A Longitudinal Study of Herd Behavior in the Adoption and Continued Use of Technology

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Appendix A

Summary of Relevant Literature on Herd Behavior

Study	Area	Definition of Herd Behavior or Similar Concepts	Major Findings
Abrahamson 1991	The diffusion of innovations across organizations	Organizations imitate others when adopting innovations.	Organizations may imitate each other when adopting innovations as fads or fashions. As a result, technologically inefficient innovations may diffuse among organizations and technologically efficient ones may be rejected.
Abrahamson and Rosenkopf 1993	The diffusion of innovations across organizations	Conceptualized as a bandwagon effect and defined as "diffusion processes whereby organizations adopt an innovation, not because of their individual assessments of the innovation's efficiency or returns, but because of a bandwagon pressure caused by the sheer number of organizations that have already adopted this innovation" (p. 488).	Bandwagon pressure, prompting other organizations to adopt this innovation. People join a bandwagon to avoid appearing different from the many other adopters.
Anderson and Holt 1997	General prediction decision making	Information cascades occur when people follow the established patterns, regardless of their private information.	When initial decisions coincide, it is rational for subsequent decision makers to follow the established patterns, regardless of their private information. Reverse cascade may also occur: "the initial decision makers are unfortunate to observe private signals that indicate the incorrect state, and a large number of followers may join the resulting pattern of "mistakes," despite the fact that their private signals are more likely to indicate the correct state" (p. 847).

Study	Area	Definition of Herd Behavior or Similar Concepts	Major Findings
Avery and Zemsky 1998	Financial investment	Herding happens when a trader who is pessimistic about the value of an assess buys it given the positive history of trading and his/her own information.	The price mechanism of the financial markets prevents information cascade from happening. Herding may occur in the presence of multi-dimensional uncertainty. As the number of dimensions of uncertainty increase, herding becomes possible. When traders are uncertain about the quality of the information they have, they are likely to follow the trend of past trades and can mis-price the asset values.
Banerjee 1992	General decision-making	Herd behavior means "everyone doing what everyone else is doing, even when their private information suggests doing something quite different" (p. 798).	People follow others in making decisions. People may join a herd, ignoring their own information. This inflicts a negative herd externality on the followers. Herd behavior may lead to undesirable outcomes. The equilibrium of a herd resulting from herd externality is quite volatile.
Bernhardt et al. 2009	Financial forecasting	Herding is a choice that biases a forecast away from an analyst's best estimate of earnings (i.e., the mean or median of his posterior), toward the consensus forecast of earlier analysts. Anti-herding is a choice to announce a forecast of earnings that is further from the consensus than the analyst's information suggests, so that the analyst's forecast overshoots his prior estimate of earnings away from the consensus in the direction of his private information.	Financial analysts anti-herd: they try to avoid herd behavior by issuing biased forecasts that fall in between his/her own forecasts and the public-available consensus forecasts. They do so in order to distinguish their forecasts from others.
Bernheim 1995	General decision making	Conformity: People conform to a single, homogeneous standard of behavior (social norm)despite heterogeneous underlying preferences.	People conform to social norms to avoid their social status being seriously impaired. The society censures nonconformists.
Bikhchandani et al. 1992	General decision making	Information cascade: An information cascade occurs when it is optimal for an individual, having observed the actions of those ahead of him, to follow the behavior of the preceding individual without regard to his own information.	People follow others in making decision when uncertainty is present. They observe the actions of others and make decisions, based on their own information and observations. Information cascades occur when people disregard their private information and follow whatever others did. Mass behavior resulting from information cascades is often fragile; small shocks can lead to large shifts in behavior.

Study	Area	Definition of Herd Behavior or Similar Concepts	Major Findings
Çelen and Kariv 2004	General decision making	Cascade behavior: acting irrespective of their private signal. Herd: individuals choose the same action.	Both meaning that people do the same thing, an information cascade and herd behavior are inherently different. The former implies that when making a decision, people ignore their private information; the latter occurs when people make an identical decision, not necessarily ignoring their private information. Therefore, an information cascade implies a herd but a herd is not necessarily the result of an information cascade. Informational cascades are usually reflected in unobservable beliefs; herds are observable actions.
Cipriani and Guarino 2005	Financial investing	Informational cascade is a situation in which it is optimal for a rational agent to ignore his own private information and conform to the established pattern of trade.	The price mechanisms of financial markets effectively prevent herding from happening. Traders do not herd. Furthermore, they show contrarian behavior: they ignore their private information to trade against the market.
David and Strang 2006	Management fashion	Management fashion: attention rapidly coalesces around a management practice as a powerful and robust means of achieving competitive success (p. 215).	This paper investigates the phenomenon of a fashion boom turning into a fashion bust, using the fashion of total quality management (TQM). The authors observed the fragility of fashion booms. The fashionable practice seems to have considerable staying power. The fashion may help practitioners find the value of the innovation.
Drehmann et al. 2005	Financial investing	An informational cascade is said to occur when it becomes rational to ignore one's own private information and instead follow the predecessors' decisions (p. 1404).	Consistent with Avery and Zemsky (1998), this study does not find herd behavior in financial markets. The price mechanism effectively incorporates public information and subsequently prevents herding from happening. This study supports the existence of contrarian behavior. People may doubt the rationality of others and consequently mistrust others' decisions. This can lead to contrarian behaviors: One trades again his/her own information and again the market.
Fiol and O'Connor 2003)	Managers' decision making	Bandwagons are diffusion processes whereby individuals or organizations adopt an idea, technique, technology, or product because of pressures caused by the number of organizations that have already adopted it.	This paper studies "micro-level processes" of managers' decision making. Managers' mindfulness influences how they scan and integrate information and consequently influences their decisions to join a bandwagon.
Graham 1999	Financial investment	Herd behavior is often said to occur when many people take the same action, perhaps because some mimic the actions of others (p. 237).	If an analyst has high reputation or low ability, or if there is strong public information that is inconsistent with the analyst's private information, he/she is likely to herd. Herding is also common when informative private signals are positively correlated across analysts (p. 237).

Study	Area	Definition of Herd Behavior or Similar Concepts	Major Findings
Grinblatt et al. 1995	Financial investment	Herding: The extent to which the group of mutual funds either predominantly buys or predominantly sells the same stock at the same time (p. 1089).	Herding may occur when people rely on the same information. The study did find a significant, though small, herding effect in investment.
Hey and Morone 2004	Financial investment	The same as (Banerjee 1992) and (Bikhchandani et al. 1992).	Although some prior research shows that the price mechanisms in markets can aggregate private information effectively, which can prevent herd behavior from happening, the authors challenged this assertion. Their findings show that socially undesired results are present. This indicates that herd behavior may exist in markets.
Kraatz and Zajac 2001	Organizations' imitations	Imitation.	This study proposed hypotheses from different perspectives such as bandwagon imitation, status-driven imitation, and social learning perspectives. The findings show that private colleges, in turbulent years, tended to imitate similar consortium partners that were performing well in adaptation to changes.
Li 2004	IT adoption	Herd behavior may arise because of informational cascades, which occur when rational individuals ignore their private information and instead mimic the actions of previous decision makers (p. 93).	IT managers often make adoption decisions in uncertainty environment and with imperfect information. Information cascades may explain why people herd in technology adoption. Network externality may reinforce information cascades and reduce the possibility of cascade reversals.
Rao et al. 2001	Securities analysts' coverage of firms listed on the NASDAQ market.	Herd behavior is reflected by investors' coverage of a firm, following previous coverage by others.	Social proof, inferred from observing the actions of others especially the most recent ones, is easy to use, but at the same time, leads to errors and subsequent decision reversal. People do not use external cues for making choices about abandon of a course of action. They argued that uncertainty may be needed for herd of abandonment to occur at the post-adoptive stage.
Walden and Browne 2009	IT adoption		Using simulation, they found herd behavior in adoption of technology. Correct herds are more likely to appear than incorrect herds. Incorrect herd is more likely than correct herds to be reversed by contrary signals. Theoretically, all herds will eventually be corrected.

Appendix B

Situating Task[1] ▬▬▬▬▬▬▬▬▬▬▬▬▬▬

(Message eliciting initial beliefs) A wiki system allows collaborators to work on the same web pages and share files. PBwiki is a wiki system that is free for most individual use. PBwiki has the following features:

1. **Function:**

    • **Collaborative Editing:** Encourage group projects by allowing people to edit pages and contribute to your workspace.

    • **Complete History and Audit Trail:** PBwiki keeps a complete audit trail of every change made to your workspace. See who changed what. Reverse any change with a couple clicks. Your PBwiki workspace allows you to maintain full accountability of your users.

    • **Easily invite others:** Get users on the workspace by inviting them with email. No more complicated user provisioning and no more waiting for IT. Inviting users is easy.

2. **Security:**

    • **Access Controls:** Control the access level of your users for the entire workspace. PBwiki includes robust access levels (Reader, Writer, Editor, and Administrator) for differentiating access to your workspace.

    • **Page- and Folder-level Access:** In addition to controlling workspace-wide access levels, control which specific pages users can access. You can set access controls on specific pages, or groups of pages. Only the people you choose can see pages with special security settings.

    • **Hideable and Lockable Pages:** Hide pages so only administrators can view or edit, or lock a page so only administrators can edit.

3. **Customization**

    • **Multimedia Plugins:** Use PBwiki Plugins to add multimedia content with a few clicks, including images, videos, photo slide shows, and more! Almost any online tool with an embed code can be used in PBwiki.

    • **Color Choice:** Chose from nine custom colors. Users have unlimited color choices, and can upload a logo to brand their workspace as a personal site. Upload a logo and PBwiki will automatically match the look and feel of your workspace to the logo.

    • **Customizable Templates:** Add templates to your workspace and stop recreating your work.

Task: *Based on the above descriptions, please report an example of what PBwiki could do for you at work or study:*

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[1]The description of PBwiki is primarily from PBworks's website.

Appendix C

Treatments

Both the number and identity of previous adopters matter. To generate the situation for herding, the information should depict "how many adopters there are and who specifically has adopted the innovation" (Fiol and O'Connor 2003, p. 56). Graham (1999) also argued that the likelihood of herding increases when the aggregate public information is strongly held by a lot of people and reinforced by the actions of the market leader.

The simulation experiment manipulated both the *number* and *identity* of previous adopters. Specifically, the experiment included three groups: control group, medium-observation group, and high-observation group. The control group did not receive any information about previous adopters. The medium-observation group received a message stating that PBwiki has been accepted by a large number of people. The high-observation group received a message that not only states that PBwiki has been accepted by a lot of people, but also specifies some large organizational adopters. The treatment messages were composed based on information from PBwiki's website and ComScore. com (a website that can report the number of visitors of a website).

Control Group: Subjects do not receive any information about previous adopters (It is also ensured that the URL of PBwiki did not appear anywhere in the survey to prevent subjects in the control groups from obtaining information regarding previous adoptions by themselves.)

Medium-Observation Treatment Group: The following message appears:
> *PBwiki is the largest business and educational wiki host in the world. Millions of people have accepted and are using it for online collaborations, knowledge management, project management, and a host of other business processes and workflows. Currently, PBwiki manages 50,000 wiki groups, with 10 million pages and 3 million users per month, according to the company. ComScore shows healthy growth and 2. 1 million unique visitors worldwide of PBwiki as of 2009.*

High-Observation Treatment Group: The following message appears:

> (a) *PBwiki is the largest business and educational wiki host in the world. Millions of people have accepted and are using it for online collaborations, knowledge management, project management, and a host of other business processes and workflows. Currently, PBwiki manages 50,000 wiki groups, with 10 million pages and 3 million users per month, according to the company. ComScore shows healthy growth and 2. 1 million unique visitors worldwide of PBwiki as of 2009.*

> (b) *PBwiki is serving teams at around half of the Fortune 500, being home to three presidential campaigns, the United Nations, The Financial Times, FedEx, and Harvard University.*

Appendix D

Measures ▮▮▮▮▮▮

The scales for measuring internal self-efficacy, disconfirmation, and satisfaction are specified below. All other factors use a seven-point Likert scale, where 1 indicates "strongly disagree," 4 indicates "neutral," and 7 indicates "strongly agree."

Measures at Time 1

Prior Experience (adapted from Kim and Malhotra 2005)
How long have you been using a wiki system? (Never used it before, less than 3 months, 3 to less than 6 months, 6 to less than 12 months, 1 to less than 2 years, 2 years or more)

Uncertainty (UNC) (adapted from Sun and Fang 2010)
UNC1.   I am NOT sure what PBwiki is about and what it could do for me.
UNC2.   I feel uncertain whether my needs when engaging in collaborative work could be met by using PBwiki.
UNC3.   I feel uncertain whether I would be able to respond appropriately to any changes/upgrades of PBwiki.
UNC4.   I feel that collaborating using PBwiki involves a high degree of uncertainty.

Imitating Others (IMI) (self-developed)
IMI1.   It seems that PBwiki is the dominant wiki system; therefore, I would like to use it as well.
IMI2.   I follow others in accepting PBwiki.
IMI3.   I would choose to accept PBwiki because many other people are already using it.

Discounting Own Information (DOI) (self-developed)
DOI1.   My acceptance of PBwiki would not reflect my own preferences for collaboration tools.
DOI2.   If I were to use PBwiki for collaborative work I wouldn't be making the decision based on my own research and information.
DOI3:   If I did not know that a lot of people have already accepted PBwiki, I might choose another wiki system for my work.

Initial Beliefs (IB) (adapted from Kim and Malhotra 2005)
IB1.   I think PBwiki would allow me to accomplish tasks more quickly.
IB2.   Using PBwiki could help improve the quality of my work.
IB3.   PBwiki would give me greater control over my work.
IB4.   Using PBwiki would enhance my effectiveness in my work.

Adjusted Beliefs (AB) (using the same items as IB, but measured after the treatment)
Intention to Use (IU) (adapted from Bhattacherjee and Premkumar 2004)
IU1.   I plan to use PBwiki for collaboration.
IU2.   I intend to use PBwiki for my future work.
IU3.   It is very likely that I will use PBwiki in the near future.

Network Externality (NE) (self-developed)
NE1.   The more people use PBwiki, the more valuable it is to users.
NE2.   By adopting PBwiki, I would help increase its value to other users.
NE3.   My adoption of PBwiki would make it more useful for people I know who already use it.
NE4.   I hope that more people will adopt PBwiki because that will increase the value of PBwiki to me.
NE5.   PBwiki will be more useful if more people adopt it.

Subjective Norm (SN) (adapted from Taylor and Todd 1995; Venkatesh and Davis 2000)
SN1.   People who influence my behavior think that I should use a wiki system like PBwiki.
SN2.   People who are important to me think that I should use a wiki system like PBwiki.

Personal Innovativeness in IT (PIIT) (adapted from Agarwal and Prasad 1998)
PIIT1.   When I hear about a new piece of information technology, I generally think about ways I could use and experiment with it.
PIIT2.   Among my peers, I am usually the first to try out new information technologies.
PIIT3.   I like to experiment with new information technologies.

Internal Self-Efficacy (SE) (adapted from Thatcher et al. 2008) (measured on a 10-point Likert scale, where 1 indicates "Not At All Confident," 5 indicates "Moderately Confident," and 10 indicates "Totally Confident.")

    SE1.   I could use PBwiki to collaborate with other people if there was no one around to tell me what to do.
    SE2.   I could use PBwiki to collaborate with other people if I had never used a wiki system like it before.
    SE3.   I could use PBwiki to collaborate with other people if I had only the online help for reference.

Manipulation Check Items (self-developed)

    MC1.   I am aware that a lot of people have adopted PBwiki.
    MC2.   I am aware that PBwiki has been adopted by a lot of well-known organizations.

Measures at Time 2

Modified Beliefs (MB) (adapted from Kim and Malhotra 2005)

    MB1.   Using PBwiki helps me to accomplish tasks more quickly.
    MB2.   Using PBwiki improves the quality of the work I do.
    MB3.   Using PBwiki gives me greater control over my work.
    MB4.   Using PBwiki enhances my effectiveness in my work.

Disconfirmation (DC) (adapted from Bhattacherjee and Premkumar 2004) (measured on a 7-point Likert scale, where 1 indicates "much worse than expected," 4 indicates "neutral," and 7 indicates "much better than expected.")

Compared to my initial expectations, the ability of PBwiki _____

    DC1.   to improve my performance was_____
    DC2.   to increase my productivity was_____
    DC3.   to enhance my effectiveness was_____
    DC4.   to be useful for my work or study was_____

Satisfaction (SAT) (adapted from Bhattacherjee and Premkumar 2004)

All things considered, I am _____ with my use of PBwiki

    SAT1: 1 "Extremely displeased" ——— 4 "Neutral" ——— 7 "Extremely pleased"
    SAT2: 1 "Extremely frustrated" ——— 4 "Neutral" ——— 7 "Extremely content"
    SAT3: 1 "Extremely terrible"   ——— 4 "Neutral" ——— 7 "Extremely delighted"
    SAT4: 1"Extremely dissatisfied" ——— 4 "Neutral" ——— 7 "Extremely satisfied"

Intention to Discontinue (DIC) (adapted from Parthasarathy and Bhattacherjee 1998)

    DIC1.   I intend to discontinue my use of PBwiki,even though I am not particularly dissatisfied with it, because I found another technology that is superior to PBwiki for my needs.
    DIC2.   I plan to stop using PBwiki, using something else superior instead.
    DIC3.   I predict that I will not use PBwiki any longer, even if I cannot find something else to replace it, because it does not fit my needs.
    DIC4.   I plan to stop using PBwiki and to find something else because I am dissatisfied with it.

Intention to Continue (IC) (adapted from Bhattacherjee and Premkumar 2004)

    IC1.   I intend to use PBwiki in the next two months.
    IC2.   I plan to use PBwiki in the next two months.
    IC3.   I predict that I will use PBwiki in the next two months.

Appendix E

The Instrument Development Process

The new measures for initating others (IMI), discounting own information (DOI), and network externality (NE) were developed following the procedure set forth by Moore and Benbasat (1991). First, items for measuring IMI, DOI, and NE were created based on their definitions and existing literature. The wording for the items measuring IMI and DOI were drawn primarily from prior herd literature. The items for IMI focus on the consistency between one's own adoption decision and that of others (i.e., one makes the same decisions they observe others making). The items for DOI focus on measuring the extent to which a person chooses to not refer to his/her own information when making an adoption decision (or in other words, how one's decision does not reflect his/her own preferences). Items for measuring NE were created, which are consistent with the definition of NE (i.e., the value of a technology increases when more people use it). Seven-point Likert scales were used, with 1 representing "strongly disagree," 4 "neutral," and 7 "strongly agree." The initial items for measuring IMI, DOI, and NE were examined by an external researcher to help ensure face and content validities based on which necessary revisions of the wording were made.

A two-step Q-sort (Moore and Benbasat 1991) was then conducted. The Q-sort has two steps with four judges in each round. The eight judges were four university faculty and staff members in the first round and four graduate students in the second round. The four judges in the first round took small cards upon which the items for IMI, DOI, and NE were printed and sorted them into groups. They were allowed to create as many groups as they wanted, but were required to name the resulting groups. In the second round, four different judges were given the names and descriptions of the three categories (IMI, DOI, and NE). They then assigned the cards to those three categories. A fourth "too ambiguous/ doesn't fit" category was also included to ensure that judges did not attempt to force-fit any item into a particular category.

To assess construct validity, item placement ratios, as described by Moore and Benbasat, were examined. The item placement ratio is an assessment of the overall frequency with which judges place items within their intended theoretical constructs (or in other words, place them in the intended groups). If an item is consistently placed into its intended construct, the researcher may reasonably be confident that the item has high construct validity. In this study, the first round yielded an overall item placement ratio of 0. 75 (= 39 (total hits) / 52 (total item placement)). The ratio was 0.81 for IMI, 0.67 for DOI, and 0.71 for NE respectively. The overall item placement ratio for the second round was 0.81 (0.75 for IMI, 0.88 for DOI, and 0.79 for NE). An average Kappa of 0.77 and 0.85 were obtained for the first round and second round card-sorting respectively. The misplaced items were examined and revised accordingly. No items were dropped because, in both rounds, no item was misplaced by more than two (out of four) judges.

An initial pilot test of the overall instrument was conducted using 73 graduate students at the researcher's school. An exploratory principle component analysis (PCA) was conducted using Varimax rotation in SPSS 16. 0. The loadings and cross-loadings were examined to assess the discriminant and convergent validities of the instruments. Loadings greater than 0. 707 are considered adequate (Chin 1998). For item purification, Cronbach's Alpha was utilized to assess the reliability of the items. A Cronbach's Alpha higher than .70 indicates that an item has good reliability(Cronbach 1970). Items with low inter-item and item-total correlations, high "Cronbach's Alpha if item deleted" statistics, or small standard deviation scores (and thus low explanatory power) were candidates for deletion (Moore and Benbasat 1991). The results of the pilot test suggested that all items should be retained. The final version of the instruments includes three items for IMI, three items for DOI, and five items for NE. Those items were included in the final questionnaire for the longitudinal study (Appendix D).

Appendix F

Loadings and Cross-Loadings[2]

	UNC	DOI	IMI	IB	AB	IU	DC	MB	SAT	DIC	NE	SN	PIIT	SE
UNC1	**0. 72**								-0. 35	0. 34				-0. 43
UNC2	**0. 89**					-0. 42	0. 39	-0. 30	-0. 44	0. 45				-0. 40
UNC3	**0. 82**													-0. 47
UNC4	**0. 77**				-0. 38	-0. 36		-0. 33		0. 32				-0. 35
DOI1		**0. 75**												
DOI2		**0. 70**												
DOI3		**0. 79**												
IMI1			**0. 90**		0. 41	0. 61	-0. 33		0. 32		0. 45			
IMI2			**0. 91**		0. 33	0. 46					0. 45	0. 31		
IMI3			**0. 90**			0. 39					0. 45			
IB1				**0. 89**	0. 47	0. 32								
IB2				**0. 90**	0. 47	0. 33						0. 32		
IB3				**0. 88**	0. 54	0. 32								
IB4				**0. 95**	0. 50	0. 32						0. 31		
AB1	-0. 31		0. 36	0. 56	**0. 99**	0. 66		0. 41			0. 51	0. 34		
AB2				0. 50	**0. 93**	0. 62		0. 38			0. 51	0. 31		
AB3			0. 32	0. 45	**0. 86**	0. 55		0. 31			0. 35			
AB4			0. 43	0. 53	**0. 94**	0. 66		0. 43	0. 35		0. 52	0. 36		
IU1	-0. 39		0. 49	0. 38	0. 65	**0. 94**	-0. 38	0. 42	0. 47	-0. 46	0. 51	0. 39		
IU2	-0. 39		0. 60	0. 31	0. 65	**0. 95**	-0. 38	0. 42	0. 44	-0. 47	0. 53	0. 42		
IU3	-0. 45		0. 49	0. 33	0. 60	**0. 94**	-0. 31	0. 41	0. 47	-0. 50	0. 42	0. 40		
ND1	0. 33					-0. 37	**0. 94**	-0. 50	-0. 72	0. 58				
ND2	0. 35					-0. 38	**0. 95**	-0. 50	-0. 66	0. 58				
ND3	0. 38					-0. 34	**0. 96**	-0. 54	-0. 67	0. 59				
ND4	0. 39					-0. 34	**0. 93**	-0. 52	-0. 68	0. 56				
MB1	-0. 36				0. 39	0. 43	-0. 54	**0. 96**	0. 47	-0. 45		0. 31		
MB2	-0. 36				0. 39	0. 44	-0. 51	**0. 97**	0. 47	-0. 46				
MB3	-0. 30				0. 41	0. 40	-0. 52	**0. 96**	0. 53	-0. 43				
MB4	-0. 34				0. 40	0. 42	-0. 53	**0. 97**	0. 51	-0. 44				
SAT1	-0. 41					0. 51	-0. 71	0. 51	**0. 95**	-0. 74				
SAT2	-0. 37					0. 43	-0. 64	0. 45	**0. 94**	-0. 70				
SAT3	-0. 40				0. 33	0. 44	-0. 68	0. 50	**0. 95**	-0. 72				
SAT4	-0. 42				0. 31	0. 47	-0. 71	0. 50	**0. 96**	-0. 74				
DIC1						-0. 43	0. 48	-0. 32	-0. 56	**0. 86**				
DIC2						-0. 44	0. 47	-0. 35	-0. 60	**0. 91**				
DIC3	0. 48		-0. 33		-0. 33	-0. 48	0. 59	-0. 49	-0. 74	**0. 81**				
DIC4	0. 42					-0. 34	0. 52	-0. 36	-0. 64	**0. 80**				

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[2]Loadings with absolute values less than 0.3 are suppressed.

	UNC	DOI	IMI	IB	AB	IU	DC	MB	SAT	DIC	NE	SN	PIIT	SE
NE1			0. 45		0. 35	0. 40					**0. 82**			
NE2			0. 47		0. 39	0. 44					**0. 86**			
NE3				0. 31	0. 46	0. 35					**0. 76**			
NE4			0. 54		0. 51	0. 56					**0. 86**			
NE5			0. 43		0. 42	0. 42					**0. 91**			
SN1			0. 32		0. 36	0. 44						**0. 97**		
SN2				0. 31	0. 30	0. 38						**0. 96**		
PIIT1													**0. 93**	
PIIT2													**0. 80**	
PIIT3													**0. 96**	
SE1														**0. 91**
SE2	-0. 51													**0. 95**
SE3	-0. 35							0. 31						**0. 89**

UNC:	Uncertainty of Adoption	IMI:	Imitation
IB:	Initial Beliefs	AB:	Adjusted Beliefs
NE:	Network Externality	SN:	Subjective Norm
SE:	Self Efficacy	ND	Negative Disconfirmation
SAT:	Satisfaction	DIC:	Intention to Discontinue

DOI: Discount of Own Information
IU: Intention to Use
PIIT Personal Innovativeness in IT
MB: Modified Beliefs

Appendix G

Supplementary Analyses

Analysis 1: Difference of IMI Between the Control Group and the Treatment Group

An ANOVA analysis was conducted to examine the difference between group means for the dependent variable of OBV (i.e., IMI) that was shown to be significant in the above PLS analysis. As shown in Table G1, the F-statistics is significant, indicating that the control group is significantly different from the treatment group in IMI. The contrast showed that the difference is -1. 78, meaning that the control group has lower levels of IMI than the treatment group. With a standard error of 0. 59, this difference is significant ($p < .003$).

Table G1. A Summary of the Results of the ANOVA Analysis[*]					
	Sum of Squares	d.f.	Mean Square	F	Sig.
Control Group versus Treatment Group	152.912	1	152.912	9.115	.003
Contrast[†]			Dependent variable: IMI		
Control Group versus Treatment Group	Contrast estimate		-1.78		
	Standard error		0.59		
	Significance mean		.003		
[*]Dependent Variable: IMI; Independent Variable: OBV [†]The contrast is based on the average of the three items of IMI.					

Analysis 2: AB Mediating the Relationship Between IB and IU

This research utilized the Preacher and Hayes (2008) method to further examine the mediating effect of AB on the relationship between IB and IU.[3] The results show that before AB was introduced as a mediator, IB had a significant total effect on IU (coefficient = 0.492, t = 8.07, p < 0.001). When AB was introduced as the mediator, IB did not have a significant direct impact on IU (coefficient =0. 089, t=1. 31). At the same time, the indirect effect of IB on IU through AB was 0. 403 with a 95 percent bootstrap confidence interval (CI) of 0.264 and 0.562. Since this CI did not contain zero, the indirect effect was significantly different from zero. In summary, these results support a full mediating effect of AB on the relationship between IB and IU.

Analysis 3: SAT and MB Mediating the Relationship Between ND and DIC

The Preacher and Hayes method was utilized to analyze the mediating effects of SAT and MB on the relationship between ND and DIC. The results show that before SAT and MB were introduced as mediators, ND has a significant total effect on DIC (coefficient = 0.614, t = 11.10, p < 0.001). When SAT and MB were introduced as mediators, the direct effect of ND on DIC became nonsignificant (coefficient = 0.103, t = 1.51). The total indirect effects, via SAT and MB, were significant (coefficient = .511, CI = (0.398; 0.665)). Specifically, the indirect effect through SAT was 0.474, which is significant (CI = (0.375; 0.613)). The indirect effect through MB was, on the other hand, not significant (coefficient = 0.037, CI = (-0.025; 0.108)). In conclusion, SAT, but not MB, fully mediates the relationship between ND and DIC.

Analysis 4: Effect Sizes for Herd Factors

To assess the effect sizes for herd factors, a model without herd factors (i.e., UNC, OBV, IMI, DOI, and AB) was examined, resulting in a model with only the initial beliefs, intention to use, and control variables at the adoptive stage. This model was then compared with the full model to assess the effect sizes, based on Cohen's f^2 formula. As shown in Table G2, the size of the effect of herd factors on intention to use is large (0.44), while the effect size on modified beliefs is medium (0.16).

Table G2. Effect Sizes of Herd Factors			
Dependent Variable	**R-Square with Herd Factors**	**R-Square Without Herd Factors**	**Effect Size[†]**
Intention to use	0. 59	0. 41	0. 44 (large)
Modified beliefs	0. 42	0. 33	0. 16 (medium)

[†]Effect size (f^2) is calculated by the formula $(R^2_{full} - R^2_{partial}) /)1 - R^2_{full})$. Cohen (1988) suggested 0.02, 0.15, and 0.35 as operational definitions of small, medium and large effect sizes respectively.

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[3]An SPSS script, developed by Preacher and Hayes, was used to calculate the bootstrap statistics. The script can be found at http://www.comm.ohio-state.edu/ahayes/SPSS.programs/indirect.htm.

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