

## International Journal of Innovation in Management

- The Effect of Board Gender Diversity on Stock Price Informativeness: Evidence from Listed Companies in the Tourism Industry** 1  
*Yi-Ling Chen, Ming-Chun Wang, and Jin-Jia Hu*
- Examining the Influence of Guild Engagement and Value Experience on MMORPG Gamers' Satisfaction and Continuance Intention for Game Playing** 15  
*Jeffrey C. F. Tai*
- The Role of Top Management and Dynamic Capability in Inter-Organizational Information System Assimilation** 35  
*Shu-Chen Yang, Chia-Chun Kang, and Zhong-Yu Chao*

**Society for Innovation in Management (SIiM)**

12F-1, No.5, Guangfu N. Rd. Songshan Dist.,

Taipei City 10560, Taiwan (R.O.C.)

<http://www.siim.org.tw/IJLiM>



Published by Society for Innovation in Management (SIiM)

# IJiM

## International Journal of Innovation in Management

### Publisher

Kuang Hui Chiu

### Published By

Society for Innovation in Management

### Editor-in-Chief

---

**Farn, Cheng-Kiang**

National Central University, Taiwan

### Executive Secretary

---

**Chiang, Ching-Chih**

Society for Innovation in Management,  
Taiwan

### Editorial Board

---

**Azuma, Tomohiro**

Kanto Gakuen University, Japan

**Borres, Isaias Lagsa**

Our Lady of Fatima University,  
Philippines

**Chang, Tung-lung Steven**

Long Island University, USA

**Duan, Yunlong**

Yunnan University of Finance and  
Economics, China

**Farn, Cheng-Kiang**

National Central University, Taiwan

**Hu, Han-Fen**

University of Nevada, Las Vegas, USA

**Hwang, Syming**

National Chengchi University, Taiwan

### Executive Editors

---

**Wang, Kai**

National University of Kaohsiung,  
Taiwan

**Yang, Shu-Chen**

National University of Kaohsiung,  
Taiwan

**Jantavongso, Suttisak**

Rangsit University, Thailand

**Lin, James T.**

National Tsing-Hua University, Taiwan

**Rhee, Maji**

Waseda University, Japan

**Tapanainen, Tommi**

Université de Liège, Belgium

**Wang, Kai**

National University of Kaohsiung,  
Taiwan

**Yaacob, Zulnaidi**

University Sains Malaysia, Malaysia

**Yang, Shu-Chen**

National University of Kaohsiung,  
Taiwan

## Call for Papers

### Scope

International Journal of Innovation in Management (IJiM) is an international, refereed, and semiannual journal published by the Society for Innovation in Management (SIiM). IJiM aims to describe, assess and foster understanding of the role of innovative technologies, managerial practices and theories. Original and Unpublished manuscripts that investigate theoretical issues or report empirical findings in all aspects of innovation in various management areas are welcomed. Topics of interest include, but are not limited to, the following:

- General innovation and management issues in enterprises.
- Comparative studies of innovation across enterprises, countries, or cultures.
- The role of information technologies in innovation management.
- A cross-disciplinary approach to the study of innovation in marketing management, supply chain management, knowledge management, and information systems management.
- Financial issues in the commercialization of innovation.
- Human resource issues in innovation and management.
- Intellectual property issues in innovation and management.
- Project management issues in innovation and management.
- Innovation at various levels of analysis, such as technological innovation, product innovation, and industrial innovation.
- Innovation in emerging areas such as environment and energy, healthcare, and service management.

Full paper manuscripts must be in English. In principle, manuscripts should not exceed 8,500 words, inclusive of references, tables, figures, and appendices. An Article Title Page indicating article title, author details (full name, affiliation, and e-mail of each author, with the corresponding author indicated), and acknowledge information should be included in the submission with the manuscript. All papers are double blind reviewed by at least two experts in the field. The review will be based on the rigor, relevance, originality, significance, quality, and clarity of the submitted manuscript to be considered for publication.

### Deadline and Submission

We cordially invite you to consider submitting your research work to IJiM. Please send your manuscript to [IJiM@siim.org.tw](mailto:IJiM@siim.org.tw) for submission.

# The Effect of Board Gender Diversity on Stock Price Informativeness: Evidence from Listed Companies in the Tourism Industry

Yi-Ling Chen<sup>1</sup>, Ming-Chun Wang<sup>2\*</sup>, and Jin-Jia Hu<sup>3</sup>

Department of Asia-Pacific Industrial and Business Management,  
National University of Kaohsiung, Taiwan<sup>1</sup>

Department of Money and Banking,  
National Kaohsiung First University of Science and Technology, Taiwan<sup>2</sup>

Department of Money and Banking,  
National Kaohsiung First University of Science and Technology, Taiwan<sup>3</sup>  
ylchen@nuk.edu.tw<sup>1</sup>, gregory@nkfust.edu.tw<sup>2</sup>, jim90080@gmail.com<sup>3</sup>

*\*Corresponding Author*

Received 21 March 2016; received in revised form 13 June 2016; accepted 24 June 2016

---

## Abstract

This study investigates the effect of gender diversity among members of the board of directors on stock price informativeness. Stock price informativeness is the price volatility that is unexplainable by market model. This study uses the data of listed companies in the tourism industry in Taiwan in 12 consecutive years from 2000 to 2011, as example to determine the impact of board gender diversity on stock price informativeness. We find that the number of female board members and the percentage of female board members are negatively associated with stock price informativeness, while managers' holding has positive relation with stock price informativeness. However, there is no significant evidence indicating that female chief executive officers (CEO), female board members, female board existence or female threshold are associated with stock price informativeness. Furthermore, we find that the number of female board members and the percentage of female board members have negative association with stock price informativeness only before the financial crisis in 2008.

*Keywords: Board gender, price informativeness, ownership structure*

---

## 1. Introduction

In modern society, as social status elevated and education improved, many policies that are aimed at achieving gender equality and guarantee for minorities are established, such as maternity leave with pay, guaranteed member quota, and so on. The European Commission is enforcing the guaranteed quota for the number of female directors to majority of listed companies in its member countries. It requires that at least 40% of the boards of directors are female. In 2014, Germany passed a bill that regulates the percentage of female members in the board of directors to be at least

30% of the total board members in big companies despite the pending criticism.<sup>1</sup> Norway, on the other hand, has already implemented a policy in 2006 that female board members should take up 40% of total board members, and the ratio for female board members stays around 36% to 40%. In addition, Fortune shows that in top 1000 companies, there are 54 female CEOs<sup>2</sup> a post usually dominated by males. From this, female nowadays not only has the same right as male but also enjoys a lot of assur-

---

<sup>1</sup><http://www.dw.de/germany-to-legislate-30-percent-quota-for-women-on-company-boards/a-18088840>

<sup>2</sup><http://www.catalyst.org/knowledge/women-ceos-fortune-1000>

ance, especially in what used to be male-dominating corporations. In other words, there is a guaranteed percentage for female board members and rise of percentage for female CEO because of the constant focus gained by gender equality. However, the lack of Enlightening and Feminism in Asia continued the culture of neglect against women. The statistic from Catalyst in 2014 shows that the percentage of female directors in Taiwan is only 4.4%<sup>3</sup>, it is far lower than 9.6% in Hong Kong, while 8.1% in China and 7.9% in Singapore. The percentage of female CEOs, which is 1.9%, is even lower than 4.0% in China, 2.7% in Singapore and 2.1% in Hong Kong.<sup>4</sup> Therefore, in Asian countries, women always play an invisible role in corporate governance.

Apart from the gender role in management, other factors that greatly influence the price informativeness include government policy and global economy. For instance, Taiwanese corporations have focused on expanding in China due to government policy such as ECFA, study programs for China students, investments from Chinese funds, individual free travels for Chinese people, the CSSTA that gained attention, and so on, all of which may deeply affect the Taiwanese industries.

According to the Ministry of Transportation and Communication's Tourist Bureau, Taiwan's tourism income from foreign exchange has surpassed domestic travels since 2008 and the total income is rising after its traveling policy opens to Chinese tourists. In addition, the number of Chinese tourists has increased from 300 thousand to almost a million in 2009 since the policy was implemented in July 2008. As the individual free travel was carried out in June 2011, the number of Chinese tourists rose from 1.7 million to nearly 3 million. According to the figures from the Tourist Bureau, the total number of tourists in Taiwan in 2012 was 5,479,099. Japan,

Hong Kong and Macau took up 2 million while China took up 2 million. From this, Taiwan's Chinese-friendly travel policy has drastic impact on its tourism industry.

The current literature suggests that female directors provide greater oversight and monitoring of managers' actions and reports (Hillman et al., 2007; Adams and Ferreira, 2009). Gender diverse boards improve the quality of public disclosure through better monitoring. Gul et al. (2011) show that stock prices of firms with gender diverse boards reflect more firm-specific information. Therefore, this study takes board gender as primary factor to investigate the correlation between female directors and stock price informativeness.

This study focuses on the effect of the management's gender equality in listed companies in Taiwan's tourism industry<sup>5</sup> and investigates its influence on stock price informativeness. In addition, it also looks at whether gender has an impact on stock price informativeness before and after the financial crisis.

## 2. Methodology

### 2.1 Data

This study focuses on listed companies in the tourism industry in Taiwan and collects ownership structure and financial sheets from TEJ, Taiwan Economic Journal, ranging from 2000 to 2011.<sup>6</sup> Among them, stock price informativeness is derived from the daily stock price, annual performance and gender of board members and supervi-

---

<sup>3</sup>Similar to Hillman et al. (2002) and Srinidhi et al. (2011), we believe that the percentage of women employed in an industry influences the likelihood of female participation in the boards of firms belonging to that industry. In 2011, the proportion of female directors in listed companies in the tourism industry rose up to 34.13 percent ranks the highest in all kinds of industries. Therefore, we focus on the tourism industry for our study.

<sup>4</sup>Eliminating missing values in ownership structure and other variables drastically reduces our sample. Finally, 96 observations from eight listed companies each year from 2000 to 2011 left in the full sample for further analysis.

---

<sup>3</sup><http://www.catalyst.org/knowledge/women-boards>

<sup>4</sup><http://www.catalyst.org/knowledge/2014-catalyst-census-women-board-directors>

sors at the end of each year. The details of our sample are in Panel A of Table 1.

**2.2 Definition of Dependent Variable**

This study takes idiosyncratic volatility (IV) as the dependent variable ( $\Psi$ ) to measure a corporation’s information disclosure. Idiosyncratic volatility is defined as the variance of stock returns that cannot be explained in market model after logit transformation. The steps are as follows:

$$r_{i,d} = \alpha_i + \beta_i r_{m,d} + \varepsilon_{i,d} \quad (1)$$

$r_{i,d}$  is the excess rate of return for a company and  $r_{m,d}$  is the excess rate of return for market portfolio under capital asset pricing model (CAPM)  $\alpha_i$  and  $\beta_i$  are measured through regression analysis. In terms of the variance of  $\varepsilon_{i,d}$ , the variance of stock price return  $\text{Var}(r_{i,d})$  can be presented in equation (2) as systematic risk and idiosyncratic volatility risk.

$$\text{Var}(r_{i,d}) = \beta_i^2 \text{Var}(r_{m,d}) + \text{Var}(\varepsilon_{i,d}) \quad (2)$$

Because  $\beta_i = \text{Cov}(r_{i,m,d}, r_{m,d}) / \sigma_{m,d}^2$ ,  $\sigma_{i,m,d} = \text{Cov}(r_{i,m,d}, r_{m,d})$  and  $\sigma_{m,d}^2 = \text{Var}(r_{m,d})$ , in equation (2), the systematic

risk and idiosyncratic volatility risk can be expressed as in equation (3)

$$\sigma_{i,e,d}^2 = \sigma_{i,d}^2 - \frac{\sigma_{i,m,d}^2}{\sigma_{m,d}^2}; \sigma_{i,d}^2 = \text{Var}(r_{i,d}) \quad (3)$$

The ratio for idiosyncratic volatility to total volatility is  $(\sigma_{i,e,t}^2 / \sigma_{i,t}^2)$ , showing the part not explained by market risk, which also equals to  $(1 - R_{i,t}^2)$  in equation (1). Therefore, through logit transformation of  $(1 - R_{i,t}^2) / R_{i,t}^2$ , the idiosyncratic volatility is obtained as shown in equation (4).

$$\Psi_{i,t} = \text{Ln} \left( \frac{1 - R_{i,t}^2}{R_{i,t}^2} \right) = \text{Ln} \left( \frac{\sigma_{i,e,t}^2}{\sigma_{i,t}^2 - \sigma_{i,e,t}^2} \right) \quad (4)$$

**2.3 Definition of Independent Variable**

This study takes board gender equality and corporate governance as primary independent variables as shown in Panel B of Table 1. With higher gender equality, what used to be a male-dominant board gradually adds female characters. Therefore, the board gender variable in this study focuses on female influence. Variables on corporate governance primarily consist of ownership structure, management holding, institution holdings, and earning quality.

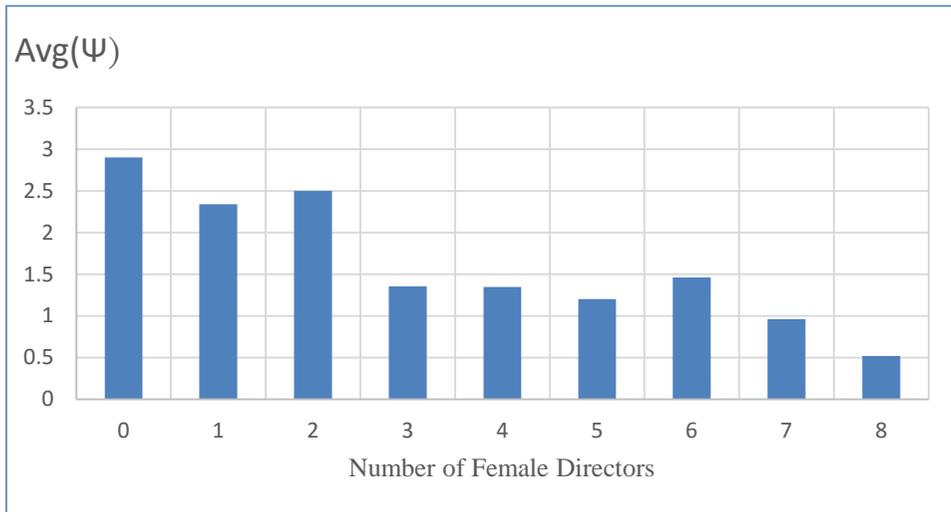


Figure 1: Graphical Representation of Relative Idiosyncratic Volatility.

Table 1: Sample Detail &amp; Definitions of Variables

Panel A		Sample Detail: Period : 2000 - 2011
Code	Name	Website
2701	WANHWA ENTERPRISE COMPANY	<a href="http://www.wanhwa.com.tw/">http://www.wanhwa.com.tw/</a>
2702	HOLIDAY GARDEN HOTEL	<a href="http://www.hotelhg.com.tw/">http://www.hotelhg.com.tw/</a>
2704	AMBASSADOR HOTELS	<a href="http://www.ambassadorhotel.com.tw">http://www.ambassadorhotel.com.tw</a>
2705	LEOFOO TOURISM GROUP	<a href="http://www.leofoo.com.tw/">http://www.leofoo.com.tw/</a>
2706	FIRST HOTEL	<a href="http://www.firsthoteltaipei.com/">http://www.firsthoteltaipei.com/</a>
2707	REGENT HOTELS & RESORTS	<a href="http://www.regenttaipei.com/">http://www.regenttaipei.com/</a>
5706	PHOENIX TOURS	<a href="http://www.travel.com.tw/">http://www.travel.com.tw/</a>
8940	NEW PLACE INTERNATIONAL CO. LTD.	<a href="http://www.newpalace.com.tw/">http://www.newpalace.com.tw/</a>
Panel B		Definition
Stock price informativeness variable		
$\Psi$	Idiosyncratic volatility of stock return	$\Psi_{i,t} = \text{Ln} \left( \frac{1 - R^2_{i,t}}{R^2_{i,t}} \right) = \text{Ln} \left( \frac{\sigma^2_{i,e,t}}{\sigma^2_{i,t} - \sigma^2_{i,e,t}} \right)$
Gender diversity variables ( <i>GDIV</i> )		
LFDIR	Ln of number of female directors	Ln(number of female directors+1)
FDIRP	Percentage of female directors	Percentage of female directors to total directors
FDIR	Number of female directors	Seats of female directors in board of director
FD	Existence of female directors	Dummy variable. 1 for at least one female director; 0 for no female director
FD2	Threshold of female directors	Dummy variable. 0 for more than two female directors; 1 for less than 3 female directors. From Figure 1, with more than 2 female directors, firm's price informativeness decreases.
FCEO	Female CEO	Gender dummy variable. 1 for female CEO; 0 for male CEO
FCHAIR	Female chairman	Dummy variable. 1 for female chairman; 0 for no female chairman
Governance variables ( <i>GOV</i> )		
LDIR	Ln of number of directors	Ln(number of directors+1)
BOARD	Percentage of stock held by board members	(total number of stock held by directors+ total number of stock held by supervisors)/ number of outstanding stocks at the end of year.
MGT	Percentage of stock held by managers	Total number of stock held by the management/ number of total outstanding stocks.
Control variables		
AGE	Firm age	Log(difference between current year and year of establishment)
DD	Dividend distribution	Dummy variable. 1 for dividend in any form; 0 for no dividend.
LEV	Leverage ratio	total liabilities/ total asset
MB	Market-to-book value	(stock price*number of outstanding shares)/ book value
ROE	Return on equity	Net profit/ total equity.
SIZE	Market value	Stock price * number of outstanding shares.
VROE	Volatility of return on equity	Var (ROE <sub>i,t</sub> )

## 2.4 Hypotheses

This study takes board gender as primary factor to investigate the correlation between female directors and stock price informativeness, and establish hypotheses. In past research, Carter et al. (2010) use financial indicators to examine the effect of board diversity but does not find any significant influence on corporate performance and proposes endogenous relation between board diversity and corporate financial performance. Rose (2007) finds no significant connection between Tobin's Q and female board members. He argues that directors with diversity are often influenced by directors without diversity, and further take their opinions. Shrader (1997) uses data from *Fortune* magazine to conduct study on the relation between ratio of female board members and accounting indices of performance, and finds significant negative connection. Adams and Ferreira (2009) point out that on average, gender diversity has negative effect on corporate performance, and find that female quota on board member reduces firm value. Boehren and Stroem (2007) propose that heterogeneous board has less effectiveness on making decision so small firms with less diverse board or board members not holding concurrent position perform better. Therefore, the following hypotheses are set up.

*H1: Female board members have negative effect on stock price informativeness.*

*H1a: The number of female directors has negative effect on stock price informativeness.*

*H1b: The ratio of female directors has negative effect on stock price informativeness.*

*H2: The female management has negative effect on stock price informativeness.*

*H2a: Female chairperson has negative effect on stock price informativeness.*

*H2b: Female CEO has negative effect on stock price informativeness.*

In addition, firms with more than two female board members have better price informativeness than those with two or less

female board members. Therefore, the following hypothesis is established.

*H3: Board with two female members or less has positive effect on stock price informativeness.*

## 2.5 Descriptive Statistics Analysis

This study performs descriptive statistics on collected data, i.e. listed companies in the tourism industry, in order to understand their basics. The data is categorized from whole sample into firms with and without female board members to conduct descriptive statistics on medium and mean for primary analysis and characteristics.

## 2.6 Regression Analysis

This study takes stock price informativeness as a dependent variable. Model 1 utilizes panel regression model to examine the effect of board gender equality and ownership structure on stock price informativeness. Model 2 utilizes panel regression model to examine the effect of residual from female directorship prediction model on stock price informativeness, with  $\beta$  being the regression coefficient,  $\gamma$  being the coefficient for control variable, and  $\varepsilon$  being the residual.

$$\begin{aligned} \Psi_{i,t} = & \alpha + \beta_1 GDIV_{i,t-1} + \beta_2 GOV_{i,t-1} + \\ & \beta_3 LDIR_{i,t-1} + \gamma_1 ROE_{i,t-1} + \\ & \gamma_2 VROE_{i,t-1} + \gamma_3 SIZE_{i,t-1} + \gamma_4 LEV_{i,t-1} + \\ & \gamma_5 MB_{i,t-1} + \gamma_6 SIZE_{i,t-1} + \gamma_7 DD_{i,t-1} + \\ & \gamma_8 AGE_{i,t-1} + \varepsilon_{i,t} \end{aligned} \quad (5)$$

## 3. Empirical Results

### 3.1 Descriptive Statistics

This study samples its data for 12 consecutive years from 2000 to 2011, for analysis and sets 2008 as cut off point to conduct empirical analysis. Because there are few listed companies in the tourism industry and little of them have data in the past 12 years, only eight companies are included in the study. The data is divided into a whole set with and without female directors as shown in Table 2.

From Table 2, the average of stock price informativeness in years without a female director (2.898) is higher than that

with female directors (1.662). This indicates that the stock price informativeness is higher in years without female directors. Boards with more than two female directors have declined price informativeness. On average, 3.130 of 8.343 directors are females. Every 11.614 directors comes with 3.429 female directors, showing that even though the number of female directors is higher than the average by 0.3, the number of board members also increases by

3.271. It signifies that the number of female directors increases with the number of board members. About 18.8% of the corporations once had female as their CEO while only 9.13% of them had female chairperson. Table 2 shows that every company included in this study has female directors throughout the period, except for 2000, 2004 and. In addition, the number of female directors increases with time, from nearly three seats to four seats.

Table 2: Descriptive Statistics

	Entire Sample		With female board member		Without female board member	
	n=96	Median	n=88	Median	n=8	Median
Stock price informativeness						
$\Psi$	1.77	1.455	1.662	1.34	2.898	2.513
Gender diversity						
DIR	8.343	7	11.614	10	6.625	8
FCEO	0.188	0	0.205	0	0	0
FCHAIR	0.094	0	0.107	0	0	0
FD	0.913	1	1	1	0	0
FDIR	3.130	3	3.429	3	0	0
FDIRP	0.307	0.273	0.336	0.286	0	0
LDIR	3.327	3.303	3.335	3.303	3.242	3.303
LFDIR	0.833	0.693	1.232	1.098	0	0
Corporate governance						
BOARD%	26.844	23.59	26.184	22.81	31.35	26.51
MGT%	1.882	0.195	0.238	0	0.177	0.23
Control variables						
AGE	1.146	1.361	1.394	1.361	0.942	0.301
DD	0.761	1	0.738	1	1	1
LEV	0.341	0.352	0.343	0.352	0.327	0.327
MB	3.337	1.716	3.516	1.818	1.456	1.267
ROE	0.070	0.052	0.067	0.050	0.098	0.104
SIZE	6027095	3250923	6313252.65	3767455.5	3022440.63	1149680
VROE	0.030	0.018	0.030	0.017	0.018	0.018

### 3.2 Panel Regression Analysis

We apply panel regression with random effects to obtain our empirical results.<sup>7</sup> Table 3 shows the number of female directors and the effect of female directors on stock price informativeness. Columns 3 and 4 show results under control variable of management holdings, and columns 7 and 8 show results under control variable of board holdings. The coefficients for number of female directors (LFDIR) in

columns 3 and 7 are -0.113 and -0.219, both with 1% significance level. The results are consistent with H1a. The coefficients for percentage of female directors (FDIRP) in columns 4 and 8 are -0.386 and -0.624, with significance levels of 1% and 5%, respectively. These support H1b. Therefore, the results indicate that both the number of female directors and the percentage of female directors have negative effect on stock price informativeness, corresponding to H1.

Table 4 examines the effect of other board gender variables on stock price informativeness, with management holdings

<sup>7</sup>After employing a Hausman (1978) test, we adopt random effects (for discussion see Wooldridge (2002, p. 288) and Baltagi (2005, p. 70)).

under control. The coefficients for number of female directors (FDIR) in columns 1, 4 and 5 are -0.066, -0.064 and -0.066, with 1% and 5% significance levels. These show that the number of female directors has negative effect on stock price informativeness, corresponding to H1a. The coefficients for female chairperson (FCHAIR) and female CEO (FCEO) in columns 2 and 3 are -0.1 and -0.107, with no significance level. These show that female chairperson and female CEO have no significant effect on stock price informativeness and contradict with H2a and H2b. The coefficients for two female directors or less (FD2) are both 0.157 at 1% significance level, specifying that the number of female directors being 2 or less has positive effect on stock price informativeness, corresponding to H3. The results above agree with the findings in Adams and Ferreira (2009) that board diversity decreases corporate performance, and the argument for heterogeneous board in Boehren and Stroem (2007).

In addition, the results for before and after financial crisis are shown in Table 5 and Table 6. Table 5 represents pre-financial crisis and Table 6 represents post-financial crisis. With management holdings under control, the coefficients for the number of female directors (LFDIR) and percentage of female directors (FDIRP) are -0.404 and -1.389, each significant at 5% and 1% significance level. With board holdings under control, both variables appear to have negative correlation even if their coefficients are not significant. The results show that both the number of female directors and the percentage of female directors before financial crisis have negative effect on stock price informativeness. While the results for both variables after the financial crisis are not significant even under control of management holding and board holdings, and coefficients are negative. However, the coefficients for the number of directors (LDIR) are significantly positive under board holdings control (0.524, 0.365), implying that the number of directors has positive effect on stock

price informativeness. On December 15, 2008, the Taiwan Stock Exchange Corporation announced that listed companies need to report their information on the directors' and officers' liability ance<sup>8</sup> which can increase information disclosure quality of listed companies (Liu, Liou and Jian; 2015). Our findings are consistent with theirs.

#### 4. Conclusion

This study applies the concept in Gul et al. (2011), considering female board members and corporate governance in the discussion of the effect of female board member on stock price informativeness. The sample comes from the stock holding structure, financial reports, and stock price data from listed companies in Taiwanese tourism industry from 2000 to 2011, and analyzed with OLS regression analysis and robust test for empirical results.

The empirical results show that in listed companies in Taiwanese tourism industry, variables on number of female directors (LFDIR) and (FDIR) have negative effect on stock price informativeness and this corresponds to Boehren and Stroem (2007), i.e. firms with heterogeneous board have worse performance. In addition, that percentage of female directors (FDIRP) and female director threshold (FD2) have negative effect on stock price informativeness, which match the findings in Adams and Ferreira (2009). Management holdings (MGT) have positive effect on corporate price disclosure, which agree with Jensen and Meckling (1976). Also, the board holding (BOARD) has negative effect on corporate price disclosure. The results above indicate that female board member's positive effect on stock price informativeness agrees with Ferreira et al. (2011) and Dasgupta et al. (2010), while ownership

---

<sup>8</sup>Please see the article 3, paragraph 26 of Taiwan Stock Exchange Corporation's Rules Governing Information Reporting by Listed Companies (2008.12.15). <http://twse-regulation.twse.com.tw/ENG/EN/law/DAT06.aspx?FLCODE=FL007250&FLDATE=20081215&LSER=001>.

Table 3: The Effect of Number of Female Directors and Percentage of Female Directors on Stock Price Informativeness

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Intercept	1.524*** (18.345)	2.057*** (14.134)	2.754*** (4.678) -0.113** (-2.570)	2.247*** (8.645)	1.971*** (10.922)	1.549*** (4.266)	2.066*** (4.295) -0.219*** (-3.266)	1.810 *** (4.875)
GDIV=								
LFDIR				-0.386*** (-2.791)				-0.624** (-2.045)
GDIV=								
FDIRP				-0.105 (-1.654)			0.037 (0.418)	-0.107 (-0.846)
LDIR								
GOV=MGT	46.296*** (5.561)	49.101*** (11.106)	51.950*** (10.558)	45.291*** (9.074)				
GOV=								
BOARD								
ROE		0.928 (1.408)	0.494 (0.855)	0.706 (0.893)	-0.008* (-1.970)	-0.015*** (-2.696)	-0.007* (-1.803)	-0.012** (-2.173)
VROE		5.055*** (2.696)	4.462* (1.996)	4.686** (2.345)		-0.799 (-0.632)	-0.818 (-0.621)	-1.240 (-0.957)
LEV		0.960*** (3.871)	0.817** (2.675)	0.976*** (4.683)		7.641** (2.388)	7.223*** (2.035)	7.187*** (2.705)
MB		-0.021* (-1.827)	-0.020 (-0.976)	-0.023 (-1.561)		0.364 (0.866)	0.773** (2.652)	0.406 (1.062)
SIZE		0.000 (0.479)	0.000 (0.557)	0.000 (0.698)		0.020 (0.846)	-0.002 (-0.140)	0.025 (1.227)
DD		0.146 (1.557)	0.156 (0.936)	0.107 (1.148)		-0.000** (-2.088)	-0.000 (-1.206)	-0.000** (-2.288)
AGE		-0.763*** (-12.167)	-0.900*** (-3.504)	-0.565*** (-5.716)		0.586 (2.440**)	0.443 (1.801*)	0.438 (1.999*)
Adj R <sup>2</sup>	0.752206	0.741661	0.774519	0.736283	0.735359	0.762239	0.741848	0.788152
N	84	71	71	71	86	71	64	71

\*\*\*, \*\*, and \* indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 4: The Effect of Other Gender Variables on Stock Price Informativeness

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Intercept	1.823*** (5.430)	2.070 *** (6.578)	2.040 *** (4.979)	1.798*** (5.399)	1.804*** (4.071)	2.303*** (9.075)	1.823*** (8.302)	1.898*** (6.371)
GDIV = FDIR	-0.066*** (-3.350)			-0.064** (-2.483)	-0.066** (-2.570)			
GDIV = FCHAIR		-0.100 (-0.717)		-0.044 (-0.298)				
GDIV = FCEO			-0.107 (-1.107)		-0.061 (-0.735)			
GDIV = FD						0.179 (1.417)		
GDIV = FD2							0.157*** (3.792)	0.157*** (3.752)
LDIR	0.025 (0.291)	-0.001 (-0.016)	0.022 (0.192)	0.038 (0.426)	0.051 (0.435)			-0.027 (-0.423)
GOV =	44.762*** (8.819)	49.501*** (10.912)	50.559*** (8.368)	44.745*** (8.649)	45.719*** (6.969)	50.588*** (9.604)	46.081*** (10.189)	46.603*** (10.397)
MGT	0.609 (0.749)	1.040 (1.467)	0.649 (0.802)	0.643 (0.774)	0.322 (0.338)	0.489 (0.684)	0.586 (0.818)	0.620 (0.816)
ROE	5.092** (2.527)	4.839*** (2.513)	5.174** (2.592)	5.101** (2.535)	5.336** (2.466)	5.28 ** (2.67)	4.867** (2.649)	4.712** (2.426)
VROE	1.007*** (4.314)	0.942*** (3.794)	0.578* (1.755)	0.986*** (4.341)	0.728* (1.932)	0.889*** (3.99)	1.090 *** (5.573)	1.118*** (5.643)
LEV	(-0.959)	-0.023 (-1.217)	-0.006 (-0.252)	-0.016 (-0.904)	-0.004 (-0.165)	-0.013 (-1.076)	-0.021 (-1.959*)	-0.024 (-1.602)
MB	0.000 (0.287)	0.000 (0.313)	-0.000 (-0.336)	0.000 (0.207)	-0.000 (-0.247)	-0.000 (-0.304)	0.000 (0.922)	0.000 (0.870)
SIZE	0.070 (0.648)	0.121 (1.068)	0.110 (1.011)	0.058 (0.525)	0.046 (0.396)	0.208 (1.865*)	0.101 (1.024)	0.111 (1.064)
DD	-0.541*** (-4.585)	-0.751*** (-11.104)	-0.68*** (-6.395)	-0.543*** (-4.329)	-0.498*** (-3.296)	-1.016*** (-4.877)	-0.665*** (-6.307)	-0.668*** (-6.497)
Adj R <sup>2</sup>	0.739167	0.730037	0.736905	0.734078	0.740277	0.740123	0.747706	0.742975
N	71	71	71	71	71	71	71	71

\*\*\*, \*\*, and \* indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 5: The Effect of Number of Female Directors and Percentage of Female Directors on Stock Price Informativeness before Financial Crisis

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Intercept	2.461*** (10.733)	1.947*** (2.947)	2.987*** (8.937)	-0.229 (-0.082)	2.023*** (13.988)	2.615** (2.492)	5.800 (1.558)	2.366* (1.888)
GDIV=LFDIR				-0.404** (-2.209)			-0.085 (-0.396)	
GDIV=FDIRP			-1.389*** (-4.022)					-0.813 (-1.104)
LDIR			-0.342** (-2.397)	-0.078 (-0.287)			0.156 (1.303)	0.013 (0.073)
GOV=MGT	27.941*** (3.511)	55.496*** (3.821)	62.154*** (5.505)	46.779*** (2.871)				
GOVE=					-0.008 (-0.965)	-0.038*** (-3.046)	-0.045*** (-4.124)	-0.049*** (-2.965)
BOARD		-4.658** (-2.52)	-5.912*** (-4.653)	-5.563** (-2.229)		0.025 (0.01)	-0.169 (-0.105)	-1.261 (-0.446)
ROE		11.612**	15.057***	18.165**		3.074 (0.694)	1.402 (0.479)	5.08 (1.228)
VROE		(2.374)	(3.402)	(2.436)		0.4 (0.447)	0.408 (0.468)	0.139 (0.174)
LEV		-0.485 (-0.614)	-1.166 (-1.331)	-1.488 (-1.375)		0.124** (0.127)	0.13* (1.804)	0.155* (2.031)
MB		0.178***	0.138***	0.105				
SIZE		(3.902)	(3.681)	(1.056)		(2.177)	(1.804)	(2.031)
		-0.000***	-0.000***	-0.000		-0.000**	-0.000*	-0.000*
DD		(-4.291)	(-4.448)	(-1.305)		(-2.316)	(-1.906)	(-2.018)
		1.199***	0.943***	0.892		0.224	0.229	0.065
AGE		(3.552)	(4.007)	(1.601)		(0.504)	(0.496)	(0.176)
		0.437	1.091***	2.723		-0.662*	-2.695	-0.230
		(0.901)	(3.215)	(1.242)		(-1.729)	(-1.145)	(-0.447)
Adj R <sup>2</sup>	0.725033	0.803357	0.918865	0.804206	0.732910	0.606140	0.722942	0.622320
N	54	39	39	33	52	39	33	39

\*\*\*, \*\*, and \* indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 6: The Effect of Number of Female Directors and Percentage of Female Directors on Stock Price Informativeness after Financial Crisis

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Intercept	0.841*** (13.849)	2.094*** (9.803)	-0.203 (-0.127) -0.078 (-0.592)	-0.090 (-0.065)	1.159*** (8.226)	2.265*** (8.203)	0.721 (1.177) -0.081 (-0.746)	1.237* (1.911)
GDIV=LFDIR								
GDIV=FDIRP								
LDIR			0.786 (1.46)	-0.394 (-1.182)			0.524*** (3.318)	-0.369 (-1.54) 0.365* (2.173)
GOV=MGT	67.685*** (5.143)	34.560 (0.937)	-24.37 (-0.393)	-38.982 (-0.589)				
GOVE=					-0.008** (-2.264)	0.008 (1.135)	0.008 (0.726)	0.010 (0.865)
BOARD		1.005 (0.534)	1.657 (0.773)	1.808 (0.855)		1.936 (1.271)	1.378 (0.782)	1.343 (0.762)
ROE		3.435 (0.407)	7.466 (0.913)	8.936 (0.993)		9.778 (1.377)	8.542 (1.097)	9.663 (1.143)
VROE		0.755 (1.63)	0.494 (1.363)	0.555** (2.228)		1.791** (2.362)	1.196 (1.173)	1.433 (1.291)
LEV		-0.019 (-0.342)	0.021 (0.524)	0.016 (0.483)		-0.077 (-1.617)	-0.016 (-0.284)	-0.031 (-0.507)
MB		0.000 (0.096)	0.000 (-1.402)	0.000 (-1.691)		0.000 (1.158)	0.000 (-0.31)	0.000 (0.001)
SIZE		0.089 (0.257)	-0.323 (-0.862)	-0.331 (-0.853)		0.279 (0.83)	-0.097 (-0.24)	-0.022 (-0.046)
DD		-1.000*** (-3.135)	-0.791*** (-3.757)	-0.817*** (-4.719)		-1.635*** (-3.046)	-1.282 (-1.761)	-1.444* (-1.813)
AGE								
Adj R <sup>2</sup>	0.860723	0.501889	0.294054	0.272727	0.738973	0.493447	0.365098	0.371966
N	24	24	24	24	24	24	24	24

\*\*\*, \*\*, and \* indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

structure also shows significant effect on stock price informativeness, but in undetermined directions (Fan and Wong (2002), Lemmon and Lins (2003)).

As Taiwanese regulations on personal privacy, such as gender, education, and tenure and so on are not easily accessible, this study only takes board gender equality as primary variable throughout the study period from 2000 to 2011 on listed Taiwanese companies in the tourism industry, along with variables on corporate governance to investigate the effect on stock price informativeness. However, in terms of stock price informativeness, taking only gender as one variable may not be sufficient in the analysis. Therefore, future research plans might include board members' educational background, age, meeting attendance, salary and other factors as variables in examining the effect on stock price informativeness. References

### References

- Adams, R. B., & Ferreira, D. (2009). Women in the boardroom and their impact on governance and performance. *Journal of Financial Economics*, 94(2), 291-309.
- Baltagi, B. H. (2005). *Econometric Analysis of Panel Data*. Third Edition, West Sussex, England: John Wiley & Sons.
- Carter, D. A., D'Souza, F., Simkins, B. J., & Simpson, W. G. (2010). The gender and ethnic diversity of US boards and board committees and firm financial performance. *Corporate Governance: An International Review*, 18(5), 396-414.
- Dasgupta, S., Gan, J., & Gao, N. (2010). Transparency, price informativeness, and stock return synchronicity: Theory and evidence. *Journal of Financial and Quantitative Analysis*, 45(05), 1189-1220.
- Fan, J. P., & Wong, T. J. (2002). Corporate ownership structure and the informativeness of accounting earnings in East Asia. *Journal of Accounting and Economics*, 33(3), 401-425.
- Ferreira, D., Ferreira, M. A., & Raposo, C. C. (2011). Board structure and price informativeness. *Journal of Financial Economics*, 99(3), 523-545.
- Gul, F. A., Srinidhi, B., & Ng, A. C. (2011). Does board gender diversity improve the informativeness of stock prices? *Journal of Accounting and Economics*, 51(3), 314-338.
- Hausman, J. A. (1978). Specification tests in econometrics. *Econometrica: Journal of the Econometric Society*, 46(6), 1251-1271.
- Hillman, A. J., Cannella, A. A., & Harris, I. C. (2002). Women and racial minorities in the boardroom: How do directors differ? *Journal of Management*, 28(6), 747-763.
- Hillman, A. J., Shropshire, C., Albert, J., Cannella, A. (2007). Organizational predictors of women on corporate boards. *Academy of Management Journal*, 50(4), 941-952.
- Jensen, M. C., & Meckling, W. H. (1976). Theory of the firm: managerial behavior, agency costs and ownership structure. *Journal of Financial Economics*, 3(4), 305-360.
- Lemmon, M. L., & Lins, K. V. (2003). Ownership structure, corporate governance, and firm value: Evidence from the East Asian financial crisis. *The Journal of Finance*, 58(4), 1445-1468.
- Liu, J. L., Liou, C. H., & Jian, P. M. (2015). Effects of directors' and officers' liability insurance on information disclosure quality and corporate fraud. *Taiwan Accounting Review*, 11(1), 79-114.
- Rose, C. (2007). Does female board representation influence firm performance? The Danish evidence. *Corporate Governance: An International Review*, 15(2), 404-413.
- Shrader, C. B., Blackburn, V. B., & Iles, P. (1997). Women in management and firm financial performance: An exploratory study. *Journal of Managerial Issues*, 355-372.

- Srinidhi, B., Gul, F. A., & Tsui, J. (2011). Female directors and earnings quality. *Contemporary Accounting Research*, 28(5), 1610-1644.
- Wooldridge, J. M. (2002). *Econometric Analysis of Cross Section and Panel Data*, Cambridge, MA: The MIT Press.

### **About Authors**

**Yi-Ling Chen** is an associate professor from the Department of Asia-Pacific Industrial and Business Management, National University of Kaohsiung, Taiwan.

**Ming-Chun Wang** is an associate professor from the Department of Money and Banking, National Kaohsiung First University of Science and Technology, Taiwan.

**Jin-Jia Hu** is a master student from the Department of Money and Banking, National Kaohsiung First University of Science and Technology, Taiwan.



# Examining the Influence of Guild Engagement and Value Experience on MMORPG Gamers' Satisfaction and Continuance Intention for Game Playing

Jeffrey C. F. Tai\*

National Chiayi University, Taiwan  
jeffreycftai@mail.ncyu.edu.tw

\*Corresponding Author

Received 25 April 2016; received in revised form 1 June 2016; accepted 17 June 2016

---

## Abstract

Massively Multiplayer Online Role-Playing Game (MMORPG) is a popular genre of electronic games with an increasing share of gaming market. Because the success of MMORPG games depends on players' sustained use, this research focuses on examining players' continuance intention for game playing and posits that it can be influenced by perceived values of playing MMORPGs. According to service-dominant logic, value experiences are not acquired but co-produced by the players themselves altogether during gaming. Therefore, this study further investigates the antecedents of such co-produced value experiences in the MMORPG games. Specifically, drawing on Higgins' (2006) Regulatory Engagement Theory (RET), this study proposes that engagement in the MMORPG's guild allows gamers to improve their co-creation of value experiences with other players during gaming, which in turn enhances the gamers' continuance intention. To examine these issues, this research formulated a model with four constructs: (1) continuance intention, (2) satisfaction, (3) perceived value, and (4) players' guild engagement. An online survey was also conducted to collect data and to test the proposed hypotheses.

*Keywords: Guild engagement, perceived value, value co-creation, regulatory engagement theory, MMORPG*

---

## 1. Introduction

As high-speed Internet connections and powerful computer hardware prevail with a steady decrease in cost, Massively Multiplayer Online Role-Playing Games (MMORPGs) become the vanguard of a new generation of computer games. MMORPGs are often fantasy or science fiction-themed in which, thousands of players interact with each other through the use of avatars (Meadows, 2008). During gameplay, players partake in a variety of activities for enhancing combat capability, social status, avatar appearance, equipment quality, etc. (Yee, 2006a). Because players are typically motivated by differentiated goals, they can cooperate with each other

to advance their avatars. Therefore, MMORPGs are equipped with functional artifacts that facilitate players to bond together (Yee, 2006b; Ang et al., 2007). Guilds are such artifacts that function as in-game communities (Guegan et al., 2015). By affiliating with guilds, players can easily accumulate resources, build relationships, seek status, and collaborate with each other to defeat challenges in the game (Williams et al., 2014). Thus, engaging with guild activities engenders additional value to players, which could not be obtained through single play (Yee et al., 2012).

Traditionally, perceived value involves a price/quality tradeoff of product/service (Oliver, 1999; Zeithaml, 1988; Monroe, 1990), which can more satisfacto-

rily explain consumer behavior (cf. Gallarza et al., 2011). Based on previous MMORPGs literature, perceived value was found to increase players' purchase/ repurchase intention, willingness to pay premium prices, positive word-of-mouth, and game loyalty (e.g., Park and Lee, 2011a, 2011b; Rezaei and Ghodsi, 2014; Shin, 2010). However, existing literature has been criticized for pitfalls, such as inconsistent conceptualizations and lack of inconclusive determinants for perceived value (Sanchez-Ferandez and Iniesta-Bonillo, 2007). In the context of MMORPGs, these issues are especially prominent as players acquire value not only from consuming the "goods" of MMORPGs but also from experiencing the "services" offered during gameplay (Kohler et al., 2011). Thus, illustration of MMORPGs' perceived value should include those derived from the artifact of the game and those acquired from the experiences of gaming. Furthermore, MMORPG players do not merely consume gaming experiences but also contribute to value creation through inter-players interactions mediated by games' features (e.g., guilds). Thus, it is important to understand if players' active engagement with such activities influences their perceived value of MMORPGs (Holbrook, 1996). In order to shed light on the research gaps, this study attempts to address the following issues: First, this study will define perceived values of MMORPGs and then examine their impacts on gamers' satisfaction and repurchase intention; this will allow us to understand the importance of perceived values to MMORPG players. Second, this study will explore how gamers form value perceptions from MMORPGs. Although past research has identified experience as a determinant to perceived value (Holbrook and Hirschman, 1982; Holbrook, 1996), the mechanism through which it works is relatively unexplored. Based on Regulatory Engagement Theory (RET) (Higgins, 2006; Higgins and Scholer, 2009), perceived value is the outcome of motivational experience and its intensity can be

affected by one's engagement with activities relevant to the value target. Since participating guild activities is pivotal to enjoying MMORPGs play, this study proposes that gamer's guild engagement facilitates players to co-create and intensify the gaming experience, which in turn can increase their perceived value of MMORPGs. Consequently, the research questions are as follows:

- What are the dimensions of perceived value of MMORPGs, and do they influence gamers' post-consumption attitude and behavior (i.e., satisfaction and repurchase intention of MMORPGs) similarly?
- Whether players' guild engagement influences their perceived value of MMORPGs?

## **2. Theoretical Foundation**

### **2.1 Perceived Value**

Perceived value was conceived to be the outcome of an evaluative judgment. Based on the theory of utility, earlier scholars held that consumers derive value perception according to the difference between the utility provided and the price paid for products/services (Tellis and Gaeth, 1990). Utility is typically evaluated based on the economic worth of what is being offered by "a bundle of product/service attributes", which considers value as an "objective state of being". This approach is thought to be too narrow to capture consumers' perceptions of "what is received" and "what is given" (Monroe, 1990; Zeithaml, 1988). Specifically, price cannot represent consumers' sacrifices in the aspects of time, effort and research spent to acquire products/services. Meanwhile, the quality is typically used to capture the excellence of goods/services received; which is also insufficient to encompass all the benefits of the goods/services being offered. Thereafter, several researches have refined the notion of value in terms of "value-in-exchange" and "value-in-use" (Vargo and Lusch, 2004). For instance, Thaler (1985) suggested a mental accounting

model positing that, perceived value is the sum of transaction utility and acquisition utility. The former represents the difference between a consumer's internal reference price and the actual price paid; the latter refers to a comparison between perceived benefit and actual price of a product or service. Applying Gutman's (1982) means-end model, Zeithaml (1988) further argued that perceived benefit of a product or service hinges on consumers' use of its offerings in situations of importance to them (Gutman, 1982). The means-end approach opens a new research perspective in understanding value (Holbrook and Hirschman, 1982). Specifically, consumers are conceived to be reflexive when making judgment of a product or service. Value, more than being a static state of consumers' cognitive assessment of product/service offerings, is considered to be a phenomenological experience of consumers' engagement with product/service offerings in specific situations (Woodruff and Flint, 2006).

Subsequent research followed this approach and focused on delineating various forms of value-in-use in the context of consumption. Babin, Darden, and Griffin (1994) drew upon the outcomes of consumption experience and developed a value scale composed of utilitarian and hedonic dimensions. Sheth, Newman, and Gross (1991) suggested five forms of consumption value: functional, social, emotional, epistemic, and conditional. Lai (1995) identified eight types of generic product benefits: functional, social, affective, epistemic, aesthetic, hedonic, situational, and holistic. Holbrook (1994) proposed a typology of value based on three dimensions: intrinsic/extrinsic, self-oriented/other-oriented, active/passive. These were extended to eight kinds of customer value: efficiency, excellence (quality), politics (success), esteem, play, esthetic, morality, and spirituality. These studies considered value in terms of "a perceptual state of being" that results from an individual's judgment on how good or bad the

experience is (Holbrook, 2006). Though useful, such researches still offer little insights into how value perceptions emerge. Hence, the following turns to discuss the process issue of value experience.

## **2.2 Value Co-creation**

Service-dominant logic (SDL) suggests that consumers are always co-creators of value that is essentially value-in-use (Ramirez, 1999; Vargo and Lusch, 2004). Specifically, at the interface of the firm with its consumers or any other stakeholders, product/service offerings are exchanged and certain interactions among the parties occur. Such interactions involve either reciprocal actions or influences of persons or things on each other (Czpiet et al., 1985). Thus, consumers derive value perceptions not only from the exchange of product/service offerings but also through the interactions made with the offerings or supplier/other stakeholders. As an example, in the former case, a patient's interactions with a doctor increase his/her knowledge of taking the medicine properly, allowing the patient to receive the full value of the medicine prescribed; in the latter case, interactions between a consumer and a personal fitness coach constitute the primary value of their fitness program. Therefore, perceived value of product/service offerings can be acquired through the non-interaction component (e.g., derived from exchanged product/service offerings) and the interaction component (e.g., derived from altered consumer experience or modified product/service offerings) (Berthon and John, 2006).

Consistent with SDL, Richins (1994) argued that a consumer derives the value of a possession based on the interactions with made with it. Richins identified value in terms of possible relationships of meanings to possessions, namely, public value and private value. Public value arises from meanings inter-subjectively attached by both the consumers and other stakeholders to the possessions, such as social relationship ties and self-expression (Kim, Gupta, and Koh, 2011). Public value results from

reciprocal actions (e.g., social relationship ties) or influences (e.g., self-expression) made between the consumers and other stakeholders; which also belongs to the interactive component of perceived value. Private value is conceived based on the consumers' subjective meanings assigned to the possessions, such as their functional and emotional significance (Rezaei and Ghodsi, 2014). In the purest case, private value captures only the non-interactive component of perceived value (i.e., value derived from exchanged product/service offerings). Accordingly, this study argues that public value and private value can represent the interactive and the non-interactive component of perceived value, respectively. However, since an individual's subjective meanings are also shaped by the interaction with other stakeholders and hence, contained the inter-subjective meanings are co-created and shared by the consumer with others. This study would also like to contend that private value can be influenced by public value.

### **2.3 Regulatory Engagement Theory (RET)**

Given consumers' role in constructing value experience, there is a need to know how their active engagement influences valuation of products/services (Kumar et al., 2010). This can be illuminated by the Regulatory Engagement Theory (RET) by Higgins (2006). RET conceptualizes value as a motivational force experience (i.e., attraction or repulsion) regarding one's goal pursuit (Higgins, 2006). Such value experience is composed of the direction (i.e., towards or away) and the intensity (i.e., strong or weak) of motivational force (Higgins and Scholer, 2009). Motivational force direction is influenced by the outcomes of goal pursuit (e.g., product/service offerings) such that the outcomes: (1) possess hedonic properties, (2) satisfy one's needs, and (3) meet the shared beliefs of social norms (Higgins and Scholer, 2009). On the other hand, motivational force in-

tensity is determined by one's strength of engagement in goal pursuit activities.

In contrast with SDL which explores how consumers' interactions with relevant stakeholders and products/services co-create value experience in terms of desirable goal pursuit outcome, RET stresses the goal pursuit process in terms of the quality of such interactions and how it intensifies the value experience. Engagement strength captures the quality of such interactions which represents one's sustained attention in terms of the state of being involved, occupied, fully absorbed, or engrossed in something (Higgins, 2006). By stressing the role of engagement strength, the occurrence of value experience can be understood; that it is dependent not only on whether the outcomes of goal pursuit meet the desired goals but also on the individual's state of engagement strength during goal pursuit activities (Pham and Avnet, 2009). RET suggests that engagement strength is affected by (1) opposing interfering forces, (2) overcoming personal resistance, (3) having regulatory fit, (4) increasing the likelihood of achieving goal pursuit outcomes, and (5) using proper means and sources of motivational force direction (Higgins and Scholer, 2009). Accordingly, consumers' value experiences can be altered through manipulation of these sources of engagement strength, even without having to change the outcomes of their goal pursuit. Since the effect of engagement on value experience has received least attention in the literature (Scholer and Higgins, 2009), this study will examine whether consumers' engagement in goal pursuit activities influence their value experience.

### **3. Research Model and Hypotheses**

**MMORPG.** An MMORPG is a self-contained, virtual world in which many users simultaneously participate in different role-playing scenarios (Griffiths et al., 2004). Three features contrast MMORPGs with other genres of online game. First, players choose an avatar or a

character to represent them in the game (Achterbosch, Pierce, and Simmons, 2008). The avatar is viewed as an idealized version of players' own personality (Ducheneaut et al., 2009); hence, players will expend significant efforts to maintain the avatar and use it to move, communicate, and engage in various actions in the game (Chuang, 2006). Second, players typically affiliate with certain communities, called guilds, in order to seek resources or collaborate with others to advance characters or accomplish combats. Guild members can make use of the built-in chat or instant messaging services to form social relationships and improve social interactions; thus, enhancing gaming enjoyment and facilitating task collaboration (Williams, 2006). Lastly, MMORPG creates a persistent world in which, events happen steadily even while players have left the game (Yee, 2006b). Such dynamism stimulates players to keep in touch with the gaming world, motivating them to renew game subscription continuously.

The sticky features turn MMORPG to become the dominant genre of online game. Super Data Research (2015) indicated that

MMO games generated a total sale of \$11 billion in 2014 alone, which accounts for 21% of worldwide digital game market. Popular titles, like Ultima Online, EverQuest, Dark Age of Camelot, and World of Warcraft (WoW) had a rapid increase in subscriptions for nearly 36 consecutive months (Ryahl, 2012). These facts manifest that MMORPGs are generally successful in attracting players. However, MMORPG players are notoriously fickle that even hot titles can quickly lose subscribers. For example, WoW had over 12 million subscriptions towards to end the 2014. Along with the aging of the game and that increasing players have tried out the endgame, WoW lost about 3 million subscribers during the first three months of 2015 (Weinberger, 2015). Because MMORPG publishers rely heavily on user subscription to generate income (Ryahl, 2012; Moon et al. 2013), retaining subscribers become increasingly important to publishers as new subscribers inevitably decrease over time. Therefore, it is important for publishers to understand the motivation behind continuous MMORPG play.

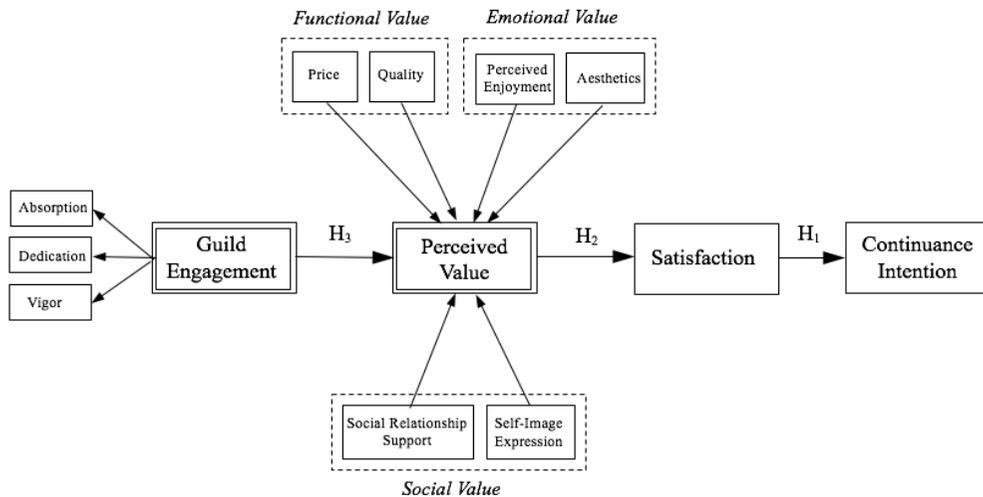


Figure 1: Research Model of Perceived Value as Influenced by Guild Engagement, Social, Functional, and Emotional Values.

**Continuance Intention.** Continuance refers to continued use rather than

first-time use. In this study, continuance intention is defined as a player's intention

to repeatedly play an MMORPG game. Earlier research assumed that continuance co-varies with acceptance and adopted the same set of pre-acceptance variables to account for both acceptance and continuance decisions (e.g., Davis et al., 1989; Karahanna et al., 1999). However, this approach cannot explicate the “acceptance-discontinuance anomaly” because users’ psychological motivations that have emerged after the initial acceptance can override their prior beliefs and then change subsequent continuance decisions (Bhattacharjee, 2001a, 2001b); hence, a more satisfactory account on continuance decisions needs to incorporate factors that capture users’ post-acceptance psychological states.

**Satisfaction.** In the marketing literature, satisfaction has long been suggested as a pivotal determinant of repurchase intention or customer loyalty (Oliver, 1980). Satisfaction is defined as an affective state arising from cognitive appraisal of experiences (McKinney, Yoon, and Zahedi, 2002). It is typically captured as (1) positive (satisfied), (2) indifferent, or (3) negative (dissatisfied) feeling or response to consumption-related fulfillment (Oliver, 1997). Being an attitude-like construct (Latour and Peat, 1979), satisfaction has been argued by Theory of Reasoned Action (TRA) and Theory of Planned Behavior (TPB) to be influential to one’s behavioral intention (Fishbein and Ajzen, 1975; Ajzen, 1985). Furthermore, Bagozzi’s (1992) appraisal-emotional response-coping framework suggests that favorable appraisals of behavioral outcome can stimulate volitive desires or relieve appetitive desires (i.e., the occurrence of outcome-desire fulfillment event), which in turn can engender positive emotional responses (e.g., pleasure) resulting in coping responses of intending to enjoy, maintain or increase the outcome. Since satisfaction with an MMORPG reflects players’ positive emotional response arising from their cognitive appraisals of playing experiences, the self-regulatory coping response would be to play the same

game continually in order to enjoy, maintain or increase the favorable outcome. Indeed, the predominant consensus of marketing research indicates that satisfied customers tend to use and repurchase a product or service more frequently than dissatisfied customers do. Moreover, extant information systems (e.g., Bhattacharjee, 2001a, 2001b; Deng et al., 2010; Zhao et al., 2012) and gaming research (e.g., Sun et al., 2014) also corroborated the satisfaction-continuance relationship. Therefore, the first proposition of this study is that: Player’s satisfaction with a MMORPG game is positively associated with his/her continuance intention of the game.

**Perceived Value.** As developed in Section 2, perceived value captures consumers’ cognitive evaluations of their experience with product/service offerings. Based on the SDL perspective, it is comprised of functional value, emotional value, and social value; the first two reflect private or non-interaction value component, while the last represents the public or interaction value component.

Functional value refers to the perceived utility of an MMORPG based on the game’s capacity for functional, utilitarian, or physical performance (Sheth et al., 1991). Following Sweeney et al. (2001), this study defines functional value in terms of price utility and functional quality. Price utility is derived from players’ perceived efficient use of money for acquiring an MMORPG (Thaler, 1985). Functional quality on the other hand, refers to overall excellence and expected performance of MMORPG. Because MMORPG is a software program, its functional quality can be manifested in its user-friendliness, performance reliability, and absence of software bugs (Kim et al., 2011). Moreover, MMORPG is constituted by multimedia artifacts; hence, the quality of graphical and acoustic features is also an essential component of MMORPG functional value.

Emotional value refers to the perceived utility of MMORPG based on the game’s capacity to arouse feelings or affec-

tive states (Sheth et al., 1991). Such emotions are different from affective moods in that, they possess greater psychological urgency, motivational potency, and situational specificity (Westbrook and Oliver, 1991; Rezaei and Ghodsi, 2014). Prior hedonic value research suggested that, emotional attraction due to consumption of goods/services is derived from their entertainment worth (Babin et al., 1994). In addition, players in the MMORPG depend principally on functional, decorative, and social props to interact with others in the virtual world. The visual appearance, sound effects, background fiction, provenance, and customizability of such digital items are very likely to arouse players' emotional response (Park and Lee, 2011a, 2011b). Accordingly, this study considers emotional value as comprised of two essential components: perceived enjoyment and aesthetics (Kim et al., 2011; Lin and Lin, 2011). Perceived enjoyment is defined as the extent to which playing MMORPG is recognized to be enjoyable, interesting, pleasurable, and capable of enticing curiosity in its own right (Teo et al., 1999; Turel et al., 2010; van der Heijden, 2003). Aesthetics is defined as the perceived visual and musical appeal of the digital artifacts presented in the MMORPG (Kim et al., 2011; Turel et al., 2010).

Social value refers to the utility derived from a MMORPG's ability to enhance players' social self-concept (Turel et al., 2010; Kim et al., 2011; Sheth et al., 1991). MMORPG players experience benefits of enhancing social self-concept in two-folds. First, the real-life idiosyncratic attributes of players are masked in the virtual world. The only visible cues of other players are their avatars and their costumes and affiliated guild names. Guilds are created and exist only in the virtual world based on the criteria internal to the game and does not have any connection to social reality. When players join a specific guild, the act itself expresses symbolic meanings to others that he or she becomes identified with that social group (Guegan, Moniner,

and Buisine, 2015). Since individuals with the same social identity tend to demonstrate in-group favoritism (Postmes, 1998), players become easily connected with the affiliated guild members and acquire their social support (Treppe, Reinecke, and Juechems, 2012). Social relationship support, hence, is posited to be one of MMORPG's social values; this refers to MMORPG's capability to help form, maintain, and enhance interpersonal relationships (Kim, et al., 2011). Second, the use of game items also provides social value to players. Typically, there are three kinds of digital game items: (1) functional, (2) vanity, and (3) social (Guo and Barnes, 2009). Functional props are used to increase the offensive power of characters in the game; vanity props are utilized to adorn characters; lastly, social props are items that are given to other players as gifts. Because some game items are appealing but rare, using them not only enhances self-image but also increases status of players in the virtual world (Park and Lee, 2011a, 2011b); therefore, social self-image expression is considered to be another social value of MMORPG. This refers to the game's capability of enhancing players' image in the eyes of others (Kim et al., 2011).

Based on the marketing literature, Expectation-Disconfirmation Theory (EDT) is the dominant perspective to examine the development of satisfaction among individuals (Oliver, 1980). EDT presumes that satisfaction is a state of emotional response resulting from cognitive evaluation processes (McKinney et al., 2002). Consumers derive their disconfirmation belief of consumption experience by comparing perceived performance against expected outcome (Bhattacharjee, 2001). Positive disconfirmation occurs when perceived performance exceeds expected performance which leads to satisfaction response and repurchase intention. EDT suggests that disconfirmation belief is the single-most pivotal cognitive determinant of satisfaction; however, subsequent research found

that perceived performance also has a significant impact on satisfaction (Churchill and Surprenant, 1982; Tse and Wilton, 1988; Bolton and Drew, 1991). Furthermore, Bagozzi (1992) argued that there are self-regulatory mechanisms at work in the attitude-intention relationship. He proposed that individuals evaluate the outcomes first and then, such appraisals of outcome-desire lead to specific emotional reactions (e.g., satisfaction); this in turn arouses coping responses of behavioral intentions. Based on the framework, perceived performance can also directly influence satisfaction aside from its indirect effect through disconfirmation belief; the latter is the only presumed possible effect based on EDT. Therefore, this study focuses on investigating the relationship between perceived performance and satisfaction. Since perceived value captures players' evaluation of MMORPG performance and the consequences of playing it (Woodruff, 1997; Grace and Weaven, 2011), this study argues that perceived value plays similar role as perceived performance of EDT or as cognitive appraisals of Bagozzi' (1992) framework. Consequently, this study contends that perceived values of MMORPG positively influence players' satisfaction of the game (Zhao et al., 2012), which leads to the study's second hypothesis that: Player's perceived value of a MMORPG game is positively associated with his/her satisfaction with the game.

**Guild Engagement.** Social dimension and immersive experience are chief motivations for people to play MMORPGs (Yee, 2006; Yee, Ducheneaut and Nelson, 2012). This is because MMORPG provides a new social environment for players to get away from their everyday real-life (Guegan et al., 2015). In the game, players are asked to choose a class (e.g., warrior, mage, hunter, etc.) at the outset. Each class has its own skills and limitations and players engage in various game activities using the skills of the chosen class. Activities of the game include but not limited to: slaying monster antagonists, attacking castles, scavenging

goods, and trading merchandize. In addition, players often spend much of their time in guilds which have formalized membership and rank assignments that highly encourage player participation. For example, special roles in the guild that have emerged through social interaction include guild leader, "tank" and "puller". "Tank" refers to the player responsible for redirecting an enemy's attention to himself during a melee attack to protect other players in the game. He is usually heavily armored and is expected to withstand large amount of damages. A "puller" is the player responsible for drawing out a monster or an enemy away from its group into the hands of the puller's ally. Aside from these roles, players engaging in guild activities may conduct the following social interactions: managing and coordinating the guild members, seeking and providing helpful tips and friendly remarks, and participating in game and real life chats (Ang and Zaphiris, 2010). The abovementioned roles are informal and guild activities are optional; yet, they enrich players' gaming experiences. For example, Ang and Zaphiris (2010) found that core guild members are usually knowledgeable players who contribute by offering help and developing the guild as a pool of resource that would assist other players to complete their quests. By so doing, they enhance their self-image in the eyes of other guild members as well as increase their innate pleasure of playing the game. Ang and Zaphiris (2010) also found that peripheral guild members, like newbies and freeloaders, are the ones who seek help at most times. These players use the guild only as an instrumental tool for task completion, thus, increasing their perceived value of value for money. These observations indicate that the nature of guild engagement in MMORPGs is in actuality, value co-creation among its members.

Theoretically, Higgins and Scholer (2009) argued that people experience value in the form of motivational force direction. While the act of engaging in guild activities,

in itself, can enhance players' motivational force direction, the extent to which players engage in these activities is also an important aspect of motivational force direction that increases players' value perceptions. Although scholars agree that engagement is a psychological phenomenon closely linked with individuals' interactive experiences (Brodie et al., 2013), each present different approach in conceptualizing it. Some scholars considered engagement as an undertaking of specific interactive experiences (Van Doorn et al., 2010), while others contend it as a motivational state (Nolan et al., 2007) or a psychological process that aggregate transient motivation states into sustained cognitive evaluations, which then leads to affective response (Bowden, 2009; Mollen and Wilson, 2010). The author of this study, however, conceives engagement as a persistent and pervasive psychological state comprising of cognitive, affective, and behavioral aspects. It was operationalized in terms of absorption, dedication, and vigor (Patterson et al., 2006). Absorption is a pleasant state of being immersed in one's work (Wefald and Downey, 2009); dedication, on the other hand, involves strong involvement, enthusiasm, and sense of inspiration to the job/task; and vigor refers to the willingness to invest efforts, having enough stamina and strength to continue, and being persistent when confronted with difficulties. Accordingly, based on RET (Higgins, 2006; Higgins and Scholer, 2009), this study argues that players who are highly active, strongly involved, and deeply concentrated on guild activities tend to perceive greater value of playing MMORPGs; thus the third postulation of this study is that: Player's guild engagement is positively associated with his/her perceived value of the game.

## **4. Method**

### **4.1 Data Collection**

This study used a web survey tool to collect opinions from MMORPG players. Participants were recruited through popular game-related Internet forums in Taiwan,

including PTT (ptt.cc) and Bahamut (www.gamer.com.tw). In order to rule out differential impact of individual games, this study focused on studying World of Warcraft (WoW), which is one of the most popular MMORPG and the only game in this genre that has ever acquired 13 million players worldwide (SuperData Research, 2015). An invitation to participate in our survey was posted in the WoW boards of the two forums. Online users who intended to participate were redirected to the survey site developed using Google Form through a hyperlink in the post. The survey asked respondents to provide information about their experience on playing WoW and their history of guild participation. Hence, non-WoW players and players without guild experiences were automatically excluded from taking the survey. Incentives for participation included provision of 300 P dollars which is a virtual currency issued and circulated in Taiwan's largest BBS – ptt. Participants also were provided with the chance to participate in a lucky draw, in which the winner can obtain a prize worth 100 New Taiwan Dollar. The survey was conducted from March 25, 2015 to April 24, 2015 which obtained two hundred and seven (207) respondents. After data collection, analysis was done for the data obtained.

The demographic distribution of the sample is presented in Table 1. The majority of respondents were male (86.95%) and between age 21-30 (around 71.01%). As expected, students constituted the largest group in our respondents. Geographically, the majority of the respondents came from Northern Taiwan. In addition, nearly half of the respondents (49.97%) had more than five years of experiences of playing WoW; more than ninety percent of respondents spent at least one hour to play WoW every day. Last, the average number of guild joined was 2.69; this indicates that respondents should possess the required knowledge to answer survey items pertaining to guild experiences.

Table 1: Demographic Profile of WoW Player Respondents of the Web Survey Tool, Taiwan, 2015 (N=207)

	Counts	Percentage
Sex		
Male	180	86.95
Female	27	13.05
Age		
Less than 15	2	0.97
16 – 20	27	13.04
21 – 25	94	45.41
26 – 30	53	25.60
31 – 35	26	12.56
36 – 40	5	2.42
Occupation		
IT-related	22	10.63
Manufacturing	16	7.73
Advertising	1	0.48
Service	24	11.59
Government	3	1.45
Education	5	2.42
Military	5	2.42
Student	95	45.89
Unemployed	14	6.76
Others	22	10.63
Geographic area		
Northern Taiwan	127	61.35
Mid Taiwan	32	15.46
Southern Taiwan	43	20.77
Eastern Taiwan	1	0.48
Others	4	1.93
Past experience on Warcraft		
< 1 year	23	11.11
1~3 years	44	21.26
3~5 years	37	17.87
> 5 years	103	49.76
Time spent on Warcraft per day		
< 1 hour	16	7.72
1~3 hours	84	40.57
3~5 hours	63	30.43
> 5 hours	44	21.26
Average number of Guild joined	2.69	

#### 4.2 Measurement Development

The measures of the research constructs were all adapted from existing scales (refer to Appendix A). After compiling the English version of the questionnaire, the draft survey items were first translated into Chinese by a bilingual research asso-

ciate. Then, the items were verified and refined for translation accuracy by two professors specialized in information systems. Thereafter, the Chinese version of the draft survey was pretested by several scholars and graduate students specialized in information systems and with online gaming experience to assess its face validity, and content validity, and to verify if the questions are easy to understand and if the statements are contextually relevant. The items and their sources are listed in Appendix A. **Continuance intention.** The items for measuring continuance intention were adapted from the three-item scale of Bhattacharjee (2001a) to fit the context of online gaming. The third item in the original scale was replaced by one developed by the authors of the study because it has been indicated in the previous study that the reversed score items had the tendency to jeopardize the reliability and distort the factor structure of the scale (Schriesheim and Eisenbach, 1995). All of the three scale items used a seven-point Likert scale anchored between “strongly disagree” and “strongly agree.”

**Satisfaction.** The scale for measuring satisfaction was also adapted from the study by Bhattacharjee (2001a) which contained four measurement items. This scale captured respondents’ satisfaction levels along a seven-point scale anchored between four semantic differential adjective pairs: “very dissatisfied/very satisfied”, “very displeased/very pleased,” “very frustrated/very contented,” and “absolutely terrible/absolutely delighted.” The scales were designed to capture respondents’ affects rather than beliefs of their experience of playing World of Warcraft.

**Perceived value.** Perceived value is conceived as a second-order construct constituted by six components (Sweeney and Soutar, 2001; Mohd-Any, Winklhofer, and Christine, 2014). The rationale for supporting our operationalization is two-fold: (1) the six components cause or change respondents’ value perceptions; and (2) these components are not necessarily high-

ly correlated. Price for money and quality capture functional value of WoW as perceived by the respondents. The measurement items for both first-order constructs were adapted from Kim et al. (2011). Emotional value of playing WoW was represented by perceived enjoyment and aesthetics. The scales for perceived enjoyment were adapted from Moon and Kim (2001), while aesthetics were operationalized based on Kim et al. (2011). Social relationship support and social self-image expression constituted the underlying components of social value derived from playing Wow; both of which were adapted from Kim et al. (2011). The measurement items for these constructs used a seven-point Likert scale anchored between "strongly disagree" and "strongly agree."

**Guild Engagement.** Guild engagement captured respondents' extent of absorption, dedication, and vigor in the guild activities when they are playing WoW. It was modeled as a reflective second-order factor with absorption, dedication, and vigor as its underlying reflective first-order constructs (Cheung et al., 2011). The construct assessed respondents' psychological states using the physical, emotional, and cognitive aspects of the interaction process during guild activities (Patterson et al., 2006). These states reflected the respondents' self-investment of personal resources in a task (Kahn, 1990), thus supporting our method of operationalizing guild engagement as a reflective second-order factor. The scales for measuring guild engagement were adapted from Cheung et al. (2001) and a seven-point Likert scale anchored between "strongly disagree" and "strongly agree" was used.

## **5. Data Analysis**

As recommended by Anderson and Gerbing (1988), this study used a two-step approach to conduct data analysis. The first step validated the measurement model by assessing the reliability, convergent validity, and discriminant validity of research constructs. The second step tested the hy-

pothesized relationships among research constructs. The data was analyzed using partial least squares (PLS), a structural equation modeling technique that uses a component-based approach for estimation. This study used PLS for the following reasons: First, this study is primarily intended for causal analysis, a condition for PLS suggested by Chin and Newsted (1999) and Joreskog and Wold (1982); Second, PLS requires fewer statistical specifications and constraints on the data than covariance-based approaches such as LISREL; Lastly, PLS is considered appropriate to use for small to moderate sample sizes (Cassel et al., 2000). The software utilized for the PLS analysis was SmartPLS v. 3.2.1 (Ringle, Wende, and Becker, 2015).

### **5.1 Measurement Model Validation**

In this study, all of the first-order constructs were measured in terms of reflective indicators allowing the quality of measurement model to be assessed using internal consistency reliability, indicator reliability, convergent validity, and discriminant validity of the research constructs (Hair et al., 2014). In addition, due to the presence of reflective-formative second-order constructs, this study used a two-stage approach to perform PLS analysis (Henseler and Chin, 2010). In the first stage, the second-order constructs utilized the indicators of the underlying first-order constructs as their measures. Such repeated indicators approach allowed the authors of the study to obtain parameters for assessing the measurement model. In the second stage, the latent variable scores of first-order constructs obtained from the previous analysis served as indicator values for the second-order constructs. Then, a PLS analysis was performed again to obtain the parameter estimates for the structural model.

Table 2 shows the mean and standard deviation of the research constructs. Moreover, composite reliability and Cronbach's alpha values which assessed the internal consistency and reliability of the research constructs are also shown. As indicated in Table 2, all of the values are

well above the commonly acceptable threshold, i.e., 0.70 (Nunnally and Bernstein, 1994). Indicator reliability was evaluated by looking at indicators' outer loadings. As shown in Appendix B, all of the loadings of the indicators are higher than 0.7 on their respective constructs, which signifies that the indicator reliability of all of the research constructs are satisfactory.

Convergent validity was assessed using two criteria: (Fornell and Larcker, 1981) First, all indicator loadings should be significant and must exceed 0.7. Second, the average variance extracted (AVE) should be greater than 0.5, to signify that the variance captured by each construct exceeded the variance captured by the measurement error of that the same construct. Our analysis shows that all of the items exhibited a loading higher than 0.70 on their respective construct. Meanwhile, all of the values of average variance extracted (AVE) range from 0.688 to 0.886. These results indicate that both criteria for convergent validity are satisfied for all of our research constructs.

Discriminant validity was evaluated by using the following criteria (Chin, 2012):

(1) items should load more highly on the construct that they intend to measure than on other constructs; (2) the square root of the AVE should exceed the values of the inter-construct correlations; (3) all the correlations among the constructs should be below the 0.85 threshold value (Kline, 1998). Appendix B presents that all items are highly loaded on their own construct than on other constructs. Table 2 shows that the square root of the AVE for each construct is greater than 0.70 (i.e.,  $AVE > 0.50$ ) as well as the correlations between the construct and other constructs, indicating that all the constructs share more variances with their indicators than with other constructs. Also, all the correlation values shown in Table 2 are less than 0.85. These analyses show that the discriminant validity of the research constructs is acceptable. Taken together, the above results demonstrate that all the measurement scales exhibit sufficient psychometric properties to support the subsequent test of the structural model.

Table 2: Correlation Matrix and Reliabilities of Research Constructs using Cronbach's Alpha, Taiwan, 2015

Construct	Mean	STD.	CR	AVE	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Vigor	5.462	0.955	0.914	0.727	(0.874)													
2. Dedication	5.504	0.875	0.898	0.688	0.839	(0.845)												
3. Absorption	4.965	1.125	0.925	0.712	0.652	0.728	(0.897)											
4. Self-image expression	4.888	1.078	0.960	0.856	0.476	0.470	0.462	(0.944)										
5. Social relationship support	4.936	1.017	0.921	0.744	0.480	0.504	0.506	0.817	(0.885)									
6. Perceived Enjoyment	5.483	0.936	0.937	0.831	0.600	0.638	0.541	0.699	0.692	(0.898)								
7. Aesthetic	5.504	1.103	0.969	0.886	0.311	0.425	0.349	0.507	0.451	0.611	(0.957)							
8. Price	5.413	1.112	0.959	0.854	0.430	0.484	0.347	0.604	0.539	0.652	0.644	(0.943)						
9. Quality	5.399	1.117	0.953	0.836	0.350	0.425	0.319	0.569	0.489	0.602	0.592	0.745	(0.934)					
10. Satisfaction	5.835	1.039	0.961	0.861	0.588	0.640	0.571	0.595	0.562	0.650	0.532	0.599	0.538	(0.946)				
10. Continuance	4.860	1.422	0.946	0.854	0.322	0.328	0.278	0.481	0.395	0.393	0.428	0.475	0.390	0.490	(0.915)			
11. Age	2.434	0.977	1.000	1.000	0.162	0.140	0.084	0.046	0.044	0.067	0.041	0.032	0.092	0.090	0.056	(1.000)		
12. Gender	0.874	0.332	1.000	1.000	0.183	0.140	0.112	0.144	0.063	0.047	0.021	0.059	0.111	0.068	-0.028	-0.070	(1.000)	
13. Experience	2.077	1.067	1.000	1.000	0.336	0.217	0.079	0.199	0.123	0.129	0.136	0.218	0.088	0.249	0.304	0.363	0.178	(1.000)

Note: the values presented in the diagonal of the table are Cronbach's Alpha values.

### 5.2 Structural Model Validation

As described previously, this study used latent variable scores of the first-order construct to represent the indicator values for the second-order constructs. Then, a bootstrapping technique with a path weighting scheme and 300 resamples was

performed to obtain the estimates of standard errors for testing the statistical significance of path coefficients using *t*-test (Hair et al., 2012). Table 3 presents the results of PLS analysis for the structural model. Using two-tailed *t*-test, all of the three path coefficients in the structural model are significant at  $p < 0.001$ ; thus, all the proposed

hypotheses received empirical support. As for the explained variances ( $R^2$ ), the results show that our research model explains 58.3% of the variances in continuance intention; 49.6% of the variances in satisfaction is accounted for by perceived value; guild engagement explains 38.6% of the variances in perceived value. These results indicate that the fit of the overall model is fairly good.

We also examined the  $Q^2$  value to assess the model's predictive relevance (Chin, 2012; Hair et al., 2014). The  $Q^2$  measure applies a sample re-use technique that omits part of the data points and uses the model and its parameter estimates to reconstruct (and thus predict) the data points of indicators in endogenous constructs. A value of 0.02, 0.15, or 0.35 indicates that exogenous constructs have a small, medium, or large predictive relevance respectively, for a selected endogenous construct (Cohen, 1988). Using the cross-validated redundancy approach with omission dis-

tance of 5, the  $Q^2$  values of the endogenous constructs obtained range from 0.184 to 0.408, indicating a medium to large predictive relevance of exogenous constructs.

Third, we calculated the  $f^2$  effect size to assess the impact of each predictor construct on its own endogenous construct. The  $f^2$  effect size measures the change in the  $R^2$  value when a specified predictor construct is omitted from the model. As shown in Table 3, the calculated  $f^2$  values indicate that all of the predictor constructs in our model have a large effect in producing the  $R^2$  for their own exogenous constructs.

Lastly, the PLS analysis shows that only perceived enjoyment, price, and social relationship support have significant loadings on perceived value at  $p < 0.1$  level (two-tail). The results also show that, except for prior experience, the other two control variables (i.e., age and gender) do not have significant impact on continuance intention.

Table 3: Summary of PLS Results of Endogenous Variables, Taiwan, 2015

	Endogenous Variables					
	Continuance Intention		Satisfaction		Perceived Value	
	$\beta$	$f^2$	$\beta$	$f^2$	$\beta$	$f^2$
Satisfaction	0.438***	0.250				
Perceived Value			0.702***	0.761		
Guild Engagement					0.657***	0.973
$R^2$	0.282		0.493		0.432	
$Q^2$	0.184		0.408		0.220	

Note: \*, \*\*, \*\*\* indicates significant at  $p < 0.1$ ;  $p < 0.05$ ;  $p < 0.01$  respectively (two-tailed test).

## 6. Conclusion

This study aims to examine the impact of players' guild engagement on their continuance intention of playing an MMORPG. The analysis showed that guild engagement enhances players' continuance intention indirectly by increasing their perceived value and satisfaction with the game. This result corroborates the proposition of both service-dominant logic as well as regulatory engagement theory that individuals' active engagement can enhance their value perception of the pursued goal, thereby, increasing their intention to continue the pursuit action. The finding is complemen-

tary to social and cognitive psychology-based consumer behavior research in that it demonstrates that interaction experiences matters to consumers' valuation of their consumption of goods/services, which in turn influence their subsequent consumption intention and behavior.

The primary limitation of this study is that it utilized a non-probability sampling to collect data. Inevitably, the generalizability of the research result is limited. There are several avenues to improve this research. First, not all examined value components are co-created in nature; thus, it is necessary to examine whether guild engagement has a similar impact on each of

the value components. Second, this study assumed that perceived value only has an indirect influence on continuance intention; however, prior literature contends that perceived value can also be directly influenced by behavioral intention. Therefore, future research could also look into the direct relationship of perceived value and continuance intention.

### References

- Achterbosch, L., Pierce, R., & Simmons, G. (2008). Massively multiplayer online role-playing games: the past, present, and future. *Computers in Entertainment (CIE)*, 5(4), 1-33.
- Ajzen, I. (1985). From intentions to actions: A theory of planned behavior. In *Action control* (pp. 11-39). Springer Berlin Heidelberg.
- Ang, C. S., & Zaphiris, P. (2010). Social roles of players in MMORPG guilds: A social network analytic perspective. *Information, Communication & Society*, 13(4), 592-614.
- Ang, C. S., Zaphiris, P., & Mahmood, S. (2007). A model of cognitive loads in massively multiplayer online role playing games. *Interacting with computers*, 19(2), 167-179.
- Babin, B. J., & Babin, L. (2001). Seeking something different? A model of schema typicality, consumer affect, purchase intentions and perceived shopping value. *Journal of Business research*, 54(2), 89-96.
- Babin, B. J., Darden, W. R., & Griffin, M. (1994). Work and/or fun: measuring hedonic and utilitarian shopping value. *Journal of consumer research*, 20(4), 644-656.
- Bagozzi, R. P. (1992). The self-regulation of attitudes, intentions, and behavior. *Social psychology quarterly*, 55(2), 178-204.
- Berthon, P., & John, J. (2006). From Entities to Interfaces: Delineating Value in Customer-Firm Interactions. In *Lusch, R.F., & Vargo, S.L., (eds.), The Service-dominant Logic of Marketing: Dialog, Debate, and Directions* (pp.196-207), New York: Routledge.
- Bhattacharjee, A. (2001). Understanding information systems continuance: an expectation-confirmation model. *MIS quarterly*, 25(3), 351-370.
- Bhattacharjee, A. (2001). An empirical analysis of the antecedents of electronic commerce service continuance. *Decision support systems*, 32(2), 201-214.
- Bolton, R. N., & Drew, J. H. (1991). A multistage model of customers' assessments of service quality and value. *Journal of consumer research*, 17(4), 375-384.
- Bowden, J. L. H. (2009). The process of customer engagement: A conceptual framework. *Journal of Marketing Theory and Practice*, 17(1), 63-74.
- Brodie, R. J., Ilic, A., Juric, B., & Hollebeek, L. (2013). Consumer engagement in a virtual brand community: An exploratory analysis. *Journal of Business Research*, 66(1), 105-114.
- Cassel, C. M., Hackl, P., & Westlund, A. H. (2000). On measurement of intangible assets: a study of robustness of partial least squares. *Total Quality Management*, 11(7), 897-907.
- Chin, W. W. (2010). How to write up and report PLS analyses. In *Handbook of partial least squares* (pp. 655-690). Springer Berlin Heidelberg.
- Chin, W.W., & Newsted, P. R. (1999). Structural Equation Modeling Analysis with Small Samples Using Partial Least Squares. *Statistical Strategies for Small Sample Research*, 307-341.
- Chuang, Y. C. (2006). Massively Multiplayer Online Role-Playing Game-Induced Seizures: ANeglected Health Problem in Internet Addiction. *CyberPsychology & Behavior*, 9(4), 451-456.
- Churchill Jr, G. A., & Surprenant, C. (1982). An investigation into the determinants of customer satisfaction. *Journal of marketing research*, 19(4), 491-504.

- Cohen, J. (1988), *Statistical Power Analysis for the Behavioral Sciences*, Hillside, NJ: Erlbaum Associates.
- Cronin, J. J., Brady, M. K., & Hult, G. T. M. (2000). Assessing the effects of quality, value, and customer satisfaction on consumer behavioral intentions in service environments. *Journal of retailing*, 76(2), 193-218.
- Czepiel, J.A., Solomon, M.R., Surprenant, C.F., & Gutman, E.G. (1985). Service Encounters: An Overview. In *The Service Encounter: Managing Employess/ Customer Interaction in Service Business*, in Czepiel, J.A., Solomon, M.R., & Surprenant, C.F., (eds.) Lexington (pp. 3-15), MA: Lexington Books.
- Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1989). User acceptance of computer technology: a comparison of two theoretical models. *Management science*, 35(8), 982-1003.
- Deng, L., Turner, D. E., Gehling, R., & Prince, B. (2010). User experience, satisfaction, and continual usage intention of IT. *European Journal of Information Systems*, 19(1), 60-75.
- Ducheneaut, N., Wen, M. H., Yee, N., & Wadley, G. (2009, April). Body and mind: a study of avatar personalization in three virtual worlds. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (pp. 1151-1160). ACM.
- Fishbein, M., & Ajzen, I. (1975). *Belief, Attitude, Intention, and Behavior: An Introduction to Theory and Research*. Reading, MA: Addison-Wesley.
- Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of marketing research*, 18(1), 39-50.
- Gallarza, M. G., Gil-Saura, I., & Holbrook, M. B. (2011). The value of value: further excursions on the meaning and role of customer value. *Journal of consumer behaviour*, 10(4), 179-191.
- Grace, D., & Weaven, S. (2011). An empirical analysis of franchisee value-in-use, investment risk and relational satisfaction. *Journal of Retailing*, 87(3), 366-380.
- Griffiths, M. D., Davies, M. N., & Chappell, D. (2004). Demographic factors and playing variables in online computer gaming. *CyberPsychology & Behavior*, 7(4), 479-487.
- Guegan, J., Moliner, P., & Buisine, S. (2015). Why are online games so self-involving: A social identity analysis of massively multiplayer online role-playing games. *European Journal of Social Psychology*, 45(3), 349-355.
- Guo, Y., & Barnes, S. (2009). Virtual item purchase behavior in virtual worlds: an exploratory investigation. *Electronic Commerce Research*, 9(1-2), 77-96.
- Gutman, J. (1982). A means-end chain model based on consumer categorization processes. *The Journal of Marketing*, 46(2), 60-72.
- Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2014). *A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM)*, London: Sage.
- Higgins, E. T. (2006). Value from hedonic experience and engagement. *Psychological review*, 113(3), 439-460.
- Higgins, E. T., & Scholer, A. A. (2009). Engaging the consumer: The science and art of the value creation process. *Journal of Consumer Psychology*, 19(2), 100-114.
- Holbrook, M.B. (1994). The Nature of Customer Value: An Axiology of Services in the Consumption Experience. In *Rust, R., and Oliver, R.L. (eds.), Service Quality: New Directions in Theory and Practice*, Thousand Oaks (pp. 21-71). CA: Sage Publications.
- Holbrook, M.B. (1996). Customer Value: A Framework for Analysis and Research. *Advances in Consumer Research*, 23, 138-142.
- Holbrook, M.B. (2006). ROSEPEKICE-CIVECI versus CCV: The Re-

- source-operant, Skills-exchanging, Performance-experiencing, Knowledge-informed, Competence-enacting, Co-producer-involved, Value-emerging, Customer-interactive View of Marketing versus the Concept of Customer Value: I Can Get It for You Wholesale. In *Lusch, R.F., and Vargo, S.L., (eds.), The Service-dominant Logic of Marketing: Dialog, Debate, and Directions* (pp 208-213), New York: Routledge.
- Holbrook, M. B., & Hirschman, E. C. (1982). The experiential aspects of consumption: Consumer fantasies, feelings, and fun. *Journal of consumer research*, 9(2), 132-140.
- Joreskog, K. G., & Wold, H. (1982). *Systems under Indirect Observation: Causality Structure Prediction*, Amsterdam: North Holland.
- Karahanna, E., Straub, D. W., & Chervany, N. L. (1999). Information technology adoption across time: a cross-sectional comparison of pre-adoption and post-adoption beliefs. *MIS quarterly*, 23(2) 183-213.
- Kim, H. W., Gupta, S., & Koh, J. (2011). Investigating the intention to purchase digital items in social networking communities: A customer value perspective. *Information & Management*, 48(6), 228-234.
- Kline, R. B. (1998). *Principles and Practice of Structural Equation Modeling*. Guilford Press, New York, NY, USA.
- Kohler, T., Fueller, J., Matzler, K., & Stieger, D. (2011). Co-creation in virtual worlds: the design of the user experience. *MIS quarterly*, 35(3), 773-788.
- Kumar, V., Aksoy, L., Donkers, B., Venkatesan, R., Wiesel, T., & Tillmanns, S. (2010). Undervalued or overvalued customers: capturing total customer engagement value. *Journal of Service Research*, 13(3), 297-310.
- Lai, A. W. (1995). Consumer values, product benefits and customer value: a consumption behavior approach. *NA-Advances in Consumer Research Volume 22*, 381-388.
- LaTour, S. A., & Peat, N. C. (1979). Conceptual and methodological issues in consumer satisfaction research. *NA-Advances in Consumer Research Volume 06*, 431-437.
- Lin, Y. L., & Lin, H. W. (2011). A study on the goal value for massively multiplayer online role-playing games players. *Computers in Human Behavior*, 27(6), 2153-2160.
- McKinney, V., Yoon, K., & Zahedi, F. M. (2002). The measurement of web-customer satisfaction: An expectation and disconfirmation approach. *Information systems research*, 13(3), 296-315.
- Meadows, M.S. (2008). *Avatar: The Culture and Consequences of Having a Second Life*. Berkley: New Riders.
- Mollen, A., & Wilson, H. (2010). Engagement, telepresence and interactivity in online consumer experience: Reconciling scholastic and managerial perspectives. *Journal of business research*, 63(9), 919-925.
- Monroe, K. B. (1990). *Pricing: Making Profitable Decisions*. New York: McGraw-Hill.
- Moon, J., Hossain, M. D., Sanders, G. L., Garrity, E. J., & Jo, S. (2013). Player commitment to massively multiplayer online role-playing games (MMORPGs): An integrated model. *International Journal of Electronic Commerce*, 17(4), 7-38.
- Nolan, T., Brizland, R., & Macaulay, L. (2007). Individual trust and development of online business communities. *Information Technology & People*, 20(1), 53-71.
- Nunnally, J. C., & Bernstein, I. (1994). *Psychometric Theory*. New York: McGraw-Hill.
- Oliver, R. L. (1980). A cognitive model of the antecedents and consequences of satisfaction decisions. *Journal of marketing research*, 17(4), 460-469.

- Oliver, R. L. (1981). Measurement and evaluation of satisfaction processes in retail settings. *Journal of retailing*, 57(3), 25-48.
- Oliver, R. L. (1993). Cognitive, affective, and attribute bases of the satisfaction response. *Journal of consumer research*, 20(3), 418-430.
- Park, B. W., & Lee, K. C. (2011). Exploring the value of purchasing online game items. *Computers in Human Behavior*, 27(6), 2178-2185.
- Park, B. W., & Lee, K. C. (2011). An empirical analysis of online gamers' perceptions of game items: Modified theory of consumption values approach. *Cyberpsychology, Behavior, and Social Networking*, 14(7-8), 453-459.
- Patterson, P., Yu, T., & de Ruyter, K. (2006). Understanding Customer Engagement in Services. Advancing theory, Maintaining Relevance. Proceedings of ANZMAC 2006 Conference, Brisbane.
- Pham, M. T., & Avnet, T. (2009). Rethinking regulatory engagement theory. *Journal of Consumer Psychology*, 19(2), 115-123.
- Postmes, T., Spears, R., & Lea, M. (1998). Breaching or building social boundaries? SIDE-effects of computer-mediated communication. *Communication research*, 25(6), 689-715.
- Pura, M. (2005). Linking perceived value and loyalty in location-based mobile services. *Managing Service Quality: An International Journal*, 15(6), 509-538.
- Ramirez, R. (1999). Value co-production: intellectual origins and implications for practice and research. *Strategic Management Journal*, 20(1), 49-65.
- Rezaei, S., & Ghodsi, S. S. (2014). Does value matters in playing online game? An empirical study among massively multiplayer online role-playing games (MMORPGs). *Computers in Human Behavior*, 35, 252-266.
- Richins, M. L. (1994). Valuing things: The public and private meanings of possessions. *Journal of consumer research*, 21(3), 504-521.
- Ryahl (2012). An Obituary for the Subscription MMO. Accessed at <http://wordpress.tswguides.com/the-death-of-the-subscription-mmo/>, 2015/8/15.
- Sánchez-Fernández, R., & Iniesta-Bonillo, M. Á. (2007). The concept of perceived value: a systematic review of the research. *Marketing theory*, 7(4), 427-451.
- Scholer, A. A., & Higgins, E. T. (2009). Exploring the complexities of value creation: The role of engagement strength. *Journal of Consumer Psychology*, 19(2), 137-143.
- Sheth, J. N., Newman, B. I., & Gross, B. L. (1991). Why we buy what we buy: A theory of consumption values. *Journal of business research*, 22(2), 159-170.
- Shin, D. H. (2010). The dynamic user activities in massive multiplayer online role-playing games. *International journal of human-computer interaction*, 26(4), 317-344.
- Statista (2015). Number of World of Warcraft Subscribers from 1<sup>st</sup> Quarter 2005 to 2<sup>nd</sup> Quarter 2015 (in Millions). Accessed at <http://www.statista.com/statistics/276601/number-of-world-of-warcraft-subscribers-by-quarter/>, 2015/8/15.
- Sun, Y., Liu, L., Peng, X., Dong, Y., & Barnes, S. J. (2014). Understanding Chinese users' continuance intention toward online social networks: an integrative theoretical model. *Electronic Markets*, 24(1), 57-66.
- SuperData Research (2015). MMO Market Report 2015. Accessed at <http://superdata-research.myshopify.com/products/mmo-market-report>, 2015/8/14.
- Sweeney, J. C., & Soutar, G. N. (2001). Consumer perceived value: The development of a multiple item

- scale. *Journal of retailing*, 77(2), 203-220.
- Sweeney, J., Soutar, G., Whiteley, A., & Johnson, L. (1996). Generating consumption value items: a parallel interviewing process approach. *AP-Asia Pacific Advances in Consumer Research Volume 2*, 108-115.
- Tellis, G. J., & Gaeth, G. J. (1990). Best value, price-seeking, and price aversion: The impact of information and learning on consumer choices. *The Journal of Marketing*, 34-45.
- Teo, T. S., Lim, V. K., & Lai, R. Y. (1999). Intrinsic and extrinsic motivation in Internet usage. *Omega*, 27(1), 25-37.
- Thaler, R. (1985). Mental accounting and consumer choice. *Marketing science*, 4(3), 199-214.
- Trepte, S., Reinecke, L., & Juechems, K. (2012). The social side of gaming: How playing online computer games creates online and offline social support. *Computers in Human Behavior*, 28(3), 832-839.
- Tse, D. K., & Wilton, P. C. (1988). Models of consumer satisfaction formation: An extension. *Journal of marketing research*, 25(2), 204-212.
- Turel, O., Serenko, A., & Bontis, N. (2010). User acceptance of hedonic digital artifacts: A theory of consumption values perspective. *Information & Management*, 47(1), 53-59.
- Van der Heijden, H. (2003). Factors influencing the usage of websites: the case of a generic portal in The Netherlands. *Information & management*, 40(6), 541-549.
- Van Doorn, J., Lemon, K. N., Mittal, V., Nass, S., Pick, D., Pirner, P., & Verhoef, P. C. (2010). Customer engagement behavior: Theoretical foundations and research directions. *Journal of Service Research*, 13(3), 253-266.
- Vargo, S. L., & Lusch, R. F. (2004). Evolving to a new dominant logic for marketing. *Journal of marketing*, 68(1), 1-17.
- Wang, Y., Po Lo, H., Chi, R., & Yang, Y. (2004). An integrated framework for customer value and customer-relationship-management performance: a customer-based perspective from China. *Managing Service Quality: An International Journal*, 14(2/3), 169-182.
- Wefald, A. J., & Downey, R. G. (2009). Construct dimensionality of engagement and its relation with satisfaction. *The Journal of Psychology*, 143(1), 91-112.
- Weinberger, M. (2015) World of Warcraft Lost Three Million Subscribers in Three Months. Accessed at <http://www.businessinsider.com/world-of-warcraft-lost-three-million-subscribers-in-three-months-2015-5#ixzz3iqYHjbdz>, 2015/8/15.
- Westbrook, R. A., & Oliver, R. L. (1991). The dimensionality of consumption emotion patterns and consumer satisfaction. *Journal of consumer research*, 18(1), 84-91.
- Williams, D., Ducheneaut, N., Xiong, L., Zhang, Y., Yee, N., & Nickell, E. (2006). From tree house to barracks the social life of guilds in world of warcraft. *Games and culture*, 1(4), 338-361.
- Williams, J. P., Kirschner, D., & Suhaimi-Broder, Z. (2014). Structural Roles in Massively Multiplayer Online Games: A Case Study of Guild and Raid Leaders in World of Warcraft. *Studies in Symbolic Interaction*, 43, 121-142.
- Woodruff, R. B. (1997). Customer value: the next source for competitive advantage. *Journal of the academy of marketing science*, 25(2), 139-153.
- Woodruff, R. B., & Flint, D. J. (2006). Marketing's service-dominant logic and customer value. *The service-dominant logic of marketing: Dialog, debate, and directions*, 183-195.
- Yee, N. (2006). Motivations for play in online games. *CyberPsychology & behavior*, 9(6), 772-775.

- Yee, N. (2006). The Psychology of MMORPGs: Emotional Investment, Motivations, Relationship Formation, and Problematic Usage. In R. Schroeder & A. Axelsson (eds.), *Avatars at Work and Play: Collaboration and Interaction in Shared Virtual Environments*. London: Springer-Verlag.
- Yee, N. (2006). The demographics, motivations, and derived experiences of users of massively multi-user online graphical environments. *Presence: Teleoperators and virtual environments*, 15(3), 309-329.
- Yee, N., Ducheneaut, N., & Nelson, L. (2012, May). Online gaming motivations scale: development and validation. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (pp. 2803-2806). ACM.
- Zeithaml, V. A. (1988). Consumer perceptions of price, quality, and value: a means-end model and synthesis of evidence. *The Journal of marketing*, 52(3), 2-22.
- Zhao, L., Lu, Y., Zhang, L., & Chau, P. Y. (2012). Assessing the effects of service quality and justice on customer satisfaction and the continuance intention of mobile value-added services: An empirical test of a multidimensional model. *Decision Support Systems*, 52(3), 645-656.

#### About Author

**Jeffrey C. F. Tsai** is an assistant professor in the Department of Management Information Systems at National Chiayi University, Taiwan. His research interests include enterprise resource planning, supply chain management, electronic commerce, and organizational impacts of information technology. His research has appeared in *MIS Quarterly*, *Journal of Management Information Systems*, *Information & Management*, *International Journal of Information Management*, and others.



## The Role of Top Management and Dynamic Capability in Inter-Organizational Information System Assimilation

Shu-Chen Yang<sup>1</sup>, Chia-Chun Kang<sup>2\*</sup>, and Zhong-Yu Chao<sup>3</sup>

Department of Information Management, National University of Kaohsiung, Taiwan<sup>1</sup>

International Chinese College, Rangsit University, Thailand<sup>1</sup>

College of Finance and Banking, National Kaohsiung First University of Science and Technology, Taiwan<sup>2</sup>

Department of Information Management, National University of Kaohsiung, Taiwan<sup>3</sup>

henryyang@nuk.edu.tw<sup>1</sup>, u9131024@gmail.com<sup>2</sup>, choich0809@hotmail.com<sup>3</sup>

\*Corresponding Author

Received 25 April 2016; received in revised form 1 June 2016; accepted 17 June 2016

---

### Abstract

Inter-organizational information system (IOIS) has already become a crucial way for many companies to strengthen the competitiveness of their supply chain. However, IOIS must be integrated with business practices and processes to generate benefits for the company. A fair amount of past research discussed factors that affected the implementation or assimilation of information technology from the viewpoint of "Technology – Organization – Environment," yet, neglected the role of the top management. This study suggests that pressure from the environment will first change the attitude of the top management, which influences the extent of assimilation of information technology. In addition, the assimilated information technology will not produce benefit directly but does so through two types of dynamic capabilities – supplier responsiveness and manufacturing flexibility. It is with the improvement in these two capabilities can a company generate better performance. Thus, the main purpose of this study is to explore the mediating role of the "top management" and "dynamic capability" in the process of inter-organizational information system assimilation. This study gathered and analyzed 108 valid business questionnaires and the results all supported the above mediating roles.

*Keywords: Technology – Organization – Environment, Top Management Support, Information System Assimilation, Inter-Organizational Information System, Dynamic Capability*

---

### 1. Introduction

Under heightened competition, companies begin to carry out virtual integration with their upstream and downstream trading partners through information technology, which results to collaborative model of business-to-business electronic commerce that can increase the speed of information exchange within the supply chain, enhance the efficiency in production and transportation, etc. The application of inter-organizational information systems (IOIS), such as electronic data exchange (EDI) and supply chain management (SCM), is a common and crucial tool com-

panies rely on to maintain their competitiveness (Chi et al., 2007; Grover & Saeed, 2007; Hartono et al., 2010; Zhang et al., 2016).

Many studies in the past examined the effect of new information technology on businesses and they concluded that information technology could significantly enhance the performance of a company (e.g., Zhu et al., 2004). However, there were also researchers who proposed completely different ideas in terms of whether information technology could generate competitive advantage for a company or not. A familiar case is the financial burden of overspending caused by a company's failed

attempt in implementing an enterprise resource planning system (ERP System), which sent a company into an unrecoverable decline (White & Fortune, 2002). This has made many managers doubtful about the business value of information technology. Because of this, Carr (2003) claimed that information technology does not matter. He believed that there was no direct influence on performance when a company adopted information technology.

Due to the aforementioned contradictions, several researchers started to concentrate on, explore and examine the role of information technology in business operation. In the studies done by Zhu et al. (2006), they claimed that the implementation of information technology had no direct influence on business performance. For an information technology to produce the anticipated benefit, the company must actually continue to use the technology after it has been adopted. Also, the technology must be integrated with business practices and processes in order to accomplish IT assimilation, which would then generate competitive advantage for the company (Mu et al., 2015; Neirrotti & Paolucci, 2011). In other words, between the issue of adopting a technology and the issue of whether the adopted information technology is assimilated or not, the latter has greater importance and is worthy of further exploration. Prior literature often employed the perspective of "Technology, Organization and Environment" (TOE) in the discussion of adopting new information technology by companies (e.g., Lian et al., 2014; Zhu et al., 2010). Yet, under this framework with three important dimensions, some studies ignored the role of the top management (an important factor under the organizational dimension) in the process of adopting or assimilating information technology (e.g., Zhu et al., 2006). When a company implements a large-scale information system (e.g., an ERP system), the top management support plays a deciding role in the success of the implementation of such system (Shah & Siddiqui,

2006). The works of Liang et al. (2007) also pointed out that the top management would be influenced by industry environment and change in attitudes toward information technology, which then affect the level of assimilation of the company's information technology. Consequently, this study suggests that top management support is a necessary and critical factor for the assimilation of information technology and worthy of further investigation.

In addition, Teece et al. (1997) believed that the importance of a company's dynamic capability (e.g., manufacturing flexibility and learning capability) would grow under the increased business competition, making it a crucial foundation for a company to create its competitive advantage. They claimed that an information technology could benefit the development of the dynamic capability of a company if it is integrated with its business practices, processes, etc. This eventually improves a company's performance. In other words, dynamic capability plays a vital role in the process of assimilating information technology to improve performance and this is also the focus of this study.

Based on the discussion above, this study serves two purposes: (1) to examine the factors that influence IOIS assimilation from the perspective of TOE and to understand the role of top management support, (2) to probe into the role of a company's dynamic capability in the process of IOIS assimilation leading to performance enhancement.

## **2. Literature Review and Hypotheses**

### **2.1 IOIS Assimilation**

Johnston and Vitale (1988) defined IOIS as a system that is established on information technology, such as computers and communication, and can facilitate functions like creating, storing, exchanging and transmitting information between companies. IOIS is a system that is founded upon information technology and connects multiple companies (Chi et al., 2007). Min and Galle (2003) considered the elec-

tronic connection between businesses as an IOIS application. It could connect upstream and downstream trading partners through the Internet and could also support a company's online trading, information exchange, etc (Grover & Saeed, 2007).

The assimilation of information technology often includes three steps: (1) the company learns about an information technology and begins to evaluate and decide whether to implement it (2) the company begins to implement the information technology and (3) the information technology is accepted within the company, is fully incorporated into the activities of the value chain and has become part of the routine work (Zhu et al., 2006). The definition of IOIS assimilation in this research is when an IOIS becomes a necessary part of the value chain activities after it is adopted, and has influences over most works within the company.

## **2.2 The Perspective of TOE**

In the past, various studies discussed the significant factors that affected IOIS implementation of a company under the framework of "TOE" (e.g., Uchenna, 2008; Zhu et al., 2006). It is clear that this framework serves well as a theoretical viewpoint for the investigation of issues related to information technology. Thus, this research employs this perspective as the fundamental framework.

Tornatzky and Fleischer (1990) believed that the adoption and assimilation of new technologies in a company were under the influences of three major dimensions – "Technology – Organization – Environment." The "technological" dimension referred to a company's capability in possessing and applying new information technology; the "organizational" dimension is the characteristics of a company, such as capital amount, number of employees, or the level of globalization and the structure of management; the "environmental" dimension describes the business environment the company is in, including its industry, its competitors and the pressure it receives from the government.

In order to increase the content validity and to accommodate the research context of interest (IOIS), this study uses the factors from previous studies using the framework of "TOE" as the primary variables. Fifteen mid or top-level managers were interviewed to find out the factors that influenced the extent of IOIS assimilation in their companies. These fifteen respondents were selected through snowball sampling. Each of them participated in a thirty-to sixty-minute face-to-face interview (carried out by one of the authors), asking them to provide all sorts of potential factors. Seven variables were selected from the results of the interviews (the ones that were selected by over 70% of the respondents) to represent the three dimensions of technology, organization and environment. The "technological" dimension is consisted of technology readiness and technology integration; the "organizational" dimension is consisted of globalization level and top management support; the "environmental" dimension is consisted of government pressure, partner pressure and competition intensity. Each of the variables is explained in the following and corresponding hypotheses are proposed. Please note that this study included the variable "top management support," which was often ignored in previous research using the framework of "TOE" under the organizational dimension, hoping to further explore the role of the top management in the process of IOIS assimilation by an organization.

### **2.2.1 Technological Dimension – Technology Readiness**

Technology readiness refers to the basic information technology capability a company possesses, including its sufficiency in software and hardware, and the number of information technology-related employees (Mata et al., 1995). The greater these related capacities are, the easier it is for a company to adapt to new information technology and for the new information technology to become part of the procedure for routine activities in the organization (Zhu & Kraemer, 2005). As for the IOIS

discussed in this study, it is built upon a company's existing electronic system. When a company already possesses a relatively strong foundation in information technology, it implies that its employees are more familiar with the electronic workflow and thinking mode, and thus, the IOIS that is being adopted is more likely to be accepted by the employees and be incorporated into the daily workflow. The more sufficient the company's software, hardware and knowledge in information technology are, the less technical difficulties there will be. These benefit the IOIS implementation, the integration of the system with current workflow and systems, and the advancement of IOIS assimilation. Hence, Hypothesis 1a is as follow:

*Hypothesis 1a: Technology readiness positively affects IOIS assimilation.*

### **2.2.2 Technological Dimension – Technology Integration**

Zhu et al. (2006) claimed that technology integration played a crucial role in IOIS implementation while technology integration referred to the connectedness between the internal and external information systems of a company. An IOIS is not only involved with the information flow and value chain within a company, but more importantly, is also connected to the upstream and downstream trading partners outside the company. According to the research by Barua et al. (2004), a company can create competitive advantage (e.g., lower transaction cost, shorten production or service lead time) through information integration, which can be achieved by the company through combining its workflow with that of their upstream and downstream trading partners with the help of information technology. Consequently, when a company is rated high on technology integration, it helps with IOIS implementation. Also, with the company's Intranet and database system that are already highly integrated, it becomes even easier to increase the possibility of incorporating the IOIS into the daily workflow (Zhu & Kraemer,

2005). Thus, Hypothesis 1b is proposed as follow:

*Hypothesis 1b: Technology integration positively affects IOIS assimilation.*

### **2.2.3 Organizational Dimension – Globalization Level**

In this study, globalization is defined as the extent of a company having worldwide trading partners and offering services such as global delivery (Zhu et al., 2006). When the globalization level is high, a company inevitably has to bear with greater cost in communication. Meanwhile, transaction and transportation expenses will also increase due to the company managing markets in different geographical locations (Zhu et al., 2004). These inefficiencies can actually be reduced with the assistance of electronic systems. Xu et al. (2004) found that higher globalization level would push a company towards automation while communicating with its trading partners through IOIS could benefit the company with information transparency, quick response time, etc., and thus, decrease the costs brought by globalization, such as in communication, transaction and transportation, (Garicano & Kaplan, 2001). Therefore, Hypothesis 2a is as follow:

*Hypothesis 2a: Globalization level positively affects IOIS assimilation.*

### **2.2.4 Organizational Dimension – Top Management Support**

Top management support refers to the level of devotion and participation of the top management towards IOIS (Bajwa et al., 2008). Several studies have shown that top management support is one of the determinants often responsible for the outcome of the adopted information technology (e.g., Lee et al., 2009; Uchenna, 2008). On many occasions, failed implementation of a large-scale information technology was attributed to the lack of top management support. For example, part of the reason that a company fails in ERP implementation is because the top management does not have sufficient devotion to it (White & Fortune, 2002). At the same time,

if the top management has greater interest in information technology, they could do a better job in strengthening the prospect brought by the adopted information technology and could encourage their employees to utilize the information technology to generate superior performance (Jasperson et al., 2005). Consequently, Hypothesis 2b is then proposed:

*Hypothesis 2b: Top management support positively affects IOIS assimilation.*

### **2.2.5 Environmental Dimension – Government Pressure**

The government has great influence over companies. For instance, the formulation of related regulations can become limitations or entry barriers for companies' investments. Subsidies can motivate the companies to adopt information technologies or to develop new techniques. The subsidies that the government offers will encourage the companies to accelerate the pace of their introduction of new information technology so that they can improve the condition of their operations and in return, influence the performance of the information technology implemented by the companies (Kraemer et al., 2006). In recent years, the Taiwan government has put forward some projects to aid the implementation of information technology like IOIS in companies. These include the "Promotion of Electronization among Small and Medium Enterprises" in 2002, the "Projects Serving the Application of New Technologies" in 2008 and the "Projects to Reduce Differences in Digitalization across Industries." These subsidiary projects help Taiwanese companies adopt inter-company information systems. Here, government pressure is defined as all sorts of measures and assistances that the government provides to encourage companies to adopt IOIS (Zhu et al., 2006).

### **2.2.6 Environmental Dimension – Partner Pressure**

Hsu et al. (2006) suggested that the external pressure challenging a company mainly came from its upstream and down-

stream trading partners. This pressure was often one of the important factors that encouraged companies to adopt new information technologies. When all the trading partners used the same information technology, a company is likely to follow suit for the sake of maintaining their business relationships. In other words, for the pursuit of maximum value and the reduction in communication and negotiation costs, companies will prefer trading partners adopting the same system (Riggins et al., 1994). Additionally, it is possible that a company, out of transactional needs, will lure or intimidate its trading counterparts into the use of a particular information technology. And when a company is a leader in its industry, it even has the power to ask all of its partners to employ the same system. These are the things that will affect a company's level of assimilation of information technology. For instance, Wal-Mart asked all its partners to collaborate on the RFID technology and turned RFID into an information technology that was closely integrated into their workflows and was necessary for any commercial activities throughout the supply chain.

### **2.2.7 Environmental Dimension – Competition Intensity**

This study defines competition intensity as the extent a company is influenced by the competitors in the market (Zhu et al., 2004). When a competitor has greater advantage, the company may be forced to enhance its competitiveness by adopting new information technologies in order to steer clear from elimination (Rai & Bajwa, 1997), or to rely on information technologies to avoid falling further behind its competitor. In other words, competition intensity will first affect the company's decision to adopt a new information technology, and since the company will want to maximize the benefit of this implementation, it will facilitate the assimilation of the technology (Zhu et al., 2006).

### 2.2.8 Top Management as a Mediator

According to the literature review on the environmental dimension as summarized above, one can see that the more appealing the government's assistance is, the more contribution the government can make towards IOIS internalization within a company. Also, when a company takes on the pressure from its partners, it will be motivated to employ IOIS and to integrate the system into its workflow. The greater competition intensity a company experiences from its competitors in the market, the more likely it will increase the level of IOIS assimilation. These viewpoints are also supported by the empirical study of Uchenna (2008). However, the study done by Hsu et al. (2006) had different results. Their conclusion was that the environment would not influence the implementation or assimilation of information technology. It is because of these conflicting empirical results on the relation between environmental factors and the implementation or assimilation of information technology that this study proposes the possibility of previous studies neglecting the role of the top management.

Top management would be affected by external environment and make policy decisions accordingly, which would then influence the resource allocation and employee behaviors both inside and outside the company (Shah & Siddiqui, 2006). The actions and decisions of the top management are determined by its judgment of the situation and its value beliefs. These in return play a part in how the top management outlines ideas for their company, such as their strategy, decision-making and future direction. Institution theory also confirmed that external pressure played a key role in the decision-making process of an organization, while government pressure, partner pressure and competitive environment would foster different kinds of driving forces for a company (Gular et al., 2002). Therefore, Liang et al. (2007) treated the top management as a mediator in their empirical research to explore the rela-

tion between institutional forces and the assimilation of information technology. They found that the top management promoted and assimilated the application of the ERP system due to the pressure from the external environment. Based on these findings, this study proposes three hypotheses as follow:

*Hypothesis 3a: Government pressure positively affects IOIS assimilation through top management support.*

*Hypothesis 3b: Partner pressure positively affects IOIS assimilation through top management support.*

*Hypothesis 3c: Competition intensity positively affects IOIS assimilation through top management support.*

### 2.3 Dynamic Capability and Performance

Researchers have disagreed on the factors that affected the implementation of information technology. So, this study first discussed the influence of TOE on the assimilation of information technology and the role of the top management. Previous research also had different viewpoints on whether or not an assimilated information technology can actually create competitive advantage for a company. Some scholars believed that information technology had a direct contribution to a better performance. For example, Bakos and Treacy (1986) pointed out that information technology could increase trading partner's switching costs. Other studies verified that the implementation of information technology could improve a company's performance and create competitive advantage (e.g., Zhu et al., 2004). However, other scholars suggested that competitors could implement the same kind of information technology, which revealed the fact that the research mentioned above overlooked a characteristic of information technology – the possibility of imitation (Teece et al., 1997). From this point of view, information technology cannot bring long-term competitive advantage to a company.

To resolve this controversy, Teece et al. (1997) proposed the idea that the imple-

mented information technology first needs to be integrated into a company's processes such as practice and workflow, and then create better performance through the improvement in the dynamic capability. Here, dynamic capability refers to the ability to integrate, to learn and to reallocate internal and external resources as a response to environmental changes (Teece et al., 1997). This capability allows a company to utilize its resources according to any change in the market and to systematically adjust its operation and routine work (Chen et al., 2008). Wu (2006) also believed that dynamic capability could generate better performance and bring competitive advantage to a company.

Teece et al. (1997) considered the dynamic capability in three parts. They are: processes which is a company's method of operation and problem-solving techniques; positions which refer to all kinds of disposable assets that a company owns; and paths which are the developmental course and strategy of a company in the past. In fact, dynamic capability is a company's ability to adapt to changes in the environment. Related research that explored a company's implementation of projects or information technology from the perspective of dynamic capability often focused on the process dimension of dynamic capability. For example, in the just-in-time manufacturing, the customer and supplier participation programs proposed by Banker et al. (2006) in their empirical research and the knowledge-based dynamic capability discussed by Wang et al. (2007) were all about companies generating better performance after improvements were made to their processes due to changes in the environment.

This study is concerned on two types of dynamic capabilities that can coordinate, integrate and reallocate internal and external resources, namely, supplier responsiveness and manufacturing flexibility. Supplier responsiveness is about the supplier's ability to fulfill the demand of a company (Carr & Smeltzer, 2000) while

manufacturing flexibility is a company's ability to adapt to uncertainty in the environment (Correa & Slack, 1996).

Performance evaluation reflects the results of an organization's business activities. Countless research was done to find out whether or not the implementation of an information system could enhance performance (e.g., Zhu et al., 2004). Traditionally, financial results such as return of investment were used to evaluate a company's performance. Nonetheless, the effect of an implemented information technology might not be reflected completely on the finance of a company, because often times, financial information only conveys short-term outcomes and cannot reveal the long-term performance of a company (Ghalayini et al., 1997) like its long-term market share and innovations.

### ***2.3.1 Dynamic Capability as a Mediator***

Per earlier discussion, the viewpoint that information technology can generate competitive advantage for a company directly usually ignores the fact that information technology can be easily imitated by competitors within the industry. Thus, Teece et al. (1997) proposed the idea of dynamic capability. Although information technology cannot bring competitive advantage to a company by itself, the abilities, such as short response time and quick adaptation to market change (Zaheer & Zaheer, 1997), resulted from the connectedness between companies through the use of information technology are important bases for a company to develop competitive advantage. Sambamurthy et al. (2003) also found that a company's effective application of information technology could foster closer relationships with its trading partners while increasing the manufacturing flexibility of the company. In addition, Banker et al. (2006) showed that companies were able to create unique processes that generated better performance with the application of information technology that was integrated into a company's processes. For example, Dell was connected with its suppliers through the application of infor-

mation technology so that its suppliers could receive order information from Dell in real time. The suppliers relied on this system to grasp and predict the change in demand and to fulfill the delivery requests (Banker et al., 2006). In other words, information technology improved the responsiveness of Dell’s suppliers and allowed Dell to deliver excellent performance (e.g., 983, 98% of the orders were fulfilled within three days), while the suppliers also developed greater flexibility. This study believes that after a company is connected with its upstream and downstream partners through IOIS, the system

can enhance its dynamic capabilities, such as supplier responsiveness and manufacturing flexibility, once it assimilates this system and integrates it into its practices and processes, which then leads to improved performance. Thus, Hypothesis 4a and 4b are as follow:

*Hypothesis 4a: IOIS assimilation positively affects a company’s performance through supplier responsiveness.*

*Hypothesis 4b: IOIS assimilation positively affects a company’s performance through manufacturing flexibility.*

The framework of this study is shown in Figure 1.

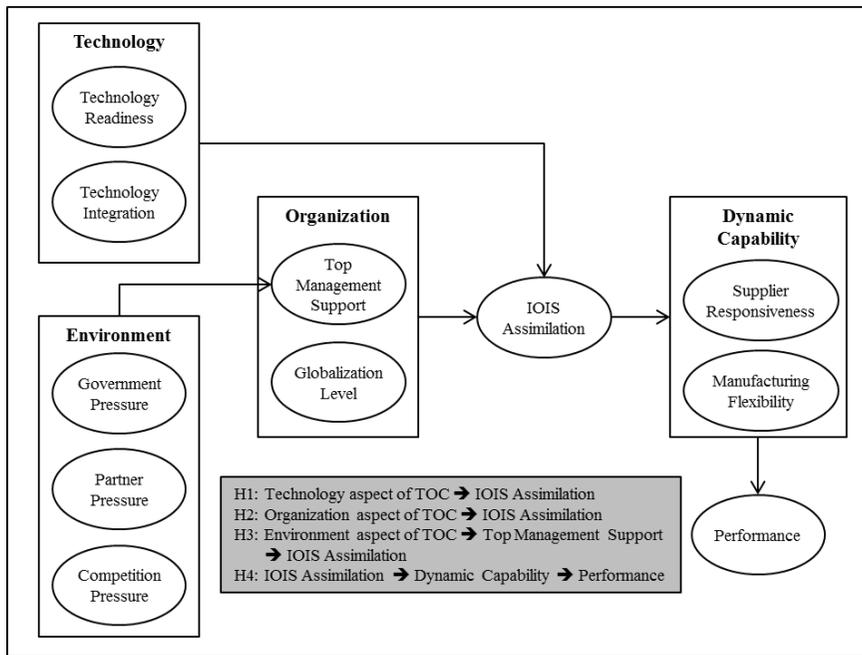


Figure 1: Research Model

### 3. Methodology

This study intends to explore the mediating roles of top management support and dynamic capability in how companies are using IOIS to deliver performance.

#### 3.1 Measurement Items

The questionnaire contained six parts where parts five and six consisted of personal and company information collected for classification purposes. As for the first

four parts, they consisted of 47 items to assess all the variables. Among these, seven questions were designed to evaluate the technology readiness in which five of them were yes/no questions used to measure level of information regarding various aspects of a respondent’s company, such as e-mail, company’s website, Intranet and the Internet. This level of information was calculated by adding up the points with 5 as the maximum value, and along with two

other items became the formative indicator for technology readiness. Other than the five items just mentioned, the rest of the questions were all measured with a 5-point Likert scale where 1 stood for strongly disagree and 5 meant strongly agree. All the questions were adapted from past studies related to company's performance and the implementation and assimilation of information system.

### **3.2 Respondents**

Respondents of this study were all from Taiwanese manufacturers. Considering the fact that most median to small companies were likely to rate low on information due to the high cost of establishing information technology, the sample was selected from the top 1,000 manufacturers published by the Commonwealth magazine in 2014. Additionally, the respondents needed to be familiar with the market, IOIS and the process of communicating with trading partners. So this study surveyed managers or the person in charge who had good understanding of IOIS from departments such as manufacturing, sales, information, research and development, and finance. In order to confirm the respondents' willingness to fill out the questionnaires, 300 companies were randomly selected from the top 1,000 manufacturers mentioned above and phone calls were made to the managers of the manufacturing or sales departments to inquire on their willingness to participate. Questionnaires were emailed or mailed to the respondents after they expressed their willingness to collaborate.

## **4. Analyses**

This study received 108 valid questionnaires. When it comes to company attributes, the industries of computer accessories and parts, semiconductor, and photoelectricity each accounted for 10% of the valid surveys and the remaining 70% came from other industries. Among these companies surveyed, 75% of them have been in the business for over 15 years. As for the number of employees, it was uniformly

distributed with around 25% for each of the following categories: under 500 employees, 500 to 1,000 employees, 1,000 to 5,000 employees and more than 5,000 employees. Finally, over half of the companies have turnover of more than NT\$10 billion. In terms of the attributes of the respondents, they mainly came from the information and sales departments, taking up 38.0% and 23.1%, respectively. Over half of them have been with the company for more than 10 years, and almost 70% of them were managers, which mean that most of our respondents had enough knowledge about his or her company, and thus, the information they provided were highly reliable.

### **4.1 Reliability and Validity**

This study tested the research model and hypotheses with structural equation modeling (SEM). Since technology readiness and competition intensity are formative indicators, and our sample size is relatively small, Smart PLS 2.0 (Ringle et al., 2005) was used for follow-up analysis. Moreover, Hypotheses 3 and 4 were about mediating effects, so this study tested them according to the method proposed by Baron and Kenny (1986). First, the mediator was excluded from the model to examine whether the independent variable had any direct effect on the dependent variable, and then the mediator was added into the model to test the validity of its effect.

The analysis started out from testing the reliability and validity of the measurement model, and then analyzed the structural model so as to test the proposed hypotheses. The measurement model of this study contained 11 variables with technology readiness and competition intensity being the formative indicators, thus, reliability and validity analyses were performed on the 36 questions regarding the remaining 9 variables. All the factor loadings of the 36 questions were over the threshold value of 0.6 and ranged between 0.66 and 0.97, which meant the scales used in the study had good convergent validity. Also, according to Table 1, our scales had composite reliabilities all larger than the

threshold value of 0.7, average variance extracted (AVE) all greater than the 0.5 standard, and the square root value of each average variance extracted were all larger

than the correlated coefficient of their corresponding variables. Thus, this study has good reliability, convergent validity and discriminant validity.

Table 1: Correlation, Composite Reliability and Average Variance Extracted

Variables	1	2	3	4	5	6	7	8	9	CR	AVE
1 Manufacturing Flexibility	<b>0.85</b>									0.93	0.73
2 Globalization Level	0.25	<b>0.75</b>								0.83	0.56
3 Government Pressure	0.40	0.16	<b>0.91</b>							0.91	0.83
4 IOIS Assimilation	0.34	0.41	0.27	<b>0.94</b>						0.97	0.88
5 Performance	0.56	0.05	0.29	0.24	<b>0.87</b>					0.94	0.75
6 Partner Pressure	0.27	0.40	0.15	0.46	0.12	<b>0.89</b>				0.92	0.79
7 Supplier Responsiveness	0.58	0.13	0.25	0.37	0.63	0.16	<b>0.91</b>			0.95	0.83
8 Technology Integration	0.31	0.33	0.15	0.49	0.10	0.31	0.16	<b>0.86</b>		0.85	0.74
9 Top Management Support	0.24	0.20	0.28	0.49	0.23	0.36	0.13	0.37	<b>0.93</b>	0.98	0.87

4.2 Hypothesis Testing

Hypotheses 1 and 2 in this study were about the direct influences between variables. They explored the effects of technological and organizational aspect of TOE perspective on IOIS assimilation. This study also included number of employees and company’s turnover as control variables that each influenced performance and IOIS assimilation. Based on the analytical results of the structural model as shown in Figure 2, only technology readiness had an insignificant influence. This meant that

Hypothesis 1a was not supported by the data while Hypotheses 1b, 2a and 2b were. Meanwhile, the technological and environmental dimensions accounted for 41% of the variance within IOIS assimilation, implying that they are major determinants of the assimilation of information technology. As for performance, the independent variables also explained 46% of its variance. This reflected the fact that variables were adequately chosen in this research model and should be able to properly investigate our research questions.

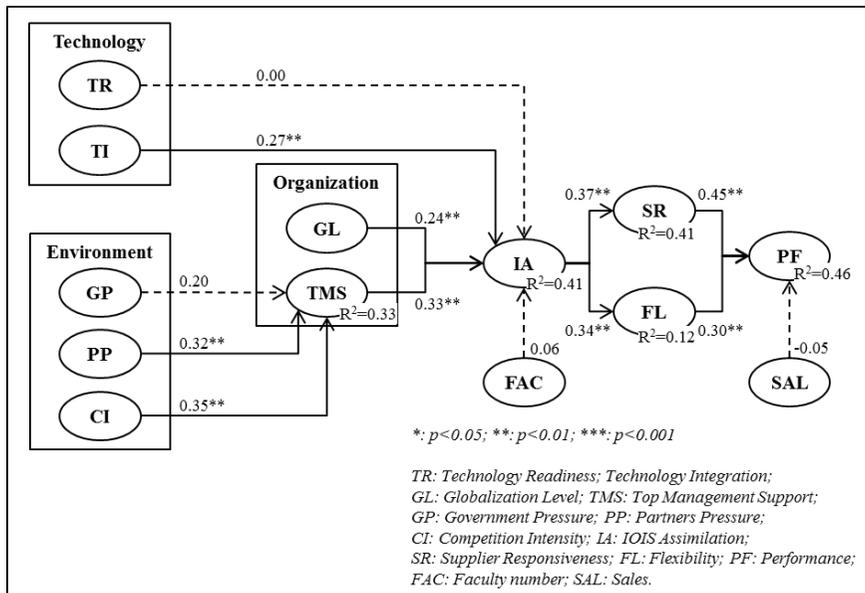


Figure 2: Direct Effect Test Results

The analysis of mediating effect was divided into two parts. First of all, this study tested whether the three factors under the environmental dimension would affect IOIS assimilation through top management support. Since the relationship between “Government Pressure” (GP) and “Top Management Support” did not receive statistical support, Hypothesis 3a was not supported. In order to test the direct effect of “Government Support” (GP) on “IOIS assimilation” (IA), this study did another round of analysis on the structural model by adding the relation between these two variables into the model. The relationship was still statistically insignificant (coefficient = 0.12, t-value = 1.43). As for “Partner Pressure” (PP), this study also included a direct path between “Partner Pressure” (PP) and “IOIS Assimilation” (IA) into the model and redid the analysis. The results showed statistical support for this relationship (coefficient = 0.21, t-value = 2.22) and confirmed Hypothesis 3b. In other words, partner pressure would directly influence the IOIS assimilation, or indirectly influence it through top management support. In addition, this study also incorporated the relationship between “Competition Intensity” (CT) and “IOIS Assimilation” (IA) into the analysis. The outcome was an insignificant relationship between the two (coefficient = 0.18, t-value = 1.74). Following the advice of Baron and Kenny (1986), the direct relationship described above was tested again after “top management support” was excluded from the model, and the result demonstrated support for the relationship between “Competition Intensity” (CI) and “IOIS Assimilation” (IA) (coefficient = 0.26, t-value = 2.80). This supports Hypothesis 3c with “Top Management Support” (TMS) as a full mediator.

In the second part, this study tested whether the IOIS assimilation would affect the performance of an organization through the two types of dynamic capability. Same as what was done in the previous section, the direct relationship between “IOIS As-

similation” (IA) and “Performance” (PF) was entered into the structural model for analysis, and the outcome revealed that the relationship was insignificant (coefficient = -0.03, t-value = 0.32). Again, based on the suggestions of Baron and Kenny (1986), this study redid the analysis after the variables “Supplier Responsiveness” (SR) and “Manufacturing Flexibility” (FL) were excluded from the model. The findings showed a statistically significant relationship between “IOIS Assimilation” (IA) and “Performance” (PF) (coefficient = 0.27, t-value = 2.93). This means Hypotheses 4a and 4b were supported and the two dynamic capability variables were both full mediators.

## **5. Discussion and Suggestions**

As far as the direct effects are concerned, the results for Hypotheses 1 and 2 are shown in Figure 2 where Hypotheses 1b, 2a and 2b all received support from the data. Only Hypothesis 1a did not reach the significance level. It is worth noticing that technology readiness under the technological dimension did not have a significant effect on the IOIS assimilation, which is different from the findings in Zhu et al. (2006). A possible explanation is that, in the past few years, electronic infrastructure has become a necessity for competition (Bhatt & Grover, 2005) due to considerable decrease in the cost of information technology and to the high competition within the industry. This forces companies to have sufficient basic software and hardware equipment and information personnel. (The results of our data analysis also revealed that the average score for each of the three technology readiness questions were 4.65, 4.14 and 4.07, and their standard deviations were 0.67, 0.92 and 0.81.) This made it hard to demonstrate any significant influence on the level of IOIS assimilation. As for the variable technology integration under the technological dimension, the outcome was consistent with that of Zhu et al. (2006). In comparison, technology integra-

tion plays a more important role in IOIS assimilation.

The two factors under the organizational dimension are globalization level and top management support, which both had positive and significant influences on IOIS assimilation. That is to say those companies with higher level of globalization must rely on information technology to enhance the efficiency of their internal workflow and to strengthen their relationships with the supply chain partners in terms of information exchange and collaboration. Additionally, top management support for IOIS will bring more resources and attention to it, which is beneficial to IOIS assimilation.

In terms of the mediating effects, Hypotheses 3c, 4a and 4b were supported while Hypothesis 3b received partial support and Hypothesis 3a did not reach the significance level. This study investigated two important mediators, top management support and dynamic capabilities. The former mediated the relationship between the three factors of environmental dimension and IOIS assimilation while the latter mediated the relationship between performance and IOIS assimilation. Regarding the environmental dimension, government pressure neither directly nor indirectly, through top management support, influenced IOIS assimilation. Yet, partner pressure acted in a completely opposite way. It directly or indirectly affected IOIS assimilation through top management support, while competition intensity cast its influence only through top management support. Overall, top management support played the role of a partial or full mediator, which confirmed the viewpoint of Liang et al. (2007) that the top management is the first to experience the pressure from the environment and then initiated changes within the company.

Unlike what was suggested in the research of Hsu et al. (2006), government pressure had neither direct nor indirect influence on IOIS assimilation. This perhaps reflected the insufficient effort made by the

Taiwanese government to promote or demand companies to invest in and apply IOIS, thus, the top management did not sense the urgency or pressure. The government failed to have direct influence on increasing the level of IOIS adoption. As for partner pressure, other than the fact that it dictated IOIS assimilation through top management support, it also had a direct influence on the assimilation. This may imply the existence of other mediators, for instance, the employees might have played the role of an alternative mediator. That is, partners from the supply chain may not limit their contact only to the top management. It is likely that they engage in various kinds of transactions and tasks directly with the employees, so other than the top management, other employees can also feel the pressure from the supply chain partners and are inclined to integrate the IOIS into everyday tasks, which, in turn, achieve in a higher level of assimilation of the system. The analysis also revealed that competition intensity could only influence IOIS assimilation through top management support, which is consistent with our hypothesis.

In terms of the mediating effect of dynamic capability, the results suggested that an increase in the level of IOIS assimilation would have a positive influence on the company's performance, but it worked through dynamic capability rather than a direct effect, a result that was also found in the study of Wang et al. (2007). This finding showed that not only the assimilated IOIS can change a company and improve on two of the dynamic capacities, namely, supplier responsiveness and manufacturing flexibility. But it can also enhance a company's performance through the improvement of these two dynamic capabilities. Furthermore, the results also demonstrated that information technology could not provide a company with better performance directly. Just like what the resource-based view calls attention to, only by creating special abilities through information technology that are hard to be imitated can a company generate competitive advantage.

### **5.1 Implications**

Theoretically, this study is another work that is based upon the perspective of TOE. But what sets it apart from previous research is the idea of top management playing a mediating role. There are similarities between our results and that of Liang et al. (2007), which showed that the top management was indeed under the influence of external environment and played the leading role in an organization when it came to facing the pressure from the environment. This pushed it to initiate changes within the company. It is worth noting that among earlier research that employed the framework of TOE, they mostly believed that the top management could directly affect the implementation or assimilation of information technology, but this study advocated a relationship among the three dimensions of technology, organization and environment, where they influenced one another. This study found that although government pressure had neither a direct nor an indirect effect on IOIS assimilation, the top management partially or fully mediated the influence of supply chain partners and competition intensity.

In addition, this study explored the influence of assimilated information technology. Most of the prior research only discussed issues related to the implementation of information technology (e.g., Hsu et al., 2006). Yet when an information technology reached the implementation phase, it could not have major influence on the company. So this study focused on the assimilation of information technology (Zhu et al., 2006). Regarding the effect of assimilated information system, this discussion centered on the performance it generated, and the results confirmed that IOIS could actually promote performance but it must go through the development of dynamic capabilities in order to have any effect. This is to say that whether or not a company can create unique abilities through information technology will be the key to whether or not an information technology can produce competitive advantage for a

company. This study also suggests that due to the difficulty in truly reflecting the change in a company brought by information technology during the phases of implementation or application, future research should expand into the phase of assimilation when exploring the influence of information technology on a company, or to discuss the three phases of implementation, usage and assimilation simultaneously (Lee et al. 2009).

Finally, this study confirmed that dynamic capability played the role of a mediator that connected information technology and performance (Banker et al., 2006). At the same time, the development of dynamic capability effectively improved a company's performance. Future research can also build on this concept when examining the relationship between information technology and performance.

In terms of practical implications, technology integration had relatively more direct influence on the assimilation of information technology when compared with technology readiness. Most of the companies were already high in technology readiness, reflecting the fact that investment in the infrastructure of information technology had already become a necessary factor for all companies to compete for their survival. Thus, it was harder for technology readiness to show any significant influence on the companies in this study. As a result, readiness in the infrastructure of software and hardware equipments is only the basic, what is more important to a company is the level of integration of the internal and external information systems. This integration can effectively help a company to reach a higher level of assimilation during the application of IOIS.

Meanwhile, one should not ignore the influence of top management on a company. Past research has proved that the top management contributed to the implementation of information systems within a company. This study discovered that the top management also played the role of a mediator between external environment and changes

within an organization. Inside a company, many thriving projects or smooth implementation of information technologies were often initiated by the leader and relied on the integration of resources within the organization. Gaining top management support can help guarantee the success of a project. The top management is also the one that interacts with trading partners. Application of the same information system by members of the supply chain in completing transactions will be the strongest driving force to assimilate information technology. In addition, this study found that it was possible for partner pressure to affect employees and lead to IOIS assimilation. From the company's point of view, having the top management and employees who share the same understanding of the dynamics of the supply chain can encourage the top management to invest more resources in IOIS or increase the likelihood of employees handling everyday tasks through IOIS. These allow information technology to bring greater benefit. Other than these, the top management also plays a key role in direct contact with competitive pressure. When the top management feels the fierce competition intensity within the industry, it will strengthen its confidence and action to promote IOIS assimilation that leads information technology to bring value to the cooperative interactions between the company and its supply chain partners.

Perhaps unique to our Taiwanese sample, this study, did not find support for the direct and indirect influences of government pressure over IOIS assimilation unlike previous research. Although the Taiwanese government promoted several exemplary subsidiaries for information in recent years and assisted hundreds of companies with their development of systems related to supply chain integration, the results of this study showed that the government's influence over companies was still limited. Thus, the government should be more aggressive and supply related resources. It should motivate the companies

to adopt IOIS through the formulation of regulations, lowering tax or the implementation of other incentives.

Moreover, this study again verified that information system was a positive asset for a company. In other words, companies should not hold back their investment in information technology but they must pay attention to careful evaluation and strict execution so that the information system and business workflow can be closely integrated. Also, when a company implements an information system, it should place special emphasis on how the system is actually being used. This is because the effect of an information system is not immediate. The system needs to be combined with daily tasks and business processes in order to transform the capabilities of a company and then create better performance. Without integrating IOIS into the processes that the trading partners interact with, a company cannot increase the collaboration efficiency of its suppliers or the flexibility of its production. In this case, the implementation is only a waste of resources and cannot produce much benefit for the company.

## **5.2 Limitations**

Constrained by factors such as manpower, resources and time, one of the biggest limitations of this research was the small sample size. Thus, future research should make an effort in increasing the sample size so as to ensure robust statistical results. Because each questionnaire was filled out by one single respondent, it is possible that the questionnaire did not reflect the actual condition of the company. The authors suggest that future studies should have one questionnaire filled out by a group of respondents, survey more people within one company, or even conduct data collection through case studies. These approaches can better examine the true condition of IOIS assimilation. The measure of technology readiness in this research failed to capture the variance across different companies, probably due to the fact that most companies were all quite developed

in their software and hardware infrastructure. Future research can devise other methods to measure this variable. Lastly, this study only sampled the manufacturing industry in Taiwan, thus, the results cannot be generalized to other industries or countries. However, its model can serve as a foundation for future research on different industries (e.g., the service sector) or on international comparison to understand how information technology changes the capabilities of other industries, how does it influence company's performance, etc.

### References

- Bajwa, D. S., Lewis, L. F., Pervan, G., Lai, V. S., Munkvold, B. E., & Schwabe, G. (2008). Factors in the global assimilation of collaborative information technologies: An exploratory investigation in five regions. *Journal of Management Information Systems*, 25(1), 131-165.
- Bakos, J. Y., & Treacy, M. E. (1986). Information technology and corporate strategy: A research perspective. *MIS Quarterly*, 10(2), 107-119.
- Banker, R. D., Bardhan, I. R., Chang, H., & Lin S. (2006). Plant information systems, manufacturing capabilities, and plant performance. *MIS Quarterly*, 30(2), 315-337.
- Baron, R., & Kenny, D. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*, 51(6), 1173-1182.
- Barua, A. P., Konana, A. B., & Whinston, F. Y. (2004). Assessing Internet enabled business value: An exploratory investigation. *MIS Quarterly*, 28(4), 585-620.
- Carr, A. S., & Smeltzer, L. R. (2000). An empirical study of the relationships among purchasing skills and strategic purchasing, financial performance, and supplier responsiveness. *Journal of Supply Chain Management*, 36(3), 40-54.
- Carr, N. G. (2003). IT doesn't matter. *Harvard Business Review*, 81(5), 41-49.
- Chen, R. S., Sun, C. M., Helms, M. M., & Jih, W. J. (2008). Aligning information technology and business strategy with a dynamic capabilities perspective: A longitudinal study of a Taiwanese Semiconductor Company. *International Journal of Information Management*, 28(5), 366-378.
- Chi, L., Holsapple, C. W., & Srinivasan, C. (2007). Competitive dynamics in electronic networks: A model and the case of interorganizational systems. *International Journal of Electronic Commerce*, 11(3), 7-49.
- Correa, H. L., & Slack, N. (1996). Framework to analyze flexibility and unplanned change in manufacturing systems. *Computer Integrated Manufacturing Systems*, 9(1), 57-64.
- Garicano, L., & Kaplan, N. (2001). The effects of business-to-business e-commerce on transaction costs. *Journal of Industrial Economics*, 49(4), 1-23.
- Ghalayini, A. M., Noble, J. S., & Crowe, T. J. (1997). An integrated dynamic performance measurement system for improving manufacturing competitiveness. *International Journal of Production Economics*, 48(3), 207-225.
- Grover, V., & Saeed, K. (2007). The impact of product, market, and relationship characteristics on inter-organizational system integration in manufacturer-supplier dyads. *Journal of Management Information Systems*, 23(4), 185-216.
- Gular, I., Guillen, M. F., & MacPherson, J. M. (2002). Global competition, institutions, and the diffusion of organizational practices: The international spread of ISO 9000 quality certificates. *Administrative Science Quarterly*, 47(2), 207-232.

- Hartono, E., Li, X., Na, K., & Simpson, J. T. (2010). The role of the quality of shared information in interorganizational systems use. *International Journal of Information Management*, 30(5), 399-407.
- Hsu, P., Kraemer, K. L., & Dunkle, D. (2006). Determinants of e-business use in U.S. firms. *International Journal of Electronic Commerce*, 10(4), 9-45.
- Jaspersen, J., Carter, P. E., & Zmud, R. W. (2005). A comprehensive conceptualization of post-adoptive behaviors associated with information technology enabled work Systems. *MIS Quarterly*, 29(3), 525-557.
- Johnston, H. R., & Vitale, M. R. (1998). Creating competitive advantage with interorganizational systems. *MIS Quarterly*, 12(2), 153-165.
- Kraemer, K. L., Dedrick, J., Melville, N., & Zhu, K. (2006). *Global e-commerce: Impacts of national environments and policy*. Cambridge, UK: Cambridge University Press.
- Lee, O., Wang, M., Lim, K. H., & Peng, Z. (2009). Knowledge management systems diffusion in Chinese enterprises: A multistage approach using the technology-organization-environment framework. *Journal of Global Information Management*, 17(1), 70-84.
- Lian, J. W., Yen, D. C., & Wang, Y. T. (2014). An exploratory study to understand the critical factors affecting the decision to adopt cloud computing in Taiwan hospital. *International Journal of Information Management*, 34(1), 28-36.
- Liang, H., Saraf, N., Hu, Q., & Xue, Y. (2007). Assimilation of enterprise systems: The effect of institutional pressures and the mediating role of top management. *MIS Quarterly*, 31(1), 59-87.
- Mu, E., Kirsch, L. J., & Butler, B. S. (2015). The assimilation of enterprise information system: An interpretation systems perspective. *Information & Management*, 52(3), 359-370.
- Mata, F., Fuerst, W., & Barney. J. (1995). Information technology and sustained competitive advantage: A resource-based analysis. *MIS Quarterly*, 19(4), 487-505.
- Min, H., & Galle, W. P. (2003). E-purchasing: profiles of adopters and nonadopters. *Industrial Marketing Management*, 32(3), 227-233.
- Neirotti, P., & Paolucci, E. (2011). Assessing the importance of industry in the adoption and assimilation of IT: Evidence from Italian enterprises. *Information & Management*, 48(7), 249-259.
- Rai, A., & Bajwa, D. S. (1997). An empirical investigation into factors relating to the adoption of executive information systems: An analysis of EIS for collaboration and decision support. *Decision Science*, 28(4), 939-974.
- Riggins, F., Kriebel, C., & Mukhopadhyay, T. (1994). The growth of interorganizational systems in the presence of network externalities. *Management Science*, 40(8), 984-998.
- Ringle, C. M., Wende, S. & Will, S. (2005). SmartPLS 2.0 (M3) beta, Hamburg, <http://www.smartpls.de>.
- Sambamurthy, V., Bharadwaj, A., & Grover, V. (2003). Shaping agility through digital options: Reconceptualizing the role of information technology in contemporary firms. *MIS Quarterly*, 27(2), 237-263.
- Shah, M. H., & Siddiqui, F. A. (2006). Organisational critical success factors in adoption of e-banking at the Woolwich bank. *International Journal of Information Management*, 26(6), 442-456.
- Teece, D. J., Pisano, G., & Shuen, A. (1997). Dynamic capabilities and strategic management. *Strategic Management Journal*, 18(7), 509-533.
- Tornatzky, L. G., & Fleischer, M. (1990). *The processes of technological inno-*

- vation. Lexington, MA: Lexington Books.
- Uchenna C. E. (2008). E-business deployment in Nigerian financial firms: An empirical analysis of key factors. *International Journal of E-Business Research*, 4(2), 29-46.
- Wang, E. T. G., Klein, G., & Jiang, J. J. (2007). IT support in manufacturing firms for a knowledge management dynamic capability link to performance. *International Journal of Production Research*, 45(11), 2419-2434.
- White, D., & Fortune, J. (2002). Current practice in project management-An empirical study. *International Journal of Project Management*, 20(1), 1-11.
- Wu, L. Y. (2006). Resources, dynamic capabilities and performance in a dynamic environment: Perceptions in Taiwanese IT enterprises. *Information & Management*, 43(4), 447-454.
- Xu, S., Zhu, K. & Gibbs, J. (2004). Global technology, local adoption: A crosscountry investigation of Internet adoption by companies in the United States and China. *Electronic Markets*, 14(1), 13-24.
- Zaheer, A., & Zaheer, S. (1997). Catching the wave: Alertness, responsiveness, and market influence in global electronic networks. *Management Science*, 43(11), 1493-1509.
- Zhang, C., Xue, L., & Dhaliwal, J. (2016). Alignments between the depth and breadth of inter-organizational systems deployment and their impact on firm performance. *Information & Management*, 53(1), 79-90.
- Zhu, K., & Kraemer, K. L. (2005). Post-adoption variations in usage and value of e-business by organizations: Cross-country evidence from the retail industry. *Information Systems Research*, 16(1), 61-84.
- Zhu, K., Kraemer, K. L., Xu, S., & Dedrick, J. (2004). Information technology payoff in e-business environments: An international perspective on value creation of e-business in the financial services industry. *Journal of Management Information Systems*, 21(1), 17-54.
- Zhu, K., Kraemer, K., & Xu, S. X. (2006). The process of innovation assimilation by firms in different countries: A technology diffusion perspective on e-business. *Management Science*, 52(10), 1557-1576.
- Zhu, Y., Li, Y., Wang, W., & Chen, J. (2010). What leads to post-implementation success of ERP? An empirical study of the Chinese retail industry. *International Journal of Information Management*, 30(3), 265-276.

### About Authors

**Shu-Chen Yang** is an associate professor in Department of Information Management, National University of Kaohsiung, Taiwan. Professor Yang received his Ph.D. and M.S. in Information Management from the National Central University, Taiwan. He is also a visiting professor in Rangsit University, Thailand. He has published in several referred journals (e.g., Psychology and Marketing, International Journal of Information Management, Journal of Management, Journal of Business Ethics, Asia Pacific Management Review, Journal of Information Management, Journal of e-Business, Management Review, Managing Service Quality, Internet Research, and others) and conference papers. His current research interests are in Internet marketing, supply chain management, and e-business.

**Chia-Chun Kang** is a doctoral student in College of Finance and Banking, National Kaohsiung First University of Science and Technology, Taiwan. Her current research interests are in Business Governance and Financial Derivatives.

**Zhong-Yu Chao** is a graduate student in Department of Information Management, National University of Kaohsiung, Taiwan. His current research interests are in supply chain management and e-business

