Motives for participation in Internet innovation intermediary platforms

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ABSTRACT

Internet innovation intermediaries are the key role of an organization that affects on innovation processes and driving a potential contributor to economic development. Therefore, understanding what are the main motivations that drive the participation of users into these innovation intermediaries is increasingly relevant. This is why this paper aims to develop an understanding on this matter with UTAUT framework in order to examine the effects of major factors on behavioral intention and actual use of Internet innovation intermediaries and topic discussions. An empirical study was conducted in 10 Internet innovation intermediary platforms using a survey instrument targeting 735 respondents and mainly from China and Taiwan. The findings show that there is a significant relationship between facilitating conditions and usage behavior proving that intermediaries can influence the usage of Internet innovation intermediary platforms. The theoretical and practical implications of the study are discussed, offering recommendations and future research directions.

1. Introduction

An increasing number of firms attempt to achieve intellectual property (IP) by acquiring and exploiting technologies and patents in particular from beyond the own firm boundaries as it can be more economically than internal technology development. These trends have increased both the opportunities and the necessity for companies to leverage the innovation potential of external partners (Gassmann, Enkel, & Chesbrough, 2010; Heider, 2012). Thus, the recently emerging innovation intermediaries aim to support this development, but however are insufficiently understood. As well as, the use of Internet innovation intermediaries, such as NineSigma, Innocentive, Innovaroor Yet2.com have been specifically helpful for technological problems requiring solutions from on distant and distinct innovation actors (López & Vanhaverbeke, 2010; Piller, 2009; Zamboni, 2011). There is however a gap in linking the type of participation common in Internet innovation intermediaries platforms. Yet still the current literature has not explored this field at an individual level or in UTAUT context.

We focus on how the Internet has impacted the process of collaborative innovation intermediaries. Hence, it is important to study how willing people are to try new Internet innovation intermediary platform services and do facilitating conditions have an effect on the consumers' adoption readiness. Thus a better understanding of user motivations is crucial for Internet innovation intermediary mechanisms to match patent creators with patent users and facilitate transactions between them, the efficiency implications and integrations of the emergence of these intermediaries for the patent market, which will be used for future empirical research.

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2. Literature review

2.1. Internet innovation intermediaries

According to Howells (2006) and Bakici, Almirall, and Wareham (2011), intermediaries can be private organizations, individuals, experts or advisors in the form of retailers, distributors, wholesalers, platforms, media companies, agencies and financial institutions. Internet innovation intermediaries are a new phenomenon. An innovation intermediary put together many different innovation community members to create the opportunity for firms to increase the feasibility of outsourcing innovation while mitigating the associated costs, and further, they can help overcome these barriers to commercialization by mediating between inventors, developers, and marketers. Innovation intermediaries provide many value-adding functions of innovation supporting links, for example IP or technologies trade, commercialization of patents to develop an appropriate business model and more generally for creations of different types of innovation partnerships and communities embed open innovation (Howells, 2006; Lopez-Vega, 2009).

Therefore, this research develops an Internet innovation intermediary of IP valuation model based on four indices including the IP provider (creators), IP user, IP specifications and IP license specifications. Applied to the Internet innovation intermediaries' context, there are only a few studies. Antikainen, Mäkipää, and Ahonen (2010) and Bakici et al. (2011) resulted that intrinsic rewards are as decisive as monetary rewards. Similarly Antikainen & Väätvjä (2010) and Svensson (2011) resulted that Internet innovation intermediaries both use monetary and non-monetary rewards. However this is why a social psychological model is required to explore these motivations and their relations on the intention to participate. Thus with this research we aim to contribute to both Internet innovation intermediary and related models of technology adoption.

2.2. Related models of technology adoption

The Unified Theory of Acceptance and Use of Technology (UTAUT) was formulated by leading technology acceptance researchers (Garfield, 2005; Venkatesh, Morris, Davis, & Davis, 2003). The UTAUT aims to explain user intentions to use an IS and subsequent usage behavior. UTAUT could explain 70% of technology acceptance behavior (Masrom & Hussein, 2008). According to the number of prior studies, the UTAUT model is the benchmark and most predictive model in the technology acceptance literature (AlAwadhi & Morris, 2008; Weerakkody, El-Haddadeh, & Al-Shafi, 2011).

We argue that because Internet innovation intermediary platforms' services are new, a lack of studies directly investigating the adoption these services is to be expected. However, we also argue that existing research directions provide valuable points of departure for further investigating and understanding the adoption of Internet innovation intermediary services. Also, because of their design, Internet innovation intermediary present a unique set of circumstances. So more importantly, patent intermediaries can make the IP markets more liquid, or will the inefficiencies persist. In this study, the focus of this study is to further validate UTAUT in the context of open innovation and in regards to Internet innovation intermediary, because the new service testing cannot be seen as a diffusion of new technology. As is pointed out, adoption of end-user services in Internet innovation intermediary platforms may be treated as technology adoption.

3. Conceptual model of Internet innovation intermediary

3.1. Research model

The UTAUT model contains different factors that either directly affects usage behavior as facilitating conditions or, affect behavioral intention by other determinant factors like: performance expectancy, effort expectancy, social influence and facilitating conditions (Garfield, 2005; Venkatesh et al., 2003). As shown in Fig. 1, these determinants and moderators have all been adapted for use in the proposed research model. As is pointed out Ristola, Koivumäki, and Kesti (2005), adoption of end-user services in Internet innovation intermediary may be treated as technology adoption.

3.2. Sample selection and descriptive statistics

Here the intention by conducting this research is to identify the main motives of users to participate in Internet innovation intermediaries. Given the novelty of the research problem, an explanatory study has been chosen as the research method. Data will be collected via a questionnaire survey. We test the validity of our hypotheses with data that comes from a recent international survey on open innovation practices. In order to conduct this research we examined the Theory of UTAUT model in the case of China and Taiwan, the data were collected through email and a paper survey, and also by phone in a few cases from March to August 2012. We test the validity of our hypotheses with data that comes from a recent international survey on open innovation practices.

Around 1000 target companies for the survey were selected from the firms operating in the Shenzhen & Zhuhai Province in China and Hsinchu Science Park in Taiwan from March to August 2012. Of the responses received 735 responses were found to be useful (73.5% of total survey). The majority of the responding firms (59.3%, 436 firms) belong to the manufacturing sector, but the service sector and information technology sector also represents a significant industry segment among
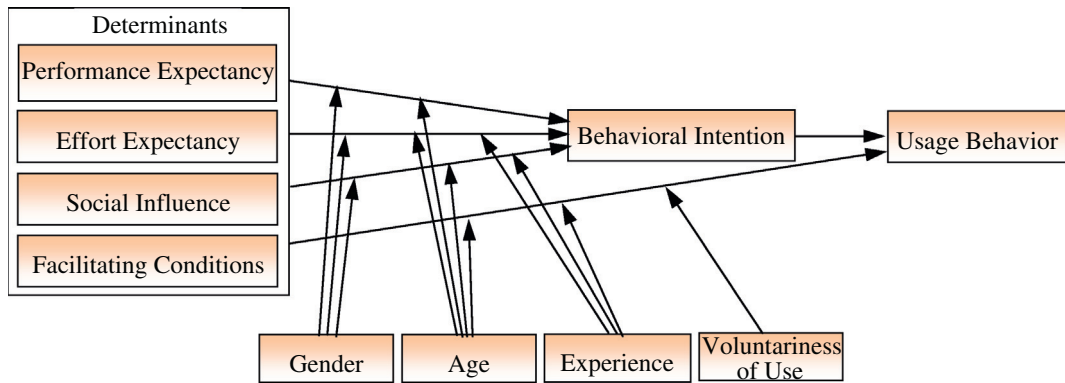
Fig. 1. Research model.

the respondent firms (16.9%, 124 firms; 16.9%, 175 firms). Most of the users were male (74.3%), while female users comprised 25.7% of the test user population. Users were relatively young, 67.8% were under 35 years old. Among China and Taiwan citizens, 76.1% said they used this intermediary service every day, and 15.2% reported used intermediary service several times a week. 8.3% of respondents reported used the Internet innovation intermediary several times a month or less.

4. Data analysis

4.1. Reliability and validity analysis

Following Anderson and Gerbing (1988), we also conducted confirmatory factor analysis to further establish the reliability and discriminant validity of the multi-item scales. The results are shown in Table 1. Table 1 shows the Cronbach's a values of the measurement items in the research model. All have Cronbach's a greater than 0.7, which is the normally agreed upon minimum value.

A confirmatory factor analysis was conducted to check the statistical validity of the constructs. As shown in Table 1, all AVE values are greater than 0.8, which indicates that the model had convergent validity. The square-root values of AVE were greater than the correlations between the corresponding constructs and the confidence intervals of the coefficients did not include 1.0, which indicated that the constructs had discriminant validity.

4.2. Results of hypotheses tests

The regression was conducted using a hierarchical two-step method. The overall fit of the regression models can be seen in Table 2.

Overall, the research model explains 51.7% (adj. $R^2 = 0.221$) of the variance in the dependent variable, Internet innovation intermediary platforms services usage. The main effects of performance expectancy, effort expectancy, social influence, facilitating conditions and behavioral intention account for 19.6% (adj. $R^2 = 0.205$) of the explained variance, while the moderating variables gender, age, prior experience and voluntariness of use.

4.3. Model testing with moderators

A regression analysis was used to measure the influence of independent variables on behavioral intention to adopt Internet innovation intermediary platforms services that is promoted by intermediaries' roles in China and Taiwan.

A total of 735 responses were analyzed. From the analysis, Table 3 shows a significant model emerged ($F(3735) = 24.389$, $p < 0.001$) with the adjusted R^2 being 0.092. The significant variable includes performance expectancy ($\beta = 0.236$, $p = 0.000$) on behavioral intention. For the moderator variables, statistically significant beta path coefficients were indicated. Gender and age did not exhibit significant interactions performance expectancy.

Table 4 presents the summary of model testing with behavioral intention as the dependent variable and effort expectancy as the predictor variable with moderators for the treatment 2.

According to the above results (Table 4) show a significant model emerged ($F(4735) = 58.845$, $p < 0.001$) with the adjusted R^2 being 0.204. The significant variables show effort expectancy ($\beta = 0.427$, $p < 0.001$) on behavioral intention. For the moderator variables, statistically significant β path coefficients were indicated. Gender and age did not exhibit significant interactions with effort expectancy. Internet innovation intermediary platforms prior experience exhibited positive interacting effect with effort expectancy on behavioral intention.

Table 5 presents the summary of model testing with behavioral intention as the dependent variable and social influence as the predictor variable with moderators for the treatment 3.

Table 1
Confirmatory factor analysis results.

Constructs			Measures		Estimate		S.E.		C.R.		p
PE			PE1		0.87		0.04		22.8[**]		0.00
			PE2		0.84		0.04		22.2[**]		0.00
			PE3		0.85		0.04		22.5[**]		0.00
			PE4		0.91		0.03		23.4[**]		0.00
			PE5		0.82		0.04		21.9[**]		0.00
			PE6		0.84		0.04		22.2[**]		0.00
EE			EE1		0.86		0.04		22.6[**]		0.00
			EE2		0.91		0.03		23.4[**]		0.00
			EE3		0.89		0.03		23.2[**]		0.00
			EE4		0.93		0.03		23.6[**]		0.00
			EE5		0.90		0.03		23.3[**]		0.00
SI			SI1		0.82		0.04		21.9[**]		0.00
			SI2		0.96		0.03		24.0[**]		0.00
			SI3		0.75		0.04		19.5[**]		0.00
			SI4		0.81		0.04		21.7[**]		0.00
FC			FC1		0.82		0.04		21.9[**]		0.00
			FC2		0.97		0.03		24.2[**]		0.00
			FC3		0.94		0.03		23.7[**]		0.00
			FC4		0.90		0.03		23.3[**]		0.00
BI			BI1		0.89		0.03		23.2[**]		0.00
			BI2		0.93		0.03		23.6[**]		0.00
			BI3		0.84		0.04		22.2[**]		0.00
UB			UB1		0.86		0.04		22.6[**]		0.00
			UB2		0.84		0.04		22.2[**]		0.00
			UB3		0.91		0.03		23.4[**]		0.00

Constructs	a	Mean	S Dev.	PE	EE	SI	FC	BI	UB	Loading	No. of items
PE	0.776	3.74	0.873	**0.894**						0.843	6
EE	0.892	3.97	0.799	0.801[**]	**0.902**					0.894	5
SI	0.724	3.87	0.942	0.727[**]	0.759[**]	**0.883**				0.868	4
FC	0.839	3.71	0.926	0.719[**]	0.696[**]	0.738[**]	**0.869**			0.823	4
BI	0.808	3.79	0.885	0.832[**]	0.826[**]	0.796[**]	0.612[**]	**0.913**		0.837	3
UB	0.853	3.87	0.803	0.840[**]	0.801[**]	0.781[**]	0.843[**]	0.836[**]	**0.871**	0.918	3

[*] $p < 0.05$.
Diagonal elements (in bold) are the square root of the average variance extracted (AVE) between the constructs and their measures; off-diagonal elements are correlations between constructs.
PE: performance expectancy; EE: effort expectancy; SI: social influence; FC: facilitating conditions; BI: behavioral intention; UB: usage behavior.
[**] $p < 0.01$.

Table 2
Regression model fit.

Model	R	R^2	Adj. R^2	SE Est.	Change statistics				
					ΔR^2	F change	$Df1$	$Df2$	Sig. F Change
1	0.443	0.196	0.205	2.175	0.196	7.253	4	730	0.000
2	0.517	0.267	0.221	2.096	0.071	2.199	21	714	0.065

According to the above results (Table 5) show a significant model emerged ($F(4735) = 89.674$, $p < 0.001$) with the adjusted R^2 being 0.256. The significant variable is shown in Table 5 that include social influence ($\beta = 0.489$, $p < 0.001$) on behavioral intention. For the moderator variables, statistically significant beta path coefficients were indicated. Gender, age, and Internet innovation intermediary platforms prior experience did not exhibit significant interactions with social influence on behavioral intention.

Table 6 presents the summary of model testing with behavioral intention as the dependent variable and social influence as the predictor variable with moderators for the treatment 4.

According to the above results (Table 6) show a significant model emerged ($F(4735) = 59.132$, $p < 0.001$) with the adjusted R^2 being 0.135. The significant variable is shown in Table 6 that include Facilitating Conditions ($\beta = 0.313$, $p < 0.001$) on use behavior. For the moderator variables, statistically significant beta path coefficients were indicated. Age, Internet innovation intermediary platforms prior experience and voluntariness of use did not exhibit significant interactions with Facilitating conditions on use behavior.

Table 3
Model testing with moderators for the treatment 1.

Model	R	R square (R^2)	Adjusted R square (Adj. R^2)	Std. error of the estimate	
Regression model					
1	0.313[a]	0.098	0.092	0.769	

Model		Sum of squares	Df	Mean square	F value	Significance
ANOVA						
1	Total	63.855	3	21.285	24.389	0.000[a]

Intention to use platforms factors	Unstandardized coefficients		Standardized coefficients	T statistics	Significance
	B	Std. error	Beta (β)		
Factors effecting Internet innovation intermediary platforms use					
(Constant)	3.015	0.148		14.563[b]	0.000
PE	0.353	0.049	0.236	6.845[b]	0.000
GED	0.074	0.032	0.029	1.135	0.253
AGE	0.053	0.024	0.097	1.325	0.273

[a] Predictors: (constant), PE.
[b] Dependent variable: BI.

Table 4
Model testing with moderators for the treatment 2.

Model	R	R square (R^2)	Adjusted R square (Adj. R^2)	Std. error of the estimate	
Regression model					
1	0.452[a]	0.204	0.201	0.679	

Model		Sum of squares	Df	Mean square	F value	Significance
ANOVA						
1	Total	82.367	4	20.591	57.845	0.000[a]

Intention to use platforms factors	Unstandardized coefficients		Standardized coefficients	T Statistics	Significance
	B	Std. Error	Beta (β)		
Factors effecting Internet innovation intermediary platforms use					
(Constant)	1.972	0.176		13.871[b]	0.000
EE	0.418	0.126	0.427	16.869[b]	0.000
GED	0.095	0.041	0.102	1.943	0.175
AGE	−0.021	−0.017	−0.059	−0.062	0.964
EXP	0.103	0.061	0.137	6.121[b]	0.000

[a] Predictors: (constant), EE.
[b] Dependent variable: BI.

5. Discussion

5.1. Summary of results

The Study has indicated that companies using Internet innovation intermediary platforms' services value in China and Taiwan and their roles as consultants, brokers, intelligence gatherers and technology scouts acting on their behalf, as well as the financial resources that can be provided. In addition, the implementation of Internet innovation intermediary platforms will help increase the transparency of open innovation, in particular the protection of intellectual property rights (IPRs). Our findings indicate that economic systems and institutions may have large effects on the behavior of firms with respect to their engagement in open innovation practices. Fig. 1 presents the model proposed and supported. Fig. 2 presents a summary of the findings. A key objective of the study was to validate the UTAUT model in the context of consumer adoption of the online communities. The model explained 51.7% of the variance in behavioral intention to use Internet innovation intermediary platforms. The key findings of the UTAUT analysis in the study and their influences on practice are outlined below.

First, regression analysis provided evidence that the performance expectancy construct has a significant positive influence on the behavioral intention to adopt Internet innovation intermediary platforms. The finding of this research confirms that performance expectancy remains significant and a strong predictor of behavioral intention (Venkatesh, Thong, & Xu, 2012; Venkatesh et al., 2003). Effort expectancy factor also has a significant positive influence on the behavioral intention

Table 5
Model testing with moderators for the treatment 3.

Model	R	R square (R^2)	Adjusted R square (Adj. R^2)	Std. error of the estimate
Regression model				
1	0.501[a]	0.256	0.251	0.619

Model		Sum of squares	Df	Mean Square	F value	Significance
ANOVA						
1	Total	132.47	4	33.118	89.674	0.000[a]

Intention to use platforms factors	Unstandardized coefficients		Standardized coefficients	T statistics	Significance
	B	Std. error	Beta (β)		
Factors effecting Internet innovation intermediary platforms use					
(Constant)	1.216	0.203		9.576[b]	0.000
SI	0.496	0.193	0.489	19.242[b]	0.000
GED	0.047	0.036	0.323	2.057	0.094
AGE	0.085	0.042	0.060	0.993	0.297
EXP	0.171	0.079	0.207	2.477[a]	0.036

[a] Predictors: (constant), SI.
[b] Dependent variable: BI.

Table 6
Model testing with moderators for the treatment 4.

Model	R	R square (R^2)	Adjusted R square (Adj. R^2)	Std. error of the estimate
Regression model				
1	0.367[a]	0.135	0.129	0.449

Model		Sum of squares	Df	Mean square	F value	Significance
ANOVA						
1	Total	83.685	4	20.921	59.132	0.000[a]

Use platforms factors	Unstandardized coefficients		Standardized coefficients	T statistics	Significance
	B	Std. error	Beta (β)		
Factors effecting Internet innovation intermediary platforms use					
(Constant)	1.031	0.185		8.749[b]	0.000
FC	0.313	0.134	0.362	8.386[b]	0.000
AGE	−0.095	0.035	0.289	1.872	0.077
EXP	−0.173	−0.096	−0.060	−0.357	0.459
VOL	0.098	0.047	0.268	1.574	0.085

[a] Predictors: (constant), FC.
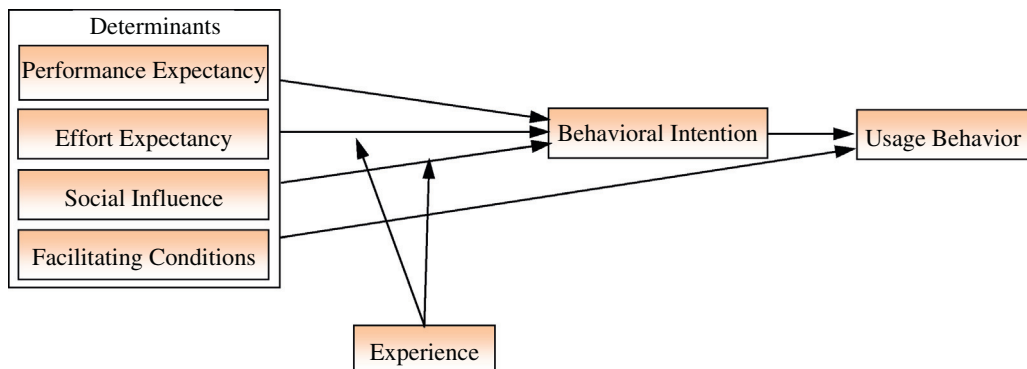[b] Dependent variable: BI.

Fig. 2. The resulting model.

to adopt Internet innovation intermediary platforms. For the moderator variables only prior use Internet innovation inter-mediary platforms' experience exhibited strongly positive interacting affect with the predictor variable. The findings of this

research and theoretical studies regarding this factor illustrated that the effort expectancy is a significant predictor of behavioral intention (Nassuora, 2012; Shao & Siponen, 2011; Venkatesh et al., 2003).

Second, Within the Internet innovation intermediary platforms' services context, social influence construct is one of the driving forces of behavior intention to use. The social influence factor has a positive influence on the perceived intention to adopt Internet innovation intermediary platforms, is the highest among the independent constructs in the research model. Whereas the finding implies that knowledge derived from acceptance and use of technology studies in the Developed World should be applied cautiously to intermediary platforms' services. The role of social influence in technology acceptance and use intention is subject to a lot of erroneous influences and moderations such as gender, age and experience (Venkatesh & Davis, 2000; Shao & Siponen, 2011; Venkatesh et al., 2003). Further, in terms of the moderator variables, statistically, prior use Internet innovation intermediary platforms' experience exhibit significant interactions with social influence upon behavioral intention.

Finally, in line with the theoretical basis, findings regarding the facilitating conditions construct suggest that it has a significant influence on the actual adoption of the Internet innovation intermediary platforms. Also, the findings suggest that moderator variables, gender, age, and prior experience did not exhibit significant interactions with facilitating conditions upon Internet innovation intermediary platforms usage behavior. Thus, the findings of the current study are in line with the previous study. Moreover, behavioral intention has a positive influence on Internet innovation intermediary platforms' Usage Behavior, which supports prior theoretical findings (Davis, Bagozzi, & Warshaw, 1989; Venkatesh et al., 2003). Further, the present study adds to our understanding of the role of intermediaries in working in parallel with different constructs in explaining behavioral intentions with regard to the adoption of Internet innovation intermediary platforms and confirms previous findings (Carter, 2008; Al-Sobhi, Weerakkody, & El-Haddadeh, 2011). Based on our conclusions, we propose the following propositions to those who lead knowledge management within online intermediary platforms. This is confirmed by empirical findings in this study. Also, this study suggests that intermediaries are essential, particularly for developing countries as they develop their infrastructure to bridge technical gaps and digital divide. Actively support the collaboration and networking among members during contests in online platforms. In particular, the purpose was to ascertain any possible benefits users expected as a result of accepting and using intermediary platforms' services.

5.2. Managerial implications

We have been focussing in this study on one particular problem, i.e. how companies in search for external technical solutions, IP, or other innovation related resources can be assisted in their search by Internet innovation intermediaries. Internet innovation intermediaries are interested in how to attract and sustain more people for the participation into their open innovation communities (Grimaldi, Cricelli, Rogo, & Iannarelli, 2012). Thus, the number of participators and their engagement is crucial for innovation intermediaries. Based on our results, it is acknowledged that intrinsic motivations such as enjoyment and intellectual challenge are crucial for participators and for attracting them. There should also be an active support for the collaboration and networking among members during contests in innovation intermediary platforms.

Next, our findings show that the most influential construct outside UTAUT model influencing the behavioral intention of firms' users to accept and use Internet innovation intermediary platforms in China and Taiwan is attitudes towards use of platforms. Moreover, the social nature in technology adoption among firms infers that using individual based theory is inappropriate (Parker & Castleman, 2007; Venkatesh et al., 2012). In addition to facilitating research on organizational performance, a general means of measuring Internet Innovation Intermediaries performance would provide many practical benefits.

Finally, management needs to support any technology adoption initiatives, for example encouraging employees to use the technology and demonstrating its benefits, similarly Gambatese & Hallowell (2011) and Sargent, Hyland, & Sawang (2012). The practical implications resulting from the resistance to change is that although it does not directly affect intention to adopt a new technology, it is a construct that definitely could prevent the general adoption of a technology. However, in an age of creative and cultural industries, taking both economic development and social valuation into consideration will be the greatest challenge that contemporary creative workers and firms will face.

5.3. Limitations and future research

One potential limitation of the present research is that our findings may well be vulnerable to the threat of single source bias. It is also necessary to examine the generalizability of these findings to other intermediary communities. Thus this study may not be able to fully capture the intention and require longitudinal studies to examine how these dynamic measures evolve over time.

This contrasts sharply with the established motivations in the actual platforms and the lack of elements allowing the expression and development of what, according to the model, constitute the main motivators. Longitudinal observation in different settings is also encouraged. Future similar researches may be conducted in other countries. Furthermore, our empirical study results conducted in China and Taiwan might not be applied to general. Future similar researches may be conducted in other countries. In addition, the intention was asked, but the actual behavior was not yet observed in this study. It is worth further studying as well.

Appendix A. Items used in estimating UTAUT

Performance expectancy

I would find Internet innovation intermediary platforms useful in my job.
Using Internet innovation intermediary platforms enables me to accomplish tasks more quickly.
Using Internet innovation intermediary platforms increases my productivity.
If I use Internet innovation intermediary platforms, I will increase my chances of getting a raise.

Effort expectancy

My interaction with Internet innovation intermediary platforms would be clear and understandable.
It would be easy for me to become skillful at using Internet innovation intermediary platforms.
I would find Internet innovation intermediary platforms easy to use.
Learning to operate Internet innovation intermediary platforms is easy for me.

Social influence

People who influence my behavior think that I should use Internet innovation intermediary platforms.
People who are important to me think I should use Internet innovation intermediary platforms.
The senior management of this business has been helpful in the use of Internet innovation intermediary platforms.
In general, the organization has supported the use of Internet innovation intermediary platforms.

Facilitating conditions

I have the resource necessary to use Internet innovation intermediary platforms.
I have the knowledge necessary to use Internet innovation intermediary platforms.
The platform in not compatible with other Intermediary platforms I use.
A specific person (or group) is available for assistance with platform difficulties.

Behavioral intention to use the platform

I intend to use Internet innovation intermediary platforms in the next 12 months.
I predict I would use Internet innovation intermediary platforms in the next 12 months.
I plan to use Internet innovation intermediary platforms in the next 12 months.

Voluntariness of use

Although it might be helpful, using an Internet innovation intermediary platform is certainly not compulsory in my job.
My boss does not require me to use an Internet innovation intermediary platform.
My superiors expect me to use an Internet innovation intermediary platform.

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