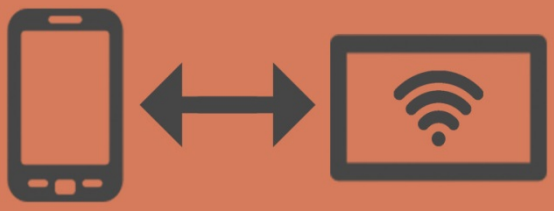
Research Summary:
When mobile meets public display

A research study on the role of interactivity and context in pervasive commerce



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Background

In recent years we have observed the expansion of digitalization which has become present in all types of environments. Computers have gradually begun to offer us assistance in the navigation throughout number of daily activities, they became ubiquitous.

Mobile phone technology progresses rapidly, and today's smartphones are much more advanced and offer a new range of features. Touch screens, GPS, connection with Internet and sensor technologies enable new qualities for advertisers such as personalization and context adaptivity (Muller et al., 2011). The mobile does not operate in a vacuum anymore but it became an important component of computerized environment, opening up new opportunities. One of these opportunities is the communication between personal devices and public devices such as public displays.

Using public displays as a part of pervasive advertising, distinguish itself from conventional advertising by implementing interactivity, providing experiences, personalization, context adaptivity and automated persuasion (Muller et al., 2011). Recently developed new technologies allow advertisements displayed via digital billboards to adapt to any measurable context such as audience, time and location (Krumm, 2011). Using context adaptive ads allows the advertisers to better target their audience (Bauer, Dohmen & Strauss 2011). Furthermore, giving the customers more control by creating choices, advertisers can enhance the customer's experience with the product information (Lombard & Snyder-Duch, 2010). Advertising through interactive public displays also produces a sense of personalization since it implements two-way communication which is not that apparent in traditional media (Lombard & Snyder-Duch, 2010).

Context adaptive systems can be employed in various ways. Creating an interactive system between public display and a mobile phone as "third party content" within is one of them.

Throughout last 15 years of research the interaction between mobile devices and public displays has been examined in diverse manners (Schneegaß, Alt & Schmidt, 2012). Nevertheless, prior studies have been mainly focusing on HCI, functionality and usability of concepts of implementing mobile interaction into public display systems (Gillispie & Calderon 2007; Muller, Alt, Schmidt & Micheils 2010; Jose, & Cardoso 2011; Dix & Sas 2010; Clinch, Kubitza, Favies, & Langheinrich 2012; Schneegaß, Alt, & Schmidt 2012).

Mobile phones, are relatively new channel for advertising (Firman, 2010) and the scientific research is yet fragmented and inconsistent (Leppäniemi, 2006). Customer attitudes are the topic which brings attention of many marketing researchers (Firman, 2010). The results of these studies (Tsang 2004, James 2004, Chowdhury 2006, Jun 2007), however, are often contradicting and propose to research the field more insightfully (Firman, 2010). Other prior studies investigated a number of mobile ad attributes such as effectiveness (Merisavo, Vesanen, Arponen, Kajalo, & Raulas, 2006) consumer acceptance (Leppaniemi & Karjaluoto, 2005), permission in mobile ads (Tsang 2004; James 2004) and attributes which are directly allied with the location independence of the mobile such as contextualization (Yuan & Tsao, 2003; Bose & Chen 2009) or location based advertising (Hühn, Khan, Lucero & Ketelaar, 2012).

Problem definition

The goal of our study was to investigate whether implementing the interactivity in context congruent advertising is noteworthy. In our research we aimed to measure customers' perception of contextual ads which are adapted to the situation customers encounter them. The main general research question which we intended to answer was if advertising based on the interaction between mobile and public display is effective, as opposed to advertising via mobile only.

As a follow-up study of Hühn et al. (2012) we used similar lab setting of virtual environment (VE) and a context sensitive mobile ad. We aimed to increase the perceived context congruency of the ad on the mobile phone by adding an additional tool - a public display. We assumed that communicating the ad message via two interactive media channels and thereby exposing a customer to the context relevant ad via both devices might influence the perceptions of the ad and hence increase the advertising processing.

Prior research emphasizes the importance of personalization and context adaptivity, which provide powerful tools for advertising (Muller et al., 2011). In our study we were particularly interested in the perceived context congruency and perceived interactivity which were our independent variables. Our dependent variables were attitude towards mobile ad, attitude towards the mobile app and buying behavior.

In order to fully understand the context in new media, we presented a conceptualized model of context for pervasive commerce (Bauer & Spiekermann, 2011) and a literature review in media context. Next, we drew our hypotheses from social psychology and advertising research.

Our first hypothesis was based on the premise that context congruency of the ad presented within the media channel, which is an interactive public display is clearly apparent, since it is located next to the advertised product. We hypothesized that adding an interactive media channel will positively influence perceived context congruency since media context may stimulate the motivation to pay attention to ads which are context congruent (De Pelsmacker, Geuens & Anckaert, 2002).

H1: People who are exposed to the ad via both channels (public display and mobile) will perceive the ad as more context congruent than the people who are exposed to the ad via mobile.

The notion of perceptual fluency model supported by affective and cognitive priming and context-induced constructed processing determines our next research hypothesis. We assumed that context congruent advertisement will influence or change customer's attitudes which are a part of non-conscious processing.

H2: Increase in perceived context congruency will have a positive effect on the attitude towards the advertisement.

H3: Increased perceived context congruency will have positive effects on the attitude towards the app.

Research in relationships between the attitude and behavior offers several specifications which illustrate the causal role of AAD. The one which we employ in our research is affect transfer

hypothesis (ATH) by Shimp (1981) which speculates that there is a direct one-way causal relationship between AAD and attitude towards the brand (Ab).
In order to establish the relationship between Ab and purchase behavior we refer to theory of reasoned action which explains the attitudinal influence on behavior (Fishbein & Ajzen, 1975).
We hypothesized that customers who will have more positive attitude towards the mobile advertisement will more likely purchase the advertised product, than customers whose attitude towards the ad is less positive.
H4: More favorable attitude towards the mobile ad will have a positive effect on buying behavior.
In our study we evaluate two groups in which degree of interactivity differs. Since perceived interactivity depends on navigation and responsiveness, we assumed that participants who interact with mobile ad only will perceive interactivity lesser than a participants who interact with public display, added interactive tool, and a mobile app.
H5: Perceived interactivity will be high when people can trigger the ad on the public display by interacting with it via mobile phone.
H6: Increase in perceived interactivity will have a positive influence on the attitude towards the app.

Methodology

In order to test our hypotheses we conducted the experiment which took place in the 'media lab' where the VE setup was located. The design of VE was based on the interiors of Dutch supermarket Albert Heijn which is a predominant chain of supermarkets in the Netherlands. A between-subjects experimental design was applied. Participants were randomly assigned into two conditions, based on the interaction with the mobile device and the public display and the mobile device only. Both groups were exposed to the same content of the advertisement. An android application has been developed and it was installed on a HTC smartphone. The public display has been designed for research purposes and has been placed within a virtual supermarket environment next to the advertised product.
A convenience sample of 41 international students and employees from the NHTV University of Applied Sciences in Breda has been selected to participate in the experiment. The participants were given a mobile phone with the preinstalled app and they were asked to do the virtual groceries. We operationalized context congruency by setting up a trigger area which has been established in a close proximity to the advertised product. When entering a trigger area a push message with an advertisement of the "Knorr" products has been received on the mobile phone, or in case of the second condition, the same ad has been visible on the public display.
To examine the hypothesized relationships a survey questionnaire has been developed. Several measurement scales were adopted from previous studies in the same field.

Findings & Future research

After completing data collection and we conducted statistical data analysis.

Based on our findings, we assume that exposing subjects to the ad via more than one media channel will influence their perception of context congruency of this ad. Moreover, we speculate that the higher perceived context congruency of an ad will lead to more favorable attitude towards the mobile app and AAD. As we found in the literature, media context has a considerable role in advertisement processing which accordingly has been evident in our research study. The presence of public display had a significant influence on a perception of context congruency of the mobile ad.

According to the literature, perceived interactivity is based on responsiveness (Wu, 1999). It gives us some indications that the degree of interactivity which we employed was too low, since our results were insignificant in that matter. Hence, we might conclude the user control of the app was limited.

The outcomes the study suggest that implementing public display into mobile advertising might influence the effectiveness of the ad which consequently leads to the purchase of advertised product. We speculate that context sensitive services can control attitudes in general and therefore, might be an effective tool in pervasive commerce.

Research in context sensitive advertising is mainly prototype-based, mostly because of the technical limitations which researchers encounter. Nevertheless, when testing advertising effectiveness, using VE is arguable, since it extensively influences the validity of the findings. During the experiment we faced several obstacles which can frame a recommendation for future studies.

The operationalization of the variables in our research has been aggregated within two experimental groups only; therefore research outcomes could have been affected. We also witnessed participants did noticing an advertisement on the public display. This could have been caused by the fact that the content of the ad on both media channels was the same.

We believe that this study can contribute to the broader research on media context in pervasive commerce which is yet evolving. Nevertheless, this field of academic investigation is yet limited and it lacks of substantial findings which we could compare with.

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