BRAND. Broad Research in Accounting, Negotiation, and Distribution, ISSN 2067-8177
Volume 4, Issue 1, March 2013

The Moderating Role of Perceived Self-efficacy in the Context of Online Buying Adoption

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Abstract

Previous researchers that have employed Technology Acceptance Model (TAM) in modeling online buying behavior, validated that consumers' attitude towards online buying is mainly determined by two salient beliefs: perceived usefulness of online buying and perceived ease of buying online. This paper takes a different approach from previous studies and postulates that the relationship between ease of buying online and attitude will be moderated by consumers' perceived self-efficacy. The results of a PLS-based structural equation modeling analysis validate this assumption, indicating a negative path coefficient for the moderating effect. This means that the direct effect of perceived ease of buying online on attitude will decrease as consumers gain more skills and knowledge about online buying and thus, they perceive an increased self-efficacy. The results of this study implies that consumers' salient beliefs of online buying must be rethought since perceived ease of buying is losing its importance in determining consumers' attitude for those highly experienced online buyers.

Keywords: online buying, perceived self-efficacy, moderating effect, structural equation modeling

1. Introduction

There is a broad literature on technology acceptance, from case-studies of particular accepted technologies and attempts of identifying the users' psychological variables that drives acceptance to complex models of users' acceptance (Dillon, 2001). Understanding why users accept or reject information technology has become one of the most demanding research tasks in IS field (Davis et al, 1989, p.982). Recently, researchers tend to concentrate their attention on users' behavior in order to improve the IS, rather than focusing on the technical features of the information system (Silva and Dias, 2007, p.72) as success or failure of new technologies depend mostly on user acceptance (Davis, 1983).

New technologies are approached as innovations that, at a certain moment of time, can be accepted or rejected by users (see Rogers, 1995: Diffusion of Innovation Theory). User acceptance is defined by Dillon as users' willingness "*to employ information technology for the tasks it is designed to support*" (Dillon, 2001). Users tend to be resistant to accepting new technologies, even though the adoption of a new technology could obviously increase performance (Swanson, 1988). However, researchers are less concerned with the study of resistance and insist on modeling users' acceptance in order to minimize the risk of resistance or rejection (Dillon, 1996).

There are many theories and models adapted for the study of user acceptance of technologies, Technology Acceptance Model (TAM), Theory of Planned behavior (TPB) and Unified Theory of Acceptance and Use of Technology (UTAUT) are just a few (Mohamadali and Garibaldi, 2010). UTAUT, however, is a more recent model that position itself as an integrated framework of all previous user acceptance related models (Williams et al, 2011).

Both TAM and TPB draw from Fishbein's Theory of Reasoned Actions (see Fishbein and Ajzen, 1975), a research framework for explaining individuals behavior in various context on the basis of their behavioral intention. TAM is different from TRA in regards to two aspects (Chen et al, 2011). First, TAM introduces two specific salient beliefs regarding the use of a technology: perceived usefulness and perceived ease of use which in turn will determine users' attitude toward a technology. Second, TAM excludes the subjective norms variable from TRA, thus ignoring the social influence of referent groups when adopting a new technology. Instead, TPB enriches TRA framework with a new belief: perceived behavioral control (see Ajzen, 1985).

Perceived behavioral control assumes that in most of the situations, humans do not have complete volitional control over their behavior (Ajzen, 1991, p. 185). The volitional control over their behavior is undermined by several restraining factors: self-efficacy and facilitating conditions (Venkatesh et al, 2003). Self-efficacy is determined by the individuals' perception regarding their capabilities, abilities and knowledge to perform a behavior.

Scholars from various fields, such as computer science, information systems and information science, have continuously tried to enhance current research frameworks of users' technology acceptance and recent studies in technology acceptance field position themselves on an ascending trend from the middle of '90 decade (Silva and Dias, 2007, p. 69).

Classic user acceptance theories, especially TAM and TPB are the main reference frameworks when explaining and predicting online consumer behavior (Cheung et al, 2003), as online buying requires users' acceptance of e-commerce websites.

Gaining researchers' interest over the last decade (Li and Huang, 2009), the study of online consumer behavior is a relatively new research field. It seems a general tendency to draw from IS-related theories, when explaining and predicting online buying adoption. I have identified various research papers that have either focused solely on TAM or augmented TAM with various variables (for example: Chen et al, 2002; Liu and Wei, 2003; O'Cass and Fenech, 2003; Shang et al, 2005; Crespo and Bosque, 2008; Shin, 2008; Yoon, 2009; Said, 2011)

This paper's primary aim is not to revalidate TAM in the context of online buying, since previous studies show the robustness of the model in this very specific context, but rather to augment TAM with "perceived self-efficacy", a variable with roots in both IS and psychology. Also, the augmentation approach is different from previous studies, since I do not postulate a direct relationship between perceived self-efficacy and other TAM's variables. Instead, the primary focus of the analysis of this paper lies in the moderation effect of perceived self-efficacy between perceived ease of buying online and consumers' attitude towards buying online. Revalidating TAM's relationships in the context of online buying is a secondary aim.

2. Technology Acceptance Model

Technology Acceptance Model was introduced in 1986 by F. Davis as an adapted TRA framework for the specificity of explaining and predicting users' acceptance of technologies, being considered less general than TRA that explains general individuals' behavior (Davis et al, 1989, p. 983). The goal of TAM is best described by authors as providing a general explanation of users' behaviors across a broad range of end-user computing technologies, "being both parsimonious and theoretically justified" (Davis et al, 1989, p. 985).

TAM identifies two salient beliefs of users in regards to computing technologies: perceived usefulness defined as "user's subjective probability that using a specific application system will increase his or her performance" and perceived ease of use, defined as "the degree to which prospective user expects the target system to be free of effort" (Davis et al, 1989, p. 985).

These two beliefs are supposed to determine user's attitude towards using a particular computing technology.

Much as TRA, user's intentions to use a particular computing technology is determined by user's attitude towards using the technology, but TAM findings suggest that intentions are also determined by user's perceived usefulness (Davis et al, 1989, p. 985).

TAM also postulates a direct and positive relationship between the two salient beliefs of users: perceived ease of use has a direct and positive effect on users' perceived usefulness (Davis et al, 1989, p. 988).

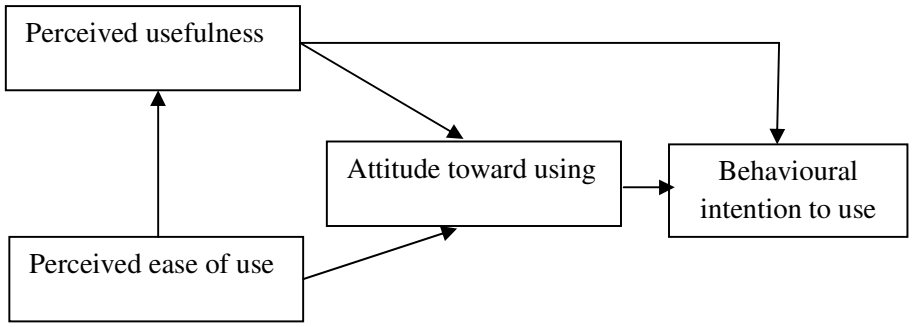

Figure 1. Initial Technology Acceptance Model (Davis et al, 1989, p. 987)

TAM's variables and relationships has been included in various empirical researches, being tested and validated under many circumstances and often extended with new variables in order to provide a better understanding of users' acceptance of new technologies (Wixom and Todd, 2005). TAM is experiencing a world-wide acknowledgement, being the most influential and common theory in IS field (Lee et al, 2003).

3. Research framework

Drawing from TAM as main research framework, I postulate the following hypotheses:

1) There is a positive and direct relationship between consumers' perceived usefulness of online buying (PU) and their attitude towards buying online (AT)
2) There is a positive and direct relationship between consumers' perceived usefulness of online buying (PU) and their intention to buy online (INT)
3) There is a positive and direct relationship between consumers' perceived ease of online buying (PEOB) and their attitude towards buying online (AT)
4) There is a positive and direct relationship between consumers' perceived ease of online buying (PEOB) and their perceived usefulness of online buying (PU)
5) There is a positive and direct relationship between consumers' attitude towards buying online (AT) and their intention to buy online (INT)
6) Consumers' perceived self-efficacy (PSE) will moderate the relationship between perceived ease of online buying (PEOB) and consumers' attitude towards buying online (AT)

Graphically, the research framework is represented in Figure 2.

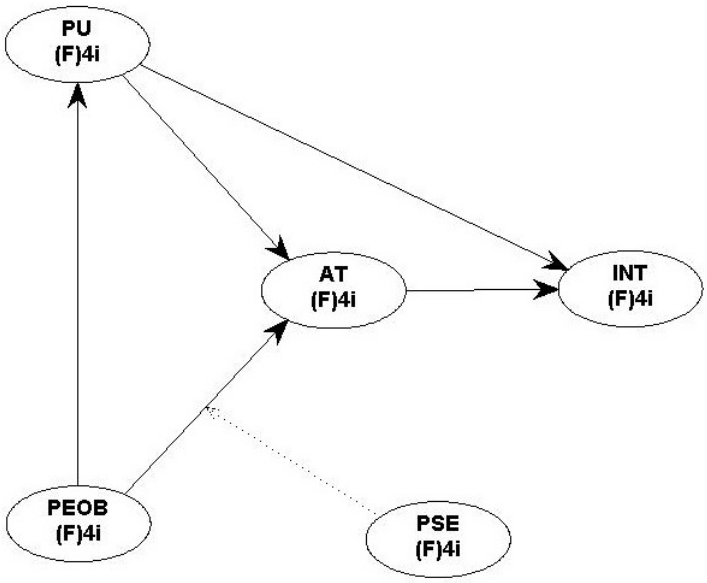

Figure 2. Research framework

4. Methodology

A web-based survey was employed for gathering primary data for the purpose of this study. The target of the study was represented by regular Internet users that have never purchased online.

Each variable of the study was constructed on multi-items and measured on a 7 point Likert scale from 1-totally disagree to 7-totally agree. The data from 112 respondents was exported in a Microsoft Excel file and WarpPLS 3.0 software was used in order to test measurements' reliability and validity and to perform the path analysis.

5. Data analysis and results

5.1 Measurements' reliability and validity

One of the most used methods to assess measurements' reliability is internal consistency. Measurements' internal consistency analysis followed Bagozzi and Yi approach of comparing three consistency indicators (composite reliability, Cronbach's alpha and average extracted variances) with a critical (Bagozzi and Yi, 1988).

Table 1. Composite reliability coefficients (CR)

PEOU	PU	AT	PSE	INT	PSE*PEO
0.894	0.82	0.917	0.891	0.931	0.935

Table 2. Cronbach's alpha coefficients

PEOU	PU	AT	PSE	INT	PSE*PEO
0.841	0.706	0.879	0.836	0.901	0.926

Table 3. Average variances extracted (AVE)

PEOU	PU	AT	PSE	INT	PSE*PEO
0.678	0.532	0.735	0.672	0.771	0.477

Table 1 to 3 contains the coefficients of internal consistency indicators. As all CR coefficients are greater than the critical value of 0.7 (Nunnally, 1978) and all Cronbach's alpha coefficients are above 0.5 (Hair et al, 1998), I can state that measurements yield are highly reliable.

The next step of the analysis is to test whether the measurements are valid, capable of measuring the phenomena investigated. One powerful way to do so is by measuring construct validity by assessing both measurements' convergent and divergent validity.

Convergent validity evaluates the scores of the indicators that are supposed to measure the same construct. If indicators yield similar results then convergent validity is assumed (Jewell, 2001).

Table 5. Combined loadings and cross-loadings

	PEOB	PU	AT	PSE	INT	PSE*PEO	SE	P value
PEOB1	0.816	-0.189	-0.192	-0.048	0.351	0.138	0.074	<0.001
PEOB2	0.808	0.047	0.002	0.002	-0.034	-0.004	0.084	<0.001
PEOB3	0.836	0.025	0.029	-0.048	-0.102	-0.139	0.079	<0.001
PEOB4	0.833	0.114	0.157	0.093	-0.209	0.007	0.087	<0.001
PU1	0.114	0.689	-0.174	-0.142	0.151	0.035	0.109	<0.001
PU2	0.018	0.712	0.218	0.053	-0.316	-0.124	0.106	<0.001
PU3	-0.081	0.767	-0.319	-0.077	0.411	-0.001	0.095	<0.001
PU4	-0.041	0.748	0.28	0.159	-0.259	0.086	0.1	<0.001
AT1	0.189	0.083	0.786	0.062	0.273	-0.031	0.076	<0.001
AT2	-0.087	-0.123	0.9	-0.042	0.068	0.047	0.056	<0.001
AT3	-0.06	0.047	0.889	-0.098	0.02	0.008	0.068	<0.001
AT4	-0.02	0.005	0.85	0.09	-0.346	-0.03	0.081	<0.001
PSE1	0.022	-0.029	-0.178	0.794	0.146	0.002	0.071	<0.001
PSE 2	0.083	-0.18	0.175	0.809	-0.088	-0.004	0.059	<0.001
PSE 3	-0.039	-0.049	0.07	0.904	-0.116	0.041	0.054	<0.001
PSE 4	-0.064	0.278	-0.083	0.766	0.078	-0.046	0.077	<0.001
INT1	0.06	-0.098	0.03	-0.059	0.885	-0.011	0.06	<0.001
INT2	-0.068	0.041	-0.039	-0.02	0.904	0.043	0.061	<0.001
INT3	-0.043	0.005	0.02	0.066	0.849	0.034	0.066	<0.001
INT4	0.051	0.052	-0.009	0.015	0.875	-0.066	0.062	<0.001
I1*PEOU	0.275	-0.105	-0.255	0.029	0.256	0.624	0.123	<0.001
I1*PEOU	0.138	0.059	0.084	-0.045	-0.086	0.681	0.144	<0.001
I1*PEOU	-0.014	0.213	0.312	-0.233	-0.342	0.676	0.124	<0.001
I1*PEOU	0.187	-0.064	-0.039	-0.14	0.143	0.691	0.114	<0.001
I2*PEOU	0.114	-0.274	-0.4	-0.018	0.605	0.684	0.111	<0.001
I2*PEOU	-0.137	-0.048	0.162	-0.039	-0.02	0.699	0.132	<0.001

I2*PEOU	-0.133	-0.126	0.153	-0.054	0.008	0.728	0.114	<0.001
I2*PEOU	0.083	-0.263	-0.227	-0.082	0.471	0.696	0.099	<0.001
I3*PEOU	0.023	-0.155	-0.234	0.071	0.378	0.746	0.117	<0.001
I3*PEOU	-0.121	-0.033	0.106	0.16	0.046	0.787	0.097	<0.001
I3*PEOU	-0.156	0.086	0.284	-0.073	-0.29	0.742	0.142	<0.001
I3*PEOU	0.078	-0.028	-0.054	-0.072	0.08	0.769	0.121	<0.001
I4*PEOU	0.003	0.146	-0.18	0.185	-0.092	0.590	0.124	<0.001
I4*PEOU	-0.112	0.242	-0.026	0.282	-0.345	0.651	0.123	<0.001
I4*PEOU	-0.195	0.332	0.256	-0.03	-0.607	0.625	0.133	<0.001
I4*PEOU	-0.002	0.111	0.017	0.095	-0.333	0.621	0.128	<0.001

From table 5 we can see that items load more inside the construct than they do outside of it which implies good convergent validity.

Divergent validity was assessed following Fornell and Larcker approach of comparing square roots of AVE of each latent variable (LV) with all the other correlations of that LV with other latent variables (Fornell and Larcker, 1981).

Table 5. Latent variable correlations with square roots of AVE on the diagonal

	PEOU	PU	AT	PSE	INT	PSE*PEO
PEOU	0.823	0.472	0.453	0.337	0.444	0.135
PU	0.472	0.73	0.613	0.359	0.669	0.144
AT	0.453	0.613	0.858	0.477	0.77	-0.001
PSE	0.337	0.359	0.477	0.82	0.532	-0.01
INT	0.444	0.669	0.77	0.532	0.878	-0.067
PSE*PEO	0.135	0.144	-0.001	-0.01	-0.067	0.690

5.2 Structural equation modeling (SEM)

The SEM analysis was performed having perceived self-efficacy as a mediator between perceived ease of buying online and attitude towards buying online:

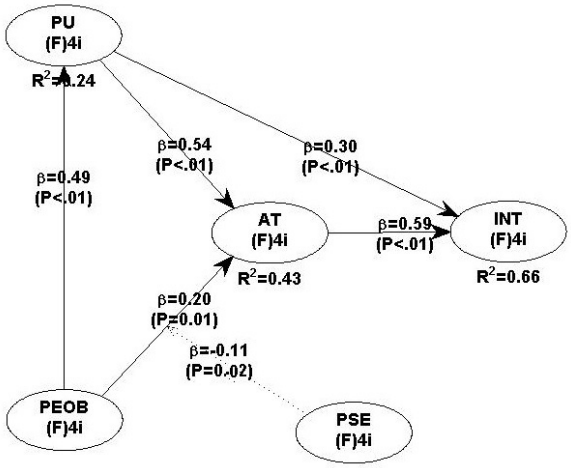

Figure 3. Structural equation modeling

Table 6. Hypotheses testing

No.	Hypotheses	Path coeff.	P value	Validation
1	PU – AT	0.541	<0.01	Y
2	PU – INT	0.303	<0.01	Y
3	PEOB – AT	0.487	<0.01	Y
4	PEOB – PU	0.200	<0.01	Y
5	AT – INT	0.590	<0.01	Y
6	PSE (moderating effect)	-0.110	<0.05	Y

According to Table 6, all hypotheses are valid at $p<0.05$.

Perceived self-efficacy has a moderating effect over the relationship between perceived ease of buying online and attitude towards buying online. The moderation effect is associated with an interaction effect. The sign and the power of the path coefficient of a moderated relationship refers to the effect of the perceived self-efficacy over the intensity of the direct relationships among perceived ease of buying online and attitude towards buying online (Kock, 2011).

The path coefficient of the moderating effect has a value of -0.110 at $p<0.05$. Since it is a negative path coefficient of an effect that moderates a positive direct relationship, the relationship between perceived ease of buying online and attitude towards buying online will go down in value as perceived self-efficacy increases. This is best illustrated in Figure 4, the plots of the moderating relationship involving the three LVs:

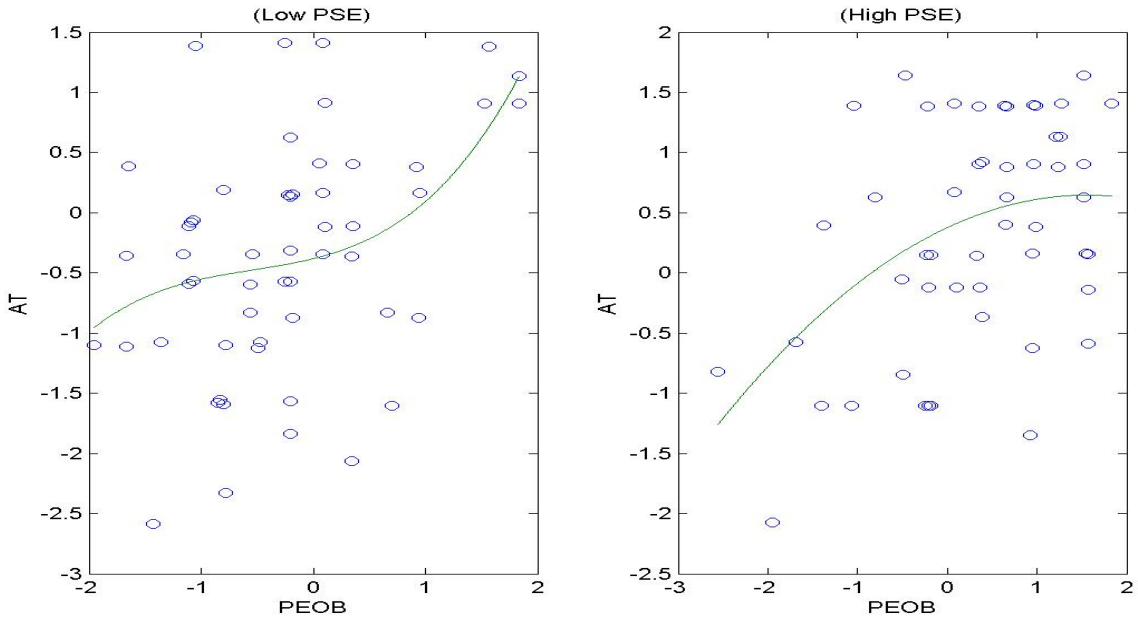

Figure 4. Plots of the moderation relationship

The first plot indicates the relationship between perceived ease of buying online and attitude towards buying online for consumers that perceive low self-efficacy. In case of

consumers with low perceived self-efficacy the relation between perceived ease of buying online and attitude towards buying online is stronger that for those consumers that perceive a high self-efficacy (see second plot from Table 4). The intensity of the relationship between perceived ease of buying online and attitude tends to decrease as self-efficacy increases. This will be further discussed in the next section as there are serious implications here.

6. Conclusion and implications

This paper employed Technology Acceptance Model (TAM) in the context of online buying for study the moderating effect of consumers' self-efficacy. Besides TAM's initial causal relationships, it was postulated that perceived self-efficacy will have a moderating effect on the direct relationship between perceived ease of buying online and attitude towards buying online.

This hypothesis was validated, as the moderating effect had a path coefficient of -0.110 at $p<0.05$. As the path coefficient is negative, the moderating effect tends to decrease the intensity of the direct relationship between perceived ease of buying online and attitude towards buying online. If consumers have a high perceived self-efficacy, the direct relation gets weaker towards neutral.

The effect of perceived ease of buying online on attitude will tend to be insignificant for those consumers that believe they have the necessary skills, abilities and knowledge to buy online. Since having what it takes for buying online, the ease of buying will not be a strong motivator to change consumers' attitude towards buying online.

TAM's postulated salient beliefs must be rethought in the context of online buying since perceived ease will lose importance as consumers get more experimented with the new way of buying. While the effect of perceived ease of buying is moderated and should be use with caution, perceived usefulness of online buying is the strongest predictor of consumers' attitude towards online buying and also an important predictor of consumers' intention to buy online.

However, future studies should extend TAM framework by identifying other salient beliefs about online buying that consumers may hold.

7. Acknowledgements

This article is a result of the project POSDRU/88/1.5./S/55287 „Doctoral Programme in Economics at European Knowledge Standards (DOESEC) . This project is co-funded by the European Social Fund through The Sectoral Operational Programme for Human Resources Development 2007-2013, coordinated by The Bucharest Academy of Economic Studies in partnership with West University of Timisoara.

8. Resources

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