CAN MONEY BUY CONTINUOUS USE?
AN EXPLORATION WITH TAXI-HAILING APPS

Haiqing Bai
School of Journalism and Communication
Xiamen University
Xiamen, Fujian 361005, P.R. China
haiqing.bai@xmu.edu.cn

Bo Xu
School of Management
Fudan University
670 Guoshun Rd, Yangpu District, Shanghai 200433, P.R China
bxu@fudan.edu.cn

Wei Zhang*
College of Management
University of Massachusetts Boston
100 Morrissey Blvd., Boston, MA 02215, U.S.A.
wei.zhang@umb.edu

ABSTRACT

In this paper, we report a study that attempts to understand how monetary incentives affect the continuous use of eCommerce innovations by examining taxi drivers' intention to continuously use taxi-hailing apps. Drawing from the Diffusion of Innovations (DoI) theory, we built a holistic model that investigates both the direct and indirect effects of monetary incentives. Survey data collected from the taxi driver users of taxi-hailing apps were used to test the model. The results suggested that monetary incentives indeed affect the continuous use of taxi-hailing apps but mostly indirectly. This study contributed to the literature on the continuous use of eCommerce innovations, enriched the DoI theory, and suggested potential ways to use monetary incentives more effectively to achieve the desired results.

Keywords: eCommerce innovations; Monetary incentives; Continuous use of IT; Intention

1. Introduction

In the last two decades, advancements in the Internet and information technologies (IT) have caused rapid changes to lifestyles and the world economy. Prior research on IT acceptance [Davis et al. 1989; Venkatesh et al. 2003] and diffusion [Brancheau and Wetherbe 1990; Rogers 2003] mostly concerned the technical features and user characteristics in end-user and enterprise computing. However, the diffusion of more recent – especially Internet-based – IT innovations seemed to most strongly emphasize growing a large user base as quickly as possible. Certainly, good reasons exist for doing so. A large user base is critical for users to consider using an Internet-based IT innovation such as Instant Messenger [Li et al. 2005] because of network externalities [Katz and Shapiro 1985]: the more users use the same IT innovation, the more utility they obtain from using it and the more attractive it becomes to potential users.

To expedite reaching critical mass, vendors of Internet-based IT innovations – especially those in the eCommerce arena – often choose to adopt monetary incentives. Some offer services or products at low prices, or even for free, to draw users. Amazon.com and JD.com, the largest B2C companies in the United States and China, have more strongly emphasized acquiring users than generating profits [Edwards 2015]. Taobao.com, the largest eCommerce company in China, offered free services to online retailers, which effectively drove eBay, which charged its sellers for listing merchandise and making transactions, out of the Chinese market [Wang 2010]. However, the use of monetary incentives appeared to have reached an unprecedented level when companies started to directly and lavishly subsidize users for using their innovations. In China, vendors of the competing taxi-hailing apps Didi and Kuaidi were reported

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* Corresponding Author

to have spent as much as $400 million to subside both riders and drivers just in the first half of 2014, propelling them to a combined market share of more than 99% and leading to their fateful merger in 2015 [Huet 2015] and the eventual acquisition of their archrival, Uber's Chinese operation [Weiss 2016].

Although such lavish spending apparently helps drive the quick propagation and initial use of eCommerce innovations, practitioners and researchers have always doubted their long-term effectiveness. For example, analysts wondered how long companies could keep the price low to please customers but ignore their bottom lines and whether companies could effectively use subsidies to reach market domination [Mak 2015]. Surprisingly, little research on IT innovation acceptance or diffusion has explicitly addressed the role played by monetary incentives despite their extreme popularity with industry practitioners. Some previous research in related areas actually casts doubt on the long-term effectiveness of monetary incentives. For example, research on how incentives affect member participation in knowledge sharing communities found that incentives increase short-term contributions but actually discourage long-term contributions after they expire [Garnefeld et al. 2012]. In this paper, we report a study that addresses this practically important and theoretically intriguing yet understudied phenomenon. In particular, we attempt to answer the following research question: *Will monetary incentives lead to the continuous use of eCommerce innovations, and how*?

We situated our study in the taxi drivers' use of taxi-hailing apps in China out of two considerations. First, taxi-hailing apps were the first arena in which the vendors used subsidies as a strategic weapon to compete with each other and, thus, provided us with an ideal setting to conduct the research. Second, at the time of the study, the apparent success of Didi and Kuaidi in quickly growing their user bases through generous subsidies appeared to have inspired similar behavior by vendors of other eCommerce innovations, such as ridesharing, dockless bike-sharing, food delivery service, and – more recently – even online-to-offline coffee businesses [Dai 2019]. Each of these eCommerce innovations also quickly grew into billion-dollar industries. For example, Meituan Dianping, whose stocks are now publicly traded on the Hong Kong Stock Exchange and whose businesses span ridesharing, dockless bike sharing, and food delivery services, has a long history of subsidizing its app users. In 2019, Meituan Dianping reported revenue of $13.7 billion. A closer examination of how monetary incentives work for taxi-hailing apps would certainly help to bring insights into how they work in other fast-growing industries that are similarly inspired by eCommerce innovations.

Although ridesharing apps such as Uber and Lyft disrupted the taxi industry by allowing non-taxi drivers to offer taxi services using their own vehicles [Cramer and Krueger 2016], taxi-hailing apps in China were originally designed to improve taxi services by matching passengers with taxies. They allowed passengers to order taxi rides and taxi drivers to take ride orders using their mobile devices. Passengers benefitted from not having to try their luck on the street and wait for an empty taxi. Taxi drivers benefitted from not having to drive empty while looking for passengers.

The apps were free to download and install by both drivers and passengers, and the taxi-hailing app vendors were supposed to make money by taking a cut out of the fares. To drive the acceptance of the apps by both drivers and passengers and subsequently increase their market share and revenue, the vendors offered generous subsidies for both drivers and passengers, especially during the first half of 2014 [Huet 2015]. Passengers usually received a deduction to their fares. Drivers received a substantial cash bonus each time they used the apps to fulfill an order. The cash bonus quickly added up to become a significant portion of drivers' total income. For this reason, we chose to focus on drivers' continuous use of the apps because the cumulative effect of the cash bonus would be more prominent and easier to detect and, hence, more feasible to study for drivers than for passengers.

This paper is organized as follows. We first develop our research model based on the Diffusion of Innovation (DoI) theory. We explain how we followed Hong et al. [2014] and used DoI theory to select relative advantage, compatibility, group identification, and perceived enjoyment as the intermediary variables that can influence taxi drivers' intention to continuously use taxi-hailing apps. We then explore both the direct and indirect effects of monetary incentives by examining how monetary incentives affect the variables and taxi drivers' continuous use of the apps. After building the research model, we explain our research method and data collection efforts, followed by a detailed description of the data analyses. We end our paper with a discussion of the findings, limitations, and contributions of this study and report results from some intriguing post hoc analyses.

2. Theoretical Development

Our theoretical presumption is that, although monetary incentives can be an important tool for promoting eCommerce innovations such as taxi-hailing apps, they alone might not be enough to drive apps' continuous use. Thus, we built our research model based on the popular DoI theory [Rogers 2003]. Following the recommendations on context-specific theorizing in Hong et al. [2014], we chose to focus on the three DoI constructs that were most important to our research context: relative advantage, compatibility, and group identification. We complement our research model with another contextual construct – perceived enjoyment – that we believe is particularly relevant to

our research context. We then examine how the focal construct of our study – monetary incentives – could impact these constructs as well as taxi drivers' current usage of and intention to continuously use the apps both within and beyond the DoI theoretical framework. Figure 1 provides an overview of our research model.
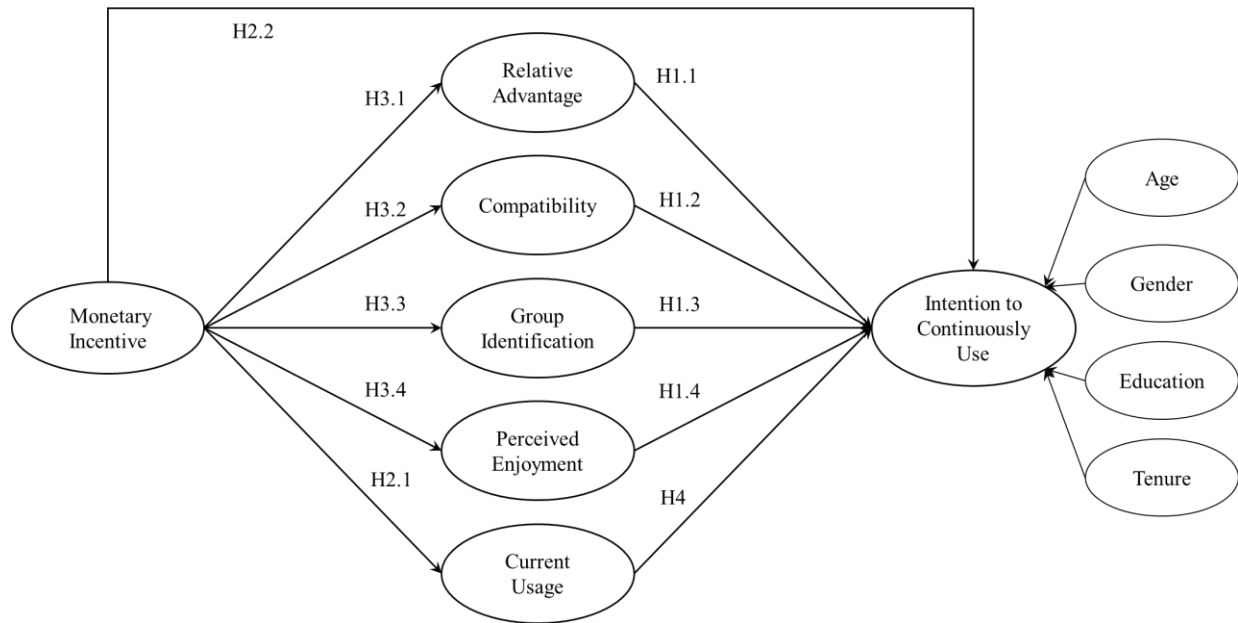

Figure 1: Research Model

2.1. Diffusion of Innovation Theory

User acceptance of technologies and innovations has enjoyed a long and fruitful research tradition in the Information Systems (IS) field. The DoI theory [Rogers 2003] is one of the most popular theories used by IS researchers to explain and predict the adoption and subsequent use of new IT applications or practices. It is a holistic theoretical framework that considers five categories of variables that may affect the rate of adoption [Rogers 2003, Chapter 6]: perceived attributes of innovation, types of innovation decisions, communication channels, nature of the social system, and the extent of change agents' promotion efforts.

In our study of the continuous use of taxi-hailing apps by individual taxi drivers, little variance seemed to exist in the types of innovation decisions (i.e., voluntary decisions by individual drivers), communication channels involved (i.e., mostly through mass communication), and the change agent's promotion efforts (i.e., same promotion efforts from app vendors). Hence, we decided to focus on the perceived attributes of innovation and the nature of the social system. Originally, the DoI theory concerned five technological attributes of innovations: relative advantage, compatibility, complexity, trialability, and observability. Rogers [2003, Chapter 6] suggested that relative advantage and compatibility are the two most important among the five factors. This suggestion was repeatedly confirmed by empirical studies [Weigel et al. 2014]. We feared that, in our research setting, the effects of observability, which refers to "the degree to which the results of an innovation are visible to others [Rogers 2003, p258]," might be difficult to detect because using the apps was intensely promoted, and the expected results were highly advertised and easily observable to taxi drivers. The effects of complexity and trialability likely attenuate after taxi drivers become more experienced with the apps after using them for some time. Thus, for the purpose of our study, we decided to focus on relative advantage and compatibility.

Relative advantage refers to "the degree to which an innovation is perceived better than the idea it supersedes" [Rogers 2003, p229]. It is conceptually close to the perceived usefulness in the Technology Acceptance Model [TAM, Davis et al. 1989; Venkatesh et al. 2003], another theory that is popular with IS researchers. Relative advantage reflects the utilitarian benefits of adopting and using new technology [Moore and Benbasat 1991; Hsu et al. 2006]. Studies consistently find that users who have a higher perception of relative advantage are more likely to adopt and use IT innovations.

Compatibility is another important construct in DoI, which is defined as "the degree to which an innovation is perceived as being consistent with the existing values, past experiences, and needs of potential adopters" [Rogers 2003, p240]. Compatibility describes the degree of congruence of an IT innovation with prior existing operational

practice. A more congruent technology is easier to understand and use and easier to incorporate into existing business processes [Zhang and Xu 2011]. Hence, it is more likely to be adopted and used [Rogers 2003]. Together with relative advantage, compatibility provides the most constant explanation for consumer intention to adopt new technologies [Lu et al. 2011]. Compatibility is also known to have a positive effect on the continuous use of innovations [Karahanna et al. 1999; Sun and Jeyaraj 2013].

Both relative advantage and compatibility are particularly important to eCommerce innovations, such as taxi-hailing apps, because these innovations are often disruptive technologies that can dramatically change existing business models and lead to profound changes to business operations [Lyytinen and Rose 2003b; Lyytinen and Rose 2003a]. An eCommerce innovation that brings a relative advantage but is still compatible with existing technology or practice is more likely to be well received. We propose the following hypotheses.

H1.1: *The relative advantage of taxi-hailing apps is positively associated with the intention to continuously use taxi-hailing apps.*

H1.2: *The compatibility of taxi-hailing apps is positively associated with the intention to continuously use taxi-hailing apps.*

DoI [Rogers 2003] emphasizes that social factors play a key role in the acceptance and use of IT innovations. The basic premise of the DoI theory is that new ideas and practices spread in a social system through interpersonal communication and social contacts; thus, social interaction strongly influences innovation adoption [Rogers 2003]. ECommerce innovations, such as taxi-hailing apps, may further amplify such influences in two aspects. First, users of eCommerce innovations are inherently connected to each other. A user of eCommerce innovations naturally becomes a member of the user social network, and the behavior of using such innovations can be strongly influenced by interpersonal factors [Jo Hatch and Schultz 1997; Zhang et al. 2017; Zhao et al. 2019]. The effect of these factors is further reinforced once it is fed back into the network, especially when the innovations consciously strive to cultivate such a network and magnify such reinforcing effects [Wang 2016]. Second, because the Internet significantly increases the volume and diversity of the information that users or potential users receive to the extent that overwhelms their self-judgment capabilities, they increasingly rely on other factors to make decisions [Chaiken 1980]. Under such circumstances, social influence variables, such as a sense of belonging and social usefulness, become more pertinent in the online context [Lin 2008].

In our study, we attempt to capture this network-based social influence through the construct of *group identification*. Group identification refers to the extent to which people feel connected to a group's character or purpose. It highlights users' attachment to a group that may emerge as simply as when users are considered "members of the same social category" [Ren et al. 2012, p843]. Many eCommerce innovations provide opportunities for users and encourage them to interact with each other or even bond with each other [Zhang and Watts 2008], facilitating such group identification that they belong to the same group of users who use the same innovation. Because group identification promotes member participation and retention and reinforces each other's behavior [Hogg 1992; Ren et al. 2012; Mamonov et al. 2016], we believe that it encourages the continuous use of eCommerce innovations, such as taxi-hailing apps. Thus, we develop the following hypothesis.

H1.3: *Group identification is positively associated with the intention to continuously use taxi-hailing apps.*

2.2.   Perceived Enjoyment

For the purpose of our study, we refer to *perceived enjoyment* as the extent to which the use of an eCommerce innovation is inherently enjoyable [Davis et al. 1992]. This hedonic factor was not included in the original DoI framework. Within motivation theory, perceived enjoyment is considered an intrinsic motivator because the fun experienced by a user when using an IT innovation usually leads to better acceptance of the innovation [van der Heijden 2004; Luarn et al. 2015]. Given its importance and prevalence, perceived enjoyment has been extensively studied in IT acceptance research [van der Heijden 2004; Cyr et al. 2006; Luarn et al. 2015]. It has been shown to positively affect the acceptance and continuous use of numerous Internet-related IT innovations, such as instant messaging [Li et al. 2005], handheld Internet devices [Bruner and Kumar 2005], learning technologies [Lee et al. 2005], eCommerce [Shen 2012; Xu et al. 2020], web portals [van der Heijden 2004], social media [Luarn et al. 2015], and virtual technologies [Barnes 2011]. Informed by all of this research, we believe that perceived enjoyment is an important contextual factor that affects taxi drivers' intention to continuously use taxi-hailing apps and, hence, we hypothesize,

H1.4: *Perceived enjoyment is positively associated with the intention to continuously use taxi-hailing apps.*

2.3.   Effects of Monetary Incentives

Monetary incentives are often used in practice to induce desired behaviors. Previous research has shown that it can be used effectively to accelerate the adoption of innovations [Rogers 2003], promote changes in health behaviors [Royer et al. 2015], trigger customer purchases [Peres et al. 2010], and induce online participation [Kuang et al. 2019].

Surprisingly, little IS research has specifically investigated the effects of monetary incentives on the adoption of IT innovations [Garnefeld et al. 2012; Lindgreen et al. 2013].

In other areas, incentives have been viewed as a source of motivation to initiate a new behavior through quite a few theoretical perspectives. Rational actor models [Fishburn 1981; Best and Kneip 2011] suggest that incentives can enhance the appeal of incentivized behavior, thereby increasing the frequency of the behavior [e.g., Osbaldiston and Schott 2012] and improved performance [e.g., Wiersma 1992]. Cognitive evaluation theory [CET, Deci and Ryan 1980; Deci and Ryan 1985] postulates that financial incentives can promote extrinsic motivation to engage in a behavior [Deci et al. 1999]. In behavioral economics, people are assumed to be more motivated to do something if they are offered a reward for doing so. For example, studies have provided evidence that monetary incentives can motivate the sending and acceptance of e-referrals [Ahrens et al. 2013]. In marketing, research has long established that promotion stimuli can directly trigger potential customers to purchase new products or can result in unplanned purchases [Peres et al. 2010].

Practically, we have witnessed waves of generous subsidies that dramatically drive the adoption of eCommerce innovations, such as taxi-hailing and ridesharing apps [Huet 2014; Mak 2015], despite growing concerns that users who are used to subsidies would stop using the apps once the subsidies are discontinued. For this study, we argue that monetary incentives, defined as the perception of how important the provided financial subsidies are to a user, can directly promote both the current and continuous use of innovations. Hence, in our research context in which the use of taxi-hailing apps is subsidized, we propose the following hypotheses.

H2.1*: Monetary incentives are positively associated with the current usage of taxi-hailing apps.*

H2.2*: Monetary incentives are positively associated with the intention to continuously use taxi-hailing apps.*

The DoI theory assumes that potential adopters' decisions are rational, and they base their decisions on the evaluations of an innovation's performance, value, or benefits [Mahajan et al. 1990]. Rogers [2003] suggests that incentives may increase the degree of relative advantage through monetary gaining, cost reduction, or improvement in social status. For eCommerce innovations, such as taxi-hailing apps, subsidies increase drivers' profits and reduce riders' costs. Thus, taxi drivers who more strongly perceive monetary incentives perceive the most advantages from using the apps. Moreover, they are more likely to have more favorable views of the apps and overlook the incongruences between the apps and existing technologies and their driving routines. Hence, we propose the following hypotheses.

H3.1*: Monetary incentives are positively associated with the relative advantage of taxi-hailing apps.*

H3.2*: Monetary incentives are positively associated with the compatibility of taxi-hailing apps.*

As previously defined, group identification refers to the extent to which people feel connected to a group's character or purpose [Ren et al. 2012]. In fact, it does not take much for people to identify with a group. As Williams [2001] points out, simply being in the same group is sufficient for group members to generate positive feelings toward each other. Because eCommerce innovations often attempt to tie users into a social network [Wang 2016], generous subsidies likely enhance users' positive feelings about using the same innovation and about each other, which can subsequently lead to heightened identification with the group. Thus, we propose the following hypothesis.

H3.3*: Monetary incentives are positively associated with the group identification of users of taxi-hailing apps.*

Marketing research has long shown that promotions generate positive experiences for customers and enhance their purchasing responses [Bagozzi 1998]. Monetary compensation from a firm could reduce negative feelings and increase customers' favorable attitudes toward the company [Eisenberger and Cameron 1996; Wagner et al. 2009]. For eCommerce innovations, subsidies play a role similar to that of promotions. With subsidies, users who more strongly perceive monetary incentives likely have a more favorable experience using innovations. Therefore, we propose the following hypothesis.

H3.4*: Monetary incentives are positively associated with the perceived enjoyment of using taxi-hailing apps.*

2.4.   Effects of Current Usage

Numerous studies from different theoretical perspectives demonstrated that current or past usage is the most powerful predictor of future usage [Venkatesh and Morris 2000; Venkatesh et al. 2003; Kim and Malhotra 2005; Kim et al. 2005]. Rogers (1995) asserts that an adopter's experience with one innovation influences the individual's perception of the next innovation and can enhance the diffusion of the next innovation. The self-perception theory and status quo bias perspective also help explain how individuals rely on their past behavior to guide their future intentions. In particular, by believing "if it was good enough for me then it is (must be) good enough for me now" [Samuelson and Zeckhauser 1988, p39], an individual often extends past perceptions of the incumbent IT system and rationalizes the continuance of the *status quo* [Polites and Karahanna 2012]. Furthermore, a behavior can continue automatically because of repeatability [Limayem et al. 2007; Barnes 2011]. If users of an eCommerce innovation exhibit a high frequency of current behavior, their continuous usage of the innovation can be derived from automatic processing. We take all of these points into considerations and propose the following hypothesis.

H4*: The current usage of taxi-hailing apps is positively associated with the intention to continuously use taxi-hailing apps.*

We present our research model in Figure 1. To account for individual differences, we also included in the model demographic information, such as age, gender, and education, as well as the number of years driving taxis, as control variables.

3.   Research Method

We tested these theoretically derived hypotheses by surveying actual users of taxi-hailing apps. Because the phenomenon under study is inherently field-based, a more controlled data collection method, such as using laboratory experiment, would have limited our ability to fully understand this complex phenomenon.

3.1.   Measures

Items for all constructs except monetary incentives were adopted from previously validated sources (Appendix A). We adopted and adapted previously validated scales from Mathieson [1991] and Bhattacherjee [2001] to measure intention to continuously use taxi-hailing apps and those from Moore and Benbasat [1991] to measure relative advantages and compatibility. The items for group identification were from Lin [2008], and those for perceived enjoyment were adapted from Barnes [2011]. The current usage items were informed by measures from Limayem et al. [2007].

We were not able to identify suitable existing scales and had to develop new monetary incentives measures. Before developing the measures, we interviewed the business managers from Didi – one of the two leading taxi-hailing apps – on their insights into how taxi drivers valued monetary incentives. They suggested that we consider drivers' sensitivity to subsidies and how they would respond if the subsidies were discontinued for both drivers and passengers. We incorporated their suggestions when drafting the measures.

Although the questionnaire was administered in Chinese, all items were originally in English and had to be translated into Chinese by one of the authors. The translation was reviewed by six established IS researchers and three language experts who had no *a priori* knowledge of the purpose of the research. All disagreements were resolved through discussions between the reviewers and the translator. We then refined these items using the data and feedback collected from 175 usable responses to a pilot survey. After the pilot survey, we made minor changes to some items before preparing the final questionnaire.

3.2.   Data Collection

Data from this study were collected using a survey of taxi drivers in two major cities in southeastern China on their use of two dominating taxi-hailing apps, Didi and Kuaidi. By considering the most prominent apps in the same industry, we had some control over unknown sources of variance, given the particular design or operation of either app [Near et al. 2004].

To collect data, four graduate research assistants distributed paper questionnaires to 450 randomly selected idling taxi drivers at airports and taxi stands in both cities. In exchange for their participation, the taxi drivers received a small gift worth approximately US\$1.10. The data collection took approximately 4 weeks. We collected a total of 437 responses. Because 52 of the responses had missing data, 385 responses were used for the data analysis, resulting in an effective response rate of 71.30%.

Table 1 provides sample characteristics. Typical respondents appeared to be male, moderately educated, and had a few years of taxi driving experience, consistent with what we would expect of a typical taxi driver. Three hundred and sixty-eight of the respondents were male, and only 17 were female. Approximately 95% had less than a college education, approximately 50% had driven taxies for at least five years, and only 6.8% had driven taxies for less than one year.

Table 1: Sample Characteristics (N = 385)

	Categories	Frequency	
Gender	Male	368	95.6%
	Female	17	4.4%
Age	<20 years	0	0.0%
	20-30 years	99	25.7%
	31-40 years	143	37.1%
	41-50 years	121	31.4%
	>50 years	22	5.7%
Education	primary school	11	2.9%
	middle high school	188	48.8%
	high school	171	44.4%
	College	15	3.9%
	Master	0	0.0%
Years of driving taxi	< 1 year	26	6.8%
	1-2 years	41	10.6%
	2-3 years	55	14.3%
	3-5 years	79	20.5%
	> 5 years	184	47.8%

4. Data Analysis and Results

We chose the partial least squares (PLS) method for the data analysis. PLS is a structural equation modeling (SEM) technique that simultaneously assesses the reliability and validity of the construct measures and estimates the relationships among the constructs. Compared with other SEM techniques, such as LISREL, PLS has less rigorous requirements for sample size and residual distribution [Chin 1998b, 2000]. In addition, PLS is primarily intended for causal predictive analysis in situations of high complexity [Urbach and Ahlemann 2010]. Because of these characteristics and advantages, PLS is popularly used in business research [Gefen et al. 2000; Urbach and Ahlemann 2010; An et al. 2020]. We used SmartPLS 2.0 for the data analysis [Ringle et al. 2005]. To examine the measurement and structural models, we followed the two-step approach in Anderson and Gerbing [1988].

4.1. Measurement Model

To validate the measurement model, construct reliability, and two types of validity (convergent and discriminant) were assessed. Reliability was assessed through composite reliability [Fornell and Larcker 1981]. As shown in Table 2, all composite reliabilities (C.R.) exceed 0.8, higher than the suggested cutoff value of 0.7 [Nunnally 1978]. Thus, the reliability of the constructs is confirmed.

Table 2: Correlations, AVEs, and Reliability Indicators (N = 385)

	1	2	3	4	5	6	7	8	9	10	11
1. Age	N/A										
2. Gender	-0.03	N/A									
3. Education	-0.06	0.06	N/A								
4. Tenure	0.43	0.08	-0.05	N/A							
5. Monetary Incentive	0.08	0.08	-0.02	0.03	**0.89**						
6. Current Usage	0.1	0.04	0.07	0.07	0.04	**0.81**					
7. Relative Adv.	0.21	-0.02	0.01	0.03	0.28	0.30	**0.85**				
8. Compatibility	0.21	-0.01	-0.07	0.02	0.25	0.24	0.70	**0.87**			
9. Group Id.	0.17	-0.01	-0.02	0	0.27	0.23	0.63	0.59	**0.86**		
10. Perceived Enjoy.	0.07	0.01	-0.04	-0.11	-0.11	0.28	0.49	0.52	0.52	**0.85**	
11. Intention to C.U.	0.2	-0.02	-0.03	0.05	0.16	0.19	0.59	0.57	0.57	0.28	**0.93**
Mean	3.17	0.95	2.49	3.92	3.31	2.35	3.76	3.67	3.50	4.71	3.77
Standard Deviation	0.88	0.21	0.62	1.28	1.14	0.82	0.92	0.96	0.99	1.21	1.01
Composite Reliability	--	--	--	--	0.89	0.80	0.93	0.91	0.92	0.91	0.93
AVE	--	--	--	--	0.8	0.66	0.73	0.76	0.74	0.72	0.87

Note: age, gender and system experience are single-item measures. The diagonal in bold is the square root of the average variance extracted (AVE). 7. Relative Adv. = Relative Advantages; 9. Group Id. = Group Identification; 10. Perceived Enjoy. = Perceived Enjoyment; 11. Intention to C.U. = Intention to Continuously Use

Convergent validity was assessed by examining factor loadings and average variance extracted (AVE). The results in Table 3 show that the factor loadings are all higher than 0.6, indicating satisfactory convergent validity [Chin 1998a]. An AVE greater than 0.5 indicates acceptable convergent validity of the construct [Fornell and Larcker 1981]. As shown in Table 2, all AVEs are greater than 0.5. Therefore, we conclude that the measures demonstrate adequate convergent validity.

Table 3: Loadings and Cross-loadings for the Measurement Model

	Relative Advantage	Group Identifica-tion	Perceived Enjoyment	Compati-bility	Monetary Incentive	Intention to Continuously Use	Current Usage
RA1	0.781	0.17	0.211	0.25	0.003	0.118	0.048
RA2	0.773	0.252	0.195	0.18	0.082	0.005	0.12
RA3	0.749	0.273	0.127	0.148	0.129	0.177	0.126
RA4	0.748	0.262	0.105	0.165	0.147	0.144	0.115
RA5	0.744	0.161	0.218	0.275	0.091	0.146	0.014
GID1	0.255	0.802	0.267	0.158	0.063	0.06	0.05
GID2	0.349	0.787	0.138	0.132	0.08	0.164	0.012
GID3	0.169	0.736	0.268	0.214	0.1	0.04	0.133
GID4	0.243	0.703	0.157	0.165	0.117	0.197	0.01
PE1	0.131	0.066	0.771	0.121	0.098	-0.033	0.103
PE2	0.221	0.241	0.754	0.157	0.029	0.201	0.082
PE3	0.161	0.246	0.753	0.2	0.004	0.23	0.043
PE4	0.222	0.34	0.682	0.101	-0.052	0.222	0.099
COM1	0.233	0.198	0.192	0.773	0.092	0.089	0.002
COM2	0.408	0.223	0.193	0.7	0.05	0.099	0.071
COM3	0.413	0.254	0.22	0.688	0.086	0.15	0.113
MI1	0.107	0.098	-0.027	0.072	0.879	0.142	0.074
MI2	0.133	0.115	0.099	0.067	0.869	-0.105	-0.074
ICU1	0.296	0.249	0.358	0.167	0.008	0.712	0.045
ICU2	0.316	0.262	0.358	0.206	0.067	0.652	-0.008
CU1	0.108	0.078	0.071	0.037	-0.024	0.306	0.836
CU2	0.152	0.055	0.178	0.067	0.025	-0.329	0.740

To assess the discriminant validity, we first checked the cross-loading matrix in Table 3, which shows that each indicator loads much higher on the construct of interest than on any other factors. Then, the square roots of the AVEs were compared with the correlations among the latent variables [Fornell and Larcker 1981]. As shown in Table 2, the square root of AVE for each construct, including that for monetary incentives, is greater than the correlations involving the construct, thus confirming the discriminant validity.

Some of the correlations shown in Table 2 are somewhat high, raising concerns over common method bias and multicollinearity. We assessed common method bias in two steps. First, we conducted Harmon's one-factor test [Podsakoff and Organ 1986]. More than one factor emerged from the factor analyses, and no single general factor accounted for the majority of the covariance between the variables. Thus, this test did not reveal a substantial common method bias. Second, we created a common method factor and added it to the measurement models to assess the effects of an unmeasured latent method factor [Podsakoff et al. 2003]. The addition of the common method factor hardly changed the correlations between the latent constructs. Based on these two tests, we concluded that common method bias was not a serious concern in this study.

Finally, to assess multicollinearity, we cross-validated the main effects using regression analysis and examined their tolerances, variation inflation factors (VIFs), and condition indices. All tolerances were higher than 0.1 (with the lowest tolerance being 0.46), and all VIFs were much lower than 10 (with the highest tolerance being 1.98). The

highest condition index was 2.40, much lower than the recommended threshold values of 15 to 30 [Hair et al. 1995, p.153]. The results suggested that multicollinearity was also not a serious concern.

4.2.   Results of Hypotheses Testing

We used SmartPLS 2.0 to test the structural model [Ringle et al. 2005] and tested the hypotheses by examining the significance of the path coefficients. The results are shown graphically in Figure 2.

As hypothesized, relative advantage, group identification, and perceived enjoyment had a significant main effect on intention to continuously use ($\beta = 0.22$, $p < 0.001$ for relative advantage, $\beta = 0.16$, $p < 0.05$ for group identification, and $\beta = 0.39$, $p < 0.001$ for perceived enjoyment), supporting H1.1, H1.3, and H1.4. However, compatibility (H1.2), monetary incentives (H2.2), and current usage (H4) did not have a significant effect on intention to continuous use. Thus, H1.2, H2.2, and H4 were not supported. Additionally, surprisingly, the link between monetary incentives and current usage was not significant, disconfirming H2.1.

The hypotheses of monetary incentives' effects on relative advantage (H3.1, $\beta = 0.28$, $p < 0.01$), compatibility (H3.2, $\beta = 0.25$, $p < 0.001$), group identification (H3.3, $\beta = 0.27$, $p < 0.001$), and enjoyment (H3.4, $\beta = 0.14$, $p < 0.05$) were all confirmed.

We summarize the results of hypothesis testing in Table 4. We also note that our model was able to account for more than half of the variance in the dependent variable, the intention to continuously use taxi-hailing apps ($R^2 = 0.52$). None of the control variables (age, gender, education, and tenure driving taxis) was statistically significant.
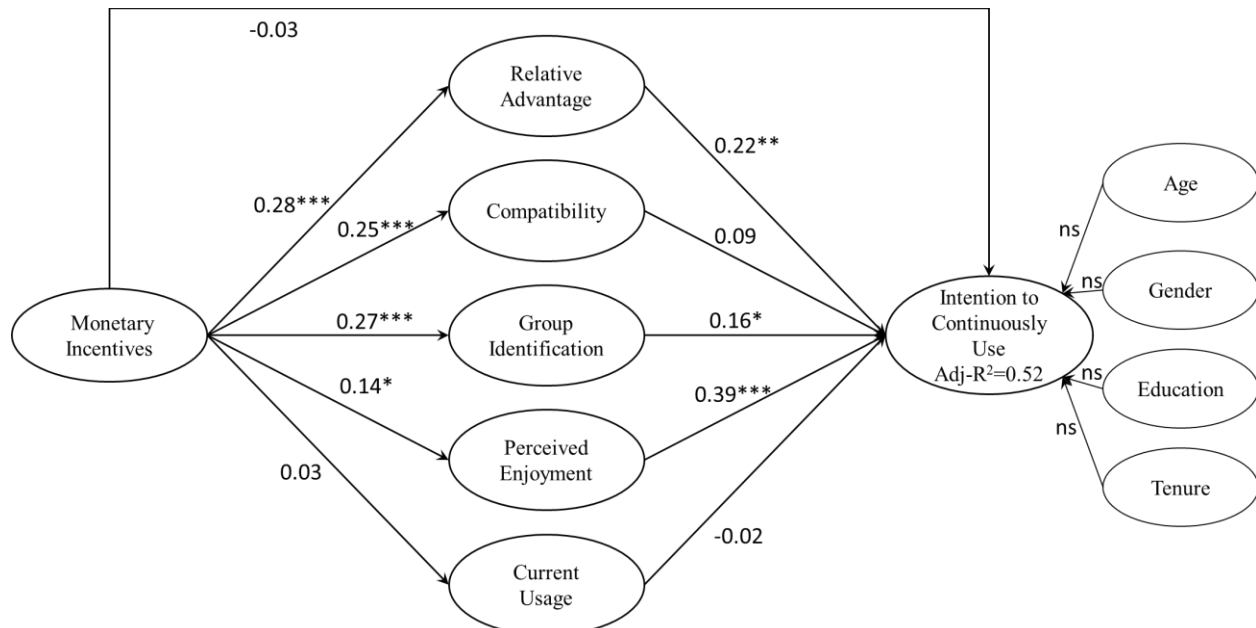

Figure 2: Results of the Structural Model
(Note: *$p < 0.05$; **$p < 0.01$; ***$p < 0.001$; ns = not significant.)

Table 4: Summary of results of hypothesis testing

	Main Effects of … on Intention to Continuously Use	Results
H1.1	Relative Advantage	Supported at $p < 0.001$ level
H1.2	Compatibility	*Not supported*
H1.3	Group identification	Supported at $p < 0.05$ level
H1.4	Perceived Enjoyment	Supported at $p < 0.001$ level
H2.2	Monetary Incentive	*Not supported*
H4	Current Usage	*Not supported*
	Main Effects of Monetary Incentives on …	**Results**
H2.1	Current Usage	*Not supported*
H3.1	Relative Advantage	Supported at $p < 0.001$ level
H3.2	Compatibility	Supported at $p < 0.001$ level
H3.3	Group Identification	Supported at $p < 0.001$ level
H3.4	Perceived Enjoyment	Supported at $p < 0.05$ level

5. Discussion and Conclusion

5.1. Discussion of Findings and Post Hoc Analyses

In this paper, we report a study that explores the effects of monetary incentives on taxi drivers' intention to continuously use taxi-hailing apps, investigating both the direct and indirect effects of monetary incentives. The derived research model was tested using a survey of 385 taxi drivers who were using the two most popular taxi-hailing apps in China. In total, three proposed predictors of intention to continuously use (relative advantage, H1.1; group identification, H1.3; and perceived enjoyment, H1.4) were shown to affect intention to continuously use as hypothesized, but the other three proposed predictors (compatibility, H1.2; monetary incentives, H2.2; and current usage, H4) were not supported. Moreover, monetary incentives affected relative advantage (H3.1), compatibility (H3.2), group identification (H3.3), and perceived enjoyment (H3.4), as expected.

The significant findings on relative advantage, group identification, and perceived enjoyment validated our efforts in contextualizing the DoI theory in our current research setting to gain a holistic view of the factors that can influence the continuous use of eCommerce innovations such as taxi-hailing apps. Collectively, these findings echoed previous research on the importance of hedonic and social factors (perceived enjoyment and group identification, respectively) in addition to technological or utilitarian factors, such as relative advantage on the Internet [e.g., Li et al. 2005]. The insignificant finding on compatibility was a surprise. In retrospect, we suspect that its effects were masked by the lavish subsidies to taxi drivers. DoI theory holds that compatibility promotes the diffusion of an innovation. However, the presence of monetary incentives might have led users to overlook possible compatibility issues between innovation and previous technologies and practices and to opt to use innovation anyway. This issue could especially be the case when the monetary incentives were as substantial as the cash bonus offered by the taxi-hailing app vendors to our respondents at the time of the data collection.

IS research has rarely focused on monetary incentives, and DoI theory only touches on this intriguing construct. Our study paints a rather holistic but cautious picture of the role that monetary incentives play in promoting the continuous use of eCommerce innovations. Its effects appear to be more indirect than direct because 1) neither monetary incentives nor current usage appeared to directly affect intention to continuously use the taxi-hailing apps, and 2) monetary incentives affect relative advantage, compatibility, perceived enjoyment, and group identification, which subsequently affect intention to continuously use. These findings seem to suggest that monetary incentives work but do so more indirectly by affecting users' evaluations of innovations and user experiences with using innovations. This indirect effect of monetary incentives seems very different from what is often found in marketing research [e.g., Bagozzi 1998; Wagner et al. 2009].

To further explore the roles played by the five factors – relative advantage, compatibility, group identification, perceived enjoyment, and current usage – we conducted two post hoc analyses. The first was a multiple mediation analysis, which allows us to assess the multiple indirect effects of the five factors simultaneously and thus enables us to better understand the extent to which they mediate the effects of monetary incentives on intention to continuously use. Our analytical approach was informed by Preacher and Hayes [2008], who recommend bias-corrected bootstrapping to measure multiple indirect effects. The testing results for the indirect effects are summarized in Table 5. The total indirect effect for all five intermediary variables assessed simultaneously was 0.170, with the 95% confidence interval for the effect size ranging from 0.087 to 0.256 and not including 0, suggesting significant mediation effects from all five mediators. Individually, the 95% confidence interval for the effect size of the indirect path through relative advantage was from 0.026 to 0.116 and did not include 0, indicating that it was a significant mediator. Similarly, the 95% confidence intervals for the effect size of group identification (0.013 to 0.086) and perceived enjoyment (0.009 to 0.099) also did not include zero, indicating that they were both also significant mediators. However, the 95% confidence intervals for compatibility and current usage included zero (-0.006 to 0.057 and -0.017 to 0.002, respectively), which is not surprising because neither compatibility nor current usage was a significant predictor of continuous usage intention. Overall, our testing suggests that relative advantage, perceived enjoyment, and group identification completely mediate the effects of monetary incentives on continuous usage intention.

Table 5: Indirect effects of monetary incentives on continuous usage intention throng relative advantage, compatibility, perceived enjoyment, group identification and current usage

	Effect	Boot SE	Boot LLCI	Boot ULCI	Zero Included?
Total	.180	.044	.010	.267	No
Relative Advantage	.062	.023	.026	.116	No
Compatibility	.021	.016	-.006	.057	Yes
Group Identification	.042	.019	.013	.086	No
Perceived Enjoyment	.047	.022	.009	.099	No
Current Usage	-0.003	.004	-.017	.002	Yes

Note: 5000 bootstrap samples; $N = 385$

Our second analysis attempted to compare the relative importance of relative advantage, group identification, and perceived enjoyment with respect to their mediation of the effects of monetary incentives on intention to continuously use. We did so by comparing the effect size of the three mediators. Interestingly, none of the differences in the effect sizes were significant at the $p < 0.05$ level, suggesting that they were equally important in terms of mediating the effects of monetary incentives on intention to continuously use.

Surprised by the nonsignificant findings regarding both hypotheses related to current usage, we conducted a post hoc analysis to more closely evaluate this construct. Because our hypothesis testing indicates that the effect of monetary incentives on intention to continuously use is indirect through the three mediator variables, we wondered whether the level of current usage could affect taxi drivers' perceptions of taxi-hailing apps. This effect is plausible because users' experience using an innovation shapes their view of the innovation. One possible explanation is that the repetition of ongoing practice over time can create a set of mental links in memory that are hard-wired, connecting situational cues and action [Turel and Serenko 2012]. Moreover, repeated behavior reinforces access to such mental links [Trafimow and Borrie 1999]. Therefore, for more active drivers with a high level of current use, their perceptions of relative advantage, compatibility, perceived enjoyment, and group identification can be more formed and reinforced when actually using taxi-hailing apps than driven by monetary incentives. For less active users, their perceptions of the four factors can be derived more from monetary incentives. Therefore, we tested whether current usage moderates the relationships between monetary incentives and relative advantage, compatibility, perceived enjoyment, and group identification.

The test requires assessing the significance of the interaction terms created from the cross-product of the moderator and predictor variables [Baron and Kenny 1986]. Within SmartPLS, an interaction term consists of all possible products from the standardized indicators of a moderator variable and those of a predictor variable [Chin et al. 2003]. Additionally, paths from the moderator to the dependent variable must also be tested. We ran bootstrapping with 1000 resamples to obtain the standard errors of the path coefficient estimates. Statistical significance was then computed using two-tailed t-tests. The results are presented graphically in Figure 3.

The explorative post hoc analysis showed that such effects were indeed strongly moderated by current usage. The path coefficients between the interaction term of monetary incentives and current usage and relative advantage ($\beta = -0.21, p < 0.001$), compatibility ($\beta = -0.17, p < 0.01$), group identification ($\beta = -0.14, p < 0.01$), and perceived enjoyment ($\beta = -0.22, p < 0.001$) are all strongly significant at the $p < 0.01$ level. The negative path coefficients suggest that higher levels of current usage decrease the effect of monetary incentives on relative advantage, compatibility, group identification, and perceived enjoyment—exactly as we suspected. Moreover, adding the moderation effects does not change the significance pattern of all proposed hypotheses. The positive results are extremely intriguing and invite future research in this area.
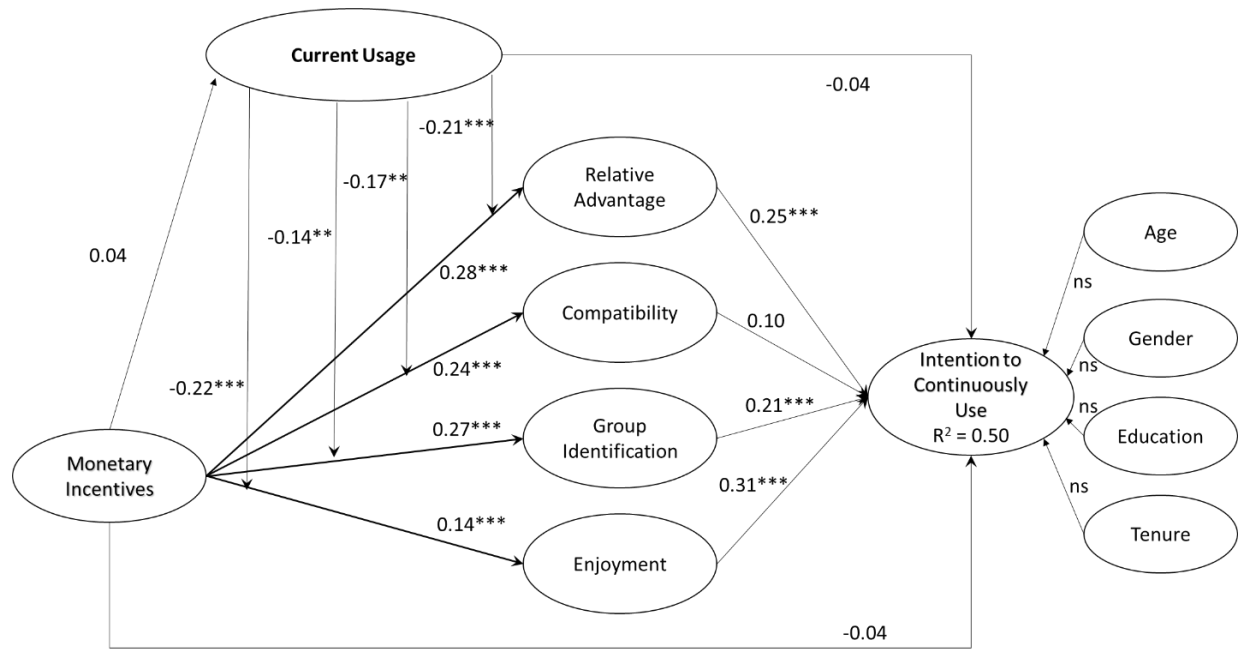
Figure 3: Results of the post hoc analysis of the moderation effect of current usage on monetary incentives on
relative advantage, compatibility, perceived enjoyment, and group identification
(Note: *$p < 0.05$; **$p < 0.01$; ***$p < 0.001$; *ns* = not significant.)

5.2.   Research Limitations and Future Research

Before we summarize the contributions of our study, we point out some limitations and offer a few thoughts on future research that can help address them. First, as in much previous research on IT acceptance and continuous usage, we used intention to continuously use an eCommerce innovation as an approximation of actual usage. We certainly wish we were able to measure actual usages. Fortunately, we measured self-reported current usage and found that it was not significantly affected by monetary incentives (Figure 2). This result lends additional support to our conclusion of the indirect effect of monetary incentives. That said, one unique advantage of studying eCommerce innovations is that the vendors usually capture many usage-related data that can be used to objectively measure actual usage. Unfortunately, we were not able to negotiate access to such data for our study. Future studies might consider using such system-captured data to both accurately measure actual usage and eliminate the threat of common method bias.

Second, our study was conducted in China on the use of taxi-hailing apps, which might prevent the generalization of the findings to other eCommerce innovations in other countries. In particular, cultures such as collectivism versus individualism might play a role in shaping our respondents' perception of enjoyment and group identification. The taxi-hailing app vendors were heavily subsidizing the taxi drivers at the time of our data collection, which might have skewed their usage intention and behavior. Moreover, we only studied cash subsidies as an illustration of monetary incentives provided to users. Although our study might have taken an important step in the study of monetary incentives, our research model certainly needs to be further refined and validated in future studies, such as by analyzing data from another country with a different culture using a different eCommerce innovation that offers a different type of monetary incentives.

Finally, although we did our best to include factors that we considered most important and relevant to our current research context, we acknowledge that we could only include a limited number of factors in our research model for the present study. Many other technological, hedonic, and social factors could be affected by monetary incentives and affect the continuous usage of eCommerce innovation. One such example is observability, which we decided not to include in our research design because we believe that it would be difficult to detect its effects, given the intense promotion efforts by app vendors. However, the taxi drivers' identification with other drivers who also used the taxi-hailing apps makes us wonder whether the group identification and online connectedness offered by the apps could have increased the prominence and eased the detection of the effects of observability. Thus, future studies should include factors such as observability and continue to explore this intriguing phenomenon.

5.3.   Research Implications

Despite the limitations, our study offered a holistic view and a systematic understanding of the factors that affect uses' intention to continuously use eCommerce innovations and explored the role that monetary incentives play in

promoting continuous usage intention. The results have a couple of important implications for research on user adoption of eCommerce innovations, especially when their uses are subsidized.

First, our holistic research model builds on the rich research tradition in the DoI theory and integrates elements of technical features, social aspects, and hedonic factors. Overall, the model was supported by the survey data that we collected and attests to the importance of technical superiority, agreeable social interactions, and pleasant individual user experiences in encouraging users to continuously use eCommerce innovations. Thus, through this study, we contribute to both accumulative theory building in DoI research and the exploration of the user acceptance of eCommerce innovations.

Second, this study focuses on the role that monetary incentives play in promoting the continuous use of eCommerce innovations. This study investigated both the direct and indirect effects, explored how they might be moderated by the current usage level, and painted a rather comprehensive picture of the roles played by monetary incentives. To the extent that monetary incentives are used by vendors to promote the penetration of eCommerce innovations, surprisingly little IS research addressed this construct and its impacts. The DoI theory only briefly discussed this construct. We hope that our study helps fill this glaring gap in the technology acceptance research literature, enriches the DoI theory, and provides incentive for more investigations into this practically important and theoretically interesting phenomenon.

5.4.   Implications for Practice

Deeply rooted in vendors' practice of subsidizing users for their use of taxi-hailing apps, this study also brings a few important insights on vendors of eCommerce innovations. The results of our study suggest that vendors take a closer and harder look at the effectiveness of monetary incentives. Although vendors may have expected monetary incentives to have an immediate effect in promoting and sustaining the use of eCommerce innovations, our study showed that their effectiveness is far from guaranteed. The impact, especially the long-term impact, is likely indirect and mediated by other factors. Our findings do not deny that monetary incentives can be an effective marketing tool. Rather, vendors should be more judicious when using monetary incentives.

Two recommendations emerge from the overall findings of our study. First, even with monetary incentives, vendors still have to pay attention to a few other factors of the to-be-promoted eCommerce innovations. In particular, our study suggests that vendors strive to achieve a high level of technical superiority, pleasant user experience, and active social interactions between users. We note that this finding is consistent with lessons learned from a few failed eCommerce innovations. For example, whereas popular opinions tended to attribute the triumph of Taobao over eBay in the Chinese market to Taobao's offering of free listings, observers also pointed out eBay's failure to offer products that are familiar to Chinese consumers, cater to Chinese consumers' usage preferences and savviness with cellphones, and facilitate communications between sellers and buyers [Wang 2010]. This recommendation is especially important for startup vendors who must balance limited budgets among product design, customer service, community building, and marketing. We caution these vendors not to overspend on monetary incentives to such a degree that they have to comprise other aspects of their innovations. We also encourage them to cleverly design their monetary incentive mechanisms to enable them to be used to enhance users' perceptions of technology superiority, user experience, and social interactions between users.

Second, our post hoc moderation test, although theoretically less rigorous but practically still intriguing, suggests that vendors should be more selective regarding recipients of monetary incentives. For users with a higher level of current usage, monetary incentives might be less influential on their perceptions of technology superiority, perceived enjoyment, and group identification because their perceptions were probably formed more from their experience of actually using eCommerce innovations than being triggered by monetary incentives. Therefore, as users become more used to innovations, vendors may be able to offer them fewer monetary incentives. Instead, they focus on using monetary incentives to acquire new customers or provide existing customers with higher quality products and services, which seems to be what credit card companies are doing when they offer strong incentives only to new customers. Of course, the prerequisite for this tactic to work is that eCommerce innovations indeed can convince users of their technical superiority, bring them great enjoyment from using the innovations, and cultivate lasting social interactions among the users soon after they are attracted to using the innovations through monetary incentives.

6.   Conclusion

To the extent that eCommerce innovation vendors use different forms of monetary incentives to promote the use of their innovations, little IS research has explored the effectiveness of monetary incentives and how they may have worked. In this paper, we report a study that attempts to fill this gap. We built our research model by contextualizing the DoI theory in this study on the continuous usage of taxi-hailing apps by taxi drivers. We use this framework to examine how monetary incentives may have worked to affect taxi drivers' continuous usage intention, both directly and indirectly. Data collected from real taxi driver users provide sufficient empirical evidence of indirect effects and

suggestions for the waning effect of monetary incentives. This study lays down a fertile foundation for future studies that can further examine the roles played by monetary incentives and offers a few insights into how monetary incentives should be used to promote eCommerce innovations, such as taxi-hailing apps. We hope that future research builds on this work and further advances our understanding of this popular marketing tool.

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REFERENCES

Ahrens, J., J.R. Coyle, and M.A. Strahilevitz, "Electronic Word of Mouth: The Effects of Incentives on E-Referrals by Senders and Receivers," *European Journal of Marketing*, Vol. 47, No. 7: 1034-1051, 2013.

An, J., M.D. Myers, and X. Yang, "Mothers' Continuance Usage Intention of a Pregnancy and Parenting Community E-Commerce Platform: Platform Gratifications and Mother Characteristics," *Journal of Electronic Commerce Research*, Vol. 21, No. 4: 277-293, 2020.

Anderson, J.C. and D.W. Gerbing, "Structural Equation Modeling in Practice: A Review and Recommended Two-Step Approach," *Psychological bulletin*, Vol. 103, No. 3: 411, 1988.

Bagozzi, R., *Marketing Management*, Upper Saddle River, N.J., Prentice Hall, 1998.

Barnes, S.J., "Understanding Use Continuance in Virtual Worlds: Empirical Test of a Research Model," *Information & Management*, Vol. 48, No. 8: 313-319, 2011.

Baron, R.M. and D.A. Kenny, "The Moderator-Mediator Variable Distinction in Social Psychological Research: Conceptual, Strategic, and Statistical Considerations," *Journal of Personality and Social Psychology*, Vol. 51, No. 6: 1173-1182, 1986.

Best, H. and T. Kneip, "The Impact of Attitudes and Behavioral Costs on Environmental Behavior: A Natural Experiment on Household Waste Recycling," *Social Science Research*, Vol. 40, No. 3: 917-930, 2011.

Bhattacherjee, A., "Understanding Information Systems Continuance: An Expectation-Confirmation Model," *MIS Quarterly*, Vol. 25, No. 3: 351, 2001.

Brancheau, J.C. and J.C. Wetherbe, "The Adoption of Spreadsheet Software: Testing Innovation Diffusion Theory in the Context of End-User Computing," *Information Systems Research*, Vol. 1, No. 2: 115-143, 1990.

Bruner, G.C. and A. Kumar, "Explaining Consumer Acceptance of Handheld Internet Devices," *Journal of Business Research*, Vol. 58, No. 5: 553-558, 2005.

Chaiken, S., "Heuristic Versus Systematic Information Processing and the Use of Source Versus Message Cues in Persuasion," *Journal of Personality and Social Psychology*, Vol. 39, No. 5: 752-766, 1980.

Chin, W.W., "Issues and Opinion on Structural Equation Modeling," *MIS Quarterly*, Vol. 22, No. 1: vii-xvi, 1998a.

Chin, W.W., "The Partial Least Squares Approach to Structural Equation Modeling," *Modern Methods for Business Research*. G. A. Marcoulides. Mahwah, N.J., Lawrence Erlbaum Associates, Inc.**:** 295-336, 1998b.

Chin, W.W., "Frequently Asked Questions – Partial Least Squares & PLS-Graph," Retrieved March 1, 2005 from http://disc-nt.cba.uh.edu/chin/plsfaq.htm, 2000.

Chin, W.W., B.L. Marcolin, and P.R. Newsted, "A Partial Least Squares Latent Variable Modeling Approach for Measuring Interaction Effects: Results from a Monte Carlo Simulation Study and an Electronic-Mail Emotion/Adoption Study," *Information Systems Research*, Vol. 14, No. 2: 189-217, 2003.

Cramer, J. and A.B. Krueger, "Disruptive Change in the Taxi Business: The Case of Uber," *American Economic Review*, Vol. 106, No. 5: 177-182, 2016.

Cyr, D., M. Head, and A. Ivanov, "Design Aesthetics Leading to M-Loyalty in Mobile Commerce," *Information & Management*, Vol. 43, No. 8: 950-963, 2006.

Dai, S., "China's Loss-Making Luckin Coffee Start-up Doubles Down on Subsidies to Win Customers from Starbucks," Retrieved September 22, 2020, from https://www.scmp.com/tech/start-ups/article/2180581/chinas-loss-making-start-luckin-coffee-doubles-down-subsidies-win, 2019.

Davis, F.D., R.P. Bagozzi, and P.R. Warshaw, "User Acceptance of Computer Technology: A Comparison of Two Theoretical Models," *Management Science*, Vol. 35, No. 8: 982-1003, 1989.

Davis, F.D., R.P. Bagozzi, and P.R. Warshaw, "Extrinsic and Intrinsic Motivation to Use Computers in the Workplace," *Journal of Applied Social Psychology*, Vol. 22, No. 14: 1111-1132, 1992.

Deci, E.L., R. Koestner, and R.M. Ryan, A Meta-Analytic Review of Experiments Examining the Effects of Extrinsic Rewards on Intrinsic Motivation, American Psychological Association, 1999.

Deci, E.L. and R. Ryan, Intrinsic Motivation and Self-Determination in Human Behavior, New York and London, Plenum, 1985.

Deci, E.L. and R.M. Ryan, "The Empirical Exploration of Intrinsic Motivational Processes," *Advances in experimental social psychology*, Vol. 13: 39-80, 1980.

Edwards, J., "Amazon's Profit Shows How Few People Understand the Way the Company Works," Retrieved March 27, 2016, from http://www.businessinsider.com/analysts-wrong-about-amazon-profit-2015-1, 2015.

Eisenberger, R. and J. Cameron, "Detrimental Effects of Reward: Reality or Myth?," *American psychologist*, Vol. 51, No. 11: 1153, 1996.

Fishburn, P.C., "Subjective Expected Utility: A Review of Normative Theories," *Theory and Decision*, Vol. 13, No. 2: 139-199, 1981.

Fornell, C. and D.F. Larcker, "Evaluating Structural Equation Models with Unobservable Variables and Measurement Error," *Journal of marketing research*, Vol. 18, No. 1: 39-50, 1981.

Garnefeld, I., A. Iseke, and A. Krebs, "Explicit Incentives in Online Communities: Boon or Bane?," *International Journal of Electronic Commerce*, Vol. 17, No. 1: 11-38, 2012.

Gefen, D., D.W. Straub, and M. Boudreau, "Structural Equation Modeling and Regression:Guidelines for Research Practice," *Communications of AIS*, Vol. 4, No. 7: 1-78, 2000.

Hair, J.F., R.E. Anderson, R.L. Tatham, and W.C. Black, Multivariate Data Analysis, Englewood Cliffs, New Jersey, Prentice-Hall, Inc., 1995.

Hogg, M.A., The Social Psychology of Group Cohesiveness: From Attraction to Social Identity, Harvester Wheatsheaf, 1992.

Hong, W., F.K.Y. Chan, J.Y.L. Thong, L.C. Chasalow, and G. Dhillon, "A Framework and Guidelines for Context-Specific Theorizing in Information Systems Research," *Information Systems Research*, Vol. 25, No. 1: 111-136, 2014.

Hsu, P.-F., K.L. Kraemer, and D. Dunkle, "Determinants of E-Business Use in U.S. Firms," *International Journal of Electronic Commerce*, Vol. 10, No. 4: 9-45, 2006.

Huet, E., "Uber's Newest Tactic: Pay Drivers More Than They Earn," Retrieved March 28, 2016, from http://www.forbes.com/sites/ellenhuet/2014/07/02/ubers-newest-tactic-pay-drivers-more-than-they-earn, 2014.

Huet, E., "In Wake of Kuaidi-Didi Merger, Uber Faces an Even Tougher Battle in China," Retrieved March 27, 2016, from http://www.forbes.com/sites/ellenhuet/2015/03/19/kuaidi-didi-merger-uber-in-china, 2015.

Jo Hatch, M. and M. Schultz, "Relations between Organizational Culture, Identity and Image," *European Journal of Marketing*, Vol. 31, No. 5/6: 356-365, 1997.

Karahanna, E., D.W. Straub, and N.L. Chervany, "Information Technology Adoption across Time: A Cross-Sectional Comparison of Pre-Adoption and Post-Adoption Beliefs," *MIS Quarterly*, Vol. 23, No. 2: 183-213, 1999.

Katz, M.L. and C. Shapiro, "Network Externalities, Competition, and Compatibility," *The American economic review*, Vol. 75, No. 3: 424-440, 1985.

Kim, S.S. and N.K. Malhotra, "Predicting System Usage from Intention and Past Use: Scale Issues in the Predictors," *Decision Sciences*, Vol. 36, No. 1: 187-196, 2005.

Kim, S.S., N.K. Malhotra, and S. Narasimhan, "Two Competing Perspectives on Automatic Use: A Theoretical and Empirical Comparison," *Information Systems Research*, Vol. 16, No. 4: 418-432, 2005.

Kuang, L., N. Huang, Y. Hong, and Z. Yan, "Spillover Effects of Financial Incentives on Non-Incentivized User Engagement: Evidence from an Online Knowledge Exchange Platform," *Journal of Management Information Systems*, Vol. 36, No. 1: 289-320, 2019.

Lee, M.K., C.M. Cheung, and Z. Chen, "Acceptance of Internet-Based Learning Medium: The Role of Extrinsic and Intrinsic Motivation," *Information & Management*, Vol. 42, No. 8: 1095-1104, 2005.

Li, D., P.Y.K. Chau, and H. Lou, "Understanding Individual Adoption of Instant Messaging: An Empirical Investigation," *Journal of the Association for Information Systems*, Vol. 6, No. 4: 102-129, 2005.

Limayem, M., S.G. Hirt, and C.M. Cheung, "How Habit Limits the Predictive Power of Intention: The Case of Information Systems Continuance," *MIS Quarterly*, Vol. 31, No. 4: 705-737, 2007.

Lin, H.-F., "Determinants of Successful Virtual Communities: Contributions from System Characteristics and Social Factors," *Information & Management*, Vol. 45, No. 8: 522-527, 2008.

Lindgreen, A., A. Doble, J. Vanhamme, J. Ahrens, J.R. Coyle, and M.A. Strahilevitz, "Electronic Word of Mouth: The Effects of Incentives on E-Referrals by Senders and Receivers," *European Journal of Marketing*, Vol. 47, No. 7: 1034-1051, 2013.

Lu, Y., S. Yang, P.Y. Chau, and Y. Cao, "Dynamics between the Trust Transfer Process and Intention to Use Mobile Payment Services: A Cross-Environment Perspective," *Information & Management*, Vol. 48, No. 8: 393-403, 2011.

Luarn, P., J.-C. Yang, and Y.-P. Chiu, "Why People Check in to Social Network Sites," *International Journal of Electronic Commerce*, Vol. 19, No. 4: 21-46, 2015.

Lyytinen, K. and G.M. Rose, "Disruptive Information System Innovation: The Case of Internet Computing," *Information Systems Journal*, Vol. 13, No. 4: 301-330, 2003a.

Lyytinen, K. and G.M. Rose, "The Disruptive Nature of Information Technology Innovations: The Case of Internet Computing in Systems Development Organizations," *MIS Quarterly*, Vol. 27, No. 4: 557-595, 2003b.

Mahajan, V., E. Muller, and F.M. Bass, "New Product Diffusion Models in Marketing: A Review and Directions for Research," *The journal of marketing*, Vol. 54, No.1: 1-26, 1990.

Mak, R., "War of Attrition," Retrieved November 8, 2020, from https://www.breakingviews.com/considered-view/china-taxi-apps-speed-towards-subsidy-showdown/, 2015.

Mamonov, S., M. Koufaris, and R. Benbunan-Fich, "The Role of the Sense of Community in the Sustainability of Social Network Sites," *International Journal of Electronic Commerce*, Vol. 20, No. 4: 470-498, 2016.

Mathieson, K., "Predicting User Intentions: Comparing the Technology Acceptance Model with the Theory of Planned Behavior," *Information Systems Research*, Vol. 2, No. 3: 173-191, 1991.

Moore, G.C. and I. Benbasat, "Development of an Instrument to Measure the Perceptions of Adopting an Information Technology Innovation," *Information Systems Research*, Vol. 2, No. 3: 192-222, 1991.

Near, J.P., M.T. Rehg, J.R. Van Scotter, and M.P. Miceli, "Does Type of Wrongdoing Affect the Whistle-Blowing Process?," *Business Ethics Quarterly*, Vol. 14, No. 2: 219-242, 2004.

Nunnally, J.C., Psychometric Theory, McGraw-Hill, New York, 1978.

Osbaldiston, R. and J.P. Schott, "Environmental Sustainability and Behavioral Science: Meta-Analysis of Proenvironmental Behavior Experiments," *Environment and Behavior*, Vol. 44, No. 2: 257-299, 2012.

Peres, R., E. Muller, and V. Mahajan, "Innovation Diffusion and New Product Growth Models: A Critical Review and Research Directions," *International Journal of Research in Marketing*, Vol. 27, No. 2: 91-106, 2010.

Podsakoff, P.M., S.B. MacKenzie, L. Jeong-Yeon, and N.P. Podsakoff, "Common Method Biases in Behavioral Research: A Critical Review of the Literature and Recommended Remedies," *Journal of Applied Psychology*, Vol. 88, No. 5: 879-903, 2003.

Podsakoff, P.M. and D.W. Organ, "Self-Reports in Organizational Research: Problems and Prospects," *Journal of Management*, Vol. 12, No. 4: 531-544, 1986.

Polites, G.L. and E. Karahanna, "Shackled to the Status Quo: The Inhibiting Effects of Incumbent System Habit, Switching Costs, and Inertia on New System Acceptance," *MIS Quarterly*, Vol. 36, No. 1: 21-42, 2012.

Preacher, K.J. and A.F. Hayes, "Asymptotic and Resampling Strategies for Assessing and Comparing Indirect Effects in Multiple Mediator Models," *Behavior research methods*, Vol. 40, No. 3: 879-891, 2008.

Ren, Y., F.M. Harper, S. Drenner, L.G. Terveen, S.B. Kiesler, J. Riedl, and R.E. Kraut, "Building Member Attachment in Online Communities: Applying Theories of Group Identity and Interpersonal Bonds," *MIS Quarterly*, Vol. 36, No. 3: 841-864, 2012.

Ringle, C.M., S. Wende, and A. Will, *SmartPLS 2.0 (Beta)*. Hamburg, Germany, SmartPLS, 2005.

Rogers, E.M., Diffusion of Innovations, New York, Free Press, 2003.

Royer, H., M. Stehr, and J. Sydnor, "Incentives, Commitments, and Habit Formation in Exercise: Evidence from a Field Experiment with Workers at a Fortune-500 Company," *American economic journal. Applied economics.*, Vol. 7, No. 3: 51-84, 2015.

Samuelson, W. and R. Zeckhauser, "Status Quo Bias in Decision Making," *Journal of risk and uncertainty*, Vol. 1, No. 1: 7-59, 1988.

Shen, J., "Social Comparison, Social Presence, and Enjoyment in the Acceptance of Social Shopping Websites," *Journal of Electronic Commerce Research*, Vol. 13, No. 3: 198, 2012.

Sun, Y. and A. Jeyaraj, "Information Technology Adoption and Continuance: A Longitudinal Study of Individuals' Behavioral Intentions," *Information & Management*, Vol. 50, No. 7: 457-465, 2013.

Trafimow, D. and W.T. Borrie, "Influencing Future Behavior by Priming Past Behavior: A Test in the Context of Petrified Forest National Park," *Leisure Sciences*, Vol. 21, No. 1: 31-42, 1999.

Turel, O. and A. Serenko, "The Benefits and Dangers of Enjoyment with Social Networking Websites," *European Journal of Information Systems*, Vol. 21, No. 5: 512-528, 2012.

Urbach, N. and F. Ahlemann, "Structural Equation Modeling in Information Systems Research Using Partial Least Squares," *JITTA: Journal of Information Technology Theory and Application*, Vol. 11, No. 2: 5-39, 2010.

van der Heijden, H., "User Acceptance of Hedonic Information Systems," *MIS Quarterly*, Vol. 28, No. 4: 695-704, 2004.

Venkatesh, V. and M.G. Morris, "Why Don't Men Ever Stop to Ask for Directions? Gender, Social Influence, and Their Role in Technology Acceptance and Usage Behavior," *MIS Quarterly*, Vol. 24, No. 1: 115, 2000.

Venkatesh, V., M.G. Morris, G.B. Davis, and F.D. Davis, "User Acceptance of Information Technology: Toward a Unified View," *MIS Quarterly*, Vol. 27, No. 3: 425-478, 2003.

Wagner, T., T. Hennig-Thurau, and T. Rudolph, "Does Customer Demotion Jeopardize Loyalty?," *Journal of Marketing*, Vol. 73, No. 3: 69-85, 2009.

Wang, H.H., "How Ebay Failed in China," Retrieved March 27, 2016 from http://www.forbes.com/sites/china/2010/09/12/how-ebay-failed-in-china/, 2010.

Wang, S., "Alibaba's E-Commerce App Has a Social Network Facebook Would Love," *Bloomberg Technology*, Retrieved November 25, 2020, from https://www.bloomberg.com/news/articles/2016-08-21/alibaba-s-e-commerce-app-has-a-social-network-facebook-would-love, Bloomberg Technology, 2016.

Weigel, F.K., B.T. Hazen, C.G. Cegielski, and D.J. Hall, "Diffusion of Innovations and the Theory of Planned Behavior in Information Systems Research: A Metaanalysis," *Communications of the Association for Information Systems*, Vol. 34: 619-636, 2014.

Weiss, T.R., "Uber China Being Acquired by China's Didi Chuxing Ride-Sharing Service," *eWeek*, Retrived November 25, 2020 from https://www.eweek.com/mobile/uber-china-being-acquired-by-china-s-didi-chuxing-ride-sharing-service, 2016.

Wiersma, U.J., "The Effects of Extrinsic Rewards in Intrinsic Motivation: A Meta‐Analysis," *Journal of Occupational and Organizational Psychology*, Vol. 65, No. 2: 101-114, 1992.

Williams, M., "In Whom We Trust: Group Membership as an Affective Context for Trust Development," *The Academy of Management Review*, Vol. 26, No. 3: 377-396, 2001.

Xu, X., J.-H. Wu, and Q. Li, "What Drives Consumer Shopping Behavior in Live Streaming Commerce?," *Journal of Electronic Commerce Research*, Vol. 21, No. 3: 144-167, 2020.

Zhang, T., C. Lu, and M. Kizildag, "Engaging Generation Y to Co-Create through Mobile Technology," *International Journal of Electronic Commerce*, Vol. 21, No. 4: 489-516, 2017.

Zhang, W. and S. Watts, "Capitalizing on Content: Information Adoption in Two Online Communities," *Journal of Association of Information Systems*, Vol. 9, No. 2: 73-94, 2008.

Zhang, W. and P. Xu, "Do I Have to Learn Something New? Mental Models and the Acceptance of Replacement Technologies," *Behaviour & Information Technology*, Vol. 30, No. 2: 201-211, 2011.

Zhao, Z., M. Chen, and W. Zhang, "Social Community, Personal Involvement and Psychological Processes: A Study of Impulse Buying in the Online Shopping Carnival," *Journal of Electronic Commerce Research*, Vol. 20, No. 4: 255-272, 2019.

Appendix A: Measures and Indicators

Relative Advantage: adapted from Moore and Benbasat [1991]
Using a Taxi-hailing App enables me to pick up passengers more quickly.
Using a Taxi-hailing App improves the quality of serving passengers.
Using a Taxi-hailing App makes it easier to pick up passengers.
Using a Taxi-hailing App enhances my effectiveness in serving passengers.
Using a Taxi-hailing App gives me greater control over my work of picking up passengers.

Compatibility: adapted from Moore and Benbasat [1991]
Using a Taxi-hailing App is compatible with how I regularly picking up passenger(s).
I think that using a Taxi-hailing App fits well with the way I like to work.
Using a Taxi-hailing App fits into my work style.

Group identification: adapted from Lin (2008)
I feel a strong sense of belonging to the driver group using Taxi-hailing App.
I enjoy being a member of the driver group using Taxi-hailing App.
I am very committed to the driver group using Taxi-hailing App.
Overall, the driver group using Taxi-hailing App has a high level of morale.

Perceived Enjoyment: adapted from Barnes [2011]
I would describe my overall experience of using a Taxi-hailing App as...

Enjoyable	………	Disgusting
Exciting	………	Dull
Pleasant	………	Unpleasant
Interesting	………	Boring

Current Usage: adapted from Limayem et al. [2007]
On average, how many times do you use taxi-hailing apps every day?
How many transactions do you do every day using taxi-hailing apps?

Monetary Incentive: self-developed
Had the taxi-hailing app vendor stopped offering subsidies, my use of the app would be discouraged.
Had the taxi-hailing app vendors stopped subsidizing riders to add tips, my use of the app would be discouraged.

Continuous Usage Intention: adapted from Mathieson [1991] and Bhattacherjee [2001]
I intend to continue using Taxi-hailing App rather than discontinue its use.
My intention is to continue using Taxi-hailing App rather than any alternative manners.