process in architecture/interior design is followed by construction, operation and maintenance and finally, by demolition and renovation/reuse phases (RIBA, 2014).

The human-centric nature of architectural/interior design theory and practice keeps it open to new perspectives from other user-centered disciplines such as marketing. They both aim to satisfy the customers and turn their insights into business value. Once the customers are recognized as the ‘users’ experiencing the physical space and its services, CX data and CX design tools can be incorporated into the design of servicescapes.

2.2 UX from the Marketing Perspective: CX Approach

Within the multidisciplinary framework of UX design and management, the challenge concerning the design of physical service space is to create an environment that builds a connection with the company’s products. For example, luxury car manufacturer Tesla has been offering hands-on experience via interactive design studios in its stores where customers can learn about, customize and purchase their own electronic cars (nurun.com, 2021). Similarly, electronics company Apple has been staging a "town squares experience" in its iconic" Mies' minimalist style glass cube design stores where customers naturally meet and spend time (Hartmans, 2016).

Figure 2. A popular technology store in Istanbul

Customer experience has gained increasing value in the world of experience economy (Pine & Gilmore, 1998) where competition is tough and companies have to create value jointly with consumers and innovation has to focus on the creation of experiences in common (Prahald & Ramaswamy, 2003). Schmitt (1999) stresses the sensational, emotional, cognitive, behavioral and relationship-based reactions of customers towards marketing stimuli to create strong experiences. Varnali (2017) defines customer experience as the human experiences seen from the company's perspective. The more this experience is meaningful and positive for the customer, the bond built between

the brand and the customer is stronger. CX methods such as customer journey maps, behavioral mapping, mystery shopper, contextual inquiry and in-depth interviews have also been included in the theory of design research, as well as in practice by various disciplines including architectural/interior design.

2.3 Customer Journey Maps for PXD

A customer journey map helps to visualize the planned service processes in a real-life setting, enabling the comparison of the individual journeys with the ones that are planned by the brands. It also enables the comparison of various individual journeys among each other (Halvorsrud *et al.,* 2016). Design teams use customer journey maps to understand how the customer experiences meet the customer expectations and at which points the design can be improved. Boag (2021), who is a UX designer, service design consultant and digital transformation expert states "Data can not tell the disappointments and experiences of customers. Only a story can do this. The best way to tell a story is customer journey mapping". In these journeys, shadowing, mapping, observations and user diaries are used as service design tools to get insights (Stickdorn & Zehner, 2009). Today customer journeys are employed by architects and interior designers who aim to handle their spatial design projects with the best in user-centered design practices and strategic customer experience thinking.

3. Methodology

This qualitative research aims to highlight the potentials of alternative UX methods for PXD. It handles a case study about the PXD of a servicescape introducing customer-centric tools. It explores how architects and interior designers as members of Physical Experience Design (PXD) teams welcome and integrate alternative UX tools into their workflows. The research questions are:

RQ1: What does UX mean for physical space design?
RQ2: What can architects and interior designers learn from CX approach?
RQ3: How can customer journey maps be used as a data collection, analysis and visualization tool in spatial design?

This research is based on a real-life branding case from Turkey where the new gas stations of a national fuel-oil distributing company were evaluated using customer journey experience analysis. The company worked with a design agency I-AM (i-amonline.com), which is specialized in developing human-oriented designs and innovative projects. The authors collaborate with the design agency I-AM on several research projects including this one as observers and academic publishing consultants.

To understand and enhance the CX in the gas stations, data is collected with contextual inquiry and behavioral mapping. Then, based on the customer journey maps, improvements and suggestions for PXD were developed. Contextual inquiry methodology combines classical in-depth interviews with an observation of the users in the actual context of use. It is a suitable method to understand the users' needs and requirements and to reveal environmental influences on the interaction with a product (usability.de). Behavioral Mapping is a direct observation technique (Ng, 2016) that is used to collect data-related fields for recording people's behaviors and movements systematically as these behaviors occur in particular locations (Bechtel & Zeisel, 1987).

Behavioral mapping is used in architectural programming, post-occupancy evaluation and behavioral research (Ng, 2016).

Initially, a contextual inquiry was carried out in 4 gas stations located in 2 different cities. The inquiries focused on the identification of the customer journeys, interaction of the customers with the visual materials and problems regarding the PXD. According to contextual inquiries in a typical gas station of the brand, the customer journey was found to include the following touchpoints (TPs): approach/entrance (1) point, pump island (2), market (3), toilets (4), vehicle washing (5), additional services (6) and farewell/exit point (7). These touchpoints then became the main nodes for data collection.

Following that, a "Behavioral Mapping" study was carried out in a location that is one of the most visited service stations of the oil company in İstanbul. The purpose was to measure the effectiveness of visual media, define the problems and improve the existing and/or suggest potential display locations in each touchpoint. Using the recordings from the eight cameras existing in the oil station, three observers checked on the number and the duration of visits and interactions of customers with the touchpoints during two workdays. The observers also surveyed a total of 150 customers to discuss their activities and experiences in the touchpoints (Table 1).

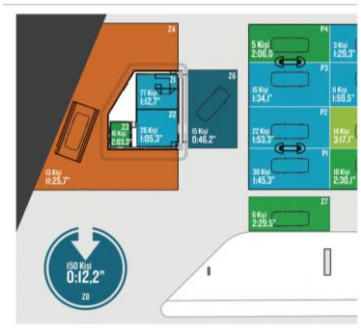
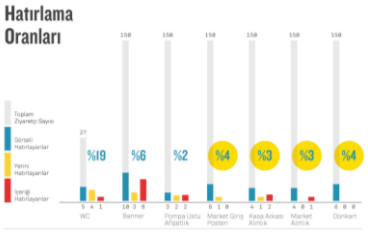
Table 1. Customer journey maps for data collection:
Behavioral metrics and contextual inquiry

Observer ♯	**Camera ♯**	**Behavioral Metrics**
O1, O2, O3	all	Number of customers entering the designated regions
	all	Time spent in designated regions and activities
O3	all	Number of times the pump counter looks
O3	3,4,5,6,7,8	Number of views of the upper pump number
none	1, 2	Whether the environment is taken into consideration in the transition between vehicle - market - vehicle (Entry and exit breakdown)
O2	9	Customers who viewed the pixage screen for more than 3 seconds and the number of views
O3	3,4,5,6,7,8	Number of customers and views towards the pump information screen
O1	none	Noticing campaign visuals - recall values of survey responses o Which of the images below did you see during this visit? o Do you remember where you saw these images? o Do you remember the information provided by this image?
none	all	The regions where time was measured are o Gas station entrance - between the end of the banner reading area o Gas station entrance - first parking break o Time spent in the air-water pump area o Time spent in the vehicle wash area o Total waiting times at the beginning of the vehicle for gasoline purchase o Walking times between vehicle - market - vehicle o Waiting in front of the cash register - processing time total o Market circulation time o Time spent on the toilet o Departure time by vehicle

4. Findings

The identification of problem areas via contextual inquiry and the evaluation of visual effectiveness via behavior mapping helped to discover problems in visual elements and the design of the servicescape. The data from the cameras revealed that the most visited areas were found to be the entrance and exit (TP1 and TP7 with 150 people/hour), the cash register desk (TP3 with 77 people/hour) and the corner zones in the pump area (TP2 with max:30 and min:1 person/hour).

Table 2. Customer journey maps as data analysis and visualization tool in spatial design

CX Research Tool	Measured Activity	Analysis and Visualization of CX data
Behavioral mapping	Number of customers Time spent in the touchpoint	
Behavioral mapping	Viewing rates	
Contextual inquiry	Recall ratios	
Contextual inquiry	Visual complexity	

As seen from Table 2, behavioral mapping helped to find out the number and duration of visits in each touchpoint while contextual inquiry helped to find out the differences between the view rates and recall rates of campaign visuals. Upon defining the context and the problems via customer journey mapping, specific objectives and solutions could be set by the PXD team for each touchpoint. For instance, for Touchpoint 3 (the market area), inconceivable brands and services came out to be the major problem. It was not possible to understand which brands, products and services were available inside the market due to the organization of the front facade. The Ultra or Full market distinction did not make any sense for the customers. Services and brands were either blocked by flags and similar obstacles or were not visible at all since they were placed away from the entrance. In the brand messaging area, the poster formats were not perceived well enough and the given content required a closer reading. Upon these findings, the solutions introduced by the PXD team were the redesign of the façade with a minimalist approach, the banning of car parking in front of the market, the avoidance of overlapping graphics and the use of horizontal and single-use of visuals, the application of warmer color filters to the photos in the posters and the consistency of the brand identity via a common visual and material language.

Table 3, maps the CX data in the overall station into seven touchpoints. The sequence of the touchpoints follows an order starting with the 'Approach and Entrance Node' continuing with the available services and ending with the 'Farewell and Exit Node'. No touchpoint is repeated in Table 3 since the table involves the collective data of 150 customers who have different needs, thus experience in the servicescape. It is not limited to the data of a time-based linear journey of an individual but rather the entire CX data gathered for each touchpoint.

Indeed, the design problem and brief given by the oil company representatives was to improve the brand identity in the existing servicescape. They demanded a place branding and UX research rather than a spatial planning and design project. This also explains the fact why the most spatial metrics in Table 3 deal exclusively with visual cues and have a strong focus on increasing sensory load related to brand perception. However and solutions proposed by the PXD team implicated the various spatial dimensions of the servicescape (Table 4).

5. Discussion and conclusion

According to customer journey mapping, the problems related to the effectiveness of visuals and design of servicescapes in the touchpoints could be categorized as:

- Lack of relation between visuals placement, customers' interaction time and spatial design decisions.
- Excessive use and/or lack of visual materials
- Use of materials incompatible with brand identity
- A weak sense of the company's brand messages
- Inconsistency of a design language for the servicescapes and the graphics
- Use of alternative communication channels
- The need for more effective use of visual communication tools, planning of their locations and creating bonds with the brand identity.

Table 3. Problems discovered and solutions proposed after customer journey mapping

Touch-point 1	**Context**	**Objectives**	**Problems**	**Solutions**
Approach and Entrance Node	-The Busiest Customer Flow -The Shortest Interaction Time -High Mental Load	-Welcoming and Providing Service Information -Enabling Comfortable and Fast Orientation -Attracting Passers-by	-Failing totem design and lack of brand visibility -Misplacement of welcome and orientation messages -Failing Flag Design -Inconsistent graphical language in entry and exit messages	-A new totem design with a led display to make the data on its screen more visible and legible -Flags with simple and plain designs -A new graphic design style in logos, print materials, graphics and even in web pages that would reflect the brand image
				
Touch point 2	**Context**	**Objectives**	**Problems**	**Solutions**
Pump Islands	Busy Customer Flow -Long Interaction Time -Medium Mental Burden (Waiting-Shopping)	-Providing Campaign and Quality Information -Effectively Using Internal/External Waiting Time -Using the Market Return Route Effectively -Increasing Visual Visibility	-Visual complexity due to excess number of messages -Misplacement of screens and campaign messages on pump islands -Inconsistent graphical language ion pump islands	-A new pump stand was designed with a minimalist style -Positioning of screens and visuals at eye-level height -Visual materials used for calls, warnings and orientation were arranged with the same graphic language and color
				

Touch-point 3	Context	Objectives	Problems	Solutions
Market	-Busy Customer Flow -Medium Interaction Time -Medium Mental Load (Goal-oriented) -Highest Visual Clutter	-Reducing Visual Chaos -Focusing the Campaign Images -Reducing Visual Chaos	-Inconceivable brands and services in the storefront -The quality and inconsistency of graphical language inside the market -The quality of photography inside the market -Use of materials incompatible with brand identity -Missing information about services	-The facade was redesigned in a minimalist manner -Car parking in front of the market should not be allowed. -Overlapping of graphics had to be avoided -Warmer color filters were applied to the photos. -A consistent material language was used.
	   			

Touch-point 4	Context	Objectives	Problems	Solutions
Toilets	-Low Customer Flow -Long effect time -Low Mental Load (Waiting - Resting)	-Attracting Non-Customers -To Strengthen the Emotional Bond with Customers -Giving Detailed Information on Products /Services	-Weak sense of hygiene and eco-friendliness 	-A more spacious and eco-friendly visual approach supporting hygiene in the toilets 

Touch-point 5	Context	Objectives	Problems	Solutions
Vehicle Washing Area	-Low Customer Flow -Longest Interaction Time -Lowest Mental Burden (Waiting)	-Using Long-Term Standby Effectively -Providing (Cross) Sales -Attracting Non-Customers -Increasing Brand Loyalty	-Lack of messages in the vehicle washing area -Inconsistency of design and graphical language in the vehicle washing area. 	-Alternative communication channels could be used for effective advertisement sources -Standardization of the design language as well as the graphical language. 

Touch-point 6	Context	Objectives	Problems	Solutions
Extra Facili-ties	-Low Customer Flow -Long Interaction Time -Medium Mental Load (Goal-oriented)	-Providing (Cross) Selling -Attracting non- customers -Providing Information about Air and Water Operation	-Lack of orientation for customers -The weak sense of hygiene in food-water stands	-Stickers were used for high-priority campaigns -The food-water stand was designed to solve this dirty image
	    			
Touch-point 7	**Context**	**Objectives**	**Problems**	**Solutions**
Fare-well and Exit Node	-Busy Customer Flow -Very Short Interaction Time -High Mental Load (Traffic Control)	-Farewell and Encouragement to Come Back -Positive Brand Perception for Leaving Customers	-Lack of farewell messages 	-Monomessage boards were positioned at the same view level with customers so that they could see the traffic at the exit. 

Besides the given brief for improving the visual clarity of the brand in the touchpoints, the PXD team acknowledged that a pumping station was a pedestrian realm therefore it had to balance convenient, low-speed car movement with safe and welcoming pedestrian circulation, most critically in the path from the pump to the cashier as much as in the waiting area by the car wash. Therefore, in addition to place branding and UX research solutions (Table 3), they came up with spatial design solutions that stem from some of the PXD team members' backgrounds and expertise in spatial design fields (Table 4). They proposed changing the position of the market area to create a welcoming and safe environment. The new position of the market could create a more effective journey. Especially if walking paths were positioned in the direction of the busy streets, the number of visitors would increase. In addition, the size and the visibility of the side surface of the market would offer a much more efficient in terms of signage/totem area. It would be possible to create a more efficient and digital advertisement surface on this wall by using a video wall. It would allow the brands inside to come to the fore and increase the effectiveness of the campaigns.

The design solutions concerning the physical dimension of the space can also be reinterpreted with theories from the spatial design field. For example, pattern language by Alexander (1977) that aims to give the environment and space its character and generate spatial designs through a collection of 253 patterns can be used for analyzing the problems and opportunities and then improving the present servicescape. According to Alexander's work:

– Patten '53 - Main Gateways' that suggests marking every boundary which has important human meaning by great gateways applies to the TP1 (the Approach and Entrance Node) and Touchpoint 7 (Farewell and Exit Node).

- Pattern ‘98 – Circulation realms’ defines a good environment to be easy to understand, without conscious attention applies to the TP3 (the market) and in TP4 (the toilets).
- Pattern ‘103 – Small parking lots’ that suggests making parking lots small, serving no more than five to seven cars, to preserve the human scale to apply to the TP2 (the pump islands) and in TP5 (the vehicle washing area).
- ‘Pattern 122 – Building fronts’ and Pattern ‘165 Opening to The Street’ that defends the locationing of the front of buildings on the street and the exposure of space and its activity to the street applies to the TP3 (the market).
- Pattern ‘124 – Activity pockets’, that surround public gathering places with pockets of activity - small, partly enclosed areas at the edges, similar to extra facilities applies to the Touchpoint 5 (the vehicle washing area) and TP6 (the extra facilities)
- Whereas Pattern ‘46 - Market of Many Shops’ that criticizes modern supermarkets and suggests establishing frequent marketplaces, each one made up of many smaller shops to create their own environment, according to their individual taste and needs contradicts with the nature of the Touchpoint 3 (the market) and the place branding attitude of creating a common visual and material language.

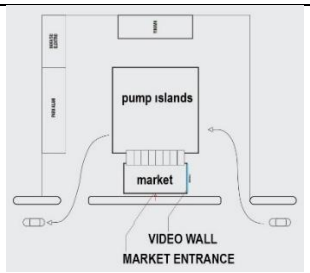
Although Alexanders’ pattern language is claimed to be an objective and evidence-based theory, reviews on his work criticize it for adopting an ontology that confuses objective and subjective phenomena, rejecting pluralistic values and alternate experiences, ignoring political and social realities and accepting only one ‘right way of building’. The theory is also claimed to depend on an idiosyncratic definition of ‘science’ that lacks proof of empirical research and eliminates scientific practices of testing and documentation (Dawes & Ostwald, 2017).

At this point, the CX research provides empirical evidence for understanding and managing the customer experience. It also involves any kind of interaction between the customer and the business through touchpoints therefore as much as the physical dimensions of the space, the social, sensory and cognitive dimensions become elements of the design problem. Thus, using the CX research tools, the PXD team came up with multi-dimensional design solutions for improving the CX in the servicescape (Table 4). The addition of restaurants and TVs would increase customers’ satisfaction in their social context while placing sleeping hubs and massage chairs would serve their sensory experiences. For improving brand recognition, a fragrance compatible with the brand’s personality and communication style could be identified and used in all markets and toilets. Sharing QR music lists with customers would make the brand a part of their journey. Using smart posters with NFC (near field communication) technology to communicate campaigns, to share bonus points or to take customer views would increase the company’s interaction with the customers. Thus, opportunities and recommendations regarding the cognitive, sensational, cognitive, social and physical customer reactions necessitate the use of alternative communication channels.

To sum up, the case study displays how adopting the (CX) approach and getting the customers’ data at each touchpoint helped the design team evaluate the spatial layout and functionality besides the messages communicated by the brand. It emphasizes the roles of spatial designers and their transforming practices for designing the UX in physical space. To design a human-centric and multidimensional space, the UX approach from human-computer interaction, the CX approach from marketing and the PXD approach from spatial design fields can be used jointly. Strategies that join multidisciplinary perspectives and methodologies will open the frontiers for innovative design processes

and competitive advantages in all fields of science and business that value the users and their experiences.

Table 4. The PXD approach and solutions of the design team

Dimensions of UX	**PXD solutions**	**Image**
Physical	- Changing the position of the market area -Improvements regarding the relations in between visuals' placement, customers' interaction time and spatial design decisions.	 
Social	-The addition of restaurants and TVs	
Cognitive	-Sharing music lists with QR codes customized by the company with the customers -Using smart posters with NFC technology to interact with the customers	
Sensational	-The addition of sleeping hubs and massage chairs -Using a customized fragrance to be used in all company toilets and markets.	 

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