

The Analysis of E-Commerce Sites with Eye-Tracking Technologies

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Abstract

The e-commerce sites have many dimensions from the final user's point of view. Making websites more usable and improving the users' experience represents an important step when desiring to keep them from moving away. This study is examining the effects of the interactivity dimensions on users' content comprehension and their attitudes towards e-commerce websites. By using the eye tracking technology, we investigate the websites interactivity dimensions, identified in the interactivity index, exploring the visual process and drawing the time spent on the site or on various regions of it, the heatmaps, the scanpaths, the percentage fixated, the fixations before, the time to first fixation or the total fixation duration.

Keywords: interactivity dimensions, website interactivity, eye-tracking, eye movements, human computer interaction

1. Introduction

In the recent years, the scientists have advocated a growth of research in analysing the human behaviour by understanding the eye movements. Various fields use the eye tracking technology to assess the visual attention, but when appreciating the decision-making process, the specialized literature acknowledge that the eye movements are directly linked to peoples' cognitive goals. These goals involve different tasks. In the virtual stores, the decision-making process involves the acquisition of visual information rendered by various elements, such as design, animations or more or less controversial applications. During the last years, some technologies were based on QR codes with their benefits and troubles, but these codes have certain limitations (M. Muntean, G. Mircea, S. Bazavan, 2012). Also, there are many challenges for electronic government and e-commerce (B. Ghilic-Micu, M. Stoica, C. Uscatu, 2015). According to (N. Sireteanu, 2012), the complexity of present computing systems has led the research communities to find new ways of designing and managing systems and services. Some authors (M. Georgescu, D. Popescul, 2014) consider that the main characteristic of the new technologies are novelty, the ability to continuously adapt and reshape depending on the users' needs and the technological discoveries in the field. A new trend (L. Radu, 2017) also includes green IT technologies and green information systems for a suitable enterprise. There are also some studies (H. Schmidt, A. Henka, G. Zimmermann, 2017) that tried to analyse the adaptability in the e-learning environments based on the eye tracking and gaze path.

One way in which we can improve, help and ease the decision-making and acquisition process is to understand the effects of the most important interactivity dimensions on users' content

comprehension and their attitude towards the website. Therefore, we use the eye tracking technology as the instrument of interactivity dimensions' assessment.

By using the eye tracking technology, we investigate the websites interactivity dimensions, identified in the interactivity index, exploring the visual process and drawing the time spent on the site or on various regions of it, the heatmaps, the scanpaths, the percentage fixated, the fixations before, the time to first fixation or the total fixation duration. Moreover, this technology represents a strong reliance for the quantitative approach, which is implemented post-experimentally.

The aim of this study is to assess the most important dimensions of websites interactivity on users' content comprehension and their attitudes towards the e-commerce websites. The dimensions included in this study were previously identified by the experts in the field of Information Technology (A. Robu, 2015). Moreover, this research develops an analysis of the heatmaps, scanpaths and of the graphical representations, together with a factorial analysis.

The following section provides a brief introduction about the used methodology and presents a conceptual framework about the web sites interactivity dimensions.

2. Theoretical background and conceptual development

Some authors (S. Necula, 2016) consider that for the online buyer, the meaning of product's characteristics, the importance of product's characteristics, and the meanings of product's price are the main factors, but we shall prove that the graphical appearance of the website is also a very important factor.

Making websites more usable and improving the users' experience represents an important step when desiring to keep them from moving away. This study is examining the effects of the interactivity dimensions on users' content comprehension and their attitudes towards e-commerce websites. Therefore, this section provides the theoretical background that established the ground for this study.

Efficiency and effectiveness

When assessing the websites, efficiency and effectiveness represent two important factors, frequently used in various studies that target the websites' usability improvement.

Efficiency indicates the ease of searching and accessing the information (R. Keeney, 1999). The perceived ease of use (PEOU) corresponds to this important determinant from the technology acceptance model (TAM). The perceived ease of use indicates the measure in which a certain person expects that using a certain system is made with a minimal effort (F. Davis, 1989).

On the other side, effectiveness shows the quality of the information which is offered by the system. This could be a factor that helps to increase the value perception (R. Ducoffe, 1996). Perceived usefulness (PU) corresponds to this determinant from the technology acceptance model. Perceived usefulness indicates the measure in which a person believes that using a certain system will help increase his performance.

Through its various dimensions, interactivity helps increasing the searching process and accessing the information. (D. Hoffman, T. Novak, 1996), (D. Cyr, M. Head, A. Ivanov, 2009), (S. Ghose, W. Dou, 1998), (O. Dospinescum, P. Brodner, 2013), (H. Teo, L. Oh, C. Liu, K. Wei, 2003), (A. Hausman, J. Siekpe, 2009), (L. Hurbean, D. Fotache, V. Pavaloaia, 2016) argue that the information process has a positive influence on attitude. The relationship between perceived ease of use and perceived usefulness shows that the intention to use a product is shaped on the basis of the user's cognitive appreciation on the way, in which a certain system helps or not to his performances' improvement. Thus, the easier a website to use, the more useful it is. If the website is considered useful, but it is hard to use, the user's performances will be lower because of his effort to navigate. Thus, we consider that a high level of interactivity raises the website's ease of use and helps to its content comprehension.

Therefore, we assume that (a) *a high level of interactivity leads to an increased level of website's efficiency*, (b) *a high level of interactivity leads to an increased level of website's*

effectiveness and (c) a high level of efficiency and effectiveness has a positive influence on the level of website's content comprehension.

Websites' content comprehension

The interactivity's influence on website's content comprehension is mediated by efficiency and effectiveness. The literature argues that a website with limited interactivity dimensions (the lack of functionalities, useless links, imperfect organization) lead to limited search and access to information, disorientation and useless cognitive loading.

When improving the websites interactivity, the users' experience is better and more, feelings of pleasure arouse, as an affective component, and a positive reaction as well, which leads to a direct influence and favourable attitude.

Therefore, we assume that (a) *a high level of interactivity leads to an increased level of the website's content comprehension* and (b) *a high level of website's content comprehension leads to a favourable attitude towards it.*

Attitude

It was argued that a high level of interactivity is frequently associated with positive attitudes towards the website (H. Teo, L. Oh, C. Liu, K. Wei, 2003), (A. Hausman, J. Siekpe, 2009). Moreover, attitude is positively influenced by the perceived usefulness. A favourable attitude intensifies the users' intention to use a certain system or website.

Therefore, we assume that *a high level of interactivity leads to a favourable attitude towards the website.*

3. Experimental material

Five interactivity dimensions were used in order to establish the interactivity index. Studies have demonstrated that there is a number of interactivity dimensions which significantly contribute to a higher level of website interactivity. Therefore, personalization, synchronization and controllability have been found to be the most important dimensions of interactivity (T. Carnegie, 2011); (A. Robu, 2015); (Y. Liu, L. Shrum, 2002); (W. Yoo, Y. Lee, J. Park, 2010); (E. Downes, S. McMillan, 2000).

Moreover, we included another two dimensions which were found by experts in prior research to be important when developing a website: adaptability and receptivity (A. Robu, 2015).

Based on the prior literature review and experts' recommendations, each of these five dimensions included in turn five distinctive factors, as follows:

The current research paper involves a model that assesses the effects of the three levels of interactivity established by the previous factors. Thus, we consider that the influence of interactivity on attitude is mediated by the websites' efficacy and efficiency that subsequently improve the users' content comprehension. A high level of interactivity eases the content search through the various dimensions of the construct, the information is clearly delivered and organized. Knowing the users' attitude towards the website, we can predict his behavioural intention.

This study assesses the homepages of six e-commerce websites that targeted mobile phone technology. In order to guarantee the objectivity of the study, they were seen for the first time by the participants.

The websites were randomly selected from the Romanian top e-commerce pages included in Traffic.ro. The websites were comprised in three different groups, according to the characteristic score. Group achievement was made by calculating the interactivity score, that is by counting the number of factors of the interactivity dimensions for each web page. The characteristic scores of the web pages ranged from 3 to 12, with 3 indicating that on the web page were 3 characteristics. Therefore, the calculated mean of the characteristics score was 5.5 and the median was 7.

Finally, based on the previous results, we categorised the five websites into three groups. The first group included the websites with a characteristic score higher than the median, that is scores 11 and 12. The second group included the websites with a characteristic score equal to the median, that

is score 7. The last group included the websites with a characteristic score lower than the median, that is scores 3 and 6.

Table 1. Factors of interactivity's dimensions

Dimensions	Factors
Personalization	Login functionality; Product listing: grid, list; Promotions; Various applications (currency, calendar, background colour, etc.); User profile storing, latest search.
Synchronization	Search characteristic; Chat; Real time support; Email; Order tracking.
Controllability	Language; Currency; Filters; Shopping cart; Animation elements such as videos (product demonstration) and carousels.
Adaptability	Blog; Forum; Social networks; Latest news; Links.
Receptivity	Recommendations; Newsletter; Security; Large images (>40%, according to [23]); Related services (product comparison, delivery services, guarantee).

Table 2 reveals the differences between the three groups or between the three levels of interactivity: high, medium and low.

Table 2. Levels of interactivity

Dimensions	Low level	Medium level	High level
Adaptability	Latest news.	Blog; Social networks; External links.	Blog; Social networks; Latest news.
Receptivity	Most popular products.	Recommendations; Newsletter.	Recommendations; Newsletter; Large images (>40%); Additional services (delivery, guarantee).
Controllability	Shopping cart.	Shopping cart; Filters.	Shopping cart; Filters; Animation elements (carousel).
Personalization	Offers.	Offers; Login functionality.	Offers; Login functionality.
Synchronization	Search characteristic; Email; Order tracking.	Search characteristic; Email.	Search characteristic; Email; Real time support.

4. Methodology, data collection, measures and procedures

Participants

This study focused on examining an important segment of the market, i.e. Generation Y. Thirty-six participants (11 males and 23 females) were examined. They ranged in age from twenty to twenty-five. All of them were undergraduate students at “Alexandru Ioan Cuza” University of Iasi, with a background in informatics. All participants reported at least one online purchase. The subjects have voluntarily registered to participate in this study, after viewing the announcement in a closed group dedicated to students who are affiliated to the informatics specialization.

Equipment

The study used an unobtrusive eye tracker device, the Eye Tribe Tracker, with an accuracy of 0.1-1 degrees. Using the infrared light, the eye tracker offered data about participants' eyes. All participants could move freely, scroll and continue to the next website when ready.



Figure 1. The Eye Tribe Tracker

Procedures

Participants were welcomed in the informatics laboratories of “Alexandru Ioan Cuza” University of Iasi and were explained the study's objectives, their rights, the incentive they receive and the required tasks. Each participant was scheduled and informed about the established laboratory. The laboratories were used for one user at a time. No participant reported contact lenses, eyeglasses or strong makeup, which would have required increased attention.

Before starting the experiment, we explained the procedures of the study (eye-tracking and filling out a questionnaire about the previously assessed web pages). They have signed an informed certificate consent. All participants voluntarily took part in the experiment for a sport club voucher. Further, the eye-tracking device was calibrated at a distance between 45-74 cm of each participant's face.

The procedure of calibration consisted of the participant's watching twelve dots which moved in the corners and centre of the screen. It was ensured that this process took place for each participant.

The participants were informed about their role and task: “Imagine that you intend to buy a new mobile phone from an online store. Therefore, you have to assess six such websites in order to gather information and lately to decide from which one you are the most inclined to buy”.

Thereafter, the participant received the stimuli. It was assessed only the homepages of the websites and they were displayed in random order. While the process took place, the websites were not online, the participants reviewing only the images of each homepage. Acting in this manner, we avoided the companies' websites updating, if occurring, and thus, maintained the consistency of the study.

Subsequently, the participants received the post-experimental questionnaire about the previously assessed web pages and demographic information, including their internet experience, age and gender was gathered.

After completing the questionnaire, participants received a one-day pass, worth 25 euro, to a sport club, as an incentive.

Measures

This study involved the use of two instruments: the eye tracker device and the questionnaire. In order to collect the quantitative data reported by participants at the end of the experiment, it was used a post-experimental questionnaire. This instrument included twenty questions and the scales corresponded to the considered objectives. The scales used were validated in several web studies (D. Cyr, M. Head, A. Ivanov, 2009); (A. Hausman, J. Siekpe, 2009); (S. Sundar, S. Kalyanaraman, J. Brown, 2003); (W. Yoo, Y. Lee and J. Park, 2010); (H. Teo, L. Oh, C. Liu, K. Wei, 2003).

Moreover, the Eye Tribe Tracker device gathered qualitative data, resulting in heatmaps and scanpaths. The heatmaps are a two-dimensional data representation, in which the eye tracker's measures are rendered as colours (A. Bojko, 2013). The heatmaps provided large gaze data sets. They revealed the areas that attracted participants the most. In this study, the values of the heatmaps reveal the relative average duration of all fixations. Using the fixations as metrics for the construction of the heatmaps represents an important step, taking into account that in this way we exclude the saccades and other data variations which in turn would mislead the final results.

In a heatmap, the colours indicate: yellow is warmer than blue and green, orange is warmer than yellow and red is hot. Each heatmap peak (i.e. red color) reveals the highest value for fixations duration in a certain area. The duration reveals the level of the cognitive processing of the participant for each assessed website. Thus, the heat quantity is proportional with the fixations duration and, as a result, with the level of the cognitive processing.

On the other side, scanpaths reveal graphical plots of the fixations. Fixations were considered to be linked with an intense cognitive process and thus, it indicates the participants' attention (B. Pan, H. Hembrooke, G. Gay, L. Granka, M. Feusner, J. Newman, 2004); (R. Vertegaal, Y. Ding, 2002); (S. Djamasbi, M. Sieges, T. Tullis, 2010).



Figure 2. Heatmap vs. Scanpath

Other relevant metrics used in this study are the following ones: percentage fixated in a certain area of interest, fixations before first fixation in a certain area of interest, time to first fixation, total fixation duration.

The data analysis was made with the EyeProof software and the EyeProof Recorder application which gathered the eyes movements when exposed the stimuli. The recorded parameters by the Eye Proof Recorder were sent online to this study's database, from TheEye Proof software.

5. Results

All data were checked and organized and the areas of interest (AOIs) were placed in order to extract statistical information. The AOIs were placed for all six websites and targeted the previously established factors in the interactivity index.

The scanpaths were the first analysed data. A scanpath represents a graphical plot of the fixations and saccades. The fixations are represented on the graphic as dots and the saccades (when the gaze is commuting from a position to another) are represented as lines which join the dots.

Efficiency and effectiveness represent two important factors when assessing the websites, seldom used when trying to improve the web usability.

First, we analysed the users' content comprehension. Figure 3 renders the scanpaths for the dicamen.ro website, which was part from the group with high level of interactivity.

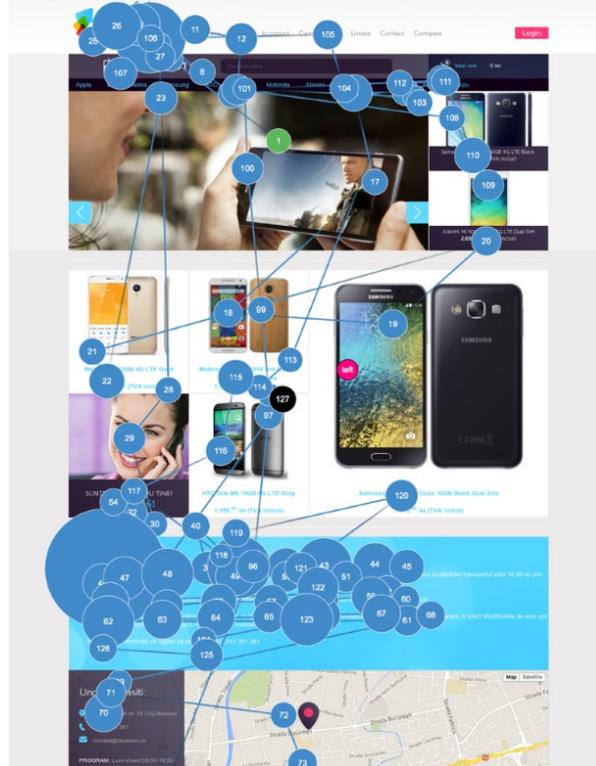


Figure 3. The representation of scanpaths for dicamen.ro

A high level of interactivity leads to an increased level of website's efficiency

Efficiency indicates the ease of searching and accessing the information. The perceived ease of use corresponds to it and it is part of the Model of the Technology Acceptance. The perceived ease of use indicates the way in which a user expects that the usage of a certain system to be made with a minimal effort.

In this graphical representation from above, we acknowledge that the gaze makes a back and forth movement between the various areas of the website and its logo. This observation is valid for all assessed websites. The textual information was viewed in a linear path, without recurrent fixations. This is showed by following the fixations numbers which were in an ascending order. It does not reveal a recurring gaze. The path of the gaze reveals the content comprehension.

The websites from the group with high level of interactivity received the most fixations in the areas of animation elements and latest releases.

In contrast to the group of high level of interactivity, the group with medium level of interactivity received the most fixations at the websites extremities. All in all, the areas fixated in

the very first moment from displaying the stimuli interests us the most. Therefore, these areas are represented by *recommendations* area and *offers* area.

The websites from the group with medium level of interactivity presented a chaotic trajectory of the gaze, as though the participants were striving to find a way in order to organize the information and select the interested products.

As a comparison, the results show that the group with a low level of interactivity, although with a very simplistic design, involves the highest level of cognitive processing from participants. This result underlines the fact that the participants did not receive the searched information or they were not displayed as expected.

The time to the first fixation shows us another difference between the three groups of websites. Depending on the fixated area, it confirms that the access to the searched information was made in a short period of time.

A high level of interactivity leads to an increased level of website's effectiveness.

Some characteristics of interactivity lead to a high level in accessing and searching the information. It contributes to the improvement of this process. The relationship between perceived ease of use and perceived usefulness indicates that the usage intention is based on the participant's cognitive appraisal on the way in which the usage of a certain system contributes or not to his performance improvement. If the website is evaluated as useful, but hard to use, the participant's performances will decrease because of the higher effort he has to make. Thus, a higher level of interactivity increases the ease of use of the website and helps to content comprehension.

Moreover, there are three indicators that revealed the areas which received attention the most: time to the first fixation, fixations before first fixation and the number of participants who had fixations. Analysing these three indicators together, we conclude that participants have fixed the information earlier in the group of websites with a medium and low level of interactivity, and fixed them later in the group with a high level of interactivity.

Along with the first fixation, an important factor, when assessing the websites' efficiency, is the number of subjects who had fixations, together with the number of their previous fixations before the first fixation. These factors, analysed together with the duration, indicate the relevance of the area of interest with the shorter duration by observing the number of subjects who had fixations and the efficiency of the areas of interest by observing the number of fixations that the subjects had before fixating our area of interest.

Therefore, the results underline that most of the subjects (34) have fixated the areas which corresponded to the *animation elements*, *last released products*, *recommendations*, *offers* and *large images* in a short period of time (0,30-5,27s) and with a small number of fixations (0,74-16,32 fixations), in comparison with the other areas selected in the present study.

The group of websites with the high level of interactivity achieved the shortest duration from the stimuli displaying till the first fixation, including the *animation elements* (0,30s), without reaching the limit of one fixation and with a maximum number of subjects who had fixations (34).

The group of websites with the low level of interactivity achieved almost similar results as the group with the high level of interactivity, with maximum of subjects (34), until one fixation and with a duration of 0,35s.

The group of websites with the medium level of interactivity achieved the maximum number of subjects (34) but with a greater number of fixations (4,26) in comparison with the other two groups of websites and with a duration of 1,45s.

A high level of efficiency and effectiveness has a positive influence on the level of website's content comprehension

Another important result which reveals the positive influence of efficiency and effectiveness on the level of website's content comprehension are the heatmaps. They reveal information

concerning the websites efficacy by identifying the fixations average duration. Figure 4 renders the heatmap for dicamen.ro website.

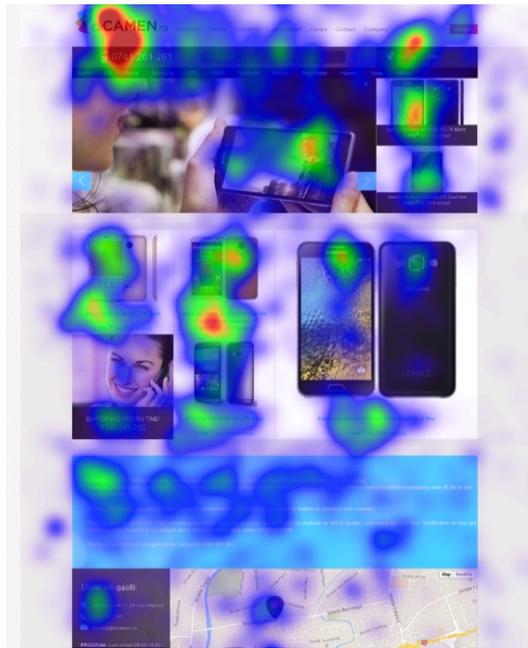


Figure 4. The representation of the heatmap for dicamen.ro

At a first glance we can state that the subjects had the longest fixation duration on the logo and the phone number. Taking into account that they have seen the website for the first time, we would state that they had an intensive cognitive processing on the logo in order to memorize it and thus, to know what to choose in the end.

A high level of interactivity leads to an increased level of the website's content comprehension

The group of websites with high level of interactivity received on the heatmaps important fixations in the targeted areas. Along with the previously analysed data, as well as with the heatmaps output, we can argue that the subjects have understood and met their tasks in an efficient and effective way. For instance, we can observe on the heatmap for the dicamen.ro website that an intensive cognitive processing took place in the *last releases* area, when subjects focused their attention on product analysis in order to assess the site offer.

If the group of websites with a high level of interactivity received a very good result, the group with a medium level suggests that the subjects needed a helping tool in order to identify the products. This result is identified in the heatmap with an intensive cognitive processing on the left side of the site, where the product categories were placed. They focused more on identifying the categories where the searched product could be found. The scanpaths also support this observation and reveal the gaze trajectory. The participants reviewed the logo, then focused more on the categories and finally they fixated the *recommendations* area of the page.

The group with a low level of interactivity received a reduced activity, focused more on the logo and a few products which were listed in the top area of the page. On both websites the attention followed the same pattern, the subjects focusing more on the logo, then on some filters and a few products.

The descriptive statistics suggests that the subjects go on ecommerce websites weekly (58.3%) or daily (22.2%). They considered the filters to be the most important tool on such websites (86%), the website recommendations to be important (50%), as well as the shopping cart (72.2%).

In order to investigate the coherence of the data and the capacity to assess the website interactivity, a factorial correspondence analysis was conducted.

Hence, the statistical t test χ^2 result indicated that (Sig.=0,010)<0,05. In order to highlight these correlations, the results of the factorial correspondence analysis indicated that the websites from the group with the high level of interactivity were chosen by the subjects to buy the mobile phone. They were the most closed to the origin of the axes. Moreover, the website dicamen.ro, from the group with a high level of interactivity was considered very interactive and it is the website chosen from where to buy, in the end, the mobile phone (Figure 5).

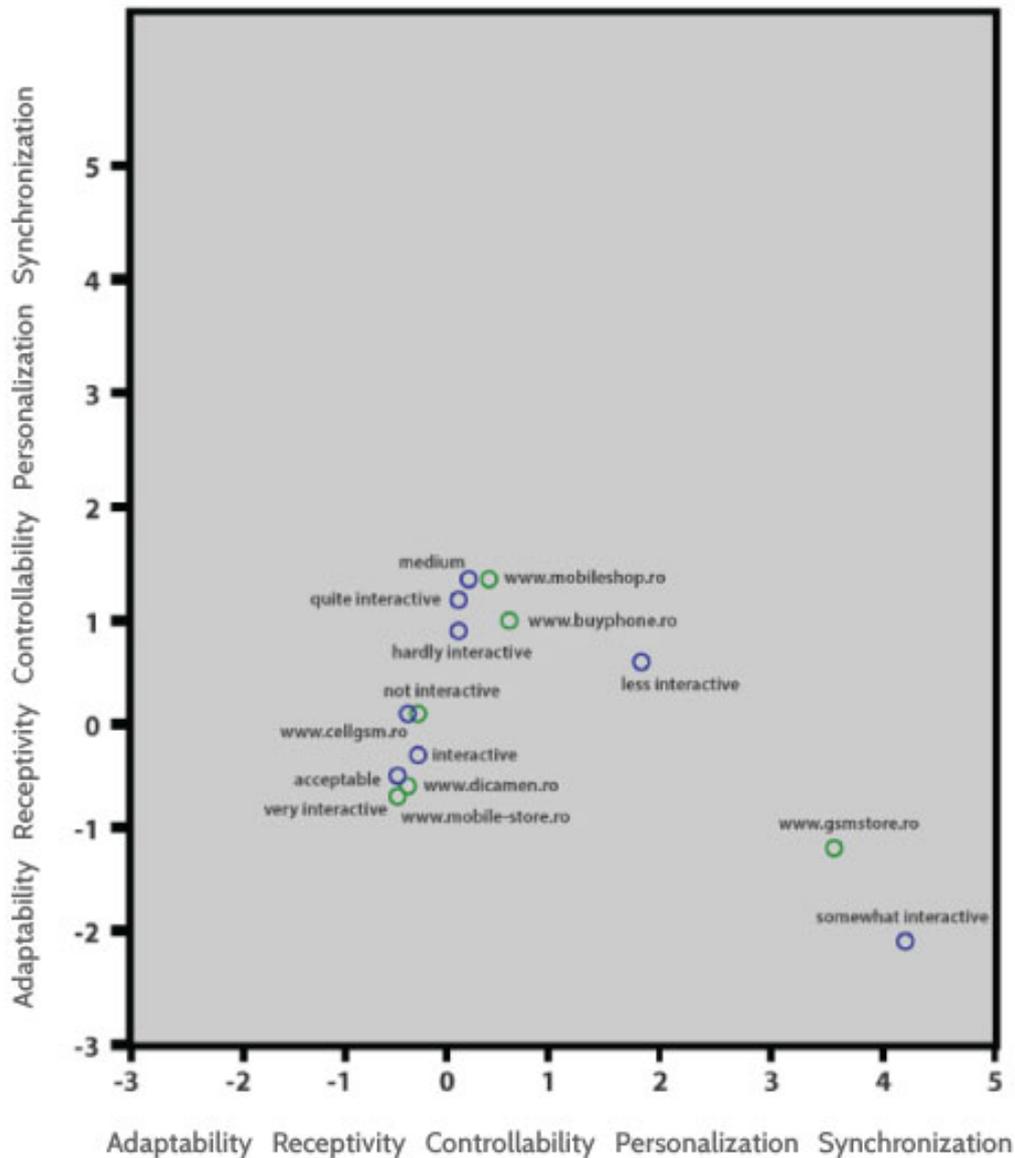


Figure 5. The variable representation in the two first factorial axes

A high level of website's content comprehension leads to a favorable attitude towards it

The results provided by the eye tracking device for our qualitative analysis are the following ones: the scanpaths and the heatmaps. These were previously discussed. But, in order to sustain these results, we have included in the analysis other metrics which have been relevant to our objectives:

- Time to the first fixation (which indicated the time from the stimuli displaying until the first fixation in a certain area of interest);
- Fixations before (the fixations before the first fixation in a certain area of interest);

- Percentage fixated (the number of participants who had fixations in a certain area of interest);
- Total fixation duration (the average fixations length in a certain area of interest).

Therefore, in order to identify more clearly the differences between the three levels of interactivity, we will further present data which will confirm what has previously been identified in the above representations. The following graphics show two examples for each first two metrics mentioned above.

A high level of interactivity leads to a favorable attitude towards the website

The attitude was positively influenced by the perceived usefulness. The favorable attitude intensified the participant’s intention to use a website.

One of the first metric which helped to assess the websites efficiency is the time to first fixation, presented in the following graphics for one site in the high level of interactivity group (dicamen.ro) and from the low level of interactivity group (buyphone.ro).

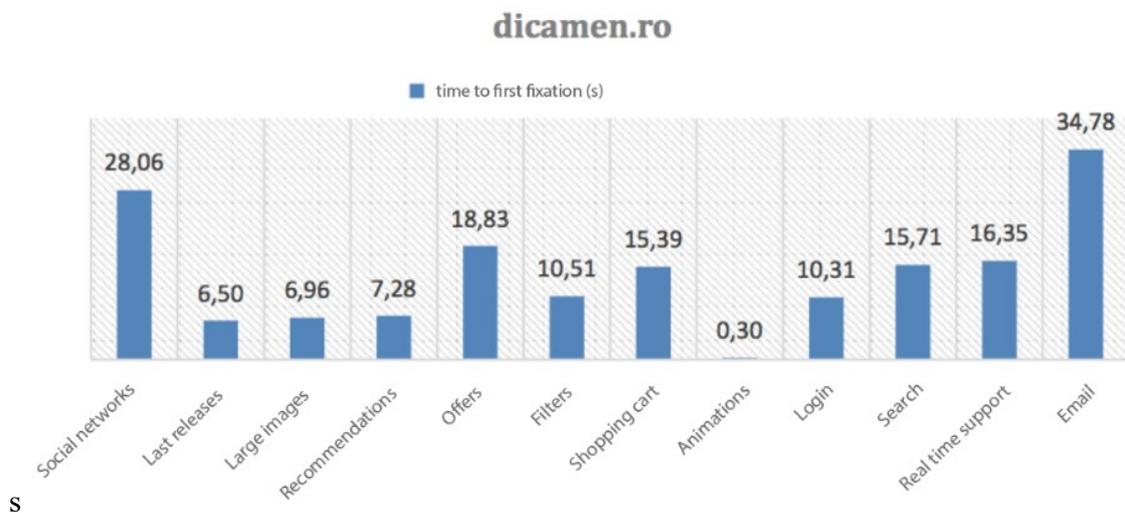


Figure 6. Time to the first fixation of the areas of interest (s) for dicamen.ro

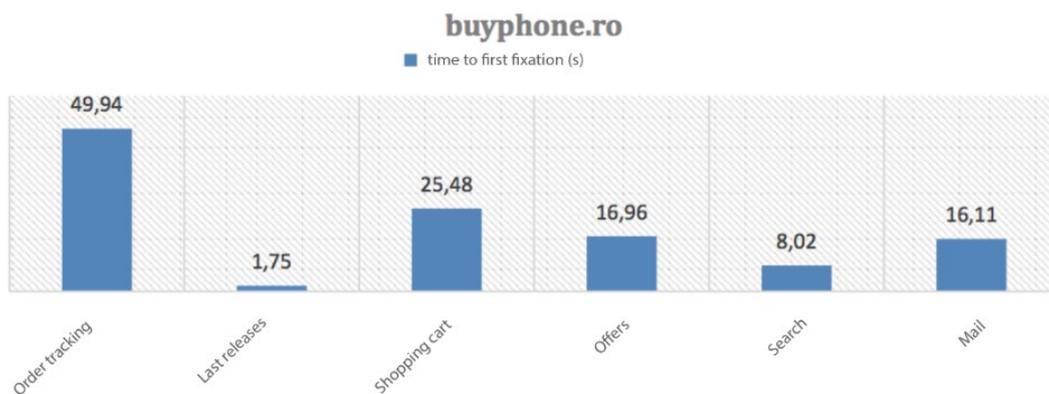


Figure 7. Time to the first fixation of the areas of interest (s) for buyphone.ro

The following graphics represent the fixations before and are representative for the dicamen.ro and buyphone.ro websites.

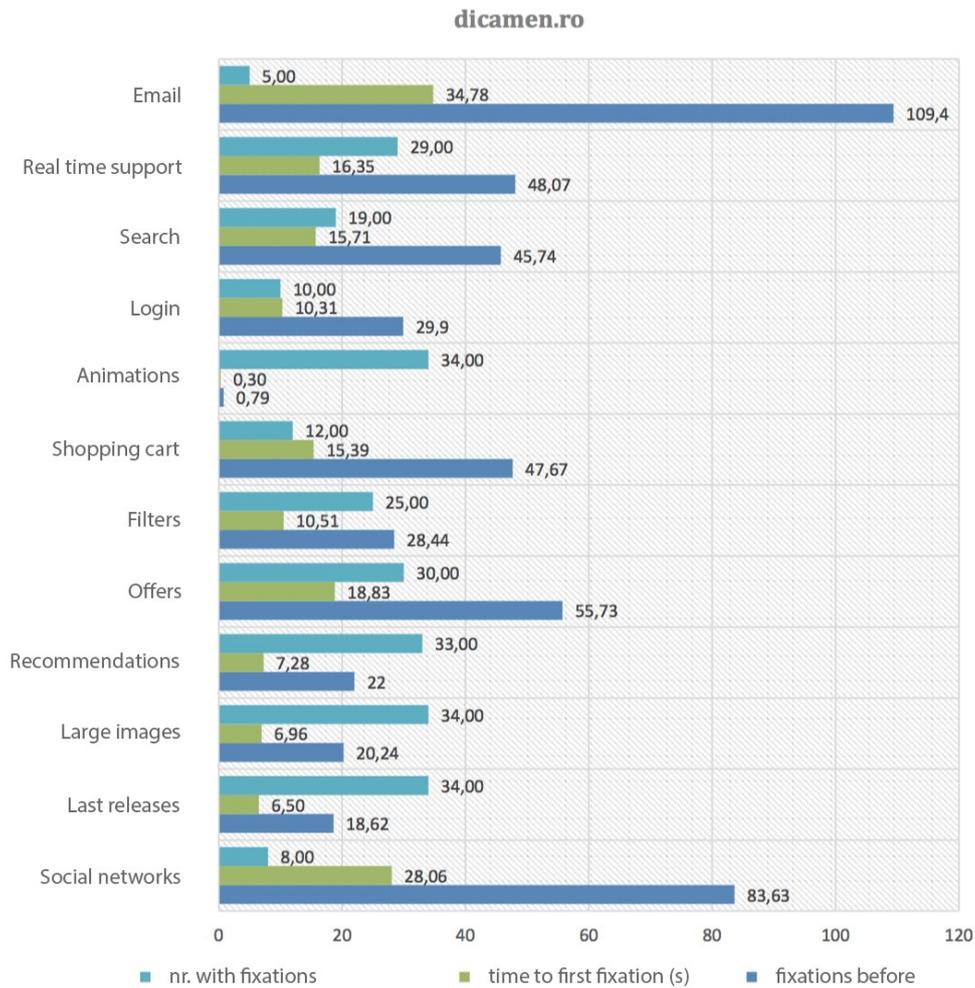


Figure 8. Fixations before, time to the first fixation and the number of participants who had fixations in an area of interest for dicamen.ro

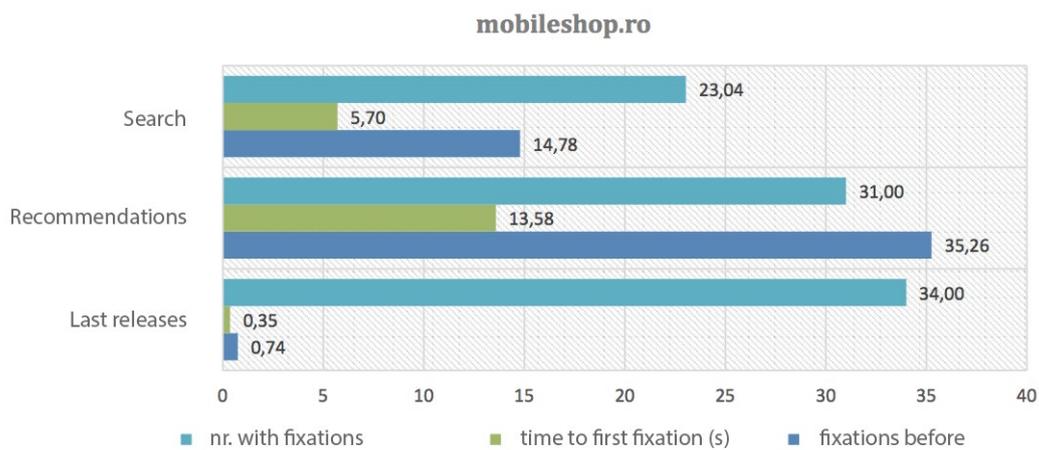


Figure 9. Fixations before, time to the first fixation and the number of participants who had fixations in an area of interest for mobileshop.ro

5. Discussions

This study sought to take a step toward understanding the interactivity dimensions which have an influence on the users' content comprehension and their attitude towards the ecommerce websites, targeting the Generation Y.

The eye tracking data showed that the group of websites with a high level of interactivity received the best results concerning the efficiency and effectiveness of the websites. This group had the shortest duration from the stimuli displaying to the first fixation, including animation elements (0,30s), without reaching the limit of one fixation and with a maximum number of subjects who had fixations (34).

The results also showed that the group of websites with a high level of interactivity received a normal eye movement trajectory, without intensive cognitive processing which would suggest a possible misunderstanding of the content. Moreover, all the subjects identified the areas of interest for the task accomplishment in a very short time for this category of websites.

Therefore, all the subjects have accomplished the received task, focusing on the areas of interest which comprised the mobile phones. The group with a high level of interactivity were the most efficient, the information being easily identified and appealing to the targeted segment of the market.

Similarly, the statistical analysis confirmed a positive attitude towards the group of websites with a high level of interactivity.

Regarding the compatibility between the written reporting and the one received from the eye tracking outputs, two major issues were identified. First, the eye tracking outputs suggests that the subjects were profoundly focused and regardful on all websites logos. According to the written and contradictory answers, the websites logos have influenced them very little (44%) and little (16.7%).

Regarding the brand of the mobile phone, the written reporting was consistent with the eye tracking results. The most searched brand for the mobile phone was Samsung (36.1%) and HTC (16.7%).

As a result, all the hypothesis were verified: (1) a high level of interactivity leads to an increased level of website's efficiency, (2) a high level of interactivity leads to an increased level of website's effectiveness, (3) a high level of efficiency and effectiveness has a positive influence the level of website's content comprehension, (4) a high level of interactivity leads to an increased level of the website's content comprehension, (5) a high level of website's content comprehension leads to a favourable attitude towards it and (6) a high level of interactivity leads to a favourable attitude towards the website.

6. Limitations and future work

This study presents several limitations. First, the study investigated only a segment of the Generation Y. Future studies could investigate different segments of the market with different levels of web experience.

Another important limitation consists in assessing only five interactivity dimensions, each of them including five factors. Further studies could investigate a larger number of factors. Moreover, in our analysis the logo of the websites, hierarchy of the regions, colours or other similar factors were excluded.

Moreover, the analysis was limited only to the commerce websites which targeted mobile phones technology. Likewise, we analysed only six websites, having in mind that a large number would have a negative cognitive loading. According to (O. Kopf, D. Homocianu, 2016) if the current results are integrated in an analytical system, the results of predictive analytics can be used to identify patterns, trends and forecast business activity flow. A future direction could be a detailed analysis for mobile phones because there are some studies (N. Dospinescu, D. Florea, 2016) that consider that one of the conditions for a smartphone to be successful on the market, when technical services and features offered are perceived as undifferentiated, represents the elements of the visual impact.

The eye-tracking device could be a limitation, concerning the fact that the subjects were aware that their activities on the websites are traced by a camera. Moreover, the universities laboratories do not represent their natural environment of buying a personal product.

Concerning the software limitations, we used the Eye Proof Analytics for collecting data, which was in that period in Beta version. For this reason, we could gather only a limited number of indicators. Future research could include more indicators, so multiple parameters can be calculated.

Further studies could imply other devices, for instance used complementarily with the neuro imagistic instruments, such as electroencephalogram (EEG) or the magnetic resonance imagistic (RMN). The results of our study could be combined with the results already published (G. Slanzi, J. Balazs, J. Velasquez, 2017), (N. Dospinescu, M. Tătărușanu, G. Butnaru, L. Berechet, 2011) about the perception of users about new technologies and the prediction of web users click intention.

7. Conclusion

The present work has important implications both in practice as well as in research. It contributes to the Human-Computer Interaction literature by providing a methodology that uses the eye tracking technology when assessing web usability. In practice, the results of this study are useful to web designers, developers, retail companies, as they deliver a scientific way to assess the new trends and also, give directions concerning the websites interactivity dimensions.

All the observations from this study are specific for a segment of the Generation Y. Therefore, companies which target this segment of the market can take advantage of the results obtained through eye tracking technology.

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