Exploring Social Influence on Customer Engagement: A Pilot Study on the Effects of Social Learning, Social Comparison, and Normative Influence

Agnis Stibe
University of Oulu
agnis.stibe@oulu.fi

Harri Oinas-Kukkonen
University of Oulu
harri.oinas-kukkonen@oulu.fi

Tuomas Lehto
University of Oulu
tuomas.lehto@oulu.fi

Abstract

Contemporary socio-technical environments hold a great potential to drive a positive influence on the behaviors and attitudes of individuals. Drawing upon social cognitive theory (SCT) and the theory of planned behavior (TPB), this paper explores how and to what extent persuasive social influence features (namely, social learning (SL), social comparison (SC), and normative influence (NI)) alter customer behavior toward engagement in feedback sharing. A theory-driven research model was composed and then analyzed using partial least squares structural equation modeling (PLS-SEM). Based on a pilot experimental study involving 69 Twitter users, the authors indicate that behavioral intention (BI) to engage in feedback sharing is partially explained by the perceived persuasiveness (PP) of a system, which is partly explained by means of NI, which in turn is partly explained by means of SC. On top of that, SL plays an important role in explaining and influencing all of the abovementioned constructs.

1. Introduction

The emerging networked digital economy enables the development of socio-technical environments that support active participation and contribution instead of passive consumption [36, 41]. Borderlines between users and designers are vanishing, and cultures of participation open up new ways for social creativity [18]. The social web facilitates the evolution of these cultures by offering a technological environment that engages diverse audiences, enhances creativity, and fosters collaboration among users who gradually turn into active contributors and designers [17]. Motivated users are very important to the success of information systems (ISs) designed for active contribution and participation. Hence, the general purpose of this research is to study means of influence aimed at engaging customers in sharing their feedback through such systems.

Previous research emphasizes the importance of developing customer-supplier relationships through dialog and interaction [42] and seeking customers' motivation for voluntarily participation [37] in the co-creation of value [23]. For example, a recent study on an airline company has highlighted the importance of using social media technologies to socialize customers toward participation [27].

Socially active people surrounded by advanced public environments have recently created an increasing number of opportunities for businesses to engage individuals in various social interactions [15]. For instance, airline travelers waiting for their flights in airports may be approached with questions about airport-related issues or concerns associated with traveling, because such feedback-sharing behaviors make the participating travelers feel more engaged [34]. Such engagement of travelers can be enabled and facilitated by airport facilities that are redesigned into socio-technical environments where ISs are seamlessly and unobtrusively integrated within the physical space.

Ideally, travelers who engage in the feedback-sharing activity experience a change in their behavior from being passive observers to becoming more active participants. The concept of a Behavior Change Support System (BCSS) was recently introduced [38, 39] as a socio-technical IS with psychological and behavioral outcomes to provide researchers and system developers with sharper conceptual-theoretical means for developing such systems and/or carrying out research with them. BCSSs influence the behaviors and attitudes of users by building upon their motivations or goals.

The key to behavior change is persuasive systems design [38]. Therefore, the concept of BCSS presents the Persuasive Systems Design (PSD) model [40], which defines a range of persuasive software features aimed at altering user behavior. Hereof:

The objective of this study is to explore the impact of persuasive software features on the perceptions of IS users engaged in a feedback-sharing activity that takes place in an airport setting.

1530-1605/12 $26.00 © 2012 IEEE
DOI 10.1109/HICSS.2013.222

The paper is structured as follows. The theoretical background is presented in the following section. The research model is developed in Section 3. The research methodology is then provided in Section 4. The data analysis and results follow in Section 5. Then, Section 6 covers a discussion of the findings, and Section 7 ends the paper with conclusions.

2. Theoretical Background

Building BCSSs requires an understanding of software and ISs as well as psychology [38]. Therefore, theories from social and cognitive psychology, such as social cognitive theory (SCT) and the theory of planned behavior (TPB), were employed to constitute the theoretical background for the study. SCT—used in psychology, education, and communications—explains how people acquire and maintain certain behavioral patterns and provides the basis for intervention strategies [4]. It deals with cognitive, emotional, and behavioral aspects to create an understanding of behavior and attitude changes [8]. It posits that people can acquire new types of behavior by observing others within the context of social interactions, experiences, and outside media influences [6].

The TPB is incorporated in the present study to complement and provide support for the theoretical concepts of SCT. The TPB, one of the most predictive persuasion theories in psychology, describes a link between attitudes and behavior [2]. It was developed from the theory of reasoned action [19] and has been applied to studies of correlations among attitudes, beliefs, behavioral intentions (BIs), and behaviors in various fields, including the domain of ISs [47].

Contemporary society produces a growing number of various ISs, which emphasizes the importance of conducting research related to user behavior also in the space of human-computer interaction and management ISs [25]. The research field focusing on studies on behavior and attitude change facilitated by computing devices is called persuasive technology [21], and the socio-technical ISs aimed at changing people's behaviors and attitudes within this research stream are called BCSSs [38].

2.1. Behavior Change Support Systems

The PSD model, the state-of-the-art vehicle for designing and evaluating BCSSs, suggests that the development of persuasive systems contains three general phases. Firstly, it is important to analyze the key issues behind a persuasive system; then, the persuasion context (the intent, event, and strategy of persuasion) should be analyzed; and finally, suitable persuasive software features need to be selected and designed [40]. The PSD model clusters persuasive software features into categories, and a special category is reserved for social influence. The design principles of this category describe how to design a system so that it persuades users by leveraging social behaviors via social learning (SL), social comparison (SC), normative influence (NI), social facilitation, cooperation, competition, and recognition. However, the model does not suggest that all possible software features should always be implemented.

2.2. Social Cognitive Perspective

According to Burnkrant and Cousineau, one of the most pervasive determinants of an individual's behavior is the influence of those around him [10]. Along the same vein, Bandura has suggested that human behaviors must be thought of in terms of self and social influences [4] and that human self-development, adaptation, and change are embedded in social systems [6]. In such systems, according to the social cognitive perspective, personal factors, behavioral patterns, and environmental events all operate as interacting determinants that influence each other [8]. It implies the dynamic interaction of the person, behavior, and environment in which the behavior is performed. This triadic reciprocal determinism unfolds multiple pathways for studying behavioral change, including environmental and personal change.

SCT is a comprehensive theory that makes it complex, and therefore difficult, to operationalize, but like many other empirical studies based on this theory [48], it is possible to employ a simplified version, adapted to the specifics of the target behavior approached in the study. In the context of social influence on one's behavior, the theory suggests looking through the lens of two main human capabilities: vicarious learning and self-regulation.

Vicarious capability implies observational learning that enables humans to expand their knowledge and skills rapidly through information conveyed by various models around them [6]. Further, the SCT of self-regulation [7] suggests that human functioning is regulated by the interplay of self-generated and external sources of influence. In other words, self-regulation is the influence over one's own motivations, thought processes, emotional states, and patterns of behavior. In the current study, the social cognitive perspective is adapted to explore the effects of personal and environmental determinants on the target behavior of airline travelers (namely, engagement in feedback sharing). For this reason, the social cognitive model is designed in the next section.

2.3. Social Cognitive Model

Several theories from social psychology [2, 19] and their applications in the IS field [47] describe BIs as immediate and important predictors of behavior. Hence, for this pilot study in a simulated airport setting, the BI construct is formalized as a behavioral determinant in the social cognitive model represented in Figure 1.

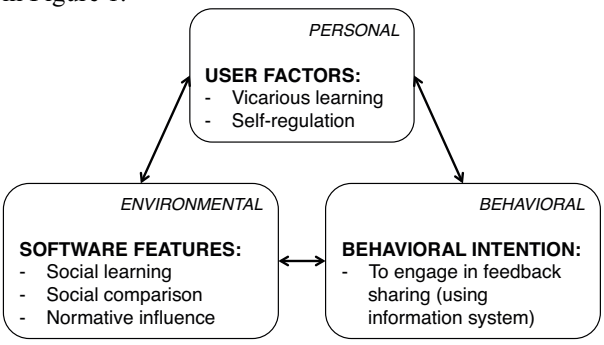

Figure 1. The social cognitive model adapted to the IS context

The reciprocal causation connecting personal determinants (user factors) and behavioral determinants reflects the interaction between what people think, believe, and feel and how they behave [8]. According to Bandura, people are equipped with the capacity for vicarious learning, which increases their behavioral knowledge and skills by observing others, thus having a direct influence on their own BIs and consequent behaviors [6]. In addition, he suggests that successful self-regulated individuals have higher motivation, exploit better behavioral strategies, and respond more appropriately to environmental influences [7]. Consequently, this study incorporates the constructs of vicarious learning and self-regulation to explore the effects of these user factors on BI to engage in feedback sharing.

The segment of reciprocal causation between environmental determinants (software features) and user factors represents the interplay among human beliefs, emotions, and cognitive competencies and how they are developed and modified by social influences conveyed through environmental factors [8]. In addition, SCT suggests exploring the aspects of social persuasion maintained by ambient environments. In the present study, the PSD model [40] has been applied to distinguish applicable persuasive design principles (i.e., persuasive software features) for social influence on user factors (namely, vicarious learning and self-regulation) and on BI to engage in feedback sharing.

From the social influence category of the PSD model, three persuasive software features (namely, SL, SC, and NI) were discerned, as they conform to the user factors of the present study. The SL feature conveys the principal idea of vicarious learning, as it implies that users will be more motivated to perform a target behavior if they can use an IS to observe others performing the behavior [40]. The SC and the NI features were found to be conformable, because they reflect the main principles of the similarly termed psychological sub-functions of self-regulation (namely, SC and standard norms) [7]. More specifically, they originate from the social referential performances of the judgmental process of self-regulation.

The SC feature implies that users will have greater motivation to perform a target behavior if they can compare their performances with the performance of others [40]. Further, the NI feature implies that an IS can leverage peer pressure to increase the likelihood that a person will adopt a target behavior [40]. The engagement in feedback sharing is the target behavior examined in the present study.

2.4. Research Question

The BCSS research agenda suggests tackling a list of open research questions, including matters categorized as the analysis of the persuasive potential of an IS [38]. The following two questions from this category framed the motivation of this study: "Which software features or combinations of software features have the greatest impact in different settings?" and "In general, how do different persuasive features relate to each other?"

Building upon the open issues mentioned above, the depicted principles of the PSD model, and the social cognitive perspective described previously, the research question of the study is formulated as follows:

How do persuasive software features of SL, SC, and NI relate to each other, and how do they affect the persuasiveness of an IS and the BI to use it for sharing feedback?

3. Research Model and Hypotheses

According to Ajzen, an individual's BI is jointly determined by the person's attitude, subjective norm, and perceived behavioral control [2]. A user's attitude is one of the primary determinants of his or her BI. In general, an attitude toward behavior is formulated as an individual user's positive or negative feelings (evaluative affect) about performing the target behavior [19]. More recently, Crano and Prislin have suggested that the construct of attitude is a central aspect that must be considered when reflecting on persuasion [13], as it represents an evaluative integration of cognitions and affects.

Furthermore, Lehto et al. [31] and Drozd et al. [14], in their recent studies within the context of persuasive systems and behavior change, have framed the attitudinal construct as person's favorable impressions toward an IS and called it perceived persuasiveness (PP) [39]. Hereof, the attitudinal construct of PP is found to be a determinant of BI. In other words, if an IS is equipped with persuasive powers (for instance, users feel persuaded while using it), then the system most likely will alter their intentions toward the target behavior. Building upon that, the research model is initiated (Figure 2) and the following hypothesis is put forward:

H1: PP has a positive impact on a user's intention to engage in feedback sharing (using IS).

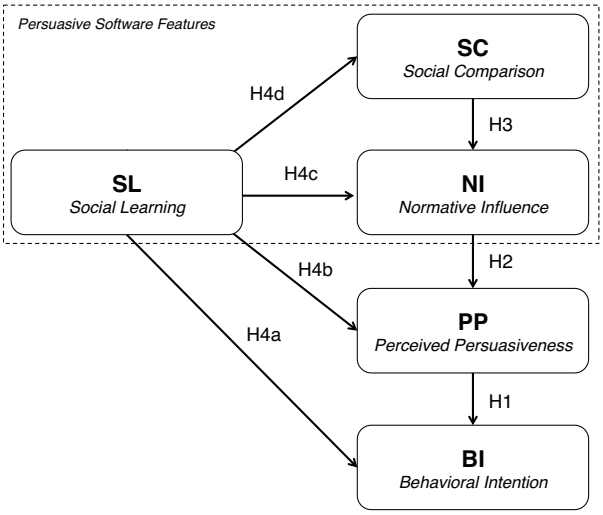

Figure 2. The research model

Ajzen has suggested that subjective norms reflect beliefs about general social pressure or what other people think the person should do [2]. TPB indicates that social norms affect BI indirectly via a user's attitude toward behavior (i.e., PP in the present study). In addition, the self-regulatory capability [7] from SCT provides support for standard norms to be influential on human judgmental processes and, consequently, on an individual's attitude or behavior or both. Social norms, standards, and social pressure [e.g., 3] all are by definition incorporated into the notion of the NI feature from the PSD model [40]. In such a way, if a system's design includes the means of NI, then the system is more likely to have stronger persuasive powers. For example, such a system can display norms that most people approve or information about how most people behave. Therefore, the following hypothesis is suggested (Figure 2):

H2: A system with an implemented NI feature has a positive impact on the PP of the system.

The self-regulatory capability [7] also provides support for SC to be influential on an individual's attitude or behavior or both. Further, Festinger [16] has claimed that people have a drive to evaluate their opinions and abilities by measuring them against standards. However, when norms are unavailable, individuals compare themselves with other people. In such a case, if a system's design includes the means of SC, then the system is more likely to have a greater influence on a user's perceptions about its NI. For example, such a system can display all similarly behaving users in the same manner, so each individual can discern him/herself and compare him/herself to others. Hereof, the following hypothesis is derived:

H3: A system with an implemented SC feature has a positive effect on a user's perception about its NI.

According to Ajzen, perceived behavioral control [2] is the other primary determinant of BI, but it also has a direct effect on a user's attitude (PP) and social norms (NI). Further, the TPB notes that the role of perceived behavior control has originated from the self-efficacy concept [5], which is firmly rooted in SCT. Later, Fishbein and Cappella even emphasized that self-efficacy is the same as perceived behavior control [20]. Furthermore, Schunk has admitted that self-efficacy in the social environment is directly influenced by vicarious experiences, because people can learn something about their own capabilities from knowledge acquired by observing others [44].

The main principles of SL [e.g., 35, 9] are well embodied into the essence of the SL feature [40], as discussed previously. Thus, if an IS's design maintains the means of SL, then the system is more likely to have stronger persuasive powers, greater influence on users' intentions toward the target behavior, and an increased effect of social norms, if implemented. For instance, such a system can display the activity updates of all users performing the target behavior. The following hypotheses are formulated accordingly (Figure 2):

H4a: A system with an implemented SL feature has a positive impact on a user's intention to engage in feedback sharing (using IS).

H4b: A system with an implemented SL feature has a positive influence on the PP of the system.

H4c: A system with an implemented SL feature has a positive impact on a user's perception about its NI, if introduced.

Enabling the users of a system to compare their performances with each other quite naturally implies that they will be able to observe others' performances, which successively provides opportunities to learn from their behavior. Therefore, if a system's design maintain the means of SL, then the system is more likely to have a stronger effect of SC, if implemented. Hence, the following hypothesis is rendered (Figure 2):

H4d: A system with an implemented SL feature has a positive effect on a user's perception of SC, if introduced.

4. Research Methodology

For the purposes of this study, an IS was developed on the Twitter (twitter.com) service, which has been verified as effective for user engagement [28, 45], persuasion [50], and influence on actions outside the virtual world [46]. The system was designed as an instance BCSS with an aim to facilitate a positive influence on users' BIs to engage in feedback sharing via the system.

4.1. System Description

The system attracted users by displaying a series of questions, but users provided their responses using Twitter. All user interaction with the system was automatically updated on the screen, so everyone was able to see the consequences of behaviors on the system's display. The actual responses provided by participants were displayed in the form of news feed on the left side of the screen (Figure 3). That element represented the implementation of the SL feature [40]. Obviously, one could observe the behavior of others through this feature, so it provided support for vicarious learning [6], which in turn influences people's behavior. On the right side of the system, an implementation was displayed aimed at highlighting the main principles of the SC feature for one group of participants (Figure 3) and the NI feature [40] for the other group of participants (Figure 4).

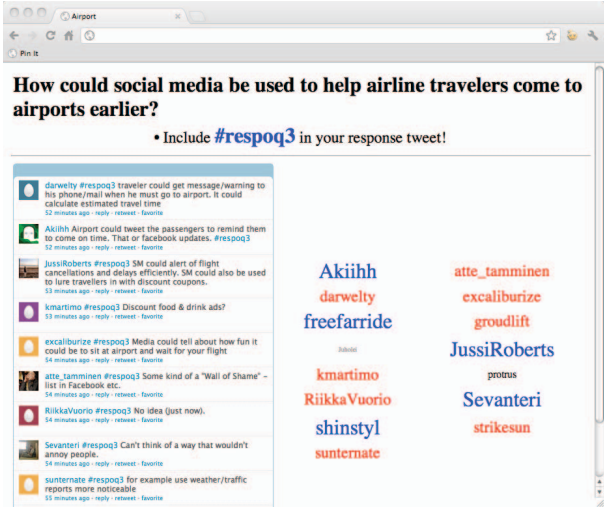

Figure 3. Public display with implemented social comparison feature

In the case of SC (Figure 3), the system increased the font and changed the color of usernames depending on how many responses were provided by each user separately. This feature allowed participants to compare themselves to others who were more active, less active, or behaved similarly to them. According to Festinger [16] and Bandura [20], such comparisons have an impact on participants' behaviors.

In the case of NI (Figure 4), the system provided an implementation of two forms of NI: injunctive norm on the upper part (by displaying what most people approve) and descriptive norm on the lower part (by showing what most people do) [11].

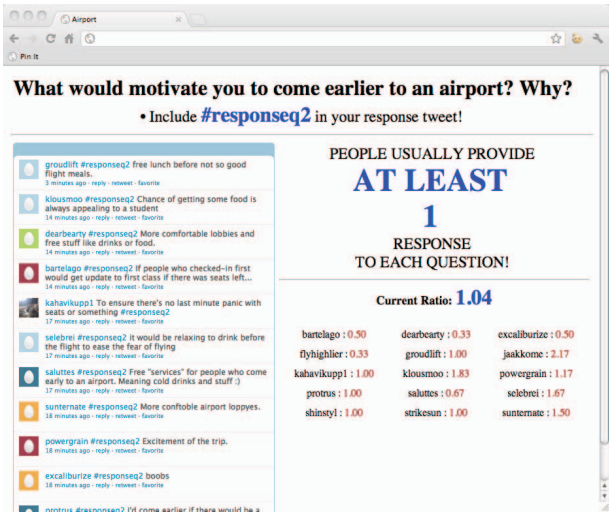

Figure 4. Public display with implemented normative influence feature

The upper part remained static, but the lower part was frequently updated depending on the ratio that was calculated as number of responses provided by users. This feature provided the opportunity for users to observe their behaviors in accordance with social norms. As known from previous studies [3, 7], such social pressures influence users' intentions and consequent behaviors (such as engaging in feedback sharing, the focus of the present study).

4.2. Data Collection and Respondents

In May 2012, a pilot study employing the system was conducted in a classroom setting where participants were asked to imagine that they were airline travelers waiting to depart at an airport. The output of the system was projected on a big screen in front of the group, and users responded via Twitter from desktop computers or mobile devices. The study was conducted for 22 minutes. Six questions related to

airline-travel issues were added to the system incrementally.

All 69 participants in the pilot study were computer science students in an undergraduate program who were enrolled in an IS security course. They were randomly divided into two groups, and each group was involved in the pilot study at different times. One group of 30 people interacted with the implementation of the system emphasizing SC, and the other group of 39 people operated with the implementation highlighting NI. Right after the interaction with the system, all users were required to fill in an online questionnaire containing demographic questions and seven-point Likert scale items (Appendix A) for assessing attitudes.

The respondents consisted of 53 males (76.8%) and 16 females (23.2%), mainly first-year students (72.5%) aged between 20 and 24 (62.3%) and having some experience with airline travel (65.2%). Of the respondents, 24 (34.8%) reported that they "never or almost never" traveled by air. In total, 12 respondents (17.4%) were students in other years of their undergraduate and graduate studies, but 7 respondents (10%) selected "other" as an option. A detailed summary is provided in Table 1.

Table 1. Respondent characteristics

	Value	*Frequency*	*%*
Gender	Female	16	23.2
	Male	53	76.8
Age	Under 20	4	5.8
	20 to 24	43	62.3
	25 to 29	13	18.9
	Over 30	9	13.0

5. Data Analysis and Results

The research model was analyzed using partial least squares structural equation modeling (PLS-SEM) by utilizing WarpPLS 3.0 software for data analysis. WarpPLS is a component-based path modeling software application that is appropriate to use when the purpose of the model is to predict, rather than to test, established theory [26]. According to Gefen et al., PLS is well suited to exploratory research [24]. Moreover, PLS is reasonably robust to deviations from a multivariate distribution.

The statistical objective of PLS is similar to that of linear regression; i.e., to demonstrate explained variance in the latent variable as indicated by R-squared values, to indicate the strength of the relationship between latent variables in terms of β values, and to test the significance of the relationship between latent variables by estimating t-values and reporting their corresponding p-values [24, 26]. According to Hair et al., the PLS-SEM minimum sample size should be equal to the larger of ten times the largest number of structural paths directed at a particular latent construct in the structural model [26]. Our sample size exceeds this requirement. We tested the difference between both groups in the sample, and they were similar (i.e., no statistically significant difference between the means of the constructs). Therefore, we were able to combine the groups and analyze them together as one coherent dataset.

Overall, testing the PLS model is carried out in two steps: assessment of the reliability and validity of the measurement model and assessment of the structural model. The measurement model includes the relationships between the constructs (Table 2) and the indicators (Table 3) used to measure them. The convergent and discriminant validity of the research instrument (Appendix A) is examined in order to verify that the constructs' measures are valid and reliable before attempting to draw conclusions regarding relationships among constructs (i.e., structural model).

5.1. Measurement Model

The measurement instrument (Appendix A) was developed based on the theory-driven items. These survey items were pretested with four scholars from the same field of research before the study. Each construct of the research model is loaded with three items. The engagement in feedback sharing is measured by BI to use the system, which in turn is explained by the PP of the system as well as by effects of persuasive software features of SL, SC, and NI.

The properties of the scales are assessed in terms of item loadings, discriminant validity, and internal consistency. Item loadings and internal consistencies greater than .70 are considered acceptable [22].

Table 2. Latent variable correlations

	CA	*CR*	*SL*	*SC*	*NI*	*PP*	*BI*
SL	.70	.83	**.79**	.58	.55	.47	.39
SC	.68	.82	.58	**.78**	.45	.44	.37
NI	.70	.83	.55	.45	**.79**	.61	.43
PP	.71	.84	.47	.44	.61	**.80**	.40
BI	.93	.96	.39	.37	.43	.40	**.94**
CA=Cronbach's Alpha; CR=Composite Reliability; Bolded diagonal=square root of Average Variance Extracted (AVE)							

The constructs in the model display good internal consistency, as evidenced by their composite reliability scores, which range from .82 to .96. Inspection of the latent variable correlations and square root of the

average variance extracted (AVE) in Table 2 demonstrates that all constructs share more variance with their own indicators than with other constructs. In addition, AVE values of all the constructs were well above the suggested minimum of .50 [22], thus demonstrating adequate internal consistency.

Table 3. Structure loadings and cross-loadings

ITEM	*SL*	*SC*	*NI*	*PP*	*BI*
SL1	**.657**	.421	.181	.139	.171
SL2	**.867**	.461	.537	.404	.372
SL3	**.841**	.488	.535	.520	.366
SC1	.622	**.729**	.510	.388	.154
SC2	.479	**.836**	.399	.371	.400
SC3	.256	**.775**	.158	.276	.288
NI1	.567	.513	**.786**	.542	.293
NI2	.477	.310	**.817**	.514	.388
NI3	.249	.251	**.771**	.385	.326
PP1	.380	.327	.456	**.878**	.357
PP2	.405	.451	.582	**.853**	.456
PP3	.329	.266	.416	**.648**	.096
BI1	.282	.301	.321	.280	**.944**
BI2	.484	.395	.406	.372	**.936**
BI3	.340	.335	.470	.471	**.935**

As all of our variables were measured using the same instrument, common method variance (CMV) poses a potential threat to the validity of the results. In order to diminish CMV ex ante, we randomized the order of the survey items, and participants were assured of the anonymity and confidentiality. Measures were also taken ex post to test and possibly control for CMV. First, we conducted Harman's single-factor test [43]. More than one factor emerged to explain the variance in our analysis, and the largest factor accounted for 31.2% of the variance. Second, we conducted a PLS common method bias test introduced by Liang et al. [32]. The test indicated that the vast majority of the paths from common latent variables to single-indicator constructs were insignificant. Furthermore, the indicators' substantive variances were substantially greater than their method. Based on the aforementioned measures, we assumed that CMV was unlikely to be a serious concern in the present study.

5.2. Structural Model

For the evaluation of the structural model, the jackknifing resampling procedure was applied to test the significance of the paths' coefficients. Jackknifing is recommended for small sample sizes [29]. We used Warp3 PLS regression algorithm in the analysis. As can be observed from Figure 5, the results of the PLS analysis provided substantial support for the proposed model. All of the hypotheses were supported.

In the structural model (Figure 5), SL explains roughly one-third (34%) of the variance in SC. In turn, together with SL, SC explains 36% of the variance in NI. Moreover, NI and SL account for 45% of the variance in PP.

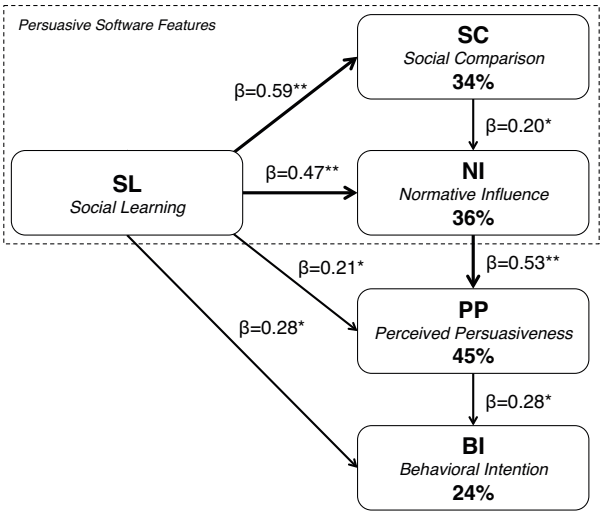

Figure 5. Research model showing results of PLS analysis

In conjunction, SL and PP explain roughly a quarter (24%) of the variance in BI to engage in feedback sharing by using the system. The β values next to the arrows explain the strengths of the particular relationships, but the asterisks mark their statistical significance ($^{**}p<.01$, $^{*}p<.05$).

Effect sizes (f^2) determine whether the effects indicated by path coefficients are small (.02), medium (.15), or large (.35) [12]. Effect sizes below .02 are considered too weak to be relevant. Most of the effect sizes for total effects are above the .02 level, thus providing support for their practical relevance. Total effects, number of paths, and effect sizes for total effects are presented in Table 4.

6. Discussion

The effects of SL [e.g., 9, 35], SC [e.g., 16], and NI [e.g., 3] on people's behaviors and attitudes have been the subjects of intense investigation in human psychology for decades. In the present study, all three social influence principles were designed as software features and then implemented in the BCSS to study their persuasive power to influence users. The results from a rigorous PLS-SEM analysis provide support for all hypotheses in the research model.

Table 4. Total effects and effect sizes

	SL	*SC*	*NI*	*PP*	*BI*
SL	n/a	n/a	n/a	n/a	n/a
SC	.586*** nop:1 f^2=.34				
NI	.585*** nop:2 f^2=.34	.203* nop:1 f^2=.09			
PP	.520*** nop:3 f^2=.26	.108NS nop:2 f^2=.05	.530*** nop:1 f^2=.34		
BI	.422*** nop:4 f^2=.18	.030NS nop:3 f^2=.01	.147* nop:2 f^2=.06	.278* nop:1 f^2=.12	

****p<.001; *p<.05; NS=non-significant; nop=number of paths; f^2=Cohen's f-squared; n/a=not applicable; SL has n/a in all cells, because it is an exogenous variable, i.e., no paths/arrows pointing toward it.*

The results demonstrate that SL plays a key role in the proposed model. It has a strong and significant effect on SC and NI, and it contributes to the explanation of variance in all of the constructs. SL alone explains roughly one-third of the variance in SC. Table 4 illustrates how SL maintains the strength and significance of the effect on PP and, consequently, on BI, even through a higher number of paths. These findings reflect the persuasive power of vicarious learning [6, 8, 9, 45], hence providing support for hypotheses H4a, H4b, H4c, and H4d.

SC has a moderate but significant impact on NI, and together with SL, it explains more than one third of the variance in the target construct. Contrary to SL, SC does not have any far-reaching effects through NI on other constructs. This explains the human tendency to look for common standards and norms first and to make comparisons with other people only in their absence [4, 16], thus supporting hypothesis H3.

NI demonstrates a strong and significant effect on PP, and together with SL, it explains almost one-half of the variance in the target construct. This explains how significantly PP is influenced by the natural drive of human beings to learn and follow social norms [7, 11], thereby supporting hypothesis H2.

Similarly to previous studies [14, 31], the current findings demonstrate a moderate but significant effect of PP on BI, and together with SL, it explains almost one-fourth of the variance in the target construct, thus providing support for hypothesis H1. Overall, this study demonstrates the persuasive powers of the three social influence features and their effects on the BI to engage in feedback sharing.

7. Conclusions

Investigating how persuasive software features alter user behavior is highly relevant, as it advances the design of future ISs [33]. Such BCSSs should not only mirror but also change customer behavior. Therefore, this study explored the effects of persuasive social influence features (namely, SL, SC, and NI) on altering customer behavior toward customer engagement in feedback sharing.

A theory-driven research model was composed and then analyzed using PLS-SEM. The results of this pilot study demonstrated that the BI to engage in feedback sharing is partially explained by the PP of a system, which is partly explained by means of NI, which in turn is partly explained by means of SC. In addition, SL plays an important role in explaining all of these constructs.

The main contributions of this study include the constructed research model and the developed measurement instrument, as they supplement the knowledge base that can be beneficial for scholars focusing on research related to social influence effects on user behaviors mediated by ISs. On the other hand, business organizations can gain immediate benefits by launching the system in their premises and collecting feedback from their customers.

Limitations of the study include the class setting where users were able to watch others performing the behavior and the narrow sample in terms of age and education, which limits the generalizability of the findings, but the framework and concepts can be applied to other settings and contexts.

Further research should focus on the improvement of the research model and survey items as well as the refinement of the design elements for persuasive software features. In the future, the system could be complemented with other features from the social influence category of the PSD model [40] to compare their effects on the target behavior either separately or in combinations. Finally, studies conducted in an actual airport or other public place should be considered.

Acknowledgements

The authors would like to acknowledge our colleagues Payam Hossaini, for developing the system, and Juha Kortelainen, for assistance in conducting the pilot study. The study was supported by the Foundation of Nokia Corporation, the Doctoral Program on Software and Systems Engineering, as well as by the Someletti research project on Social Media in Public Space, grant 1362/31, and the SalWe Research Program for Mind and Body, grant 1104/10, both

provided by Tekes, the Finnish Funding Agency for Technology and Innovation.

References

[1] Ajzen, I., “Constructing a Theory of Planned Behavior Questionnaire: Conceptual and Methodological Considerations,” 2002. Available from: http://www.people.umass.edu/aizen/contact.html

[2] Ajzen, I., "The Theory of Planned Behavior," Organizational Behavior and Human Decision Processes, 50(2), 1991, pp. 179-211.

[3] Asch, S.E., “Effects of group pressure upon the modification and distortion of judgment,” In H. Guetzkow (Eds.), Groups, Leadership and Men, Carnegie Press, Pittsburgh, PA, 1951.

[4] Bandura, A., Self-Efficacy: The Exercise of Control, Freeman, New York, 1997.

[5] Bandura, A., “Self-efficacy: Toward a Unifying Theory of Behavioral Change,” Psychological Review, 84, 1977, pp. 191-215.

[6] Bandura, A., “Social Cognitive Theory of Mass Communication,” Media Psychology, 3(3), 2001, pp. 265-299.

[7] Bandura, A., “Social Cognitive Theory of Self-Regulation,” Organizational Behavior and Human Decision Processes, 50, 1991, pp. 248-287.

[8] Bandura, A., Social Foundations of Thought and Action: A Social Cognitive Theory, Prentice-Hall, Englewood Cliffs, NJ, 1986.

[9] Bandura, A., Social Learning Theory, Prentice Hall, Englewood Cliffs, NJ, 1976.

[10] Burnkrant, R. and A. Cousineau, “Informational and Normative Social Influence in Buyer Behavior,” Journal of Consumer Research, 2(3), 1975, pp. 206-215.

[11] Cialdini, R.B., C.A. Kallgren, and R.R. Reno, “A Focus Theory of Normative Conduct: A Theoretical Refinement and Reevaluation of the Role of Norms in Human Behavior,” In M. P. Zanna (Eds.), Advances in Experimental Social Psychology, Vol. 24, Academic Press, New York, 1991, pp. 201-234.

[12] Cohen, J., Statistical Power Analysis for the Behavioral Sciences, Lawrence Erlbaum, Hillsdale, NJ, 1988.

[13] Crano, W.D. and R. Prislin, “Attitudes and Persuasion,” Annual Review of Psychology, 57, 2006, 345-374.

[14] Drozd, F., T. Lehto, and H. Oinas-Kukkonen, "Exploring Perceived Persuasiveness of a Behavior Change Support System: A Structural Model," Lecture Notes in Computer Science, Vol. 7284, Persuasive Technology, Linköping, Sweden, 2012, pp. 157-168.

[15] Eriksson, E., T.R. Hansen, and A. Lykke-Olesen, “Reclaiming Public Space: Designing for Public Interaction with Private Devices,” In Proceedings of the First International Conference on Tangible and Embedded interaction, ACM Press, New York, 2007, pp. 31-38.

[16] Festinger, L., “A Theory of Social Comparison Processes,” Human Relations, 7(2), 1954, pp. 117-140.

[17] Fischer, G., "Social Creativity: Exploiting the Power of Cultures of Participation," Seventh International Conference on Semantics, Knowledge and Grids, 2011, pp. 1-8.

[18] Fischer, G., E. Giaccardi, H. Eden, M. Sugimoto, and Y. Ye, "Beyond Binary Choices: Integrating Individual and Social Creativity," International Journal of Human-Computer Studies (IJHCS), Special Issue on Computer Support for Creativity (E.A. Edmonds and L. Candy, Eds.), vol. 63, 2005, pp. 482-512.

[19] Fishbein, M. and I. Ajzen, Belief, Attitude, Intention, and Behavior: An Introduction to Theory and Research, Addison-Wesley, Reading, MA, 1975.

[20] Fishbein, M. and J.N. Cappella, “The Role of Theory in Developing Effective Health Communications,” Journal of Communication, 56, 2006, S1-S17.

[21] Fogg, B.J., Persuasive Technology: Using Computers to Change What We Think and Do, Morgan Kaufmann, San Francisco, 2003.

[22] Fornell, C. and D. Larcker, ”Evaluating Structural Equation Models with Unobservable Variables and Measurement Error,” Journal of Marketing Research (18:1), 1981, pp. 39-50.

[23] Fragidis, G., I. Ignatiadis, and C. Wills, “Value Co-creation and Customer-Driven Innovation in Social Networking Systems,” In Revised Papers of the First International Conference on Exploring Services Science, IESS 2010, Lecture Notes in Business Information Processing, Vol. 53, 2010, pp. 254-258.

[24] Gefen, D., E.E. Rigdon, and D.W. Straub, “Editor’s Comment: An Update and Extension to SEM Guidelines for Administrative and Social Science Research,” MIS Quarterly (35:2), 2011, pp. iii-xiv.

[25] Grudin, J., “Human Factors, CHI, and MIS,” P. Zhang and D. Galletta, (Eds.), Human-Computer Interaction and Management Information Systems: Foundations. Advances in Management Information Systems, Vol. 5, M.E. Sharpe, Armonk, NY, 2006, pp. 402-421.

[26] Hair, J.F., C.M. Ringle, and M. Sarsted, ”PLS-SEM: Indeed a Silver Bullet,” Journal of Marketing Theory and Practice (19:2), 2011, pp. 139-151.

[27] Jarvenpaa, S.L. and V.K. Tuunainen, "Company Tactics for Customer Socialization with Social Media Technologies: Finnair's Rethink Quality and Quality Hunters Initiatives," 45th Hawaii International Conference on System Science, 2012, pp. 713-722.

[28] Junco, R., G. Heiberger, and E. Loken, “The Effect of Twitter on College Student Engagement and Grades,” Journal of Computer Assisted Learning, 27(2), 2011, pp. 119-132.

[29] Kock, N., “Using WarpPLS in e-Collaboration Studies: Mediating Effects, Control and Second Order Variables, and Algorithm Choices,” International Journal of e-Collaboration, 7 (3), 2011, pp. 1-13.

[30] Latane, B., "Studies in Social Comparison: Introduction and Overview," Journal of Experimental Social Psychology, Suppl. 1, 1966, pp.1-5.

[31] Lehto, T., H. Oinas-Kukkonen, T. Pätiälä, and O. Saarelma, “Consumers’ Perceptions of a Virtual Health Check: an Empirical Investigation,” the 20th European Conference on Information Systems, 2012, paper 154.

[32] Liang, H., N. Saraf, Q. Hu, and Y. Xue, "Assimilation of Enterprise Systems: The Effect of Institutional Pressures and the Mediating Role of Top Management," MIS Quarterly (31:1), 2007, pp. 59-87.
[33] Loock, C.-M., T. Staake, and J. Landwehr, "Green IS Design and Energy Conservation: An Empirical Investigation of Social Normative Feedback," ICIS Proceedings, December 6, 2011, Paper 10.
[34] Mangold, W.G. and D.J. Faulds, "Social Media: The New Hybrid Element of the Promotion Mix," Business Horizons, 52(4), 2009, pp. 357-365.
[35] Miller, N.E. and J. Dollard, Social Learning and Imitation, Yale University Press, New Haven, 1941.
[36] Mumford, E., "Sociotechnical Systems Design: Evolving Theory and Practice," In Computers and Democracy, (G. Bjerknes, et al., Eds.), Avebury, Aldershot, UK, 1987, pp. 59-76.
[37] Nambisan, S. and A.R. Baron, "Virtual Customer Environments: Testing a Model of Voluntary Participation in Value Co-creation Activities," Journal of Product Innovation Management, 26, 2009, pp. 388-406.
[38] Oinas-Kukkonen, H., "A Foundation for the Study of Behavior Change Support Systems," Personal and Ubiquitous Computing, Springer London, 1617-4909, 2012, pp. 1-13.
[39] Oinas-Kukkonen, H., "Behavior Change Support Systems: A Research Model and Agenda," Lecture Notes in Computer Science, Vol. 6137, Persuasive Technology, 2010, pp. 4-14.
[40] Oinas-Kukkonen, H. and M. Harjumaa, "Persuasive Systems Design: Key Issues, Process Model, and System Features," Communications of the Association for Information Systems, 24(28), 2009, pp. 485-500.
[41] Oinas-Kukkonen, H. and H. Oinas-Kukkonen, Humanizing the Web: Change and Social Innovation, Palmgrave Macmillan, Basingstoke, UK, 2013.
[42] Payne, A., K. Storbacka, and P. Frow, "Managing the Co-Creation of Value," Journal of the Academy of Marketing Science, 36, 2008, pp. 83-96.
[43] Podsakoff, P.M., S.B. MacKenzie, J.-Y. Lee, and N.P. Podsakoff, "Common Method Biases in Behavioral Research: A Critical Review of the Literature and Recommended Remedies," Journal of Applied Psychology (88:5), 2003, pp. 879-903.
[44] Schunk, D.H., "Self-efficacy Perspective on Achievement Behavior," Educational Psychologist, 19, 1984, pp. 48-58.
[45] Stibe, A. and H. Oinas-Kukkonen, "Exploring the Effects of Social Influence on User Behavior Targeted to Feedback Sharing," In Proceedings of the IADIS WWW/Internet Conference (ICWI), Madrid, Spain, Oct 18-21, 2012.
[46] Stibe, A., H. Oinas-Kukkonen, I. Berzina, and S. Pahnila, "Incremental Persuasion through Microblogging: A Survey of Twitter Users in Latvia," In Proceedings of the Sixth International Conference on Persuasive Technology, Columbus, OH, USA, June 2-5, 2011.
[47] Venkatesh, V., M.G. Morris, F.D. Davis, and G.B. Davis, "User Acceptance of Information Technology: Toward a Unified View," MIS Quarterly, 27(3), 2003, pp. 425-478.
[48] Wang, S.-L. and P.-Y. Wu, "The Role of Feedback and Self-Efficacy on Web-Based Learning: The Social Cognitive Perspective," Computers & Education, 51, 2008, pp. 1589-1598.
[49] Wills, T.A., "Downward Comparison Principles in Social Psychology," Psychological Bulletin, 90, 1981, pp. 245-271.
[50] Young, M.M., "Twitter Me: Using Micro-Blogging to Motivate Teenagers to Exercise," In Global Perspectives on Design Science Research, Vol. 6105, 2010, pp. 439-448.

Appendix A. Measurement Items for Principal Constructs

Construct	Abbr.	Item	Adapted from:
Social Learning	SL1	The system enabled me to learn from others.	[6, 8, 9]
	SL2	I learned from tweets provided by others in the system.	[6, 8, 9]
	SL3	Observing tweets posted by others in the system helped me to respond.	[6, 8, 9]
Social Comparison	SC1	The system helped me compare my performance with the performance of others.	[16]
	SC2	In the system I could see similar others who perform like me.	[4, 30]
	SC3	In the system I could see others who are less active comparing to me.	[49]
Normative Influence	NI1	The system provided me with information about how most people perform.	[11]
	NI2	The system displayed common patterns that people would normally follow.	[7]
	NI3	The system explained me how people usually respond.	[7]
Perceived Persuasiveness	PP1	The system encouraged me to tweet.	[14, 31, 40]
	PP2	The system motivated me to participate more actively.	[14, 31, 40]
	PP3	The system influenced my thoughts while using it.	[14, 31, 40]
Behavioral Intention	BI1	I would consider using such a system while being in airports.	[47]
	BI2	I would be willing to try such a system in the future while being in airports.	[1, 47]
	BI3	I would like to use such a system when traveling through airports.	[1, 47]
All items employed a seven-point Likert scale for assessing attitudes, the first option being "strongly disagree," the last option being "strongly agree," and the middle option being "undecided."			