

CONTEXT-SOCIAL MODEL OF PROSUMPTION IN E-COMMERCE - ANALYSIS OF A PROTOTYPE SOLUTION FOR CLOTHING INDUSTRY

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The aim of this paper is to look at cooperation practices between producers and prosumers in e-commerce and to explore future possibilities. The paper presents project of an innovative solution utilizing habits of social media users to provide valuable suggestion to clothes' purchasers. Described system will enable not only acquiring opinions on specific products by also its correlations with other items. Recommendation system could be also utilized by clothes manufactures and sellers to deliver valuable data about consumers real opinions and preferences. The last decade has seen a considerable increase of online shops for fashion goods. Technological advancements, improvements in logistics, and changes in buyer behavior have led to a dissemination of apparel goods and respective data on the Web.

Key words: Prosumption, rating system, fashion industry

1. Prosumption

The modern consumer creates his identity through the ownership of goods, because he believes that quantity and quality of items possessed transfers to his status, social prestige and recognition [1]. This conviction is supported by the producers and politicians who describe consumption as necessary condition of economic growth in capitalist economy. To satisfy his need for unique, tailored

products customer has to take part in production process by specifying design requirements or by partially customize product himself.

The term 'prosumption' originates from combination of two words: 'production' and 'consumption'. Prosumption means integration of production and consumption processes, until the boundaries between them becomes blurred [2]. Consumer and producer function are combined, however in different way than in traditional agricultural societies, when prosumers were independent and self-sufficient [3]. Prosumer nowadays is an active and conscious consumer who wants to be co-creator, not just a passive recipient. Prosumers are more aware of their rights as well as their position on the market. That's why companies are forced to change their strategies and treat clients as equal and establish new kind of relationship with them. This is enforced by new technologies which give consumer quick access to information of product and services, opportunity compare prices and ask other whether merchandises are worth buying [1]. Prosumers are not afraid to experiment and they think for themselves. They are opinion leaders; other people value their point of view and advice given. Moreover, prosumers are characterized by skepticism, since, although they appreciate the media and advertising as a source of information or entertainment, they do not take the media uncritically [6].

Web 2.0 prosumption

Web 2.0 differs from Web 1.0 not only in technical aspects enabling richer user experience. The main difference is user's participation in creation of content. Users are no longer passive viewers. Instead they are forming online communities, they blog, add content and comments to network discussions, contribute reviews, share experiences and opinions. For manufacturers these users are valuable source of feedback because they provide new ideas for products' improvements. As a result a large part of product know-how is generated by actual end-users of the products. These prosumers often substitute manufacturer's product support, answering beginner's questions and delivering quicker and more adequate solution to common problems. Honest opinions about product, demonstrating not only advantages but also limitation sometimes even including links to alternative products may be not enthusiastically welcome by manufactures.

Manufactures gladly receive consumers feedback in early stage of business, but as it grows to large, steady client base, they may restrict comment and search opinions available for consumers, resulting in most active prosumers disappointment, expressed on producers forums. As an example recent changes in comment system on Allegro, large auction site, were broadly criticized by users and resulted in temporary drop in number of transactions amount. Users who built their credibility through years, as a result of the changes were deprived of history

and now its status is equal to users who join the service year ago [7], what results in decrease of buyers trust in sellers' rating.

There are indications that capitalism is having a difficult time gaining control over at least some of the prosumers on Web 2.0 This means that, at the minimum, companies will have a different relationship with such prosumers than it has with producers, consumers, or more traditional prosumers [8]

2. Analysis of a current feedback solutions

To reveal how prosumers are acting in current online communities we have browsed shopping sites and social networking sites, extracting knowledge from consumers' statements. We also compared how biggest successful retailers incorporate prosumers voices and pinions on their sites. Our research shows that major shopping sites allow customers to express their opinion about product, and buyers willingly share their opinion.

Table 1. Comparison of feedback option available on biggest e-shopping sites

Shopping site	Text review	Rating	Real photo
Aliexpress	Yes	1-5 stars	Yes
Ebay	Yes	1-5 stars	No
Amazon	Yes (tpurchase over 50\$)	1-5 stars	Yes (also video)
Target	Yes	1-5 stars (in few categories)	Yes
Walmart	Yes	1-5 stars	Yes
Rakuten	Yes	1-5 stars	Yes

Source: own preparation on the basis of retailer portals

3. Rating systems

Prosumers activity manifests itself in participation in estimation of entities such as products, web-sites, companies or other users. They express opinions by the mean of rating (or reputation) systems, which can be independent services or integrated part of shop or auction site. Rating systems provide valuable advice to users, based on the collective experience of other users. These comments can not only convince new users to buy products, they can also provide information which size or color options one should choose. Users who complies with these recommendations will have more satisfying products experience.

Authenticity of users' opinion is related to cost of participation, where the cost is low (when user only has to click recommend/not recommend links) user doesn't have to thoroughly think over his opinion, when cost of participation is high (e.g. user has to write review) user opinion will be more valuable.

Anonymity of many online communities has advantages and disadvantages. It's hard to identify participants and trace their history, they can often change pseudonyms, create multiple accounts, sometimes their options are sponsored by manufactures. Reader doesn't know if persons whose post he reads are expressing honest opinion about product they have acquired and used for a while, or are working on commission of clothing companies, and their duty is to write a good reviews of product (or maybe even to critique competitors). On the other side pseudo-anonymity of the web also allows to express opinions which are controversial, but valuable for others consumers. User only want to know if the person giving recommendation applies the same criteria, has the same expectations from a product, knowing real name is not important. Rating sites enable prosumers to expose information about themselves, which may be essential for other users to decide if particular opinion is valuable. One of these sites is Makeup Alley, a Web site that focuses on user-generated reviews, the unvarnished truth about beauty products online. Makeup Alley has a library of well-cataloged, super-specific criticism that allows women to do their prepurchase research among peers they trust, despite or perhaps because of their pseudonymity [9].

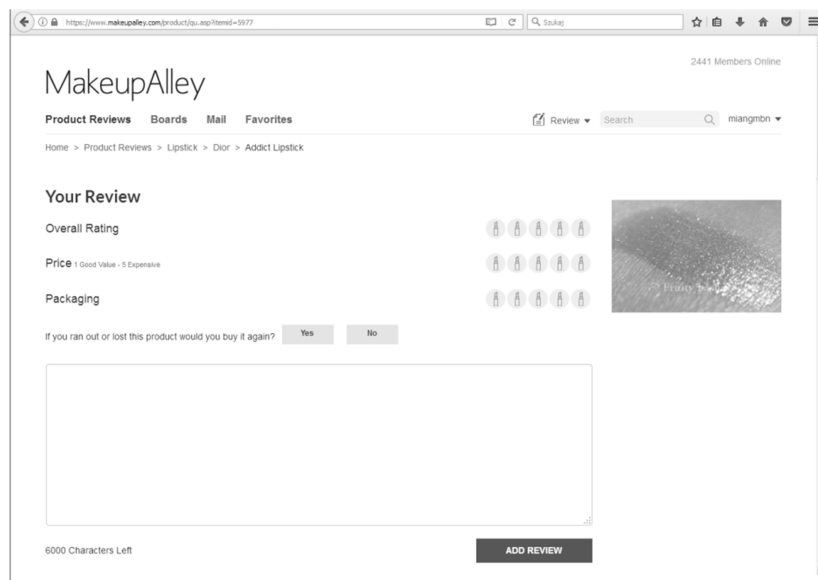


Figure 1. MakeupAlley product review screen
<https://www.makeupalley.com/product/qu.asp?itemid=5977>

4. Social context solution for e-market in fashion industry

The exploding use of social media plays an important role in consumers' growing desire to utilize fashion choices to express themselves, showing style, self-image and values.

Inspiration for this prosumers driven rating systems' idea was a combination of several phenomena occurring on the edge between technology, society and economy. Development of mobile, portable and wearable devices, as well as redefining the role of the media, consumption of art and entertainment and many other examples of socio-economic and technological changes had great impact on e-market. Important role play social media such as Facebook, Twitter, YouTube as well as the phenomenon of active inclusion consumer in the process of delivering goods and services to the market.

The contextual-social model in e-commerce is based on several assumptions:

1. Location of goods and services in context of the user, interaction with user, user's environment and use-cases is commonly accepted, trusted and effective method of communicating and adopting the offer of goods and services to the market.
2. Use of commonly accepted and adapted tools and methods related to social media, such as sharing one's image, sharing information about products and services as a part of raising oneself prestige and well-being, sharing information about methods and context of use, evaluation of product and services, free exchange of ideas and opinions placed places in the context of e-commerce business model will as a result stimulate spontaneous collaboration of the users and select a new group of producers and suppliers who can benefit from this process.

At the same time we are observing strong tendency to adapt a new generation of semantic network, a solution which promotes standards for describing content on the Internet in a way that allows machines and programs (e.g. agents) to process information in a manner appropriate to their meaning. Semantic web uses specifically designed languages for publishing data: OWL (Ontology Web Language), RDF (Resource Description Framework) and XML (eXtensible Markup Language). The importance of information resources is determined by the so-called ontology. The technology of the semantic network, solving the problem of semantic chaos and acts as an intelligent provider of information fragments selected according to interest of the recipients. It is assumed that web network is extension and development of the traditional role of the media in the construction of consumer identity [4].

The concept of contextual and social model in e-commerce can be showed on the example of fashion industry. Process of purchasing garments is well-known to all consumers. There is a distance created by technology between the product and

the consumer. Making purchase traditional way consumer can to try on clothes before buying them. Electronic commerce doesn't give such opportunity. Consumer has to rely on size charts provided by manufactures. Exact measurements of so-called standard sizes: S,M,L,XL may vary between brands, or between different lines of clothes for the same brand. Even if retailer provides size chart specifically for given product it still can be misleading, not taking into consideration many factors such as elasticity of material. Perception of colour depends of lighting. Important information such as exact fiber composition, which should be placed on labels are often lacking on retailers sites.

Recommendation from prosumers

To choose clothes wisely one could have utilize not only information provided by retailers but also data generated by other prosumers. They can write subjective review, value quality, impression that product makes. They can attach real photo of the product, showing how this garment looks on a particular person, how it matches theirs hair colour and skin tone, how it fits person's shape. Prosumers can also link a YouTube video, showing clothes in motion, making a illusion of three dimensional view. Clothes can be presented in matching sets, showing how to combine different pieces in a ingenious full outfit. Other consumers will be not only buying the same piece of cloth but copying the whole look. User acquires advice about fashion items, which includes real life photos, short review, links to s sites where he can see the photo of person wearing outfit in context or a particular social event. All these information consist of willingly and explicit delivered feedback.

Traditional recommendation systems rely on implicit, less accurate data, and techniques used by e-commerce sites in order to find a most appropriate items are based on finding associative rules between different user or different items bought by particular user.

Content-base filtering relies on recommending items similar to those user have bought or rated in the past. Similarity between items in the same category is calculated based on their features, which may include exact subcategory, size measures, material, colour, designer, style, occasion.

These features falls into three categories: continuous, boolean and discrete features For all these features we can calculate similarity of two items. If size of domain of particular attribute far exceeds size of remaining one, this attribute outweigh effect of remaining attributes.[10] Simple solution for a problem of scalability and mutability of different attributes is assigning weighs, so total similarity of two items is sum of weighted similarities for individual attributes.

$$D(x_i, x_j) = \sum_{k=1}^p w_k \cdot d_k(x_{ik}, x_{jk}); \quad \sum_{k=1}^p w_k = 1, \quad (1)$$

where w_k is weigh for k -attribute, $d_k(x_{ik}, x_{jk})$ similarity for k -attribute of object x and y [10]. Instead of recalculating weighs values for different number of attributes so they always sum up to 1, we can simply divide sum of weighted similarities by sum of weighs.

$$D(x_i, x_j) = \frac{\sum_{k=1}^p w_k \cdot d_k(x_{ik}, x_{jk})}{\sum_{k=1}^p w_k} \quad (2)$$

Recommending clothes that are comparable to clothes bought before may be not very useful, because when client wants to buy the same product (maybe in other colour or size), he will be aware of that fact, and simply enter in search engine desired product features. More challenging is to recommend product the user haven't bought or try before.

Collaborative filtering relies on finding groups of users who share the same preferences. Algorithm decides which group user belongs to by taking into account his purchases and ratings. Collaborative techniques are efficient in providing valuable recommendation but also have some serious drawbacks. First is cold-start or sparsity problem, when initial data about user's preferences are too small to locate neighbourhood group. Another difficulty is scalability problem, with more users and items computation time grows. User's preferences changes, recommend system have to adapt for the changes, so calculation should be repeated. Relying on user's past purchases may be deceiving. Both recommendation techniques are computation heavy and not always guarantee useful recommendation.

Proposed system used a different approach. It relies on explicit entered data about body type, height, weight, detailed measures. Algorithm searches for items from specified category recommended by users who have similar body type and present clothes for analogous occasions. Consumer has possibility to look at real photograph of desired item wore by a person with comparable body type. He can read a review written by a someone he can relate to.

On a retailer site you can only see a photo of a one person, one body type, hairstyle. Community created image gallery can show how particular cloth looks on a different people. They are not professional perfect models, so user can get an idea how these clothes are going to look on him. Moreover he can see whole outfit, clothes recommended by others as a complementary to searched item. In these approach there is no need for collaborative filtering algorithm, based on previous purchases, which may be misleading about real user's taste. Consumer will be presented with selection of items, which other prosumers willingly want to recommend. Prosumers whose opinions will be most valuable for a specific person

are those who look alike, have similar body measurements, colouring, but also those who have similar taste in fashion, or are presenting garments for analogous occasion. Not all these criteria can be easily declared by choosing search options. Users should also have opportunity to tag other users as 'trusted', which means that these users' opinions are more valuable, and recommended by him clothes should be high in search results.

We can't rely only on prosumers' voluntary workforce to collect all the information about available products. To acquire broad range of products for a system we could utilize information provided by manufacturers and retailers. This data can be completed by information supplied by actual users. Hybrid approach addresses a cold-start problem, where there is not enough user-collected data to find recommendations for search with a number of specific criteria.

5. Rating system components

Data collected from retailers about a particular fashion item include information defining product type (shirt, jacket, skirt), attributes (e.g. sleeve length) and availability of different colour variants and sizes, if these are woman or/and man cloth. Additional information may include style, information about material (wool, cotton) and its percentage in an item. To assign items to categories we have to define mapping of categories for different retailers. Taxonomy of categories should be hierarchical, contain most obvious and easy to assign to categories. More specific categories, which differ between retailers can be marked as tags (e.g. V-neck T-shirts falls into category "T-Shirts", with a tag "V-Neck")

The proposed system will enable two basic activities for users: search and rating. Search enables user to find desired clothes by giving their measures and preferences. Measures and criteria can be entered as allowed range or as exact values. Search can be conducted in retailer data, and also in prosumers' entered information, where information provided by user's 'trusted users' with whom one can relate, will be most valuable.

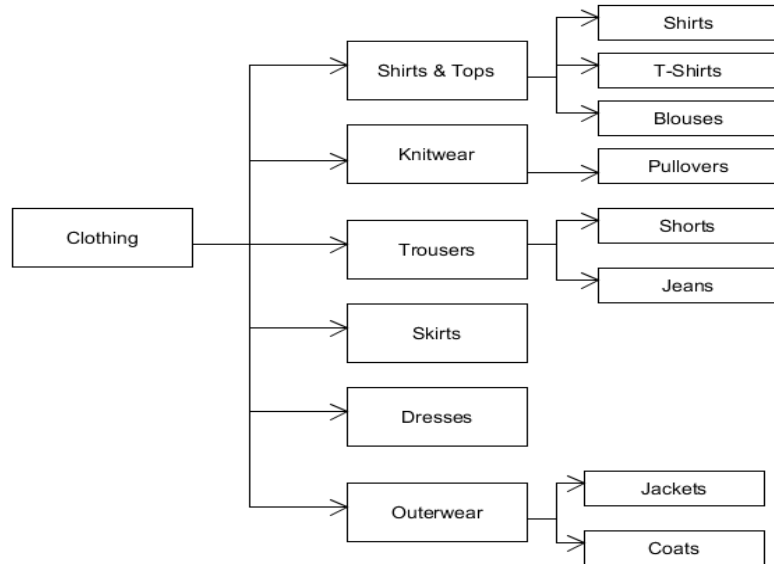


Figure 2. Example of clothes' categories taxonomy, own work based on existing e-commerce taxonomies

Application have to measure which items from database fulfill the search criteria with most accuracy. Product data will be acquired from different websites, so number of available features may vary Application can't search only for exact matches, but have to find clothes most similar, just like in case of content-base filtering, but instead of comparing two items, one item is compared to user's defined criteria.

$$D(x_i, x) = \frac{\sum_{k=1}^p w_k \cdot d_k(x_{ik}, x_k)}{\sum_{k=1}^p w_k} \quad (3)$$

Important aspect in searching is accuracy of data. User wants to find accessible product. Data provided by retailers sometimes lack the information about accessibility of specific size and colour, so prosumers should have option to easily check 'not available'. Search could only include items which was entered or reviewed in a specific time-span (e.g. last year).

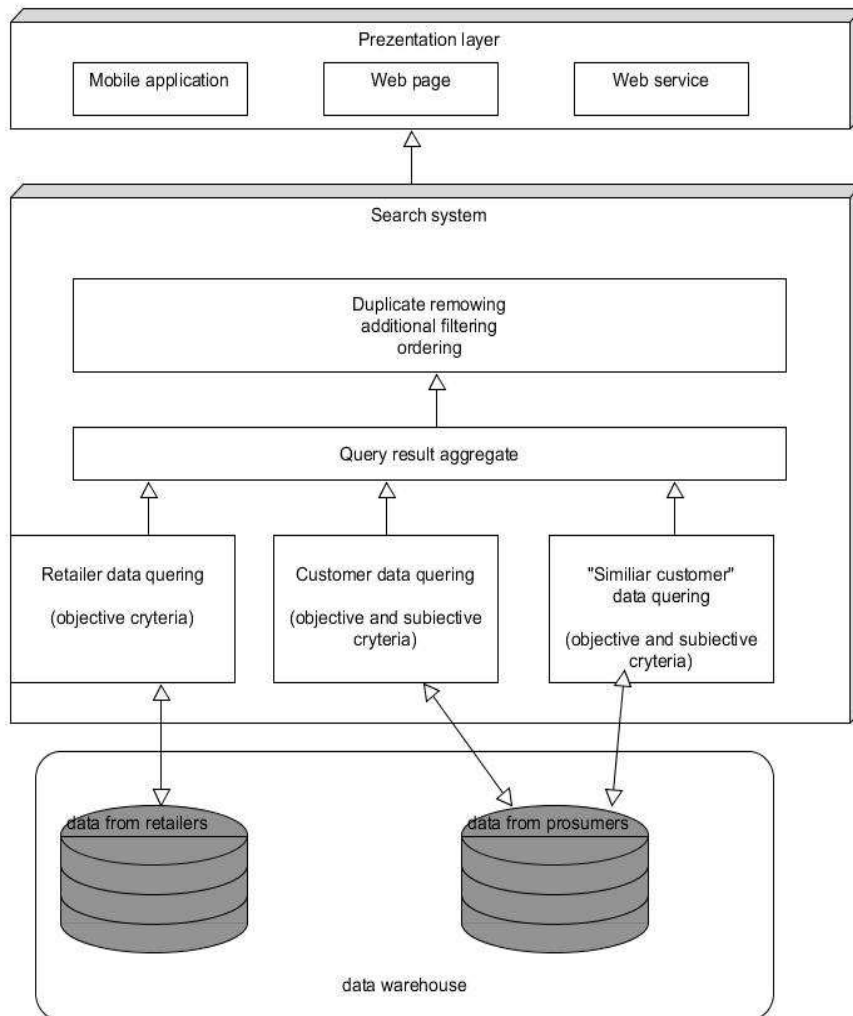


Figure 3. Search system proposal, own work

Rating enables to express opinion about items found in database or add a new item (with link to retailer's site) and rate it. Rating should be as descriptive as possible, but also provide some discrete values to enabled easy search on user's inputted information. Additional data could include for example subjective quality of material, fiber composition, adjustment to measurement or size information entered by producer (bigger, smaller). User can also add real photos of the product which could differ from idolized image provided by manufacturer. Information can be supplemented by links to videos showing particular piece of cloth in motion.

Consumers may present the whole outfits, recommending to join jacket with particular trousers or skirt, shoes and accessories. This possibility forces to enable option of adding links to others items in the same system.

Rating should be as users friendly and intuitive as possible. We want to encourage to utilize the system not only tech-savvy users but a broad range of ordinary consumers.

6. Conclusion

Comparison of feedback options available on larges e-commerce sites shows that companies want to receive feedback form prosumers and present their opinions to other consumers. However these solutions are limited.

Presented system may be used as standalone site but extracted information could be also incorporated in sellers' and manufacturers' portals. Because of its autonomy from sellers and producer would be viewed by consumers as more reliable and trustworthy than opinions submitted on selling portal, where negative opinions may be "moderated" and deleted by company's marketing.

Prosumers want to actively participate in production, by entering valuable feedback, which agitates producers to create more sought after products. Such partnership results in more tailored offer, meaning less unsold items, lack of necessity of return purchased goods Manufacturing of items tailored to consumers' taste lessens environmental waste and pollution connected with production. Prosumers readily give feedback, but want to be sure it won't be tampered with, that negative opinions won't be erased. Presented system may be used as standalone site but extracted information could be also incorporated in sellers' and manufacturers' portals. Because of its autonomy from sellers and producers system will be viewed by consumers as more reliable and trustworthy than opinions submitted on selling portal, where negative opinions may be "moderated" and deleted by company marketing.

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