International Journal of Engineering & Technology, 7 (4.19) (2018) 470-475

International Journal of Engineering & Technology

Website: www.sciencepubco.com/index.php/IJET

Research paper

Investigating the Relations between Social Influence, User's Attitudes and Behavioural Intention in a Persuasive Website Environment

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Abstract

In an online environment, visual design plays an important role in influencing web users' impression of a website. Previous research has clarified that different elements of visual design stir up dissimilar impacts towards the end-users. This paper investigates the impact of persuasive visual towards users' attitudes and behaviours. Specifically, it examines the critical roles of social influence in the form of visual persuasion in motivating users to have a favourable impression of a particular website. Survey data was collected in an experimental study that was conducted online. Structural model assessment is carried out using confirmatory factor analysis (CFA) in conjunction with PLS-SEM analyses. The general analysis of model fit indicates that the two models proposed in this paper surpassed the cut off values for model acceptance with most of the model fit criteria reflects outstanding explanatory power. The findings offer new insights into the role of visual persuasion in web design with respect to the relationships between social influence, users' attitudes, and intentional behaviour.

Keywords: *U Persuasive design, PLS-SEM, user experience, visual persuasion.*

1. Introduction

Fairly recently, scholars from the field of human-computer interaction (HCI) actively elaborate on the role of visual aesthetic in improving user experience (UX). Some researchers suggest that visual aesthetic is equally as important as usability. Furthermore, past research has proved that a website with high aesthetic design satisfies the web users more compared to the less appealed website even though usability was well designed [1], indicating that visual aesthetic is assessed independently from perceived usability [2]. Thus, it is argued that visual aesthetic plays an important role in influencing users' overall impression of a website. Notably, the first impression of a website is made instantly [3], [4], thus making it more crucial to trigger web users' interest as soon as they set eyes on the website. In such a short time, it is more likely that the web users will only take note of the visual objects that stand out on a website while ignoring the others [5].

However, there are limited guidelines on what kind of visual objects that piques web users' interest to prolong their stay on a website. Simply tossing out visual cues on a website might not only be pointless and not serving its purpose but might also irritate web users. As an example, banner (i.e. a graphic image advertisement displayed on a webpage) that is carelessly designed had caused the declined of click-through rates despite being one of the most popular types of ads on the web [6], [7]. Thus, making it essential for web designers to identify which visual objects or cues that successfully attract the web users and at the same time influence them to elaborate further on the website.

One of the approaches that can be used to attract web users' attention is by designing the website persuasively [8], [9]. This approach is in line with the suggestion in [9] that design goals should also include another aspect of UX, such as emotions, motivation, and persuasion. Therefore, this research examines the use of visual persuasion as the objects of interest to influence a favourable impression of the web users. For this purpose, the principles of social influence in [10] are defined as the dimension of social influence in the extended version of first impression formation of persuasive website model by the researchers in [11]. A recent article that compares the impact of a fairly common visual design and a persuasive visual design clearly shows the role of visual persuasion in influencing the relationship between users' attitudes and their behavioural intention (see [8]). This article extends the previous work by assessing the extended persuasive visual design model depicting the relationship between social influence dimension and users' behavioural intention.

2. Research Background

Early discussion of persuasion in the domain of interface design is evident from work in [12] and [13]. The research evaluated the rhetorical effectiveness of metaphor that appeals to users' emotions as well as presenting the idea of influencing users with the visual elements in the computer application. The result shows that graphical user interface appeals to the credibility of the application. It is noted that at the time when the research was conducted, the computer is still considered as an alienated

technology in which users has yet to overcome their fears of computing.

Much later, as Internet technology and e-commerce emerge, the researchers in [14] initiated the idea that web design elements also have their own persuasive power. They believed that the design elements on a website could serve as the persuasive triggers that persuade web users to explore and interact, up to the extent that the users may purchase something on the site. The outcome of the research reveals that design elements appeal to users' observation of logic, emotion, and credibility differently based on the way they are being presented on the web. Similarly, the researchers in [15] conducted a pair-wise comparison with 13 experienced online shoppers to rank the importance of 9 persuasive triggers. They conclude that persuasive triggers appealing to website's credibility and logic are more important than appealing to users' emotion.

In psychology, a first impression is an event when one person first encounters another person and forms a mental image of that person. In this study, "first impression" is defined as the event when a user first encounters a new website and forms a mental image of that website. When visiting a website, the user's brain collects information he/she received from the senses, e.g. sight, hearing. The information is visualised in the brain to create a visual form of the information; a process that is known as mental image processing. Researchers highlight that mental imagery formed from sensory information helps users to form expectations and creating experiences similar to product trial [16]. Upon entering a website, it takes around 50-500 milliseconds for average users to process their mental model of first impression [17], [18]. In this short time, it is wise to imply that their impression is mostly influenced by the visual design on which they lay their eyes upon entering the website. This is supported by existing studies that show how the first impression is highly correlated with visual appeals of the website [17]–[19]. The first impression formed during this short time helps the users to decide whether they are going to remain at the website or continue surfing to other sites [20]. Regardless of the instant moment taken for the development of the first impression, it appears to be powerful and often has a long-term effect on users' perceptions and attitude towards a website [4], [18].

Previously, empirical research was conducted to investigate the key design factors in the formation of impressions towards web interfaces (see [11], [21]). The research investigated the importance of website design in influencing users' impression of the website, and how it affects user' intention to elaborate further on the website. Screenshots of 50 official state tourism websites in the United States are used as the treatments during the experiments, and the research participants were exposed to each screenshot for 7 seconds as the method to examine users' instant reaction of the website's design. Limitation of the research includes inabilities to perform examinations on the use of particular design components, as well as the experiment, was not identical to the actual web environment. It is predicted that these limitations lead to some unfavourable implications to the research findings. As such, the current research aims to improvise the models in [11] and [21] by making the following adjustments: 1) Instead of using a slideshow of tourism website's homepage, this research's experiment was carried out using web sample that runs on a web server, thus creating an identical web environment. 2) No time limit was set during the experiment's walkthrough. Research participants freely explored the website anyhow they like. 3) As time limit was not set, first impression factor is not observed. Contrarily, this research observes users' satisfaction with the website; therefore, the model is discussed from the perspective of user experience (UX) of human-computer interaction. In the early stage, users' satisfaction was estimated to mediate the interactions between users' motivation to process the information on the web and their behavioural intention. 4) In [11] and [21], no specific visual cue is studied. On the contrary, this research focuses on visual persuasion as the treatment in the persuasive visual design. 5) Visual persuasion is classified according to the principles of social influence discourse in [10].

Social influence refers to "the change in one's attitude, behaviour, or beliefs due to external pressure that is real or imagined" [22], [23]. With proper use, the six principles, namely: (1) reciprocation, (2) commitment and consistency, (3) social proof, (4) liking/friendship, (5) authority and (6) scarcity can be used to influence others to take action.

The rule of reciprocation is described as "we should try to repay, in kind, what the other person has provided us" [10]. Hence, the reciprocity principle of social influence is the practice of exchanging things with others for mutual benefit. This is since people tend to return given favour because they feel indebted to the other person. It is part of human nature to avoid being labelled as a moocher, ingrate, or freeloader if no effort was taken to return given favour.

Similarly, people have a general desire to appear consistent in their behaviour. Thus, when they ask for a particular product or information, they commit themselves to acting upon the requested product or information. This fact is describing the commitment and consistency principle. According to [10], once a person takes a stand, naturally, that person will behave in ways that are consistent with the stand.

The social proof principle is about the assumption that the majority is wiser than a single person's opinion. Cialdini [10] has stated that "the principle of social proof states that one important means that people use to decide what to believe or how to act in a situation is to look at what other people are believing or doing there". It is the tendency of perceiving an action as proper when other people are also taking the same action [10]. It has been emphasised in [10] that social proof is most influential when the person is uncertain, and there is some sort of similarity with another person. One of the common techniques used to portray social proof is called word-of-mouth, in which information (or testimony) is passed from person to person.

The liking principle is the belief that people prefer to say yes to individuals they know and like [10]. The likeable person does not necessarily have to be only family or close acquaintances, but also a likeable stranger. In order to be a likeable stranger, a compliance strategy should be employed, e.g. make the potential customer like the stranger first. Cialdini [10] gives four guidelines to achieve this: i.e. 1) physical attractiveness, 2) similarity, 3) compliments and 4) contact and cooperation.

Authority is the phenomena in which an individual tends to comply with the requests of the authority, even if the request makes him/her act contrary to personal preferences. Cialdini [10] argues that "the tendency to obey legitimate authorities comes from systematic socialization practices designed to instil in members of society the perception that such obedience constitutes correct conduct". Based on the rule of authority, the authority does not have to be real, i.e. the appearance of authority is enough. Thus, a celebrity's endorsement or a model dressed in uniform are examples of the application of the authority principle.

Scarcity is the rule of the few, i.e. "people assign more value to opportunities when they are less available" [10]. This is due to the reason that people tend to assume that an object that is scarce in resource is much more valuable, as it gets harder to possess; thus, they would want to get it before somebody else takes it. The scarcity may be real or just imagined. The common compliance technique for this principle is by placing a limited number of criteria or deadlines in the ads.

These six principles can be used as visual cues to help the process of making a decision. The authors in [24] claim that humans can use certain visual cues to help them determine whether or not to comply with a request. As a result, this research implies that the added value of social influence principles depicted in the form of visual persuasion can enhance the persuasiveness of a website. This research defines visual persuasion as "any picture cues or textual messages that carry the influence effects towards users' first impression, and consequently, affects their attitudes and behavioural intention". It is predicted that the more persuasive a

website is perceived to be, the more likely web users to form a favourable first impression toward the website that consequently affects users' attitudes and intention towards the website.

In this paper, behavioural intention is measured using two indicators; i.e. intention to use, and intention to recommend. In the extended model, perceived informativeness, usability, credibility, visual aesthetic, engagement, and social influence represent the predictors, whereas satisfaction and behavioural intention represent the observed variables (see [25]). The newly extended model needs to be explored with exploratory factor analysis (EFA) before a much solid model can be developed; hence, the inclusion of the social influence dimension in the structural equation model is made under two conditions: 1) the principles of reciprocity, commitment, authority, liking, social proof, and scarcity are treated as dominant variables in the 1st order model, and 2) in the 2nd order model, the six principles are treated as the constructs for the social influence dimension.

3. Research Method

Once the theoretical analysis was done and the focus of research was specified, a preliminary study conducted to examine the current state of persuasive visual application on the tourism websites. The result indicates that not all social influence principles under the studies in this research are fully applied in the existing tourism websites. As a result, the web samples need to be developed to meet the requirements of the research.

Following the design guidelines for conducting A/B test method, the control and treatment websites were identical and shared the same colour, navigation, and layout themes to ensure that there were only small differences between both web samples. A/B test method is a common type of live-site study in which the researchers manipulate elements of the page that are presented to the users [26]. The control and treatment websites were made identical to reduce misleading or bias results. In addition, liquid layout was employed so that the website could also be viewed using smaller screened devices, such as tablets and smartphones. The treatment web sample differs from the control web sample in terms of the additional visual persuasion as part of the visual content. In emphasising the social influence principles in the treatment website, several visual cues representing each social influence principle (i.e. visual persuasion) are included in the website, as explained in [8], [27].

The measures used for data collection were adapted from a variety of sources; hence the instruments were pilot tested prior to the actual assessment of the research. As a result, 44 psychometric indicators representing 12 predictors, were administered for the reliability and validity test using EFA. In adopting the procedures in [28], participants were required to navigate a website before filling up the online questionnaires. The random assignment approach was used instead of repeated measures, to shorten the time needed for survey completion, as well as to reduce the dropout rates (i.e. participants leave before completing the survey). In total, 181 participants recruited via Facebook evaluated the persuasive website. Majority of the participant's age between 18-40 years old, hold a degree, employed or a student, spent at least 3 hours online daily, and travel at least once a year. Data obtained from Google Analytics (i.e. a web analytics service that tracks and reports website traffic) shows that most respondents resided in Malaysia and more than 30% used mobile devices to access the website.

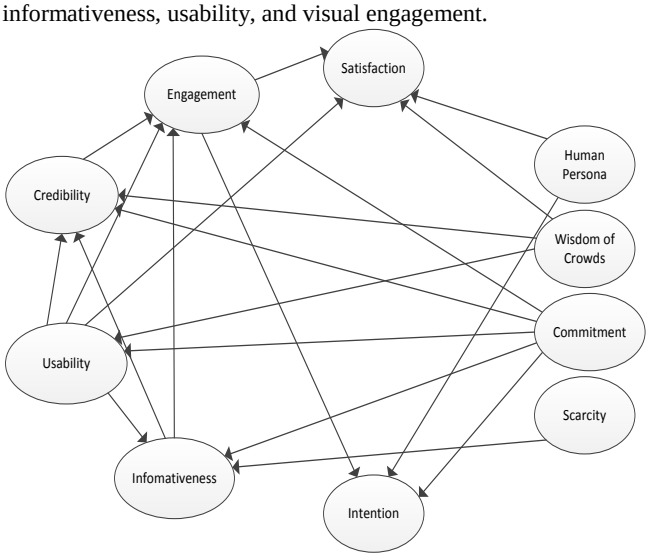
4. Data Analysis and Result

Data obtained from the survey was not normally distributed, leading to the decision to use Partial Least Squares Structural Equation Modelling (PLS-SEM) to assess the structural model. The result of the EFA shows the sign of multicollinearity issue. Therefore, several factors in the model were either removed or combined as a new factor. It is predicted that the outcome of the model assessment was because this research is evaluating the visual design of a website. Thus, participants' responses relied on the way they look at the visual object or cue on the website. For example, visual cues related to the principles of liking, social proof, and authority were about human figures or something that everyone is paying attention to (e.g. 'like' button). As such, the indicators were highly correlated to one another. Resultantly, the indicators were split into two categories, i.e. indicators related to human figure forms a group labelled as a human persona, whereas indicators related to the crowd's opinion form another group referred as the wisdom of crowds. Figure 1 portrays the SEM models after modification. After that, structural model assessment is carried out on the SEM models to discover the model fit as well as the relationship between the predictors and the observed variables.

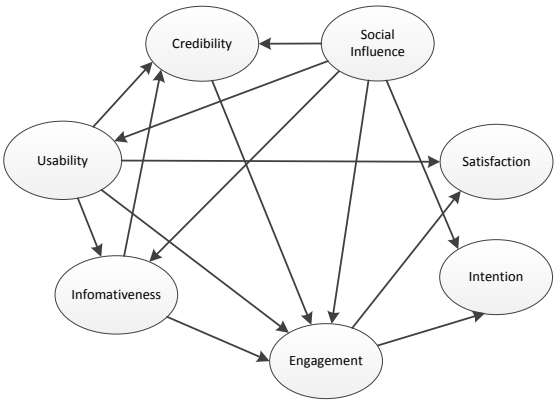
Three main criteria in [29] were referred for assessing the model fit: 1) significant P values at 0.05 levels for the Average path coefficient (APC), 2) Average block VIF (AVIF) must be lower than 5, and 3) significant P values at 0.05 level for Average R-squared (ARS); respectively and in the order of importance. Basically, all the model fit the criteria mentioned above and is well met by the 1st order and the 2nd order models, indicating that both persuasive models have acceptable qualities (see Table 1).

The Tenenhaus Goodness of Fit (GoF) threshold by Wetzels, Odekerken-Schröder, & van Oppen [30] was used to estimate model's explanatory power. As shown in Table 1, the GoF of equal or greater than 0.25, and 0.36 represent moderate and large explanatory power, respectively. Therefore, the 1st order and the 2nd order model exceed the threshold with GoF of greater than 0.6 each; indicating that both models have outstanding explanatory power.

In assessing the model quality, the latent variable coefficient (R-squared) threshold in [31] was referred, i.e. R-squared of 0.75, 0.50, or 0.25 are considered as substantial, moderate, or weak, respectively. The model quality indices in Table 1 indicate the substantial variability of the perceived engagement's data in the 1st order and the 2nd order model (i.e. R-squared of 0.813 and 0.821, respectively). The rest of latent variables record moderate R-squared except for perceived credibility that shows weaker coefficient (i.e. R-squared of 0.484 in the 1st order model and 0.477 in the 2nd order model). In particular, the 1st order model better explains perceived credibility, satisfaction, and behavioural intention whereas the 2nd order model better explains perceived informativeness, usability, and visual engagement.



1st Order Model



2nd Order Model

Fig. 1: 1st order model of persuasive visual design model for website design

Table 1: Model fit and quality indices

Model fit	1st Order (N=181)	2nd Order (N=181)
Average path coefficient (APC)	0.285, P<0.001	0.357, P<0.001
Average block VIF (AVIF)	2.251	2.872
Average R-squared (ARS)	0.649, <0.001	0.626, P<0.001
Tenenhaus Goodness of Fit (GoF)	0.662	0.656
Latent variables coefficients: R-squared		
Informativeness	0.564	0.583
Usability	0.619	0.649
Engagement	0.813	0.821
Credibility	0.484	0.477
Satisfaction	0.706	0.548
Intention	0.706	0.680

Table 2: Path analysis result with WarpPLS 5.0

	1st order			**2nd order**		
Associations	**β**	**ES**	**Supported?**	**β**	**ES**	**Supported?**
Usability → Informativeness	0.461	0.326	✓	0.300	0.212	✓
Commitment → Informativeness	0.137	0.090	✓	-	-	-
Scarcity → Informativeness	0.246	0.148	✓	-	-	-
Social influence → Informativeness	-	-	-	0.500	0.372	✓
Commitment → Usability	0.672	0.521	✓	-	-	-
Crowds → Usability	0.170	0.098	✓	-	-	-
Social influence → Usability	-	-	-	0.805	0.649	✓
Informativeness → Engagement	0.192	0.137	✓	0.127	0.091	✓
Usability → Engagement	n.s.	-	×	n.s.	-	×
Credibility → Engagement	0.435	0.352	✓	0.412	0.333	✓
Commitment → Engagement	0.315	0.251	✓	-	-	-
Social influence → Engagement	-	-	-	0.394	0.331	✓
Informativeness → Credibility	0.181	0.103	✓	n.s.	-	×
Usability → Credibility	0.206	0.130	✓	0.198	0.124	✓
Commitment → Credibility	0.240	0.152	✓	-	-	-
Crowds → Credibility	0.184	0.099	✓	-	-	-
Social influence → Credibility	-	-	-	0.441	0.297	✓
Usability → Satisfaction	0.196	0.119	✓	0.139	0.084	✓
Engagement → Satisfaction	0.633	0.465	✓	0.631	0.463	✓
Crowds → Satisfaction	0.182	0.059	✓	-	-	-
Human persona → Satisfaction	0.178	0.062	✓	-	-	-
Engagement → Intention	0.668	0.542	✓	0.559	0.452	✓
Commitment → Intention	n.s.	-	×	-	-	-
Human persona → Intention	0.207	0.091	✓	-	-	-
Social influence → Intention	-	-	-	0.297	0.228	✓
n.s.: not significant						

Each arrow in the SEM model represents a hypothesis. The hypothesis is empirically supported if the following three conditions are met: 1) the estimated path coefficient (β) is in a positive value, 2) the p-value is significant (less than 0.05), and 3) the effect size (ES) is above 0.02. Otherwise, if one of the conditions is not fulfilled, i.e. the β is a negative value, the p-value is insignificant, or the ES is below 0.02, the hypothesis will be rejected. Negative β means that any increment of the latent variable causes a decrement in the criterion variable; whereas ES below 0.02 means that the association is too weak to be considered. In referring to the result shown in Table 2, it can be summarised that the outcome of the path analyses is quite consistent between both persuasive models. The only difference spotted is in the association path of perceived informativeness and perceived credibility, that is the association is significant in the 1st order model (β=0.181; p=0.006; ES=0.103) and not significant in

the 2nd order model (β=0.100; p=0.084; ES=0.056).

Particularly in the 1st order model, perceived informativeness is positively related to perceived credibility and engagement, but not significantly associated with satisfaction and behavioural intention. Usability has a positive influence on informativeness, credibility, and satisfaction. Perceived credibility is found to affect perceived engagement positively. Perceived engagement in turn, directly influences satisfaction as well as behavioural intention. As for the social influence dimension, commitment is positively associated with perceived informativeness, usability, engagement, and credibility whereas scarcity only has impacts on perceived informativeness. Reciprocity, liking, social proof, and authority are not tested in this section as the variables were either excluded from the model due to insignificant paths or rebranding as new variables during measurement model assessment of reliability and validity. Due to that, two variables are newly constructed, i.e. human persona and wisdom of crowds. Human persona is found to influence perceived satisfaction and behavioural intention. In the meantime, the wisdom of crowds has an impact on usability, credibility, and satisfaction.

Similarly, in the 2nd order model, informativeness is positively associated with engagement. Usability is significantly related to informativeness, credibility, and satisfaction in the same way credibility affected engagement. In turn, engagement significantly influences satisfaction and behavioural intention. Interestingly, social influence shows positive impacts on perceived informativeness, usability, engagement, credibility, as well as behavioural intention. The ES for the associations is between 0.228 and 0.649, indicating medium to large effect on the path coefficients. This result shows that social influence factors play a major part in influencing users' motivation during their visit to a website. Interestingly, perceived satisfaction of visual persuasion on the website does not have a direct impact on behavioural intention in both models. Instead, several other predictors appear to have direct impacts on behavioural intention (i.e. perceived engagement and social influence).

Looking specifically at the relationship between social influence, users' attitudes and behavioural intention, it can be concluded that more than 80% of perceived engagement in the persuasive model is explained by perceived informativeness, credibility and commitment in the 1st order. Similarly, perceived informativeness, credibility and social influence also explain more than 80% of perceived engagement in the 2nd order persuasive model. On the other hand, perceived credibility is affected by perceived usability and social influence. Interestingly, more than 70% of perceived satisfaction in the 1st order persuasive model is explained by perceived usability, engagement, crowds and the human persona, while it is moderately affected in the 2nd order persuasive model. Similarly, in the 1st order persuasive model, engagement and the human persona explain more than 70% of behavioural intention. In the same way, 68% of intention in the 2nd order persuasive model is explained by the power of social influence.

5. Conclusion

This paper extends the previous work in [8], [25] by assessing the persuasive visual design model for website design. The models' fit in this article shows greater qualities than the non-persuasive model built to examine the effect of common visual design towards users' attitudes and behavioural intention (see [8]). Thus, it is concluded that persuasive visual design model better explains web users' behavioural intention, specifically the intention to use and intention to recommend. Most importantly, the use of visual persuasion helps to improve users' perceptions of the website design. This also means that Cialdini's principles of social influence are applicable in the form of visual persuasion.

Social influence positively impacts perceived informativeness, usability, engagement, and credibility while indirectly influences users' satisfaction with the website. The result shows that by using visual persuasion in the design, it helps users to easily look for information as the most wanted information are tailored according to their need. The visual persuasion used in the study is also useful in engaging the users with the content of the website. More importantly, with visual persuasion, the website appears more credible to the users. The outcome of research provides empirical evidence on the influence of persuasive visual design and its effects towards users' attitudes and behaviours.

Nevertheless, this research has a few limitations. Firstly, this research investigates the effects of persuasive visual design using tourism information as the subject of study, specifically focusing on New Zealand tourism. This information may not be relevant to most of the research participants. Thus, the moderating effect is possibly affected. Future research should employ tailored information that is well customised to each individual's requirement. Secondly, this research does not control the type of devices used to browse the web sample during the online experiments. Therefore, the moderation effect of devices cannot be investigated. However, external factors such as the device's screen size, or the speed of the Internet may also give rise to some implications for the result. Thus, future research may also consider such moderating factors during the investigation. Lastly, the visual cues representing the liking principles may not be relevant to the research participants as the researcher avoids obtaining private information from them. However, the liking principles work best when visual cues of close relatives or friends were used. Therefore, it is recommended that future research employs appropriate visual cues that are specially customised to each research participant.

Acknowledgement

This research is fully supported by University Research Grant from Sultan Idris Education University under the grant number of 2018-0134-109-01.

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