

A “Mobile First” Service Personalization System in the Tourism context

Abstract. Service personalization has direct consequences on service perception and service evaluation. As number of mobile users continue to rise, researchers must focus on addressing the problem of inadequate service personalization due to lack of effective mobile service personalization system. This study underscores the importance of the need for an optimized design for the smartphone based web services in order to achieve expected service outcomes. The design principles outlined consider the disruptive circumstances of the mobile user and characteristics of the mobile phones.

Keywords: Mobile first, Personalization, Services, Signifiers, Non-recurrent usage.

1 Introduction.

Smartphones are pervasive, with over 2.5 billion users around the globe [14]. For those who own them, smartphone permeate in their everyday life providing them with anytime anywhere connectivity to the web and other information resources [4, 24]. For the first time in October, 2016 the number of worldwide smartphone users crossed the desktop users [13]. Understanding the mobile web and its pattern of usage is indispensable for service providers.

In this study we examine the implications of mobile web use on service personalization¹. The context of our work is in the hospitality industry due to the historical differentiation value of personalization in the industry [12]. Moreover, technology mediated service interaction results in novel and beneficial outcomes [18]. The focus of our problem is to solve the problem of limited service personalization due to access of the “Desktop based” personalization system on smartphones. Specifically, we design a smartphone based system that enables travelers to complete the process more efficiently

¹ We define personalization as “How well the customer feels that the service can be personalized to meet his or her needs.” [16]

and we focus on the non-recurrent usage² of the system. In particular, we use the “Mobile First”³ approach which prioritizes the design for mobile first than any other device [22]. We develop an instantiation based on the theoretical foundations of design science research and present a prototype of “mobile first service personalization system” (MFSPS). The system is novel in the tourism landscape as only few applications focus on the traveler’s interaction with hotel accommodation providers [7]. The main objective of the MFSPS is to increase the number of users personalizing the service (personalization extent) and enable them to complete the initiated personalization.

In the further sections, a) we report the previous work related to role of technology in service personalization and related research on mobile web design, b) explain the problem in detail, c) describe the research process in brief d) discuss the requirements and design principles of the artifact e) describe the instantiation and discuss the key points of this study.

2 Related Work

Several researchers have investigated the role of technology in service personalization in Information Systems and related fields. [5, 23]. Very few studies have focused on designing artifact for mobile devices even though mobile services are presumed to achieve higher personalization than web-based services [10]. Some researchers investigated differences between personal computers and smartphones, they explored the unique characteristics of mobile phones such as the size and shape of the device, constant connectivity to the Internet, instant access and increase in user-generated content [21]. Due to the continuous access to Internet, users multitask [11] and they are distracted on a continuous basis compared to the personal computers [6]. Usability for the mobile application was of interest recently and several constructs are outlined to evaluate it, however the study is limited to mobile applications only and does not apply to websites [8]. Researchers proposed the solution: tree based views and hierarchical text summary for effective mobile web design [1]. They conceptualized effective presentation adaptation of web content on mobile devices however it was limited to a simple structure of the webpage. In the tourism industry researchers were interested in the taxonomy of the mobile app users specifically the travelers [7]. As discussed in previous section, our focus is on the design for the mobile web and specifically for the non-recurrent usage of the system.

² We refer to non-recurrent usage as limited usage of an application. A user may be reluctant to download a “mobile app” for a service which he uses infrequently, for example a traveler visiting a hotel website once or twice in a year. Hence the focus must be on an effective mobile website design.

³ The approach is useful to develop a consistent design across all devices and enables to simplify the complex navigations and interaction on desktop.

3 Problem Identification

The context of our work is a European hotel which implemented a desktop based service personalization system provided by a software solution provider. Previous study demonstrates that users selected more preferences and in addition they selected a wide range of (non-essential) preferences for their hotel stay [18]. The system enables travelers to precisely state their preferences or personalized needs even before their arrival at the destination. Specifically, the current system enables user to select more than fifty amenities displayed in several categories on a dashboard called “My-Page” (Figure 3.1). The system was successful compared to the conventional routes of personalization that is by calling the Front Desk at the Hotel and requesting for an amenity. High number of personalized amenities results in improved customer satisfaction, increase in service value and loyalty [18]. Despite the innovative approach of the technology to personalize preferences, approximately 20% of the users personalized their stay through My Page [18]. This is a concern for the service provider and hence to increase the personalization extent, the introspection of current system is necessary. The current system was suitable for personal computers, so users trying to access the system from smartphones were unable to view all the information on small screens effectively. Therefore, as the trend toward smartphones and away from desktop continues, an optimized design for smartphones is essential.

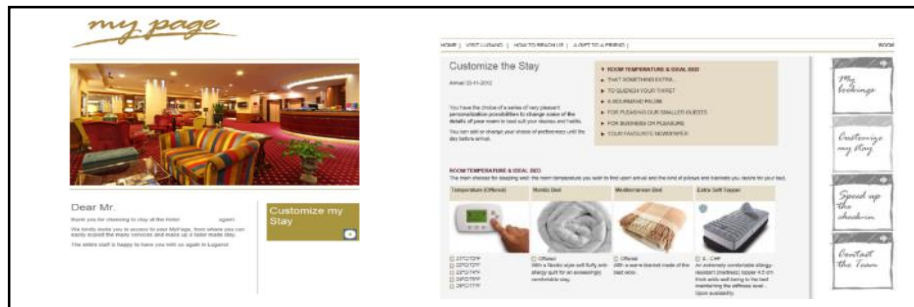


Fig. 3.1 Email: My Page and My Page Dashboard

Our solution is to develop a socio technical artifact (a prototype) specifically for the smartphone enabled personalization process. We accomplish this by following the research process described in the next section, our entry point in the research process is the problem-centered initiation approach [19].

4 Research Process

The DSR process we adapted follows the six steps described in the **Table 1** below [19].

Step	Service Personalization system	Status
Problem Identification and motivation	The utility of the service personalization system on mobile phones is underutilized, users initiating the process leave the current system. Need for an effective mobile web design is identified.	Completed
Objective of the solution	Increase the extent of the personalization and complete the initiated process.	Completed
Design and development	Iterative design process: working prototype is completed. ⁴	In-Progress
Demonstration	Gather insights from the manager of the Hotel.	Planned: Spring 2017
Evaluation	Evaluation is based on comparison with old system and metrics are based on meta-requirements defined in further section.	Planned: Spring 2017
Communication	Publication in relevant outlets.	In-Progress

Table 1. Research Process adapted from [19]

5 Design of the Socio-Technical Artifact (MFSPS)

i. Kernel Theory: We use collective knowledge from different disciplinary roots to develop MFSPS. Originally rooted in the field of ecological psychology we adopt the following notion of affordances: “Affordances define what actions are possible. Signifiers specify how people discover those possibilities: signifiers are signs, perceptible signals of what can be done.”[15, 17]. We use Norman’s theory of design specifically the components: signifiers and affordances to better comprehend the design elements of the MFSPS.

Order and complexity of the web-page affects its usability. We use the theory of environmental aesthetics and preference research to incorporate a simple layout in the design and reduce complexity. The theory provides guidelines to organize the design elements in an intuitive and logical flow. This makes it easier for a user to find the intended information [2]. From the cognitive perspective, understanding the behavioral intention to personalize is critical, hence the theory of planned behavior supports to examine this notion. [3].

⁴ The working prototype can be accessed at <http://goo.gl/KF0kBa>

ii. Meta-Requirements: We follow Walls (1992) Information Systems Design Theory (ISDT) to identify the class of problems known as “Meta-requirements” [20]. As discussed in previous section we target users for non-recurrent usage of the system. One way to achieve the objective is to enable instant access and remove any intermediate steps in accessing the mobile website. Hence we provide **Instant access** (MR1) to the personalization system through the email link sent to the user after reservation confirmation. Our decision to choose mobile website over mobile application eliminates the possibility of platform differences (Android, iOS) and also supports the goal for non-recurrent usage of the system. We need to eliminate any obstacles from completing the process of personalization due to the characteristics of mobile phones hence the system must be simple to use and we aim to minimize the cognitive effort required to complete the process: **Effort Minimization** (MR2). As mobile users are distracted easily, provisions must be made for them to return and continue the process of personalization: **Process completion** (MR3). We propose that a high level of interaction between the system and user is essential and it can be realized by providing feedback. This can help the user to better understand if the intended action was completed: **Feedback** (MR4) In order to achieve the requirements defined above, we use intuitive and coherent mobile design elements-**Organization** (MR5).

iii. Meta-Design: After describing the meta-requirements, we articulate the meta-design principles for MFSPS in the **Table 2** below.

MR	DP	Meta Design Principle
MR1	DP1	Responsive design to view similar information across all devices.
	DP2	Access to mobile website in one finger-tap.
MR2	DP3	Save session data to show the last saved preferences selected by a user.
	DP4	Finger size controls: toggle switch, sliders, large buttons, tabs menu placed on the bottom of the screen.
MR3	DP5	Use of email reminders.
	DP6	Using personalized messages in email reminders.
MR4	DP7	Display clearly the value (price) of each amenity.
	DP8	Provide feedback if the amenity is personalized.
MR5	DP9	Use of cards to combine different parts of information together: image, expandable textbox, action elements like toggle switch or slider. The cards are useful for vertical scrolling on the mobile phone.
	DP10	Use of navigable tabs to organize each category.
	DP11	Metaphors to signify the navigable tabs:glyphicons

Table 2. Meta-Design Principles for MFSPS

iv. **Evaluation:** We measure the extent of users personalizing the new system compared to the old system to validate our objective of increased extent of personalizations. Evaluation of the artifact and the data analysis are planned in subsequent stages of the study. Initially we will focus on the impact of MFSPS over the old system. We plan to achieve this objective by comparing the personalization extent of the new system over the old system by conducting A/B test. We will measure the number of users personalizing the system and also the percentage of users completing the process. Further we will measure firm level impact of the system utility in terms of increased service performance, value and ratings. This process will help us to identify the critical design principles. Supporting results can lead to the validation of the design principles and will help service providers to utilize MFSPS for improving service delivery to their customers.

6 Instantiation

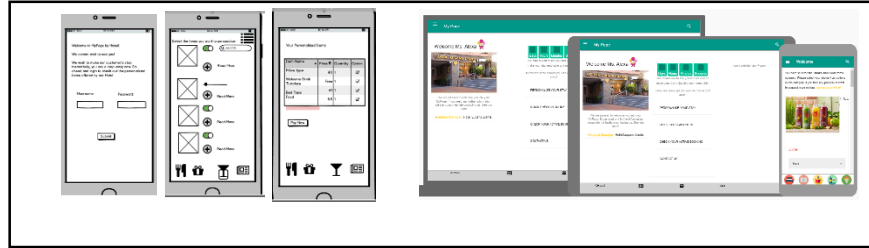


Fig. 6.1. Mockups and Iteration

Fig 6.2 Cross platform design.

We designed the socio-technical artifact in several stages. In the first stage, we visualized the system through rough sketches and mock-ups and further revised it to a working prototype in each revision. Figure 6.1 demonstrates the mockup and captures the design principles and meta-requirements discussed in the earlier section. In the next stage, we designed the working prototype. (Figure 6.2) The key design decisions we implemented in the process are summarized below:

Design Decisions:

- We realized the meta-requirements and meta-design by developing the artifact based on Google's material design philosophy. [9] Material design is a visual language developed by Google for cross-platform design which is closely related to our objective in this study. We selected the top five categories of amenities based on previous data showing high percentage of personalization on the desktop system, as the tabs on the mobile system. The (a) part of the Figure 6.3 shows the percentage of personalization requests for different amenities and their respective categories.

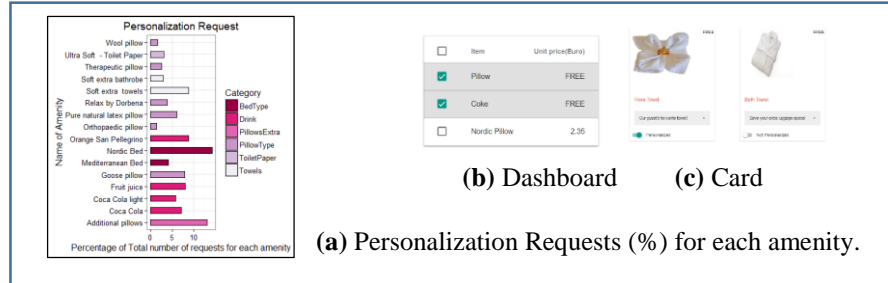


Fig. 6.3 Design Decisions

In the prototype, we created a small dashboard to show the selected preferences to the users. They can choose to change their preferences at any stage while using the system (Figure 6.3 (b)). Tabs are placed at the bottom of the screen for easy access on the smartphone and users can switch quickly between the tabs. The toggle switch elements is an intuitive component and it is used to select or deselect any amenity. (Figure 6.3 in the (c)). Email reminders are essential to complete the process of personalization. We pragmatically decided that they must be sent by default at least two weeks before the traveler arrives. If the traveler is unable to finish the personalization process due to unforeseen reasons, personalized email reminders must be sent to complete the process.

7 Discussion

Mobile web can not only enhance the quality of interaction but also offer individual attention. As the number of smartphone users continue to rise, developing personalized services for smartphones is expected to plummet. The design principles formulated in this article can be utilized and extended in other applicable areas. Our socio technical artifact is by no means accurate, however the eleven design principles developed in this study can address the problem of low service personalizations specifically in the case of tourism industry. Successful implementation of the smartphone based system can establish a direct connection with travelers and gradually eliminate the involvement of third party systems for hotel reservations. Once the system is stabilized and evaluated, the economic benefits and service outcomes are likely to be positive for the service provider. Future studies can also focus on providing content-specific amenities targeting specific groups of users based on the analysis of frequent preferences made by users.

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