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Complete Research

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Abstract

Recommender Systems are traditionally been used in online environments. The present study fo-cuses on factors affecting consumers' acceptance in recommendation systems that will be used in traditional stores. For this purpose, we have developed a garment recommendation system apply-ing and evaluating the aforementioned factors through an experiment. The main insights of the study indicate that consumers' personality affect consumers' preferences and garments' style.

Additionally, when a consumer has high motivation to purchase a particular garment (s)he does not waste his/her time for looking around other types of garments. This means that if a garment provider wants to increase cross selling then he has to recommend products that are close to that event such as accessories.

Keywords: *recommender systems, persuasion, acceptance.*

1 Introduction

Recommender Systems are typically applied in online environments and are characterized as one of the most successful software tools since they meet the needs of both product/service providers and customers. The main inputs of a Recommender System in an on-line store are users' id, his/her rating upon products (s)he has seen and purchase history. However in a physical environment data collection is more complex since the data that should be collected for the provision of a recommendation through a kiosk, is a combination of data from both off-line (e.g. which products (s)he holds) and on-line environment (e.g. user's id, history purchase). The present study focuses in that point which is it's main distinction from other studies, the design of a Recommender System for a physical (off-line) store. Given that factors that affect consumers' behaviour when they are shopping on a physical store (such as time pressure, crowding, etc) are still to be investigated, it would have been interesting to study in that direction. At the first phase, our goal is to determine the factors affecting recommendations' acceptance and consecutively to implement them on a physical store.

The context of this study is physical garment store. The design of a recommendations' service that will suggest garments (or other accessories) to consumers according to their preferences is one of the innovative consumer services that are willing be designed in the fashion domain. Recommending garments and relevant accessories to consumers gives product providers the opportunity to increase sales as well as to increase satisfaction loyalty of their customers. However, in order to secure the success of the recommendation service, it is crucial to identify the factors that affect the consumer's decision making towards using the recommendations services in the in-store environment.

Thus, we will focus on a Recommender System which recommends garments, examining it – at this stage of the project - from the interface perspective. More specifically, we will focus on investigating the impact of three important factors on the acceptance and use of the recommendation service is consumer's personality. For this purpose, we have developed a garment recommendation system applying and evaluating the aforementioned factors through an experiment, as described in the next sections.

The paper is organized in five sections. In Section 2 is described the role of persuasion and the factors affecting recommendations' acceptance. Section 3 presents in detail our study which is divided into two phases the garments' style classification and the experiment. In Section 4 are presented the experimental results are discussed, while in Section 5 the main conclusions of this research are demonstrated and what our future work involves.

2 Literature Review

2.1   Factors affecting recommendations' acceptance

The main research in Recommender Systems has traditionally been focused on their algorithmic perspective. The implicit assumption that the more accurate recommendations are provided, the more successful the RS is, has recently been challenged since other factors have been identified as antecedents of a RS success. Some of these factors are the presentation of a recommendation (Nanou et al. 2010), the set size of recommendations (Ho and Tam, 2005), recommendation's novelty, serendipity (i.e. Pu and Chen, 2011, Cremonesi et al., 2010) as well as user's personality(Gkika and Lekakos, 2014).

Clothing style preferences differentiate among humans. Body type, body image, age as well as fit preferences are some of the factors that affect someone's clothing style (Chattaraman and Rudd, 2006; Chattaraman et al., 2013). In order someone to feel comfortable with his/her clothing, usually prefers to purchase garments from a specific clothing style.

H1: Consumer's style affects garment preferences

H2: Consumer's purchase intention is affected by garment's clothing style

A human's personality is defined as '*a dynamic organisation, inside the person, of psychophysical systems that create the persons' characteristic patterns of behaviour, thoughts and feelings*' (Allport, 1961, p. 11). Studies indicate that personality influences the way people make their decisions (Nunes et al., 2012). Given that the type of services we examine are trying to form, change or reinforce people's opinions and decisions, they are trying to persuade them in other words, it would have been useful to examine how people with different personality are getting persuaded. According to Moddy et al. (1977) there is correlation between three out of five personality factors and clothing style preference. Moreover, studies have shown that dress express personality, nevertheless clothing choice has also been viewed as overt behavior, which is being influenced by an individual's personality profile (Gurel et al., 1972). Thus, the third hypothesis of the experiment is:

H3: Consumer's personality affects her intention to purchase garments

The Elaboration Likelihood Model (ELM) indicates that individuals with low motivation or ability to process the information provided with a recommendation could eventually get persuaded to select/use the item if appropriate peripheral cues enrich the recommended item. According to the Fogg (2009) in order for someone to get persuaded to perform certain behaviour (s)he should have motivation to act, the ability to do it and get prompted by an activating trigger. If any of those three components is not present or their mix is not appropriately balanced then the individual will not perform the target behaviour. In case someone lacks motivation then the triggers should be in the form of 'motivational elements' so as to grab customer's attention and consecutively make them see and process the provided recommendations.

H4: Consumer's motivation to purchase affects the amount of products (s)he purchase.

In order to evaluate the above hypotheses an experiment was conducted as described in the next section.

3 Research Design and Methodology

3.1   Garments' style classification

In order to investigate whether people with the different personality have different clothing style (H1) preferences, garments had first to be categorized regarding to their style so as to examine which clothing style(s) is/are preferred from each personality group. In order to experiment with a wide variety of garments, different style garments have been used. We adopted Shen's et al. (2007) methodology and taxonomy of clothing style, which consists of 6 categories (formal, luxurious, trendy, funky, casual and sporty). Shen et al. (2007) indicate that a garment may belong to more than one type of clothing, for instance a black midi dress may be characterized both formal and luxurious.

For the classification of garments in our experiment, 14 fashion experts evaluated 35 garments from the last Diffusione Tessile's collection, an Italian garment provider. For each garment the experts were asked to evaluate each garment's compliance with the six style groups and providing a rating from 0-10 (0 not matched to a category – 10 perfectly matched to a category). Finally, 24 out of 35 garments were selected and used in our experiment, those with the highest matching averages.

3.2   Experiment Design

In order to investigate the above hypotheses a between-groups experiment was conducted for two different scenarios of the customer experience use case. The first scenario simulates a low intention/ low motivation shopping behavior, where consumers visit the store without a clear intention to buy something. This "Shopping therapy" scenario differentiates from the second scenario, which simulates a high intention/high motivation scenario where consumers visit the store in order to perform a planned purchase (e.g. a garment for an important event). The distinction of the two scenarios was necessary since (according to the Elaboration Likelihood Model) users with different level of motivation levels respond differently to motivational triggers with respect to the acceptance of recommendation. The first scenario asked the participant to imagine that it is Saturday morning and she is going for "shopping therapy" while at the second scenario she is supposed going shopping in order to purchase a garment for an important event to her (e.g. a special dinner, a date, an appointment) which would take place that day. Consecutively, in both scenarios, experiment participants were asked to imagine that they enter a store in which a number of recommendations (24 in total) were provided to them through a touch screen monitor.

At the first step of the experiment, participants were asked to fill-in a questionnaire with personality related questions, utilized to classify them in personality groups in order to examine potential relationship between personality and garment preferences (style groups) as well as the acceptance of recommendations (H3/H4).

There is a variety of tools and methodologies in order to measure a person's personality but the most widely accepted and used is that of the Five-Factor Model of personality, or the Big Five (John, 2008). According to Five-Factor Model, each person is characterized by five personality traits (extraversion, neuroticism, agreeableness, conscientiousness and openness to experience) to lower or higher degree. The questionnaire that used for personality is Big Five Inventory (John et al., 1991; 2008)) which consists of 44 questions. Moreover, there were questions about users' motivation to purchase (Tam and Ho, 2005). The particular questions were used so as to investigate whether people with a different personality profile behave in a different way in case of having both high and low motivation to purchase.

At the second step of the experiment, six blogs of garments were presented to the participants (i.e. six web pages with four garments each) (Figure 1 and Figure 2). The participants were asked through a questionnaire if they like the recommended garment and match their style (by providing ratings in a 1 to 5 scale) as well as whether they believe the garment is novel or a serendipitous recommendation for them and finally their intention to purchase it or not. The above questions are concerning novelty and serendipity used in previous studies (Celma et al., 2008; Adamopoulos & Tuzhilin, 2013). The goal of the aforementioned questions was to examine whether a person with a particular personality profile considers a recommendation (a garment with a specific clothing style) novel or serendipitous as well as her intention to purchase it.

Figure 1: Second step of the experiment ('Shopping Therapy' scenario)

Figure 2: Second step of the experiment ('Event' scenario)

At the third and last step of the experiment a final questionnaire was provided which contained questions a few demographic questions.

3.2.1 Sample

The experiment participants were invited through posts in University's Facebook groups (e.g. undergraduate, postgraduate and PhD students). The invitation message was asking recipients to participate in a research in which they would be asked to rate recommendations provided by an application as well as to fill in a psychographic questionnaire in the domain of fashion. The link to access the system was provided and a clear suggestion concerning the anonymity of their participation was included in the message.

The properly completed surveys where 38 in the 'Shopping Therapy' scenario and 33 in the 'Event' scenario, in a total of 71 participants. All users were females while the 46% of the sample ware aged between 18 and 24 years old, the 52% were between 25 and 34 years old and the 2% at the age of 35-44 years old.

3.2.2 Survey Results

The first step of our analysis was to investigate the effect of consumer's personal clothing style on her garment preferences (H1). For both scenarios we measured the participants' average preference rating for the garments on each one of the six clothing styles and then an ANOVA analysis was conducted in order to measure potential differences among the different styles. ANOVA results suggested that in both scenarios, there are significant differences ($p < .001$) among the average rating of garments in each clothing style category (Table 1). Thus, H1 is confirmed.

Scenario	Sign	Mean Square
Shopping therapy	.000	4.640
Event	.000	3.294

Table 1: ANOVA results for H1

Consecutively, we compared in both scenarios, the ratio of the amount of garments (s)he declared she would purchase to the amount of garments she declared that match her style (Case 1). Then, we compared it to the ratio of the amount of garments (s)he declared she would purchase to the amount of garments that does not match her style preferences (Case 2). In this way we investigated whether the consumer's intention to purchase was affected by the garment's clothing style (H2). A paired t-test analysis was performed and the results indicated that the difference of means between the above elements is positive (Table 2), which denotes that a garment's style affect the consumer's intention to purchase it.

Scenario	Case 1 – Case 2		
	Mean	**St. Deviation**	**Sign.**
Shopping therapy	719	.278	.000
Event	.649	. 281	.000

Table 2: T-test Results for H2

In order to investigate H3, we examined which combinations of personality traits tend to score highest ratings on a diverse group of garments' style. Thus, the fsQCA methodology was performed for both scenarios. The five personality traits were used as possible conditions that influence the acceptance of garments (in the form of liking the garments). As a first step, the prescriptions of fsQCA required calibration of the cases into membership sets through fsQCA 2.0 soft-

ware. The function demands as input three threshold points; a full-membership value, a nonmembership value and a cutoff point. Because the dataset consists of subjective cases, we used cluster analysis following the k-means algorithm (k=3) to calculate the three membership sets. More specifically, high values are correlated with the full-membership set, medium values are correlated with the crossover point set and finally low values are correlated with the non-membership set.

The results of fsQCA indicate 3-7 alternative solutions comprising of alternative combinations of the personality traits that lead to high garment preferences. Black circles indicate the required presence of a personality trait in a solution. White circles indicate the required absence of a personality trait from the solution. Blank cells indicate that in that particular solution, the presence or absence of that personality trait is indifferent. Each solution is accompanied by two additional measurements of fitness, which express the 'predictive power' of each solution, namely the consistency and coverage indexes. Consistency presents how consistent is the empirical evidence with the outcome which is investigated while coverage estimates the proportion of cases that address the outcome which is under investigation.

Table 3 illustrates the results of fsQCA for the Shopping Therapy Scenario. The analysis identified seven solutions leading to high intention to purchase garments. All solutions require the absence of a personality trait by individuals. For example, the first solution proposes that individuals who are not agreeable but they are conscious and open to new experiences are likely to have high intention to purchase garments.

Personality Traits	Solutions leading to high intention to purchase Garments						
	1	2	3	4	5	6	7
Extraversion				○	○	●	●
Agreeableness	●	●			○	●	○
Conscientiousness		○	○	○	●	●	●
Openness	○	○	○	○	●	●	○
Neuroticism	○		○			●	●
Consistency	0.7	0.682	0.648	0.651	0.892	0. 956	0.875
Coverage	0.43	0.421	0.654	0.666	0.189	0.155	0.183
Overall solution consistency	0.635						
Overall solution coverage	0.812						

Table 3: fsQCA results for the paths leading to intention to purchase garments (Shopping Therapy Scenario)

The next Table 4 presents the different paths, consisting of combinations of personality traits, which lead to high acceptance of garments in the case of Event Scenario.

Personality Traits	Solutions leading to high intention to purchase Garments		
	1	2	3
Extraversion		●	
Agreeableness			○
Conscientiousness			○
Openness	●		
Neuroticism			
Consistency	0.887	0.853	0.671
Coverage	0.4	0.49	0.746
Overall solution consistency	0. 790		
Overall solution coverage	0.680		

Table 4: fsQCA results for the paths leading to high intention to purchase garments (Event Scenario)

In order to examine whether the consumer's motivation to purchase affects the amount of products (s)he purchase (H4), we measured and compared, for both scenarios (Shopping Therapy Scenario – Event Scenario), the average means of the garments that the participants had declared their intention to purchase (Table 5). The paired t-test results indicated that there are significant differences ($p < .05$) for the aforementioned metric between the scenarios. Hence, we accept H4.

Shopping Therapy Scenario – Event Scenario

Mean	St. Deviation	Sign
1.667	4.105	.035

Table 5: T-test Results for H4

4. Main Findings and Future Work

The present research emphasizes the impact of consumer's personality on the acceptance and use of recommender systems. First, we empirically validated that a consumer's clothing style affects which garments (s)he is going to purchase. His/Her purchase preferences are close to his/her personal clothing style. Thus, when a recommender system provides products that are related to someone's style (such as garments or shoes) then the recommendations should be close to his/her personal preferences on the grounds that the more recommendations close to his/her style, the more purchases (s)he will intend to do. In fashion's domain terms, garments' grouping according to user's style is very important.

Moreover, the effect of human's personality on his/her garment preferences is validated in the present experiment. Due to the fact that our sample was quite limited we could have only an indication that people with different personality profile have different garment preferences. In the fashion domain, the consumer's personality profile can be captured by the recommender system through the customer's loyalty card. The customer may scan his/her loyalty card on touch-screen monitors and then personalized services and recommendations can be provided to the customers.

Recommendations won't be provided through only their purchase history (like traditional Recommender Systems), since personal clothing style and personality profile should also be taken into consideration for an effective recommender system.

Customers' sometimes go shopping for fun, they do not want to purchase something (low motivation to purchase) while some others go for planned purchases (high motivation to purchase) for a wedding or a special event. The results indicate that when (s)he has high motivation to purchase a particular garment (s)he does not waste his/her time for other types of garments. This means that if a product provider wants to increase cross selling then he has to recommend products that are close to that event such as accessories. In our future research we intend to concentrate on the impact of the types of recommendations (serendipitous, novel, diverse) on consumers' acceptance.

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