THE IMPACTS OF EUROPEAN DEBT CRISIS, QUANTITATIVE EASING MONETARY POLICY IN THE U.S., AND ABENOMICS ON PERFORMANCE OF TAIWANESE ELECTRONIC PARTS AND COMPONENTS MANUFACTURING FIRMS: A CASE STUDY IN SOUTHEAST ASIA

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ABSTRACT

After the sub-prime mortgage crisis, the resulting global economic downturn had a negative impact on foreign investment in Taiwanese firms. In recent years, the onset of the Euro crisis, the implementation of Quantitative Easing Monetary Policy in the U.S. and Abe's policy changed the economy, regardless of whether this change was positive or negative. The major purpose of this study is to investigate the impact of these three international events and other macroeconomic variables on the performance of Taiwanese electronic parts and components manufacturing. To understand the results, a binominal logistic model was used to produce the empirical evidence using samples from Taiwanese electronic parts and components manufacturing industry firms chosen from the top 5 scale of assets. The dependent variable is "consolidated monthly sales." The independent variables are "actual effective exchange rate index in Taiwan," "The amount of investment approved for the six main countries in Southeast Asia," " exports to the six main countries in Southeast Asia," "the period of the European Debt Crisis," "the QE1period," "the QE2period ," "the QE3period"and "the Abenomics period."

As the result of the empirical analysis, the variable, "exports to the six main countries in Southeast Asia," is found to have a significantly positive effect on performance. The variable, "the Abenomics period," is found to have a significantly negative effect on performance.

Keywords: European Debt Crisis, Quantitative Easing Monetary Policy, Abenomics, Performance, Exports.

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INTRODUCTION

1.1 Background

In recent years, investing in China has been the main choice for the location of Taiwanese firms, but investing in Southeast Asia (Thailand, Vietnam, Singapore, Philippines, Malaysia, and Indonesia) should not be neglected. There are many factors that impact Taiwanese firm performance, especially the impact of international mega events that have occurred and changed the global economy along with worldwide demand. In the EU region, the United States and Japan started the Quantitative Easing Monetary Policy and solved debt problems in order to arrest the economic downturn. Exchange rate fluctuations made it difficult for firms to finance and also impacted operating performance.

1.2 Motivation

Taiwan is an island state. There have been many extensive experiences with investment in the past, and these experiences resulted in Taiwan having a comparative advantage in regard to the export of foreign investment. While foreign investment has many purposes, Dunning (1998), Porter (1980) and Root (1987) pointed out that the purpose of cross-border investment includes benefits and motivation. Over the last decade, low cost and a good investment environment in Southeast Asia has attracted foreign investment and Taiwan's industries.

After Taiwanese firms began operations in Southeast Asia, they extended their scale and made the environment more competitive by taking advantage of low labor costs and tax preferences. In recent years, since the signing of trade agreements between Taiwan and China to enhance economic relations and the occurrence of three international events (after 2008, the US subprime mortgage financial crisis), Taiwanese firm performance was affected. The major purpose of this study is to investigate the impact of these three international events and other macroeconomic variables on the performance of Taiwanese electronic parts and components manufacturing firms.

1.3 Limitations of the study

This study focuses on the impact of three international events and macroeconomic variables on the performance of Taiwanese electronic parts and components manufacturing firms, but some factors, including environmental factors, entry mode factors and other more detailed factors such as entry mode licensing, joint venture, and wholly owned subsidiaries are not included.

Anderson and Gatignon (1986) classified entry mode into three categories: high, medium and low control. A highly controlled entry mode includes sole proprietorship and main equity.

A medium control entry mode includes a majority stake, a joint venture contract and franchise ownership. A low control entry mode includes a minority stake. In addition, there is an important relationship between the level of control and risk. A greater degree of control of the entry mode results in the suffering of more as a result of risk. Other factors, such as experience with foreign investment, the proportion of shareholders being directors and supervisors, policy and location changes, are not included in this study. The source of the study sample are Taiwanese electronic parts and components manufacturers. The data in this study are derived from MOPS, TEJ, AREMOS, MOEA but do not include private companies, OTC and emerging companies.

LITERATURE REVIEW

Measure operating performance of the relevant literature：

Dewenter, Malatesta (2001) used the return on sales, ROE and ROA as a measure in a study of state-owned businesses transforming to privately owned businesses. Anderson, Gerbing (1988) suggested that it is difficult to set a performance standard and indicated that performance is dependent on the environment, strategies and other variables and therefore developed subjective indicators such as satisfaction and efficiency. Satisfaction includes both customer satisfaction and job satisfaction. Efficiency is measured by general financial goals such as the ROE, ROA and sales growth rate. Venkartraman, Ramanujam (1986) classified performance into three levels: financial performance, business performance and organizational performance. Financial performance factors included ROE, ROI, sales growth rates, etc. Enterprise performance includes financial performance and organizational performance, including market share, product quality, added value production and marketing influence, among others, and organizational performance includes loyalty, employee morale, etc. According to the aforementioned, and we found the monthly Roe data was too difficult to collect, so we measured the consolidated monthly sales for the purposes of performance measurement.

Relevant variables affecting business performance:

There are some advantages that attract foreign firms to operate their businesses in Southeast Asia, including cheap land, plants and labor costs. However, with the European debt crisis and the implementation of easing monetary policy in the United States and Japan, the

investment environment in Southeast Asia changed. Changes in the exchange rate caused Taiwanese firms to choose different strategies to maintain profit levels. Increasing or decreasing the amount of investment and different entry modes all affect Taiwanese firm performance.

Relevant literature is summarized as follows:

Adler and Dumas (1984) pointed out that an unexpected change in the exchange rate will cause changes in firm revenue, profitability, market value, assets and liabilities denominated in foreign currencies and competitiveness, especially in the case of multinational companies. Bodnar & Gentry (1993) found exchange rate fluctuation to have a significantly positive effect on all industries in the U.S., Canada and Japan. The explanation from Bodnar & Gentry (1993) was that (1) the firms faced different levels of foreign exchange rate risks depending on the business activities of individual industries that were dependent on the exchange rate. However, the outcome for the coefficient of the foreign exchange risk was inconsistent, which implied the impacts canceled each other out. (2) The companies faced different levels of foreign exchange exposure depending on the degree of hedging investment. Junzand and Rhomberg (1973) suggested five main reasons for the J-curve effect as follows: 1. recognition lag: Because of the information asymmetry that occurs after exchange rate fluctuations, importers and exporters cannot not get the correct price immediately. 2. Decision lag: after the traders know the changes in price and the exchange rate, they usually need some time to evaluate and establish new strategies. 3. Delivery lag: because of changes in price, new orders are issued, and then new delivery procedures begin. 4. Replacement lag: after the demand for new orders, productivity is not in accordance with the existing equipment. Therefore, manufacturers are not able to meet the immediate requirements for the new orders and they need more time to replace the current equipment in order to achieve this end. 5. Production delay: when the demand for new orders increases, firms need more time to produce their products. Therefore, Taiwan’s actual effective exchange rate index was chosen for the purposes of this study to measure the change in exchange rate in order to avoid the J-curve effect.

Grosse and Trevino (1996) found a significant positive correlation between direct investment in the United States and its exports and the domestic market size. They also found a significant negative correlation between the amount of US imports, cultural and geographical distance and the exchange rate. Ajami and BarNiv (1984) examined how a country's economic factors affected direct investment in the U.S., and they found that direct investment

in the U.S. could be explained by the country's exports, the real GDP and interest rates. Klein and Rosengren (1994), Cushman (1988) and Froot and Stein (1991) indicated that foreign direct investment and the exchange rate have a significant negative correlation. This study examines the impact of macroeconomic variables on performance. Therefore, we use exports,

METHODOLOGY

3.1 Data Sources and Sample Selection

Douglas (1983) and Yu and Ito (1998) believed that the scale of asset may affect multinational corporate performance. This research takes samples of firms in Taiwanese electronic parts and components manufacturing firms that are the top five total assets and have investments in Southeast Asia, and the study period is from January, 2007 to November of 2014. The research covers five Taiwanese firms in Taiwanese electronic parts and components manufacturing and a total of 475 samples. Monthly data is collected from the Taiwan Stock Exchange Market Observation Post System.

Table1 Definition of Independent Variables and Dummy Variables

Variable Code	Independent Variable	Data Period	Source
Y_i	The consolidated Monthly sales for the i firm i=1,2,3,4,5	Monthly	MOPS
Taireeri	Actual effective exchange rate index in Taiwan	Monthly	TEJ
Inv	The amount of investment approved for the six main countries in Southeast Asia	Monthly	AREMOS
Exp	The exports to the six main countries in Southeast Asia	Monthly	MOEA
Variable Code	Dummy Variables	Data Period	
D_1	$= 1, After\ the\ European\ debt\ crisis$ $= 0, Before\ the\ European\ debt\ crisis$	1: January, 2010~June,2011 0: others	
D_2	$= 1, Implementation\ of\ U.S.QE1\ policy$ $= 0, others$	1: March, 2009~March, 2009 0: others	
D_3	$= 1, Implementation\ of\ U.S.QE2\ policy$	1: August, 2010~June, 2012	

	$= 0, others$	0:others
D_4	$= 1, Implementation\ of\ U.S.QE3\ policy$ $= 0, others$	1: August, 2012~November,2014 0: others
D_5	$= 1, Implement\ Abenomics\ policy$ $= 0, others$	1: January, 2013~November,2014 0: others

EMPIRICAL RESULTS AND ANALYSIS

4.1 Initial Regression Model Analysis

In this study, E-Views 7 statistical analysis software is used to analyze the equation, and then the problems that may arise are modified. The above variables and the ordinary square method are used to analyze the economic implications. Klein's method is used to test for multi-collinearity; the White test is used to test for heteroscedasticity, and the Durbin-Watson test is used to test for autocorrelation. This research investigates the impacts of the European debt crisis, the Quantitative Easing Monetary Policy in the U.S., and Abenomics on the performance of Taiwanese electronic parts and components manufacturing firms as a case study in Southeast Asia using a multivariate regression model. The model is set as follows:

$$Y_i = \propto + \beta_{taireeri} Taireeri + \beta_{inv} Inv + \beta_{exp} Exp + \gamma_1 D_1 + \gamma_2 D_2 + \gamma_3 D_3 + \gamma_4 D_4 + \gamma_5 D_5$$

$$Y_i = \propto + \beta_{taireeri} Taireeri + \beta_{inv} Inv + \beta_{exp} Exp + \gamma_1 D_1 + \gamma_2 D_2 + \gamma_3 D_3 + \gamma_4 D_4 + \gamma_5 D_5$$

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$$Y_i = \propto + \beta_{taireeri} Taireeri + \beta_{inv} Inv + \beta_{exp} Exp + \gamma_1 D_1 + \gamma_2 D_2 + \gamma_3 D_3 + \gamma_4 D_4 + \gamma_5 D_5$$

First, the model in this study took the form of a logarithm in order to solve the problem as to whether the coefficients are too large to observe.

4.2 Multicollinearity Test

It the data in this study exhibit multi-collinearity, if $Ry>Ri$ (individual R-square), then that individual variable (which is multi-correlative with other variables) should be deleted. In this study, there are five models, and the minimum for Ry= 0.777550.

The results are shown in Table 2.

Table2			
Variable Code	Independent Variable	R-squared	Multicollinearity

EXP	The exports to the six main countries in Southeast Asia	0.735336	No
INV	The amount of investment approved for the six main countries in Southeast Asia	0.124031	No
TAIREERI	Actual effective exchange rate index in Taiwan	0.494470	No

(Source: This research)

The results of the multicollinearity test indicate that none of the variables have a multicorrelation.

4.3 Heteroskedasticity Test

We conduct the test for heteroskedasticity using the White test, while the foregoing description of the model took the form of a logarithm. The White heteroskedasticity test is used after taking the logarithm. The null hypothesis : No Heteroskedasticity. If the p-value is less than 0.05, we reject the null hypothesis. Once we reject the null hypothesis, the regression variables must be in the form of a logarithm**.**

The results of the heteroskedasticity test are presented in Table3:

Table 3

Regression model	F-statistic	F(8,86)	Heteroskedasticity
Y1（the first firm）	0.837681	2.05	No
Y2（the second firm）	2.022765	2.05	No
Y3（the third firm）	0.541424	2.05	No
Y4（the fourth firm）	1.701039	2.05	No
Y5（the fifth firm）	0.980350	2.05	No

(Source: This research)

4.4 Autocorrelation Test

A Durbin-Watson Test was used to test for autocorrelation, and the data in this study is time series data. As a result, the D-W value, on average, =1, so there is an autocorrelation problem suggesting that the residual term may be dependent. We therefore need to add the AR coefficient to modify the model.

The results of the autocorrelation test are presented in Table 4:

Table 4

Before adding AR	Durbin-Watson stat	After adding AR	Durbin-Watson stat

Y1（the first firm）	0.964413	Y1（the first firm）	2.108259
Y2（the second firm）	0.926776	Y2（the second firm）	2.082082
Y3（the third firm）	0.631601	Y3（the third firm）	1.523844
Y4（the fourth firm）	1.122721	Y4（the fourth firm）	2.214063
Y5（the fifth firm）	1.086669	Y5（the fifth firm）	1.932632

(Source: This research)

4.5 Final regression model

After the above tests, the result for the final model with a logarithm and AR coefficient added is presented as Table 5 (1-5):

Table 5-1

Y1（the first firm）

	EXP	INV	TAIREERI	D1	D2	D3	D4	D5
COEFFICIENT	0.947***	0.0058	1.54	-0.25**	0.039	-0.15	-0.015	0.45***
PRO.	0.00	0.73	0.39	0.024	0.76	0.20	0.93	0.0073
T-STATISTIC	5.67	0.35	0.869	-2.31	0.31	-1.292	-0.087	2.75
R-squared	0.8534							
Adjusted R-squared	0.8377							
Durbin-Watson stat	2.1083							

Note:***significant at the 1% level, **5% level, *1% level

Source: Summarized by this study

Table 5-2

Y2（the second firm）

	EXP	INV	TAIREERI	D1	D2	D3	D4	D5
COEFFICIENT	0.66***	0.012	0.38	-0.091	-0.11**	-0.18***	-0.31**	1.61***

PRO.	0.00	0.18	0.70	0.12	0.094	0.0058	0.0013	0.00
T-STATISTIC	6.76	1.36	0.39	-1.56	-1.694	-2.83	-3.33	18.25
R-squared	0.979496							
Adjusted R-squared	0.977299							
Durbin-Watson stat	2.082082							
Note:***significant at the 1% level, **5% level, *1% level								
Source: Summarized by this study								

Table 5-3								
Y3 (the third firm)								
	EXP	INV	TAIREERI	D1	D2	D3	D4	D5
COEFFICIENT	0.511***	0.016*	-0.058	-0.027	-0.0009	-0.016	-0.015	0.397***
PRO.	0.00	0.075	0.96	0.72	0.99	0.83	0.89	0.0002
T-STATISTIC	5.03	1.80	-0.052	-0.37	-0.01	-0.21	-0.14	3.90
R-squared	0.872788							
Adjusted R-squared	0.859158							
Durbin-Watson stat	1.523844							
Note:***significant at the 1% level, **5% level, *1% level								
Source: Summarized by this study								

Table 5-4								
Y4 (the fourth firm)								
	EXP	INV	TAIREERI	D1	D2	D3	D4	D5
COEFFICIENT	0.68***	-0.007	-1.32	0.08	-0.006	-0.031	-0.38***	0.98***
PRO.	0.00	0.43	0.32	0.43	0.95	0.75	0.006	0.00
T-STATISTIC	6.01	-0.79	-0.995	0.80	-0.063	-0.32	-2.82	7.40

R-squared	0.870244							
Adjusted R-squared	0.856342							
Durbin-Watson stat	2.214063							
Note:***significant at the 1% level, **5% level, *1% level								
Source: Summarized by this study								

Table5-5								
Y5 (the fifth firm)								
	EXP	INV	TAIREERI	D1	D2	D3	D4	D5
COEFFICIENT	0.56***	0.0046	-1.39	0.022	-0.0076	0.00069	-0.006	0.12
PRO.	0.00	0.55	0.11	0.67	0.90	0.99	0.94	0.14
T-STATISTIC	6.97	0.59	-1.61	0.42	-0.13	0.012	-0.073	1.51
R-squared	0.849567							
Adjusted R-squared	0.833449							
Durbin-Watson stat	1.932632							
Note:***significant at the 1% level, **5% level, *1% level								
Source: Summarized by this study								

At the 1% level of significance, “The exports to the six main countries in Southeast Asia” has a positive significant effect on the performance of the Taiwanese firms. At the 10% significance level, “The amount of investment approved for the six main countries in

Southeast Asia" has a positive significant effect on the performance of Taiwanese firms, but only in three of the five firms. "Actual effective exchange rate index in Taiwan" has no significant effect on the performance of the Taiwanese firms under consideration. The "European debt crisis" has no significant effect on the performance of the Taiwanese firms, but only Y1 firm has a negative significant effect on the performance of the Taiwanese firms at a 5% level of significance level. "The U.S QE1 policy" has a negatively significant effect on the performance of the second firms at the 5% level of significance; "The U.S QE2 policy" has a negative significant effect on the performance of the Y2 firm at the 1% level of significance, and "The U.S QE3 policy" has a negatively significant effect on the performance of the Y2 firm at the 5% level of significance. "The U.S QE3 policy" has a negatively significant effect on the performance of the fourth firms at the 1% level of significance. Abenomics has a positively significant effect on the performance of Taiwanese firms, but only in the case of four of the five firms at the 1% level of significance.

CONCLUSIONS AND SUGGESTIONS

This research project focuses on the impacts of European debt crisis, Quantitative Easing Monetary Policy in the U.S. and Abenomics on the performance of Taiwanese electronic parts and components manufacturing firms in Southeast Asia, and we added three macroeconomic variables. In the results, at the 1% level of significance, "The exports to the six main countries in Southeast Asia" were shown to have a positively significant effect on the performance of the Taiwanese firms under consideration in this study. Abenomics has a positively significant effect on the performance of the Taiwanese firms at the 1% level of significance. We believe that the "European debt crisis" has no significant effect on the performance of the Taiwanese firms examined in this study, but the coefficients for the "European debt crisis" are negative in five of the firms. Zhang (2013) found that Taiwanese firm sales decreased because of the shrinking of the entire market in Europe after the European debt crisis. The results of the present study concurred with the research of Zhang.

"The U.S QE policy" was not shown to have a significant effect on the performance of the Taiwanese firms being examined in this study. Exchange rate fluctuations affect Taiwan's electronic components industry in the U.S., European markets and global markets, and competition from Asian markets including China, Korea, and Japan have been characterized with rapid development in the electronics manufacturing industry. Taiwanese firms are thus facing a highly competitive market. These factors led to the need for research examining the

impact of the U.S QE policy on Taiwanese firm performance. However, we now believe that the U.S QE policy has no significant effect on Taiwanese firm performance.

Su (2013) pointed out Taiwanese firms relying on Japanese equipment importers and technology caused the depreciation of the yen. However in the electronic parts and components manufacturing industry, firms in direct competition with Japanese companies experienced a loss of sales. This result was in agreement with the research of Su (2013).
There have been few studies on the impact of international events and macroeconomic variables on performance. Therefore, this study could help governments and companies determine the impact of these factors on performance. The impact of international events requires continuous observation. We hope that researchers will continue to observe and analyze changes in the future. The factors affecting operating performance include the environment and entry mode, among others. We therefore recommend that researchers add more factors that may potentially affect performance in order to analyze their effects as well.

Table6 Comparison of Conclusions from this Research and those of Previous Studies

Author	Paper Title	Conclusion
Lin & Chou（2005）	The Effects of Investment in China on the Financial Performance of Taiwan Parent Companies	The amount of money invested is a chief factor affecting the financial performance of the parent companies.
Jan-Yan Lin & Ya-Hui Lin （2011）	Influence of Internationalization, Firm Size and Firm Characteristics on the Performance Effect of Parents and Subsidiaries: A Study of Taiwanese Investment in China	The larger and more internationalized the investment scope of the subsidiaries, the more significant the effect on financial performance is.
Hsin-Hong Kang & Su （2004）	A study of investment and performance in China –take conventional industries and information technology	EPS will be influenced significantly by investment amounts, the world economy, GPD and exchange rates.

	industries in Taiwan for example	
This study	The impacts of European Debt Crisis, Quantitative Easing Monetary Policy in U.S., and Abenomics on performance of Taiwanese Electronic Parts and Components Manufacturing Firms: A Case Study in Southeast Asia	The exports to the six main countries in Southeast Asia and Abenomics have a significant impact on firm performance.

REFERENCE

[1] Adler, M., and B. Dumas, 1983, "International Portfolio Choice and Corporation Finance: A Synthesis," Journal of Finance, 38, 925-984

[2] Ajami, R. and R. BarNiv. 1984. "Utilizing Economic Indicators in Explaining Foreign Direct Investment in the U.S.,|| Management International Review, vol. 24, pp. 16-26.

[3] Anderson and Gatignon(1986). Modes of Foreign Entry: A Transaction Cost Analysis and Proposition. 1-26

[4] Bodnar, G. M., Gentry, W.M., 1993. Exchange Rate Exposure and Industry Characteristics: Evidence from Canada, Japan, and the USA. Journal of International Money and Finance, February, 29-45.

[5] Jian-yi Zhang (2013) "Research on the status of the US and European markets and export competitiveness Reengineering", Council for Economic Planning and Development（In Chinese）.

[6] Chu-Ying Lin & Kuan-Ling Chou (2005)," The Effects of Investment in China on Financial Performance of Taiwan Parent Companies", Soochow Journal of Economics and Business No.51 (December 2005)：269-296.（In Chinese）

[7] Cushman, D.O. (1988), Exchange rate uncertainty and foreign direct investment in the United States, Weltwirtschaftliches Archiv, Vol. 124, pp. 322-336.

[8] Dewenter, Kathryn M. and Paul H. Malatesta (2001), Firm ownership and performance, American Economic Review 91, 320-334.

[9] Froot, K., and J. Stein, "Exchange Rates and Foreign Direct Investment: An Imperfect Capital Markets Approach", Quarterly Journal of Economics (1991) 1191-1217.

[10] Jan-Yan Lin & Ya-Hui Lin (2011)" Influence of Internationalization, Firm Size and Firm Characteristics on the Performance Effect of Parents and Subsidiaries: A Study of Taiwanese Investment in China", Vol.9 No.2 (2011/08), 59-87（In Chinese）

[11]Junz, H., and R.R. Rhomberg (1973), "Price Competitiveness in Export Trade Among Industrial Countries," American Economic Review, Papers and Proceedings, 63,412-418.

[12] Klein, M. and E. Roengren. "The Real Exchange Rate and Foreign Direct Investment in the United States: Relative Wealth vs. Relative Wage Effects." Journal of International Economics (1994), 373-389.

[13] Kojima, K. (1978), *Direct Foreign Investment: A Japanese Model of Multinational Business Operation*, New York: Praeger Publishers.

[14] Venkatraman, N., & Ramanujam, V. (1986). Measurement of business performance in strategy research: A comparison of approaches. Academy of Management Review, 801-814.

[15] Xian-yang, Su,(2014),"The Effect and Meaning of the Japanese Abenomics," Report of Taipei Foreign Exchange Market Development Foundation,pp.174-pp.181 (in Chinese)

TECHNOLOGY FOR ANALYSIS OF DESIRABLE PRODUCT SPECIFICATIONS BASED ON TARGET CUSTOMERS' eWOM

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ABSTRACT

In today's highly competitive business environment, the primary way an enterprise enhances its competitive advantage is to understand target customers' preferences and needs for the products. In the past, visiting customers in person or conducting questionnaires were the main measures an enterprise took to grasp customers' preferences and needs. With the development of Internet and the rising popularity of community websites, more and more consumers will post the Product Review online, which offers enterprises another way to grip consumers' preferences and needs for products more objectively. As a result, how to assist enterprises to effectively analyze a large number of target customers' eWOM on the Internet and further extracting decision-making information is one of an enterprise's major studies on increasing its competitive capability.

The purpose of the study lies in designing an IT-based method that can outline desirable specifications on the basis of target customers' eWOM. Such method is able to help an enterprise quickly adapt consumers' preferences and demands for products to product planning. In so doing, not only can an enterprise shorten its time to market, but it can also raise the target customers' satisfaction for the products. In accordance with above purposes, the main research projects include: (i) the design of a desirable product specification identification process for target customers' eWOM, (ii) the development of desirable product specification identification techniques for target customers' eWOM, and (iii) the implement of desirable product specification identification techniques for target customers' eWOM.

Keywords—Electronic word-of-mouth (eWOM), Target customers, Product Specification.

INTRODUCTION

The boom of Information and Communication Technology and the globalization of markets have enhanced the interaction between consumers and enterprises. The increasing variety of products and competitors result in tougher business environments so that an enterprise has changed the business models from product orientation to customer orientation to satisfy consumer demands. A customer-oriented business model is based on the understanding of target customers' product preference and demands. An enterprise used to understand consumer preference and demands through the interviews between salespersons and consumers or questionnaire survey. Nevertheless, the development of the Internet and the popularity of discussion communities cause more and more consumers making online comments on products. It presents that an enterprise could more objectively understand consumers' product preference and demands from an alternative channel. Consequently, effectively analyzing valuable decision information from a great deal of customers' eWOM is a primary issue for an enterprise enhancing the competitive advantages.

Current research on consumers' eWOM is divided into two categories. First, how to extract and classify customer opinions in eWOM is studied. For example, aiming at big eWOM, Zhan et al. (2008) preceded multi-document summarization to select the most representative eWOM. Chen et al. (2011) proposed to classify subjective sentences and objective sentences with Support Vector Machine (SVM) so as to accurately find out the customer opinions (subjective sentence), in a lengthy article, about products. Zhu et al. (2011) and Bafna & Toshniwal (2013)

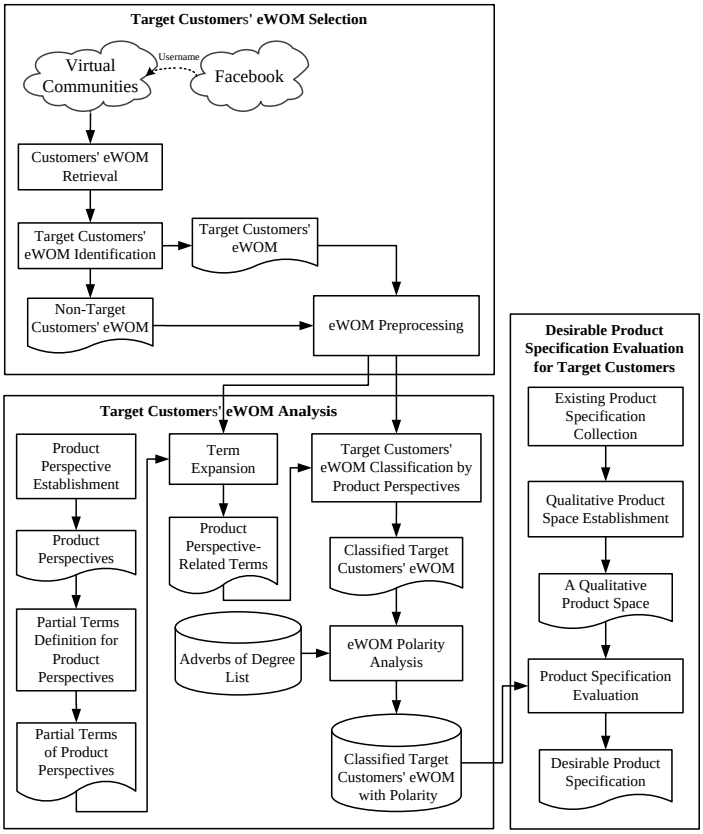
first looked for customer opinions in eWOM about products and then classified such opinions with positive and negative judgment. Second, the application of eWOM extraction is researched. For instance, Esparza et al. (2012) established the user preference model with the speech, constructed the merit/demerit model of a product with all user comments on the product, and finally compared such two models for recommending products to users. Zhang et al. (2012) analyzed user opinions about self-produced products for the drawbacks in customers' eyes or the relatively weak dimensions in comparison with competitors' products. Above research on consumers' eWOM was still on the beginning stage, and most studies focused on the extraction and classification of customer opinions in eWOM, but seldom on the application of consumers' eWOM, and even rarely on the decision support for product design and development.

In this case, a desirable product specification identification mechanism, aiming at target customers' eWOM, is developed in this study to assist an enterprise in rapidly transforming target customers' product preference and demands for products into the product planning to further shorten the time to market for products and enhance the customers' product satisfaction. Accordingly, the research items include (i)the design of a desirable product specification identification process for target customers' eWOM, (ii)the development of desirable product specification identification techniques for target customers' eWOM, and (iii)the implementation of desirable product specification identification mechanism for target customers' eWOM. The development of desirable product specification identification techniques for target customers' eWOM covers target customers' eWOM selection, target customers' eWOM analysis, and desirable product specification for target customers.

METHODOLOGY

Aiming at target group's eWOM, a desirable product specification identification process is developed in this chapter, including target customers' eWOM selection, target customers' eWOM analysis, and desirable product specification for target customers.

Figure 1
Desirable Product Specification Identification Process forTarget Customers' eWOM



2.1. Design of a Desirable Product Specification Identification Process for Target Customers' eWOM

Aiming at target group's eWOM, a desirable product specification identification process is developed in this chapter, including target customers' eWOM selection, target customers' eWOM analysis, and desirable product specification for target customers.

2.1.1. Target Customers' eWOM Selection

With the popularity of Facebook, online discussion communities often allow users directly using the Facebook account as the community account, for the sake of convenience. Users therefore could make comments with the Facebook identity. In this study, Facebook users are judged as target customers with the personal data (such as age, gender, and working place) so as to identify their eWOM. Target customers' eWOM and non-target customers' eWOM are further preprocessed in order to keep the nouns, adjectives, and adverbs in eWOM for analyses.

2.1.2. Target Customers' eWOM Analysis

eWOM appraisal refers to target customers commenting on some dimensions of a target product. As a result, the analysis of target customers' eWOM aims to analyze the product dimensions from eWOM. First, a user would define the target product and the concerned product dimensions. For example, a user establishes a target product as "smartphone" and the product dimension as "camera". Based on the defined product dimension "camera", related seed terms are artificially defined, such as pixel and taking pictures. Nonetheless, such seed terms related to the product dimension might be insufficient that the related terms, based on such seed terms, should be expanded so as to acquire more sufficient related terms. Furthermore, the eWOM preprocessing result in (1)Target Customers' eWOM Selection is preceded the product dimension classification, based on such related terms. As the example of "This mobile phone is expensive" in an eWOM, the term "expensive" often appears with the seed term "price" that the product dimension of "price" is included in the related term stock after term expansion. In this case, even though the term "price" is not mentioned in eWOM, the term "expensive" in target customer's eWOM is still classified into the product dimension "price". Moreover, the related term stock would be adjusted the weight according to the

frequency of the term appearing with several product terms, e.g. an eWOM "The camera of a mobile phone is great" in the camera dimension, an eWOM "The battery endurance of this mobile phone is great" in the battery dimension, and another eWOM "The memory of this mobile phone is great, presenting 64GB" in the hardware dimension. The adjective "great" simultaneously appears with several product terms that the adjective "good" in camera, battery, and hardware dimensions would be reduced the weight. Finally, the classified target customer eWOM, according to the product dimension, is analyzed the positive/negative appraisal so that target customers' eWOM present the value for product specification review.

2.1.3. Desirable Product Specification Evaluation for Target Customers

eWOM makes comments on current products; the real specification information of a product must be acquired to make the eWOM appraisal valuable. For instance, a target consumer comments the screen of smartphone A being too small. The real screen size of smartphone A should be acquired in order to clearly know the target consumer's dissatisfaction with the screen size. Web Spider is therefore utilized for collecting current product specification information in this study. Furthermore, such product specification information is established a prototype of Qualitative Product Space (QPS) according to above (2). Finally, the prototype of Qualitative Product Space (QPS) and the product comments in target customers' eWOM analyzed in (1) are evaluated in order to adjust the specifications of current products and further acquire satisfactory product specifications for target customers.

2.2. Development of Desirable Product Specification Identification Techniques for Target Customers' eWOM

Based on the identification process for desirable product specifications in target customers' eWOM described in Section 2, the relevant core methods, including target customers' eWOM selection, target customers' eWOM analyses, and desirable product specification evaluation for target customers, are developed.

2.2.1. Target Customers' eWOM Selection

Target customers' eWOM selection covers customers' eWOM retrieval, target customers' eWOM identification, and eWOM preprocessing, as detailed below.

A. Customers' eWOM Retrieval and Target Customers' eWOM Identification

In order to effectively retrieve and identify target customers' eWOM, eWOM of a target product announced in various virtual discussion communities which are registered with Facebook IDs is first retrieved, such announcers are further judged the personal data for being target customers, and such retrieved eWOM are identified as target customers' eWOM. The identified eWOM is divided into target customers' eWOM and non-target customers' eWOM.

B. eWOM Preprocessing

Target customers' eWOM and non-target customers' eWOM identified in step A. are preprocessed. First, some blanks or special symbols which could result in misjudgment are trimmed. CKIP Client (Academia Sinica, 2011)is utilized for sentence segmentation, word segmentation, and part of speech tagging in order to acquire nouns, adjectives, and adverbs in eWOM.

2.2.2. Target Customers' eWOM Analysis

Target customers eWOM analysis aims to classify the target customers' eWOM of products acquired in Section 2.1 and judge the positive and negative appraisal. Target customers' eWOM analysis mainly involves in five steps, namely product perspective establishment, partial terms definition for product perspectives, term expansion, target customers' eWOM classification by product perspectives, and eWOM polarity analysis.

A. Product Perspective Establishment

Products involved in target customers' eWOM are broad that the product specification dimensions covered in target customers' eWOM should be artificially established before the analysis for the product specification appraisal.

For example, the smartphone specification appraisal of a target customer might be defined the dimensions of camera pixel, screen size, and memory capacity. Acquiring the real specifications according to such product specification dimensions, the product specification appraisal in target customers' eWOM could be acquired.

B. Partial Terms Definition for Product Perspectives

According to above product dimensions, synonyms are artificially tagged online (Kuantung Hsieh, 2003)(Ministry of Education, R.O.C. ,1994) in order to look for the related terms as the seeds for the expansion. For instance, some synonymous words related to the battery dimension of a smartphone, including standby time, endurance, battery life, quantity of electric charge, milliampere, and charging, could be defined.

C. Term Expansion

First, according to the nouns, adjectives, and adverbs acquired from the preprocessing in Section 3.1, C-value method is used for selecting important and common terms in daily life. The calculation is shown as Equation (1).

$$\text{C-value}(a) = \begin{cases} \log_2(|a|) \times \text{frq}(a), & a \text{ is not nested.} \\ \log_2(|a|)(\text{frq}(a) - \frac{1}{P(T_a)})\sum_{b \in T_a} \text{frq}(b)), & \text{otherwise.} \end{cases} \quad (1)$$

where a is the candidate string, $\text{frq}(.)$ is its frequency of occurrence in the corpus, T_a is the set of extracted candidate terms that contain a, and $P(T_a)$ is the number of these candidate terms.

Second, such selected terms and the related terms defined in product specification dimensions are proceeded correlation comparison in order to expand the related terms in the product specification dimensions. The calculation is shown as Equation (2).

$$\text{RlogF}(t) = \text{logfrq}(t, T) \times R(t, T) \quad (2)$$

where $\text{RlogF}(t)$ is the relevance between the term and the product specification dimension, T is the related term in the defined product specification dimension; $\text{frq}(t, T)$ is the number of times the term t simultaneously appearing with the related term T in the product specification dimension, and $R(t, T)$ denotes $\text{frq}(t, T) / \text{frq}(t)$.

The related terms in the product specification dimension would be sequenced RlogF, and the terms with larger RlogF are regarded as the related terms in a new product specification dimension. However, the RlogF sequencing could stands for the relevance between terms and product specification dimensions. Consequently, related terms in the dimension need to be adjusted the RlogF sequence in other dimensions. First, the RlogF sequence is quantified with Equation (3). Second, related terms which need to be revised φ because of the RlogF sequence in a different dimension are calculated (Equation (4)). Finally, the correlation between related terms and product specification dimensions acquired with Equations (3) & (4) are calculated with Equation (5). The product specification dimension with the highest relevance is the one in which the terms belong.

$$\eta_i(t) = 1 - \frac{\gamma_i(t)}{|S_i|} \quad (3)$$

where $\eta_i(t)$ is the quantified value of the RlogF sequence, S_i is the set of related terms in the product specification dimension, $|S_i|$ is the quantity of related terms in the product specification dimension, and $\gamma_i(t)$ is relevance sequence of related terms in the product specification dimension.

$$\varphi(t) = \frac{-\sum_{i=1}^{m} \frac{\gamma_i(t)}{\sum_{1\le j\le m}\gamma_j(t)} \log \frac{\gamma_i(t)}{\sum_{1\le j\le m}\gamma_j(t)}}{\log m} \tag{4}$$

where m is the number of product specification dimensions correlated with related terms in the product specification dimension.

$$\text{score}_i(t) = \eta_i(t) \times (1 - \varphi(t)) \tag{5}$$

D. Target Customers' eWOM Classification by Product Perspectives

Target customers' eWOM classification mainly segments and classifies sentences of related terms in the product dimension in the preprocessed eWOM. For example, "The camera pixel is good, the screen size is small, and the resolution is not bad, but the battery endurance is bad" in an eWOM, three product specification dimensions, camera, screen, and battery, are mentioned. Such three dimensions are segmented into "the camera pixel is good", "the screen size is small, and the resolution is not bad", and "but the battery endurance is bad" for product specification classification to analyze the positive and negative appraisal. The segmentation and classification equations for target customers' eWOM are shown as Equation (6) and Equation (7).

$$U^* \overset{\text{def}}{=} \arg\max_{U} J(C, U) \tag{6}$$

$$J(C, U) = \sum_{1\le i\le k} \left[\delta(u_{i-1}, u_i) \times \text{score}_{a^*}(u_i)\right] = \sum_{1\le i\le k} \left[\delta(u_{i-1}, u_i) \times \sum_{t\in u_i} \text{score}_{a^*}(t)\right] \tag{7}$$

where C is the set consisting of *n* sub-sentences, $C = \{c_1, c_2, c_3, ..., c_n\}$, U is the set of *k* paragraphs, $U = \{u_1, u_2, u_3, ..., u_k\}$, $J(C, U)$ judges whether the clauses in the same product specification dimension is segmented into the same segment, u_i, u_{i-1} are the sub-sentences in different product specification dimensions that $\delta(u_{i-1}, u_i) = 1$ when the two sub-sentences are in different product specification dimensions, or $\delta(u_{i-1}, u_i) = 0$, and a^* is the most representative product specification dimension of u_i.

E. eWOM polarity analysis

We manually construct a polarity dictionary includes both of positive sentimental words(good, beautiful, nice, etc.), negative sentimental words(worse, dirty, etc.), and antisentiwords(not, never, etc.)(Shengchieh Kao ,2014).By referring to this polarity dictionary, if this eWOM contains positive sentimental word, it would be judged a positive eWOM, if it contains both of positive sentimental word and antisentiwords, it would be considered a negative eWOM.

2.2.3. Desirable Product Specification Evaluation for Target Customers

According to the product specification appraisal in target customers' eWOM analyzed in Section 2.2.2, a desirable product specification evaluation is developed in this section to derive the product specifications

conforming to target customers' preference. Such a desirable product specification evaluation contains existing product specification collection, qualitative product space (QPS) (J.N Lewis et al., 2010) establishment, and product specification evaluation.

A. Existing Product Specification Collection

Based on the product specification dimensions established from product perspective in Section 2.2.2(A), the detailed specifications for current product specification dimensions (such as the camera dimension for a mobile phone iphone 6 with 8 million pixels and 1GB RAM) are manually collected, and a product specification database is constructed.

B. Qualitative Product Space (QPS) Establishment

An empty QPS is established based on the above product perspectives. Product specifications collected in step (A) are then filled in the empty QPS to form the product QPS.

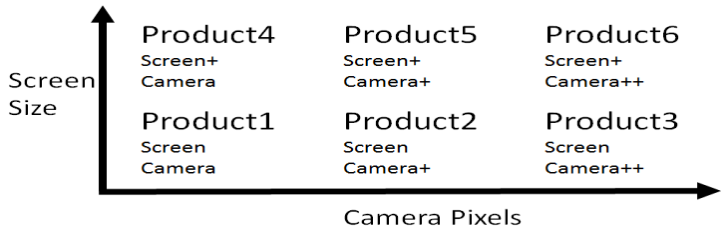
(1) Empty Qualitative Product Space (QPS) Establishment

The above product perspectives are independently established an exclusive coordinate as the product QPS.

(2) Qualitative Product Space (QPS) Establishment with Product Specifications

Product specifications are retrieved from the product specification database, in which the product QPS is filled according to the specifications, Fig. 2.

Figure 2
Filled qualitative product space example



(3) Product Specification Evaluation

Randomly selecting a product in the established QPS as the initial point of the rapid product navigation (J.N Lewis et al., 2010), parts of eWOM are randomly selected from the database to be the target customers' opinions. Based on such opinions, existing products in QPS are navigated till the product QPS does not move (convergent). Finally, the stayed product specifications are those conforming to target customers' preference. The algorithm for rapid product navigation is designed by C#, Table 1.

Table 1
Algorithm for Rapid-Product-Navigation

	INPUT: Random eWOMs in one perspective, which is represented $E = \{e_1, e_2, e_{3\ldots}e_n\}$. *Product* means a product's specification in one perspective. Define theQualitative product space in all perspective, which is represented by $QPS = \{q_1, q_2, q_{3\ldots}q_n\}$. T_d and T_p are consts. ***OUTPUT***: A desirable product specification.
1.	**int** count = 0
2.	**foreach** q_i in the QPS
3.	**while** (true)
4.	**if** |*positive* in E – *negative* in E| < T_d
5.	count++;
6.	**if** *positive* in E > *negative* in E && *positive* in E – *negative* in $E > T_d$
7.	*Product LEVEL DOWN*;

```
8.          count = 0;
9.        if positive in E < negative in E && negative in E – positive in E > T_d
10.         Product LEVEL UP;
11.         count = 0;
12.       if count >= T_p
13.         break;
14.       Random another eWOM set E;
15.   return Product;
```

Result

This research use smart phone as a case to implement, and choose students as target customers. After Rapid-Product-Nevigation, the desirable smart phone specification for students in Taiwan as follows: Screen 5 inches, Camera 20 mega pixels, Ram 3GB, Rom 32GB, Battery 2600mAh.

We sent out the online questionnaire to evaluate our result and received 325 completed questionnaires. and rated their satisfaction of the perspective specification on a five-point hedonic scale (1 = unsatisfied extremely, 5 = satisfied extremely).

Table 2
Mean specification satisfaction ratings

Perspective	Satisfaction rating
Screen	4.15
Camera	4.56
Ram	4.39
Disk	4.20
Battery	3.00
Overall	4.06

As the result, expect the battery, other perspectives' mean scores are all higher than 4, camera's score even reach 4.56, and overall's score is 4.06. So this methodology is worth consideration for product development.

Conclusions and Perspectives

A novel technology for identifying a desirable product specification in target customers' eWOM is developed in this study, aiming to assist an enterprise in rapidly changing target customers' preference and demands into the product planning so as to reduce the time to market for products and enhance production satisfaction of target customers. The main results and contributions of this study are concluded as follows.

(1) Desirable product specification identification model for target customers' eWOM. Aiming at target customers' eWOM, a desirable product specification identification model is designed in this study for an enterprise rapidly transforming target customers' preference and demands into the product planning so as to enhance the product satisfaction of target customers.

(2) Desirable product specification identification method for target customers' eWOM. According to the desirable product specification identification model, a related desirable product specification identification method, including target customers' eWOM selection, target customers' eWOM analysis, and desirable product specification evaluation for target customers, is developed for the implementation of desirable product specification identification mechanism.

(3) Desirable product specification identification mechanism for target customers' eWOM. This mechanism could real-time acquire target customers' opinions about product specifications on online communities, objectively analyze

and generate desirable product specifications for the reference of product design and development, as well as satisfy target customers' demands.

The research outcomes could implement the desirable product specification identification mechanism for target customers' eWOM and enhance target customers' satisfaction with product specifications so as to satisfy target customers' demands for product specifications and further promote the product competitiveness of an enterprise in the market.

REFERENCE

[1]. Jiaming Zhan, Han Tong Loh and Ying Liu (2008), Gather customer concerns from online product reviews, Expert Systemswith Applications, Vol. 32,No. 2, Pp. 2107-2115

[2]. Wei Chen, Yanquan Zhou and Xin Wang (2011), Chinese Subjective Sentence Extraction Based on Dictionary and Combination Classifiers, Physics Procedia, Vol. 22, Pp..593-601

[3]. Jingbo Zhu (2011), Aspect-Based Opinion Polling from Customer Reviews, IEEE Transactions on Affective Computing, Vol. 2,No. 1, Pp. 37-48.

[4]. Kushal Bafna and Durga Toshniwal (2013), Feature based Summarization of Customers' Reviews of Online Products, Procedia Computer Science, Vol. 22, Pp. 142–151

[5]. Sandra Garcia Esparza, Michael P. O'Mahony and Barry Smyth (2012), Mining the real-time web A novel approach to product recommendation, Knowledge-Based Systems, Vol. 29,, Pp .3-11

[6]. Wenhao Zhang, Hua Xu and Wei Wan (2012), Weakness Finder: Find product weakness from Chinese reviews by using aspects, Expert Systems with Applications, Vol. 39,No. 11, Pp. 10283–10291

[7]. J.N Lewis, R.Teratanavat, J.Beckley, M.A Jeltema. (2010), "Using a Consumer-driven Rapid Product Navigation Process to Develop an Optimal Product" Food Quality and Preference, Vol. 21, No. 8, Pp. 1052-1058.

[8]. Shengchieh Kao (2014), Development of a Technology for Part of Speech Combination Supported Chinese eWOM Analysis, National Cheng Kung University, Tainan.

[9]. Academia Sinica (2011),CKIP (Chinese Knowledge and Information Processing), URL: http://ckipsvr.iis.sinica.edu.tw/

[10]. Kuantung Hsieh (2003), Tung tung synonym online dictionary, URL: http://www.kwuntung.net/synonym/

[11]. Ministry of Education, R.O.C. (1994), Ministry of Education online dictionary, URL: http://dict.revised.moe.edu.tw/

RESERCH OBSTACLES IN TOURISM: A STUDY APPLIED TO EGYPTIAN UNIVERSITIES

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ABSTRACT

Research has a key role in sustainable and comprehensive development for any country. The primary body producing research in Egypt is higher education institutions (i.e. universities). It is claimed that the academic research contribution to tourism industry development is limited. This study aims to investigate the challenges of university research. It examines the effect of research challenges on the tourism industry development. Employing structural equation modeling for analysis purposes of 151 questionnaire forms collected from academics, the findings revealed that lack of clear university research policies, weak financial support, university research environment, researchers-related factors, research output marketing challenges, and field-related challenges are negatively affecting the tourism sector development. This study is useful for research policy-makers to set up research priorities to meet the societal needs.

Keywords- Academic research, Challenges, Egypt, Tourism.

INTRODUCTION

At its various levels, research exists as one of the most outstanding factors contributing to the comprehensive development process of industry. In the rapidly changing world, societies aspire to provide rising generations with the knowledge necessary for solving problems and dealing with present and future challenges. Because of their crucial impacts, education and research can be considered the society's most critical investment in human resources. Higher education and research hold a key role in promoting comprehensive development and rapid transformation necessary for nations facing the consequences of globalization. There is a dire need in the Arab world for a complete re-examination of higher education, and research policy in order to work towards enhancing their quality to meet needs of the modern society. In the Arab world, research is mostly linked to higher education institutions (i.e., universities). It is believed that higher education and research constitute the best and the most appropriate model with a primary function of producing and providing advanced scientific knowledge enables progress and builds a better future (Bin Tareef, 2009).

Furthermore, research is an essential component for any country to achieve sustainable and global development. It is also essential for social mobility, the achievement of harmony, justice, comprehensive peace, and most importantly the development of human resources (Karimian, Sabbaghian, Salehi, & Sedghpour2012). Academic research should aim to educate well-aware, autonomous, and responsible citizens committed to national and universal principles, capable of dealing with the challenges of the century and of lifelong learning. It is strongly linked to universities in Egypt where universities are one of the main and popular bodies conducting and producing research. As a result of this linkage between university and research, research was poor in Egypt until 1907 as universities did not exist before that time in Egypt. The establishment of Cairo University in 1908 was the beginning of escalating the number of universities and students joining these institutions (Bond, Maram, Soliman, & Khattab, 2013). Number of universities in Egypt has increased from one public university in 1908 to 27 public universities at present. In addition, 19 private universities, and a small number of public research centers have been established (Ministry of Higher Education, 2014).

Despite the increasing number of universities in Egypt and considering them the main body producing academic research, the Central Auditing Organization, the formal authority of auditing in Egypt, has criticized Egyptian universities for their relatively low output of scientific research compared to universities in other countries (OECD & World Bank, 2010; World Economic Forum, 2011). The global competitiveness report issued by the World Economic Forum in 2011 has ranked Egypt the 113th out of 142 countries on the quality of scientific research and 83rd on its capacity for innovation (Bond, et al., 2013). This simply leads to the fact that research in Egypt occupies the tail position of global rankings. Therefore, this study investigates the challenges

facing the quality of scientific research produced by universities. It examines the determinants of research produced in tourism and hospitality sector and its contribution to solving the developmental problems of the sector. There are very few studies, if any, looking at the challenges of tourism and hospitality research and its contribution to the sector development (Rosen College of Hospitality Management, 2013). This study is very useful for policy-makers seeking the effective contribution of academic research in developing tourism field. In the following sections, the study discusses the challenges of tourism research, its contribution to the field development, research framework and hypotheses development, as well as research methodology, findings and discussion.

LITERATURE REVIEW

1.1. Brief Overview of Academic Research in Egypt

There is a belief that the poor Arabic economic performance is a result of the lack of focus on knowledge and research as one of the main development pillars (El Baradei & El Baradei, 2004). The community of scientific research in Egypt is suffering a climate of frustrations, which squandered several chances for contribution to the development of the country. There is a lack of coordination between the institutions of scientific research and development authorities in Egypt. In addition, Egypt lacks the appropriate mechanisms for marketing the product of research centers and transfer of research to the application stage (Belal & Springuel, 2006).

Generally, the funding of the research system in Egypt is provided primarily by the Ministry of Finance based on planning documents developed by the Ministry of Planning in consultation with the Ministry of State for Scientific Research. The funding for university research is very low, limiting the universities' ability to play an important role in the generation and dissemination of knowledge. At 0.2%, of GDP, Egypt spends ten times less than the best OECD performers, and is only at half the average level of expenditures in the Arab region (OECD & World Bank, 2010).

As for well-educated researchers, the country supports the mobility of academic staff. Mobility not only provides participating individuals with an international experience and contacts with peers abroad, but eventually will be translated into research activities back home. In the case of Egypt the efforts being made on mobility appear not to be driven by strategy, at either the system or institutional level (OECD & World Bank, 2010). In addition, a small percentage of university postgraduate students has the opportunity to read for their PhD abroad being fully-funded by the government. However, Egypt has been steadily losing scientists. Two thirds of the postgraduates studying overseas in the late 1990 and early 2000 did not return home (Bond, et al., 2013). It is estimated that there are more than 6500 Egyptian PhD holders working as faculty members and researchers in universities in Europe, North America and Australia (OECD & World Bank, 2010). This is due to factors hindering research such as limited national funding, increasing cost of applied research, inadequate networking, inadequate coordination between different research organizations, poor dissemination and use of research findings, in addition to better career for them abroad.

1.2. Challenges of Tourism and Hospitality Research, and Research Hypotheses Development

Unfortunately, tourism research did not provide an interactive international platform for academics and industry practitioners from diverse backgrounds and interests to meet critical issues that will affect the future direction of tourism research and practice. Also, there is a lack in promoting mutual dialog, interaction and understanding of various stakeholders of tourism research outputs, including academic researchers and scholars, industry professionals, and government officials (Rosen College of Hospitality Management, 2013). In addition, many tourism researchers have been deeply criticized for a disappointment to advance research addressing fundamental social and political questions, preferring to focus instead on small-scale, technically-based problem-solving research (Corbyn, 2008; Tuchman, 2009).

There are 8 faculties of tourism and hotels belong to public universities in Egypt in addition to 2 faculties belong to private universities and many private tourism and hotel institutes (Ministry of Higher Education, 2014). Despite having this number of faculties in Egypt, very few studies targeted the academic researchers to clarify the perceived challenges of them to produce high quality research solving the obstacles to industry development. Filling this gap, this study has examined and classified the challenges of research in tourism field

to five main categories: university research environment, financial factors to support research, university research policies, research marketing, and researchers' related factors.

1.2.1. University Research Environment

University research environment refers to the university and faculty's support provided to researchers to help them produce high quality research. This support could include the clear policy of research, setting up research priorities, and procedures of educating and improving the quality of researchers and post-graduate students. The research environment in universities significantly affects staff members and postgraduate students, the main categories producing academic research.

As for staff members, although more than one third of the total number of faculty members employed in Egyptian public universities is professors or associate professors, their research capacity is low as a result of being engaged in teaching, in addition to their need to be well-prepared and qualified continuously to do high quality research. The low-level skills of research and teaching duties of staff members have also affected postgraduate students, where supervisors do not have enough time to guide their research students and help them overcome any research obstacles. This eventually has led to the fact that universities do not have a meaningful role to play in the research and development due to the lack of standards and criteria for measuring performance and contribution to relevant fields (OECD & World Bank, 2010). Based upon the above argument, the first hypothesis of the study was developed as follows:

H1: University research factors have a negative effect on the contribution of academic research in solving tourism sector problems.

1.2.2. Financial Support

Financial challenges refer to the financial allocations to support scientific research, research excellence, scholars and incentives, and the different requirements for research such as laboratories, equipment and periodicals. Farajanee (2000) reported that the expenditure of Arab states on research is almost the lowest in the world. The governments in most Arab countries serve as the primary or sole source of research funding. One reason of low quality research is the lack of financial incentives for university staff members (OECD & World Bank, 2010). In addition, the financial allocations for attending international conferences or publishing in international periodicals are at minimum level.

On the other hand, the governmental funding allocation for scientific research has never exceeded 0.5% of the GDP. Researchers, particularly in humanities and social sciences have been suffering from severe shortage and even lack of any funding allocated to conduct research. A revolutionary change has taken place in 2014, where it has been decided to allocate 1% of the GDP for scientific research (Egyptian Constitution, 2014). As claimed earlier by OECD & World Bank (2010), at 0.2%, of GDP, Egypt's expenditure on scientific research is very low. Based upon the above argument, the second hypothesis of the study was developed as follows:

H2: financial support has a negative effect on the contribution of academic research in solving tourism sector problems.

1.2.3. Researchers-related Factors

In a study conducted by Al-Furaih and Al-Shayji (2005) in Kuwait to examine obstacles to scientific research encountered by faculty members in research sponsored projects, the results indicated that the major obstacles were inherent in the excessive number of procedures that reduce their incentives to apply for funding. Additional challenges include the inadequacy of qualified research assistants, and the preoccupation of the faculty members in administrative duties and teaching assignments.

Furthermore, potential researchers in universities lack the facilities and adequate funding and incentives to engage in research activities (OECD & World Bank, 2010). Other factors include inadequate networking and coordination between different research organizations to support researchers (Bond, et al., 2013). A further challenge of research is the lack of motivation of staff members to do research except for promotion purposes (Karimian, et al., 2012). In addition, academic staff members at universities frequently and even regularly manage their research productivity independently without or may be with limited support and guidance from institutional administrators (Bowen, 2005). Based upon the above discussion, the third hypothesis of the study is:

H3: Researchers-related factors are negatively effecting the contribution of academic research to solving tourism sector problems

1.2.4. Research Policies

In a study by Bin Tareef (2009), the results revealed that there is a lack of strategic planning for research. In addition, there is an absence of clear scientific policies and strategies. Unclear policies linked to national priorities have led to research output that is not linked to industry development. One key challenge for research priorities in Egypt is the need to have a research model that is responsive to societal needs and is carried out by multidisciplinary teams of researchers (OECD & World Bank, 2010).

The separation of public research institutions from the university and the lack of strong links and co-operation between the two bodies hinder the ability of universities to effectively provide training for adequate number of masters, doctoral students and post-doctoral staff members who will be the infrastructure of research development in the future (OECD & World Bank, 2010). A clear policy for protecting the copyrights of researchers is still missing in universities resulting in the spread of plagiarism concerns (Bin Tareef, 2009). The key factor in the absence of research policies is the lack of a strategic plan for research within university (Karimian, et al., 2012). Build upon the mentioned challenges, the fourth hypothesis of the study was formulated as follows:

H4: A lack of clear research policies is negatively effecting the contribution of academic research to solving tourism sector problems

1.2.5. Research Marketing

Djeflat (2009) claimed that the lack of a clear vision of universities in promoting scientific and technological researches is a key factor limiting the contribution of research to industry development. Belal and Springuel (2006) added that one serious challenge for scientific research is promotion, particularly publication of results in scientific periodicals. The fact that USA, the UK, Australia, New Zealand and Canada accommodate over three-quarters of tourism and tourism related journals and their editors (Lew, Hall, & Williams, 2008) have resulted in the fact that journals output is dominated by institutions in the same countries (Jogaratnam, Chon, McCleary, Mena, & Yoo, 2005).

Mobility of staff members, attending international conferences and workshops, and participating in international research projects are various mechanisms of promoting research output. However, the fact that universities have limited funding to support these activities limits their ability to interact with industry stakeholders seeking solutions for their work problems. The absence of a strategy to publish conference papers and research articles on an international-scale decreases the opportunity of research contribution to industry and does not motivate researchers to produce high quality research. Therefore, the fifth hypothesis of the study is:

H5: A lack of marketing activities of academic research output is negatively effecting the contribution of academic research to solving tourism sector problems.

1.2.6. Field-related Challenges

Tourism sector is similar to other fields in Egypt in which industry is not actively cooperating with academic institutions. In addition, many universities in the Arab world operate in seclusion from their surroundings, and unable to open up and interact with society (Abdul-Haqq, 2002). The tourism and hospitality sector is fragmented and the response to academic research is weak. The chronic gap between the industry and academia is not limited to the Arabic world (Abou-Shouk, Abdelhakim, & Hewedi, 2014).

Some challenges relate to the tourism field are the difficulty of getting reliable information from the industry, the lack of response of industry to academic calls of participation in conferences and workshops. Even the requests of academic community to industry, to provide their real problems to enable researchers study and solve these problems, have had a very weak response. Therefore, the sixth hypothesis of the study was developed as follows:

H6: Field-related challenges are negatively effecting the contribution of academic research to solving tourism sector problems

1.2.7. Research Contribution to Tourism Sector Development

The fact that many universities in the Arab world operate in seclusion from their surroundings has kept academia removed from reality and out of touch with actual dimensions of society's problems (Abdul-Haqq, 2002). This removal leads to weak contribution of academic research to industry development. Add to this, low-quality research and unclear goals of the field's research (Al-Nashif, 2001) resulted in lack of contribution to industry development. The gap between the university's interests and society's concerns is another challenge for research contribution to industry development (Al-Yusuf, 2000).

Furthermore, Murphy (1996) quoted that low research capacity, tension between academics and practitioners, and lack of impact are most common challenges of the weak impact of research on society development. Hillage *et al.* (1998) added that research does attempt to tackle issues that are relevant to policy and practice although it is often inadequate and lacks quality and impact on solving industry problems. Despite the weak contribution to the field, Ren *et al.* (2010) concluded that in spite of the challenges facing tourism research, the field has much to build on and to be hopeful about. This requires tourism scholars to have the self-assurance to reach out to new coalitions, alliances and agendas. Therefore, it is hypothesized that:

H7: Weak contribution of academic research in solving sector problems is negatively affecting the sector development.

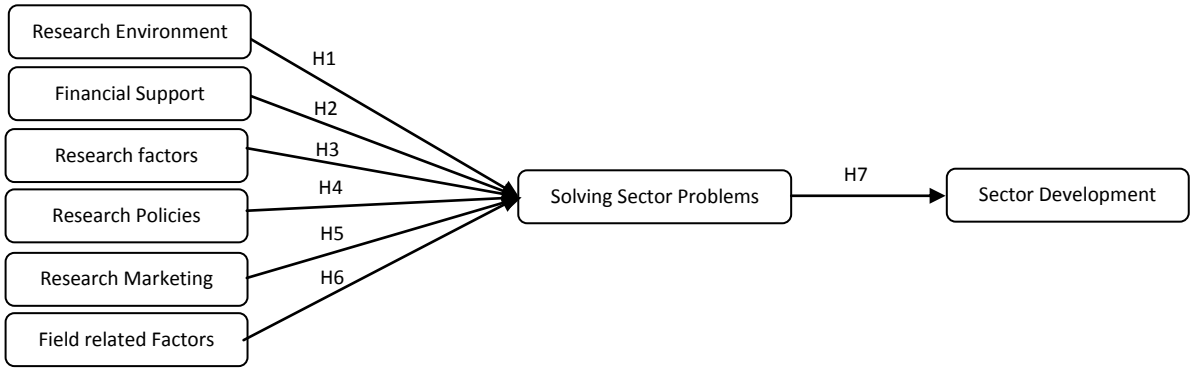
RESEARCH FRAMEWORK

Building upon the research challenges cited in literature review, the conceptual framework conceptualizes the causal relationships among research challenges on the one side, and the development of tourism and hospitality sector on the other. This causal relationship is mediated by the contribution of tourism and hospitality research to solving the problems of the sector. The conceptual framework includes six independent variables (challenges) that affect the contribution of tourism and hospitality research to solving sector problems (mediator). Furthermore, the contribution to solving sector problems and its effect on the development of the sector (dependent variable) is another assumed causal relationship. From Figure 1, seven hypotheses were developed to measure the cause-effect among constructs. The first of the sixth hypotheses (H1) measures the effect of university-related factors on solving sector problems. From H2 to H6, hypotheses measure the effect of financial support challenges, research-related factors, research policies, research marketing activities, and tourism field related factors on the contribution of research to solving tourism and hospitality sector problems respectively. The seventh hypothesis investigates the relationship between solving sector problems and its contribution to sector development.

RESEARCH METHODOLOGY

The deductive approach employing quantitative method was used in this study to test the hypothesized model of challenges. A questionnaire was used for data collection purposes. The form was developed based on literature review. Forty four items were employed to measure the causal relationships between factors related to researchers, research policies, marketing, university environment, and tourism field on the one hand, and the contribution of

Figure 1
Hypothesized Research Model



these factors to development of tourism and hospitality sector on the other. This relationship is mediated by the contribution of tourism and hospitality research in solving the problems of the sector.

From the 44 items, the initial questionnaire form included 4 items to measure researcher related factors: researchers have sufficient education and training to do better research, researchers have enough time to do good research, researchers have high self-esteem to do research, and getting promoted is a secondary motive for researchers to do research. 9 items were used to measure the factors relate to research policies: there is a clear research policy of your university, faculties have a clear research policy, the faculty research policy is linked to society problems, there are declared procedures to do/ join research teams in university, there is a strategy to protect copyrights of researchers, faculties declare their annually research plan, junior researchers are trained to do research in university, specific criteria of supervising junior researchers are declared, and faculties have specific procedures to help researchers overcome research obstacles.

In addition, 6 items were used to measure the factors relate to the university environment: supervisors have enough time allocated to directing their research students, junior researchers are freely choosing their research strategy, supervisors employ up-to-date researches to help their students, there are clear simple procedures of doing research in university, emergent research topics are discussed in faculties' scientific seminars, and faculties are practically helping researchers to overcome any research obstacles. 8 items were used to measure the factors relate to marketing tourism and hospitality research: university markets industry-beneficial research, there is enough information to help researchers publish their research in tourism periodicals, faculties of tourism and hotels have their own periodicals to publish tourism research, faculties have clear procedures for researchers to present in their conferences, faculties market good research papers presented in their conferences, faculties have a clear policy to market their research projects, faculties have a recommended list of periodicals and journals for publishing research, and there is a kind of coordination between faculties and publishers to publish research papers.

Furthermore, 9 items were used to measure the financial factors to support research: university funds good research papers/ projects, in general, university is financially supporting research, university funds conference attendants inside/ outside Egypt, university contributes to scholarships funding of researchers, university provide incentives to encourage researchers, university provides sufficient facilities (laboratories, materials..etc) to support research, buying references and other sources of research is cheaper in Egypt, faculties have libraries with relevant references for research, and libraries' procedures to obtain scientific resources (books, journal articles…etc) are simple.

Additionally, 6 items were used to measure the factors relate to research in tourism and hospitality field: public relevant authorities cooperate with researchers providing needed data (reports, statistics..etc), private relevant enterprises cooperate with researchers providing needed data, accurate updated statistics of tourism and hospitality sectors are available, it is easy to get publications of other universities and research centers, there is an accurate updated research database for tourism researches, and quality procedures are followed in tourism research. One item was used to measure the mediating variable: contribution of tourism and hospitality research in solving the sector problems, and another was used to measure the outcome variable: contribution of tourism and hospitality research in developing the sector. The questionnaire form comprised a series of Likert-type (1-5 disagree/agree) statements to measure the above-mentioned dimensions of the study.

The initial form was validated by a panel of academics and comments given by the panel were considered in the final form. Later, the form was piloted on 50 respondents to check its construct validity. Corrected item-total correlation statistics were obtained and based on the recommendations of Netemeyer, Bearden, and Sharma (2003) that items below 0.35 should be excluded from the form, 3 items were excluded from the dimension of research policies: faculties have a clear research policy, there are declared procedures to do/ join research teams in university, and specific criteria of supervising junior researchers are declared. Another 3 items were excluded from marketing dimension: faculties have clear procedures for researchers to present in their conferences, faculties have a clear policy to market their research projects, and there is a kind of coordination between faculties and publishers to publish research papers. In addition, three items were excluded from financial support dimension: university contributes to scholarships funding of researchers, university provide incentives to encourage researchers, and libraries' procedures to obtain scientific resources (books, journal articles…etc) are simple. The final form retained 35 out of 44 items to measure the 8 dimensions of the study. Reliability tests of the amended constructs revealed reliable findings. Employing structural equation modelling, the advanced multivariate technique, to measure complicated causal relationships among constructs of the study makes it a highly appropriate analytical approach for this research (Olsson, Foss, Troye, & Howell, 2000). WarpPLS version (4) was used to conduct the structural equation modelling analysis.

As for the sample of the study, the questionnaire form was sent to postgraduate students and staff members in 7 public faculties of tourism and Hotels in Egypt using simple random sample technique. 151 responses were collected, valid and free of missing data, for data analysis purposes. Measurement and structural models were obtained and validated based on the fit indices cited by Kock (2013). To assess model fit, indices include average path coefficient (APC), average R-squared (ARS), average adjusted R-squared (AARS), average block variance inflation factor (AVIF), and average full collinearity VIF (AFVIF). APC, ARS and AARS should have P values equal to or lower than 0.05 while AVIF and AFVIF values should be equal to or lower than 3.3, particularly in models where most of the variables are measured through two or more indicators. Composite reliability statistics and Cronbach's alpha should be 0.7 or above to verify the reliability of the measurement model (Hair, Anderson, Tatham, & Black, 1998). Furthermore, average variance extracted (AVE) should be equal to or higher than 0.50 to verify the convergent validity of the model (Fornell & Larcker, 1981).

RESEARCH FINDINGS

2.1. Descriptive Statistics

Descriptive statistics depict that 75.5% of respondents are males and 24.5% of them are females, 43.7% of respondents are between 31 and 40 years old, 29.8% of them ranged from 25 to 30 years, 8.6% of respondents fall between 18 and 24 years, and the rest is aged above 40 years. 41.1% of respondents have PhD qualification, 37.7% of them are reading for PhD, 16.6% are reading for MSc. and 4.6 have MSc. 79.5% of respondents are working in the public sector, 15.2% in private sector, and 5.3% are self-employed.

Looking at the mean values, it is revealed that the respondents disagree with research related factors (mean value of 1.83), research policies (mean= 1.29), and tourism field related factors (mean= 2.43). However, respondents have neutral opinions towards university research environment (mean=2.56), research marketing practices (mean= 2.70), and financial support (mean= 2.92). Although respondents believe that doing research helps to some extent to solve the sector problems (mean= 3.88), they think that that extent to which research solves the problems of the sector does not sufficiently develop the sector (mean= 2.66).

2.2. Measurement Model

The measurement model measures the relationships between the observed variables (indicators) and the unobserved variables (constructs) (Hox, 2010). Table 1 depicts the structured loadings of indicators, Cronbach's alpha, composite reliability, and AVE of constructs.

Table 1
The Measurement Model

Constructs (reflective)	Loading	Effect Size	AVE	SQRT AVE	CA	CR
University Research Environment						
Supervisors have enough time to directing their research students	0.802	0.209	0.513	0.716	0.805	0.862
Junior researchers are freely choosing their research strategy	0.650	0.137				
Supervisors employ up-to-date researches to help their students	0.850	0.235				
There are clear procedures of doing research in university	0.623	0.126				
Emergent research topics are discussed in faculties' seminars	0.615	0.123				
Faculties are practically helping researchers to overcome obstacles.	0.723	0.170				
Financial Support						
University funds good research papers/ projects	0.799	0.177	0.602	0.776	0.865	0.900
In general, university is financially supporting research	0.833	0.192				
University often funding local/ international conferences' attendants inside/ outside	0.792	0.174				
University provides sufficient facilities to support research	0.718	0.143				
It is cheap to buy references and other sources of research in Egypt	0.842	0.196				
Faculties have libraries with relevant references for research	0.653	0.118				
Researcher-related Factors						
Researchers have sufficient education and training to do research	0.678	0.206	0.559	0.748	0.753	0.835
Researchers have enough time to do good research	0.760	0.258				
Researchers have high self-esteem to do research	0.725	0.235				
Getting promoted is not the main motive for researchers to do research	0.821	0.302				
Research Policies						
There is a clear research policy of university	0.775	0.190	0.527	0.726	0.814	0.867
The research policy is linked to society problems	0.873	0.241				
There is a strategy to protect copyrights of researchers	0.715	0.162				
Faculties declare their annually research plan	0.549	0.095				
Junior researchers are trained to do research in university	0.760	0.183				
Faculties have specific procedures to help overcome research obstacles	0.638	0.129				
Research Marketing						
University markets industry-beneficial research	0.752	0.199	0.568	0.754	0.803	0.865
There is enough information to help researchers publish their research in tourism	0.532	0.100				
Faculties of tourism and hospitality have their own periodicals	0.789	0.219				
Faculties market good research papers presented in their conferences	0.853	0.256				
Faculties have a recommended list of journals for publishing research	0.801	0.226				
Tourism Field-related Factors						
Public relevant authorities cooperate with researchers to obtain data (reports,	0.907	0.251	0.547	0.739	0.821	0.874
Private relevant enterprises cooperate with researchers to obtain data	0.839	0.214				
Accurate and updated statistics of tourism sector are available	0.782	0.187				
It is easy to get publications of other universities and research centres	0.759	0.175				
There is an accurate updated research database for tourism researches	0.619	0.117				
Quality procedures are followed in tourism research	0.429	0.056				

Note: AVE: Average Variance Extracted, SQRT AVE: Square Root AVE, CA: Cronbach's Alpha, CR: Composite Reliability

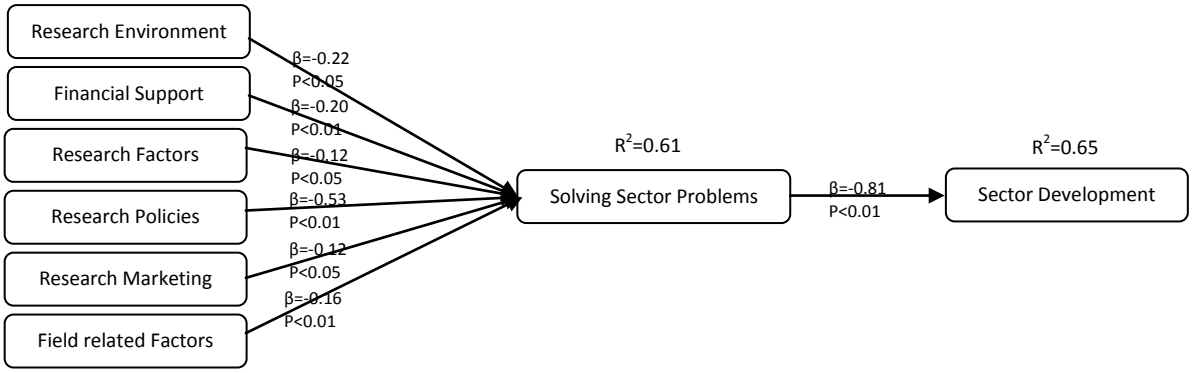
Looking at Table 1, it is revealed that the measurement is valid where statistics of AVEs are greater than 0.50 verifying the convergent validity and square root AVE (SQRT AVE) are greater than correlations among constructs evidencing the discriminant validity. Furthermore, the measurement model is reliable where Cronbach's alpha and composite reliability statistics are greater than 0.70. Medium effect sizes of indicators in the model are revealed that significantly contributing to their constructs.

2.3. Structural Model

The structural model measures the causal relationships among constructs. For the model fit indices, APC=0.309, P<0.001, ARS=0.631, P<0.001, AARS=0.621, P<0.001, AVIF=1.572, AFVIF=1.677, and large Tenenhaus GoF=0.647, which all falls within target values. It is revealed that university research environment is negatively affecting the research contribution to the sector ($\beta_{Env \rightarrow Solv}$=-0.22 and P<.01) (H1), financial support is negatively affecting the contribution of research to the sector ($\beta_{Fin \rightarrow Solv}$=-0.20 and P<.01)(H2), researcher-related factors are negatively affecting the contribution of research in solving the sector problems ($\beta_{Res \rightarrow Solv}$=-0.12 and P<.05)(H3), research policies are negatively affecting the contribution of research to the sector problem-solving ($\beta_{Pol \rightarrow Solv}$=-0.53 and P<.01) (H4), marketing practices are negatively affecting the research contribution to the sector ($\beta_{Mar \rightarrow Solv}$=-0.12 and P<.05)(H5), and field-related factors are negatively affecting research contribution to solve tourism sector problems ($\beta_{Res \rightarrow Solv}$=-0.16 and P<.01) (H6) (Figure 2).

In sum, the lack of qualified researchers, lack of clear research policies, unsuitable research environment, weak marketing activities of research, weak financial support, and some factors relating to the field have a negative effect on the research contribution to solving the tourism sector problems. These factors explain 61% of weak contribution of research to tourism sector problem-solving. In turn, the lack of contribution to solve sector problems is negatively affecting the development of the sector ($\beta_{Sol \rightarrow Dev}$=-0.81 and P<.01) (H7), failing to solve sector problems explains 65% of weak research contribution to the tourism sector development. Therefore, statistically, the research hypotheses are supported.

Figure 2
The Structural Research Model



2.4. Discussion of Findings

Critically analyzing the revealed findings, it is clear that the absence of clear research policies is the highest factor affecting the contribution of research to the sector problem-solving. This implies that the universities have tourism and hospitality faculties lack a clear research policy by which a road map of research priorities is identified considering the sector problems. This absence of policy might be due to lack of the link between universities and industry where the real problems of the industry are not recognized by academics and there is no real contribution of academia to the industry challenges. Failing to have an identified research plan, annually declared, makes researchers randomly selecting research topics that might not be relevant to the sector or studied theoretically far away from the sector realities. Furthermore, having a research policy that does not link to the society problems makes it irrelevant leaving aside the real problems challenging the field. However, having a clear research policy linked to society and sector challenges without well-educated and trained researchers leads to no real contribution of research to the sector. The fact that researchers are not well-trained to do research is evident in Egypt. Junior researchers lack guidance and support during their early stages in research. In addition, the failure to protect the copyrights of researchers in Egypt and the rules enabling supervisors to use their students' work discourage junior researchers' creativity. Failing to have specific procedures to overcome research obstacles leads to low-quality research produced. These procedures could include the follow up with Msc. and PhD researchers, coordinating data collection process with relevant bodies, providing materials needed for their research and educate them on publishing concerns revealed into weak researchers and irrelevant contribution of their research. These findings are in line with Bin Tareef (2009) who reported that clear scientific research policies and strategies in universities are absent, and OECD & World Bank

(2010) who mentioned that research output is not linked to industry development, and (Karimian, et al., 2012) who concluded that the key challenge for research priorities is the lack of response to societal needs.

Research environment is the second factor affecting research contribution to tourism and hospitality sector development. It is the university atmosphere that enables researchers to do research. In that environment, the fact that researchers, particularly staff members, have a lot of burdens teaching students. Teaching is the top priority of staff members. Aside from teaching, staff members have the responsibility of supervising post-graduate students which needs time and effort. The fact that staff members have enough time to do research is a myth. Therefore, this is another reason of why junior researchers lack the sufficient time, and support of supervisors resulting in not well-educated researchers. What is more, employing the updated researches of supervisors to educate and guide their students is lacking. Even in faculties' seminars, discussion of emergent research topics and advances in the field is absent. Lacking a clear research policy leads to unplanned environment to assign articulate roles for supervisors and researchers to do research. In addition, faculties do not have much to do if students struggle in collecting data, conducting interviews with senior managers, or providing enough facilities and materials to do their experimental research. Therefore, it is factual to claim that the university environment does not support the research process and their top priority is teaching process, particularly with free university education to students funded by the government. This finding is consistent with OECD and World Bank (2010) citing that universities do not have a meaningful role to play in the research and development.

Financial support is a crucial factor predicting the contribution of research to sector development. Where universities are funded by the government, a certain percentage of their budget is spent on research. The priority is given to have prepared facilities for researchers (i.e. laboratories, materials, and libraries with relevant recent sources of knowledge). Although having a budget assigned to buy new and recent references, it is expensive for researchers to buy references if the university library does not have it. Sometimes, the lack of materials required for scientific purposes is another reason for low-quality research. Despite of the recent start of universities to fund good research papers/ projects, this is still too limited and follows long series of procedures to get the grant. Rewarding good research is still a limited culture that needs to expand in the Egyptian universities. Additionally, according to regulations, university funds conference fees and travel tickets only and researchers pays for accommodation and living costs. For international conferences, university funds fees and tickets once every two years. In a stage that junior researchers need to exchange knowledge and experiences with international peers, it is difficult for them to do so without significant contribution from universities. Furthermore, funding training courses for junior researchers is limited leading to unqualified researchers at the end. To sum up lack of financial support is critically affecting the quality of research and researchers and this in turn affecting the contribution to the sector development. This finding is concurrent with Farajanee (2000) that the expenditure of Arab countries on research is almost the lowest in the world, and OECD and World Bank (2010) reporting that low-quality research is a result of low financial support.

Field-related factors have an effect on research contribution to sector development. This construct implies the chronic lack of cooperation and appreciation of industry for academics. Most professional managers believe that academia is totally separate from reality; they do not pay attention to research and researchers. More often, they do not welcome researchers for interviews or filling their questionnaires and so on. Moving to public sector authorities that have updated reports and statistics on the sector, most often, it is difficult for researchers to get these relevant materials for their research which leads to research so far behind reality. Even having an accurate and updated database of theses, conference proceedings, and journal articles is lacking in the Egyptian universities. In addition, where the research process is fragmented among universities, industry, and public bodies, it is hard to have certain quality procedures followed, and the end result is a research output that is too far behind the realities of the sector and lacks contribution to the field. This finding is in line with Abdul-Haqq (2002) and Abou-Shouk et al. (2014) who asserted that the gap between academia and industry is one main reason that universities work far from their surroundings and industry does not support universities providing researchers with real problems, enough, accurate, and updated information to work on and solve these problems, and the result is weak contribution to the field.

One of the most important factors in research contribution to the field is marketing research output. Most academic institutions could have good research and could be useful to industry if researches are promoted. This could motivate researchers to innovate. This puts the responsibility on academic institutions that do not have

good marketing practices for their resources of research that could be transformed to be a source of revenue for them. Unfortunately universities do not have good and wide marketing channels to market their research products. Encouraging researchers to publish their theses, research projects or research papers in international periodicals is still limited. Therefore, good suggestions and recommendations of researchers for society and industry problems might remain on library shelves only. Providing outlets to market research could be done in two ways. The first is a faculty can have its own periodical to publish local research. The second is holding conferences and inviting industry professionals and issuing a proceeding with the presented papers. Although these are good practices of marketing but neither are marketed. Therefore, the problem persists and industry-beneficial research is still lacking. Even in conferences, although academics invite professionals, the latter rarely responds claiming they are busy having more important concerns. Another good practice of marketing research is recommending a list of journals for researchers to publish their work in. This is still not practiced in the field of tourism and hospitality in Egypt, reflecting a shortage in marketing practices of research in academic institutions in Egypt. This finding is in line with Djeflat (2009) and Belal and Springuel (2006) claiming that universities lack a clear vision of promoting scientific researches output.

Researchers are the core component in the research process. Some factors adversely affect their role in producing better research. Lack of well-educated and trained researchers is the main barrier to research contribution to the field. Weak researchers are the outcome of a mixture of the above mentioned factors. Another reason is the burdens of teaching and having no enough time to do research. Researchers are not self-motivated to do research. One main reason for doing research is to get promoted. Publishing local papers and/or attending conferences improve chances of promotion. This is another reason why researchers do not have to publish internationally although internationally published papers carry more weight in competition for promotion. Lack of encouragement for researchers to form or join research teams and the long time and effort involved in international publications are additional reasons for the low-quality research that in turn does not contribute to managing and solving the problems facing the industry. In the end, this leads to very weak contribution to development in the field and strengthen the belief of industry professionals that academics are far behind the real challenges of the field.

CONCLUSION AND IMPLICATIONS

This study aimed at investigating the factors affecting the contribution of research to the development of tourism sector. These factors include research policies, research environment, marketing practices, financial support, field and researchers-related factors. Theoretically, this study contributes to the extant knowledge and it is one of very few studies investigating the challenges of tourism research contribution to industry development in the Egyptian context. It incorporates different constructs to build the challenging model in tourism sector in a developing country, Egypt. It touches very critical factors and introduces a model that explains and answers the question of why educational research does not significantly contribute to tourism sector development.

Practically, this study provides education policy-makers with important insights to develop the research contribution to industry. The fact that research should respond to society needs should be the priority of university research. Promoting research output useful to industry should be stressed in the university research policy. Encouraging researchers and rewarding them for international publications should be provided. The need of academics to establish links with industry is a must. Industry professionals on the other side have to report their challenges to academics and try their solutions, discuss their suggestions, and evaluate their impact on the sector development.

This study has a number of recommendations to academics and industry. As for academics, the university should have a clear research policy considering the national priorities and address the societal needs. Incentives should be provided to encourage researchers to do good research; rewarding those publishing internationally in journals with impact factor should be the prevailed culture in the universities. Promoting the research output is necessary to activate the effect of research on sector development. Expanding the ability to staff mobility internationally is necessary for gaining knowledge and exchanging experiences and is a good introduction of international cooperation among researchers (i.e. research teams, research projects…etc). Universities should introduce the service of consultancies to industry; this could be useful to learn about the sector challenges. Excellence research centers could be a good service to introduce to industry. Evaluating the effect of university research on industry development should be done annually, and having a strategic plan for enhancing research quality should be set.

As for tourism industry, there is a need to cooperate with academic side, attending their conferences, seminars, and workshops. Professionals should help academics to learn about their challenges and help them solving it. Bridging the gap between academia and industry is useful for both parties. Supporting good research production could be a social responsibility towards junior researchers.

This study has a number of limitations; first it takes the academic side and investigates their challenges and lack of contribution of their research to industry development. It limits the research to educational research done in universities. Industry professionals should be involved as well and a discussion of their beliefs towards the weak contribution of research to the field should be introduced. This study is limited to tourism and hospitality research and is not generalized to all sectors and academic disciplines in Egypt. Limiting this study to quantitative methods is another limitation as more expansion and interpretation can be obtained from qualitative research.

REFERENCES

[1] Fornell, C., & Larcker, D. (1981), ''Evaluating structural equation models with unobservable variables and measurement error''. *Journal of Marketing Research,* Vol.18, Pp. 39-50.

[2] Murphy, R. (1996), ''Like a bridge over troubled water''. *British Educational Research Journal,* Vol. 22, No. 1, Pp. 3-15.

[3] Hair, J., Anderson, R., Tatham, R., & Black, W. (1998),''*Multivariate data analysis*'' (5th ed.). New Jersey: Prentice Hall.

[4] Hillage, J., Pearson, R., Anderson, A., & Tamkin, P. (1998), ''*Excellence in Research on Schools*''. London: Department for Education and Employment.

[5] Al-Yusuf, A. (2000), ''Education's Relationship with Society and Determining its Quantitative Features''. *Alim al-Fikr,* Vol., 1, No. July-September, Pp. 18-23.

[6] Farajanee, D. (2000), ''The capability of the Arab human resources''. *Journal Arab Future,* Vol. 2, Pp.73.

[7] Olsson, U., Foss, T., Troye, S., & Howell, R. (2000), ''The performance of ML, GLS, and WLS estimation in structural equation modelling under conditions of misspecification and nonnormality''. *Structural Equation Modeling: A Multidisciplinary Journal,* Vol. 7, No. 4, Pp. 557-595.

[8] Al-Nashif, T. (2001), ''*Power, Intellectual Freedom and Society*''. Beirut: The Arab Institution for Studies and Publishing.

[9] Abdul-Haqq, M. (2002), ''The University Education Crisis'': In the Goals and Objectives or in the Means and Ends? *Majallat Al-Tarbiya.* Vol. 141, Pp. 170.

[10] Netemeyer, R., Bearden, W., & Sharma, S. (2003), ''*Scaling procedures: issues and applications*''. London: Sage Publications.

[11] El Baradei, M., & El Baradei, L. (2004), ''Needs assessment of the education sector in Egypt''. Cairo: German Development Cooperation Agencies. *ZEF Bildungsstudie,* Vol. 12, Pp. 1-84.

[12] Al-Furaih, S., & Al-Shayji, A. (2005), ''Obstacles Encountered by Faculty Members at Non-Science Colleges at Kuwait University in Sponsored Projects of Scientific Research''. *Journal of the Gulf & Arabian Peninsula Studies,* Vol. 31, No. 119, Pp. 59-59.

[13] Bowen, J. (2005), ''Managing a research career''. *International Journal of Contemporary Hospitality Management,* Vol. 17, Pp. 633-637.

[14] Jogaratnam, G., Chon, K., McCleary, K., Mena, M., & Yoo, J. (2005), ''An analysis of institutional contributors to three major academic tourism journals: 1992– 2001''. *Tourism Management,* Vol. 26, No. 5, Pp. 641-648.

[15] Belal, A., & Springuel, I. (2006), ''Research in Egyptian Universities: The Role of Research in Higher Education''. Retrieved 14th November, 2014, URL: http://portal.unesco.org/education/en/files/51625/11634283495Springuel-EN.pdf/Springuel-EN.pdf

[16] Corbyn, Z. (2008), ''Did poor teaching lead to crash? '', *The Times Higher Education,* p. 5.

[17] Lew, A., Hall, C., & Williams, A. (2008), ''Tourism: Conceptualizations, Institutions, and Issues''. In C. Hall, A. Williams & A. Lew (Eds.), *A Companion to Tourism* (pp. 3-22). Oxford: Blackwell Publishing Ltd.

[18] Bin Tareef, A. (2009), ''Scientific Research in Jordanian Higher Education Institutions: An Evaluation of the Status and Obstacles''. *Journal of Instructional Psycholog,* Vol. 36, No. 2, Pp. 158-168.

[19] Djeflat, A. (2009), ''Universities and scientific research in in the Magreb states: power politics and innovation systems''. *International Journal of Technology Management,* Vol. 45, No. 1/2, Pp. 102-113.

[20] Tuchman, G. (2009), ''*Wannabe U: Inside the Corporate University*''. Chicago: University of Chicago Press.

[21] Hox, J. (2010), ''*Multilevel analysis: techniques and applications*'' (2nd ed.). London: Routledge.

[22] OECD, & World Bank. (2010), ‘‘*Reviews of National Policies for Education: Higher Education in Egypt*’’: OECD and the International Bank Reconstruction and Development/ The World Bank.
[23] Ren, C., Pritchard, A., & Morgan, N. (2010), ‘‘Constructing Tourism Research: A Critical Inquiry’’. *Annals of Tourism Research,* Vol. 37, No. 4, Pp. 885-904.
[24] World Economic Forum. (2011), ‘‘The Global Competitiveness Report 2011-2012’’. Geneva: World Economic Forum.
[25] Karimian, Z., Sabbaghian, Z., Salehi, A., & Sedghpour, B. (2012), ‘‘Obstacles to undertaking research and their effect on research output: a survey of faculty members’ views at Shiraz University of Medical Sciences’’. *Eastern Mediterranean Health Journal,* Vol. 18, No. 11, Pp. 1143-1150.
[26] Bond, M., Maram, H., Soliman, A., & Khattab, R. (2013), ‘‘Science and Innovation in Egypt’’. San Francisco: Creative Commons.
[27] Kock, N. (2013), ‘‘*WarpPLS 4.0 User Manual*’’. Laredo, Texas, USA: ScriptWarp Systems.
[28] Rosen College of Hospitality Management. (2013), ‘‘*2nd World Research Summit for Tourism and Hospitality: Crossing the Bridge*’’. Orlanda, Florida, USA. URL: http://www.tourismandhospitalitysummit.com/
[29] Abou-Shouk, M., Abdelhakim, A., & Hewedi, M. (2014), ‘‘Factors Affecting the Development of Target Competencies Among Final-Year Tourism and Hospitality Students in Egypt’’. *Journal of Hospitality & Tourism Education,* Vol. 26, Pp. 178–187.
[30] Egyptian Constitution. (2014), ‘‘*Article 23 Part III*’’.
[31] Ministry of Higher Education. (2014), ‘‘The Ministry's Portal’’ Retrieved 15th November, 2014, URL: http://www.egy-mhe.gov.eg/en

SUPPLY-SIDE PERSPECTIVES ON THE MARKET FOR TOURISTS WITH DISABILITIES IN KOREA

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ABSTRACT

The purpose of this study was to examine the supply-side perspectives of the market for tourists with disabilities in Korea, and the differences, if any, between two representative sectors: accommodation and travel agency. A self-administered questionnaire was developed and distributed to employees of the sectors via e-mail and on-site visit. A total of 369 responses were used for data analysis. Major findings include firstly, employees of the two sectors agree that the people with disabilities have the same right and desire to travel as people without disabilities have; however, they do not seem to recognize the economic potential of the market. Secondly, the two sectors are ill-prepared for the market, albeit the state of readiness is better in the accommodation sector than in the travel agency sector. Implications of the results are discussed.

Keywords: Market for tourists with disabilities, Perception, Readiness states, South Korea, Tourism industry

INTRODUCTION

To date, it is estimated that about 650 million people (approximately 10% of world's population) have a disability, defined as including those who have long-term physical, mental, intellectual or sensory impairments which in interaction with various barriers may hinder their full and effective participation in society on an equal basis with others." (United Nations, 2006) In the case of the European Union (EU), 80 million people are registered as people with disabilities (European Commission, 2010), whereas the number of people with disabilities in the US is expected to reach 100 million by 2030 (Burnett & Baker, 2001). In Korea, the registered people with disabilities were about 2.5 million by the end of December, 2013 (Ministry of Health and Welfare, 2013). Considering the aging trends worldwide, the number of people with disabilities is expected to continually rise (Genoe & Singleton, 2009). In general, the market for tourists with disabilities has not gained much attention from the tourism industry since the nature of the industry is oriented by economic profitability and efficiency. As such, the disabled consumer/user has been invisible in the context of tourism.

However, the situation is changing little by little due to unprecedented interest in the market. Some researchers (Darcy & Pegg, 2011; Dwyer & Darcy, 2008; Israeli, 2002; McKercher et al., 2003; O'Neill & Knight, 2000; Ozturk et al., 2008; Ray & Ryder, 2003) have emphasized that people with disabilities have much the same travel desires and motives as their counterparts. Furthermore, it is suggested that tourists with disabilities have economic potentiality as a niche market (Yau et al., 2004). The Disability Discrimination Law enactment by many countries (e.g., US, UK, Australia, etc.) and international declarations (e.g., UN Convention on the Rights for Persons with Disability) have also contributed to this change. Tourism environments have

become more disability friendly. However, a plethora of evidence exists showing disability unfriendliness. The tourists with disabilities still suffer from inaccessible tourist facilities and information as well as travel industry employees' lack of knowledge on the people with disabilities and inappropriate disability services.

For people with disabilities to fully participate and enjoy tourism activities, many stakeholders, including the disabled themselves, should collaborate to create complete and appropriate tourism environments. In this sense, the role of tourism companies becomes extremely important since they are responsible for fulfilling travel desires of people with disabilities and motives with tourism products and services. Unfortunately, as of now, little research has been conducted concerning the best methods to serve market for tourists with disabilities from supply-side perspectives. This research seeks to bridge this gap. Therefore, the purpose of this study was to investigate the supply-side perspectives of market for tourists with disabilities in Korea. More specifically, this research identifies (1) tourist companies employees' overall perceptions of the market for tourists with disabilities, (2) tourist companies' current readiness states for the market for tourists with disabilities, and (3) the differences in terms of (1) and (2) between two representative sectors of tourism businesses (i.e., accommodations and travel agencies). As exploratory research, this study was expected to identify useful implications for expanding the size of market for tourists with disabilities in Korea.

LITERATURE REVIEW

1. The potentiality of the market for tourists with disabilities

The potentiality of the market for tourists with disabilities is related to the travel demands of people with disabilities; however, little research has been conducted to identify demand. Thus, it can be only inferred either from travel related characteristics of people with disabilities or from their general consumption sizes or from several fragmented studies. Studies have identified some characteristics of tourists with disabilities (Turco et al., 1998; Westcott, 2004): they have the same travel desires and motives as people without disabilities; though not all, many of them have enough wealth to travel and willing to pay for the expenses associated with traveling; they tend to travel with other care-givers due to their physical, sensory or mental limitations; they tend to avoid crowded tourist sites; and they are loyal to service providers who are able to meet their specific needs.

Prager (1999) had cited a *Wall Street Journal* article which indicated that population of people with disabilities would occupy a significant market portion in every sphere of consumption, including tourism, by 1999. Harris Interactive Market Research conducted several studies of market for tourists with disabilities on behalf of Open Doors, an organization supporting Americans with disabilities. Results of the study (Open Doors, 2002) revealed that 71% of individuals with disabilities in the US had traveled at least once within the two years prior to the study; 20% of them had traveled six times within the same time period. Furthermore, 7% of those surveyed had traveled overseas within the same time period. Results of another study (Open Doors, 2005) showed that, in 2005, the estimated numbers of people with disabilities who traveled for either pleasure or business purposes were 21 million. Research conducted by Touche Ross showed that over eight million European with disabilities traveled overseas at least once a year; over 15 million European with disabilities took one domestic trip that included an overnight stay; and another 22 million European with disabilities took a domestic day trip (Touche Ross, 1993). According to the results of another study, specifically focused on French citizens with disabilities (Charbonneau, 2006), it was estimated that the numbers of French tourists with disabilities in 2006 were 19.2 million to 57.6 million. On the other hand, in Australia, people with disabilities accounted for 11% of the total domestic tourists (Bureau of Tourism Research, 2003). A more recent study conducted by VisitEngland (ENAT, 2009) suggested that 12% of England's domestic tourists who stayed at least one night away from home were composed of people with disabilities. In addition, the study showed that people with disabilities traveled a total of 5.7 million times per year, generating about £1 billion in economic benefits/ revenue.

The potentiality of the market for tourists with disabilities can be inferred from their economic contribution to a nation (Buhalis et al. 2005; Dwyer & Darcy, 2008; Neumann & Reuber, 2004; Open Doors, 2005). Open Doors reported that, in 2002, people with disabilities in the US spent a total of $13.6 billion ($3.3 billion for air transportation, $4.2 billion for accommodations and $2.7 billion for food and beverage) (Open Doors, 2002).

Neuman and Reuber (2004) reported that the economic contribution generated by German tourists with disabilities reached to €25 billion, and OSSATE (One-Stop-Shop for Accessible Tourism in Europe) estimated that tourists with disabilities spent approximately €80 billion in 2003 (Buhalis et al. 2005).

Considering the above results, the potentiality of people with disabilities as a significant market segment should not be ignored. However, despite the economic benefits that tourist businesses could grasp from the market segment, tourism environments have continued to be unfriendly to the community with disabilities (Abeyraine, 1995; Card et al., 2006; Cavinato & Cuckovich, 1992; Eichhorn et al. 2008; Daniels et al. 2005; Darcy, 1998; Imrie & Kumar, 1998; Israeli, 2002; Lee, 2012; McKercher et al. 2003; Smith, 1987; Turco, 1998; Yau et al. 2004). For people with disabilities, facilities and services (e.g. attractions, transportation, accommodations, restaurants etc.) that can meet their needs are of critical importance during travel. This implies that tourism businesses should play pivotal roles in encouraging the expansion of the market for tourists with disabilities. The following section reviews some research in this area.

2. The Market for tourists with disabilities from the perspective of tourism businesses

How much a tourism company benefits from people with disabilities depends upon some factors. One is related to the level of recognition on the market as a niche market. The higher the level is, the higher the efforts a company gears to the market. The other is the level of preparedness in terms of facilities and information accessibility and trained employees. As a company increases its preparedness level, its reputation as a disability friendly company will also increase. To reach high levels of preparedness, a tourism company should be aware of laws concerned with people with disabilities and abide by the laws. At present many countries require both public and private sectors to provide accessible facilities and information with people with disabilities unless it involved unreasonable expenditure on the basis of laws (e.g., Americans with Disabilities Act in U.S., Disability Discrimination Act in Australia, Equality Act in United Kingdom, Anti-Discrimination Against and Remedies for Persons with Disabilities Act in Korea). In addition, Article 30 of the Convention on the Rights of Persons with Disabilities, an international convention, stresses the importance of accessibility to cultural contexts and urges every country to join in an effort to improve the rights of people with disabilities to enjoy their cultural life (Darcy & Pegg, 2011). Tourism and related services are not excluded from this effort.

Given the significant role of tourism product/service suppliers in expanding the market for tourists with disabilities, some, though not many, scholars have conducted research from the supply-side perspectives (Burnett & Baker, 2001; Darcy & Pegg, 2011; Grady & Ohlin, 2009; McGrath, 2009; Open Doors, 2002; Ozturk et al. 2008; Rice, 2006; Small et al. 2008). These studies can be broken into three categories. The first category includes studies investigated the current state of tourism services for tourists with disabilities (Darcy, 1998; Israeli, 2002; McGrath, 2009; Murray & Murray, 1995; Small et al. 2008). Findings of these studies generally pointed out insufficiency or inappropriateness in terms of the disabled tourists' requirements. Israeli (2002) reported that the accessibility of tourist attractions for people with disabilities was at a lower quality than required. It was revealed that only 0.75% of all available hotel rooms in Sydney, Australia were accessible (Darcy, 1998; Murray & Murray, 1995). Small et al. (2008) found that advertisements of airline companies were generally targeted to people without disabilities who are wealthy and elite passengers without taking account of those with disabilities. McGrath (2009), after analyzing sport and recreation strategies released by 31 municipal governments in Australia, reported that although these strategies considered the physical accessibility for people with disabilities, they seldom considered specific requirements brought about by types of disabilities.

The second category focuses on how disability related laws influence the tourism industry. Grady and Ohlin (2009) discussed the implications of the Americans with Disabilities Act in the context of providing fair service for those with a mobile disability. Upchurch and Seo (1996) studied how ADA impacted accommodation sectors in the US. Both of these studies emphasized that tourism companies should follow the laws if they could not provide any clear evidence proving "unreasonable expenditure" and that it is a social responsibility of the companies.

The third category includes studies (Burnett & Baker, 2001; Darcy & Pegg, 2011; Grady & Ohlin, 2009; O'Neill & Knight, 2000; Open Doors, 2002; Ozturk et al. 2008; Rice, 2006; Takeda & Card, 2002) that investigated perceptions of tourism business employees on the market for tourists with disabilities. A general conclusion from these studies can be summarized as "being unaware of economic potentiality of the market for tourists with disabilities and consequent non-committed approach to the market." O'Neill and Knight (2000)

investigated the perception of hotel employees in West Australia on the market for tourists with disabilities. They found that (1) no hotel considers the extent of accessibility improvement as a business performance indicator, (2) employees' perception of economic benefits accrued from offering service for tourists with disabilities is low, (3) there exists widespread perception that the provision of room for people with disabilities is an added expense for the hotel, and (4) there exists widespread perception that the market for tourists with disabilities is unprofitable. Burnett and Baker (2001) revealed that employees of American tourism businesses thought that it costs lots of money to abide by ADA guidelines and had a negative opinion of the economic potential of the market for tourists with disabilities. Open Doors' study (2002) revealed that all of the U.S. tourism business employees interviewed expected an increase in the number of tourists with disabilities if some investments to enhance facilities and/or services for people with disabilities were made. However, according to the study, it was shown that only 20% of the interviewees would invest money for these improvements. Rice (2006) discovered that managers in U.S. tourist businesses: (1) had no interest in satisfying the needs of people with disabilities; (2) had a narrow perspective of meeting the minimum guidelines regulated by building codes; (3) were unaware of the fact that securing nondiscriminatory and accessible facilities is an effective way of building and maintaining a competitive edge in marketing and service provision; (4) were pessimistic about return for the investment on accessibility improvements for tourists with disabilities; and (5) had no interest in making additional efforts to improve accessibility beyond the minimum standards set by local building codes. Ozturk et al. (2008), in their study on the perceptions of Turkish tourism employees on the market for tourists with disabilities, revealed that Turkish tourism employees were willing to provide services for people with disabilities. However, they mentioned that it was impossible since tourism companies in Turkey were generally not well-prepared for tourists with disabilities. Takeda and Card (2002) found that there was a lack of understanding of tourists with disabilities' needs among tourism companies' employees. As such they suggested that travel agencies might face lots of difficulties when developing travel packages for people with disabilities.

Some research results indicate a little different view on the market for tourists with disabilities. For example, according to Grady and Ohlin's study (2009), tourism business employees in the U.S. perceived that the ADA is not only applicable to facility accessibility, but also to general services. This finding may indicate an attitudinal transition taking place within the tourism industry. Results of Darcy and Pegg's study (2011) also show this kind of transition. They investigated how Australian tourism industry employees perceive tourists with disabilities. Major findings were: the respondents were enthusiastic about providing quality services for tourists with disabilities regardless of established laws' or policies' regulation; they indicated that understanding needs or motives for tourists with disabilities was useful; and some additional efforts from both tourism business employers and employees were needed in order for them to serve tourists with disabilities more effectively. Based on these findings, Darcy and Pegg suggested such areas of interest needed to be intensively implemented as attitude changes toward tourists with disabilities; safety; communication channels that make enable tourists with disabilities to report their special needs or requirements to the employees directly; changes in attitudes of tourists without disabilities toward rooms or facilities for people with disabilities; flexible operation hours of supporting equipment; refined standards going beyond laws or administrative orders; approaching tourists with disabilities as a market segment; and employee training or education programs (e.g., attitude, knowledge, and skills; and marketing and accessibility information delivery) enhancing their ability when providing services with customers with disabilities .

In sum, the studies mentioned above indicate that the travel industry, in general, does fail to recognize the economic potential of the market for tourists with disabilities and their readiness for the market is insufficient. However, the studies reviewed are confined to the Western world; thus, the situation on the other side of the world needs to be investigated.

METHODOLOGY

1. Research instruments

A self-administered questionnaire composed of two parts was developed. The first part included seventeen items (e.g., "The market for tourists with disabilities has a great economic potential," "The market for tourists with disabilities is an unprofitable one," etc.) pertaining to Korean tourism business employees' perceptions on the nature of the market for tourists with disabilities that were drawn from previous research (Burnett & Baker, 2001; Darcy, 1998; Darcy & Pegg, 2011; Grady & Ohlin, 2009; Israeli, 2002; McGrath, 2009; Murray &

Murray, 1995; O'Neill & Knight, 2000; Open Doors, 2002; Ozturk et al. 2008; Rice, 2006; Small, 2008; Takeda & Card, 2002) and modified for this research context. Each item was evaluated on a five-point Likert-type scale (5 = strongly agree; 1= strongly disagree).

The second part included twelve items (e.g., "Has facilities for people with disabilities [ex: ramp, entrances, rooms, bathrooms, elevators, emergency lights, emergency alarms, parking spaces for people with disabilities, Braille menus, etc.]", "Has a service manual for customer with a disability," "Educates and/or trains employees regularly concerning customer service for people with disabilities," etc.) measuring Korean tourism companies' readiness states for the market for tourists with disabilities. These were also derived from previous research (Darcy & Pegg, 2011; McGrath, 2009; Murray & Murray, 1995; Ozturk et al. 2008; Rice, 2006; Small, 2008; Takeda & Card, 2002) and modified for this research context. A five-point Likert-type scale (5 = definitely yes; 1 = definitely no) was used to measure these twelve items. Focus group interviews with employers and professionals in tourism service areas were also conducted in each of the two parts.

2. Data collection and analysis

E-mailing was used as a method to collect data from those who work for tourism companies, from March 5, 2012 onwards. Questionnaires and cover letters which explained the purpose and content of the study were attached to individual e-mail addresses which were obtained from several sources (e.g., list of members of Korean Tourism Industry Associations, tourism industry employees' business cards personally collected). After a week from the first e-mail, reminder e-mails were sent to non-respondents. Two weeks after the second round, the letter and questionnaire were sent again to non-respondents. In spite of these efforts, only 78 questionnaires were returned. Due to small numbers of returned questionnaire, trained surveyors visited tourism companies located in several big cities (Seoul, Incheon, Daejeon, Busan, Gwangju, etc.) in South Korea to obtain more data from March 27-April 20, 2012. In total, 369 questionnaires were utilized for data analysis after excluding 44 inappropriate questionnaires (either questionnaires were not completed or questionnaires were from those who work outside of the tourism field). SPSS 20.0 was used to code and analyze data. Analytical technique was confined to descriptive statistics (e.g., mean, frequency distribution, and standard deviation) and independent t-tests.

RESULT

1. Profile of the Respondents

Table 1 shows the characteristics of the 369 respondents. Of the 369 respondents, males and females were similarly distributed (51.8% and 48.2%, respectively). Respondents in their 20s and 30s commanded the majority, 36.6% and 36.9% respectively. For respondents' level of income, 36.3% of them earned between US$ 2,000-2,999 and 33% made US$ 1,000-1,999 per month last year.

Table 1

Demographic Characteristics of the Respondents

	Percentage
Gender	
Male	51.8
Female	48.2
Total (n=365)	100.0
Age	
20s	36.6
30s	36.9
40s	20.5
50s	6.0

Total (n=366)	100.0
Monthly Income (in USD)	
Less than $1,000	1.6
$1,000 to $1,999	33.0
$2,000 to $2,999	36.3
$3000 to $3,999	16.2
$4,000 to $4,999	9.1
More than $5,000	3.8
Total (n=364)	100.0

The majority of respondents (52.0%) worked in Seoul, the capital city of South Korea (see Table 2). A majority of the respondents were either employed at accommodation (43.1%) or travel agency/tour operator (42.5%) sectors. Most of the respondents were in charge of customer service (49.7%) or sales (20.9%) and more than half of them (57.2%) had less than five years of work experience. Slightly more than half of the sample had an experience in serving customers with disabilities (56%), and a majority of them (69.3%) did not have family members, relatives or friends with disabilities.

Table 2

Employment Characteristics of the Respondents

	Percentage
Business location	
Seoul	52.0
Busan	9.2
Incheon/Kyeonggido	16.3
Gwangju/Jeollado	5.7
Daejeon/Choong-chungdo	6.8
Others	10.0
Total (n=369)	100.0
Types of business employed	
Accommodation	43.1
Travel agency/Tour operator	42.5
Others	14.4
Total (n=369)	100.0
Department working in	
Customer service (including reservation)	49.7
Sales	20.9
Marketing	8.8
Strategic planning	8.2
Others	12.4
Total (n=364)	100.0
Working experience (years)	
1-2	32.3
3-5	24.9
6-10	21.0
11-15	7.7
16-20	10.5

21-25	2.5
More than 25	1.1
Total (n=362)	100.0
Experience in servicing disabled customers	
Yes	56.9
No	43.1
Total (n=364)	100.0
Having family/friends with disabilities	
Yes	30.7
No	69.3
Total (n=365)	100.0

Since the majority of respondents worked in accommodation or travel agency/tour operator sector, in the following description of the results, firstly overall perceptions on the market for tourists with disabilities and readiness states of the Korean tourism industry will be presented with using all responses; secondly a comparison between accommodation and travel agency sectors will be presented after excluding responses from those who work for other sectors of the tourism industry.

2. Perceptions of employees of Korean tourism industry on the market for tourists with disabilities

Table 3 shows Korean tourism industry employees' perceptions on the market for tourists with disabilities. Employees in the Korean tourism industry highly agreed on such items as "People with disabilities have the same travel desire as people without disabilities" (Mean= 4.26), "The market sufficiently caters to the desires of tourists with disabilities" (Mean= 3.98), and "The market for tourists with disabilities has different needs and requirements according to individual characteristics such as type of disability, level of disability, usage of assistive instruments" (Mean= 3.90). On the other hand, respondents showed a low level of agreement on such items as "The market for tourists with disabilities is an unprofitable one" (Mean= 2.88), "The market for tourists with disabilities has a great economic potential" (Mean= 2.98), "The market for tourists with disabilities is a useful alternative to overcome seasonality problems confronted by tourism businesses" (Mean= 3.10), "The size of market for tourists with disabilities is too small for tourism businesses to give considerable attention to" (Mean= 3.18), and "The market for tourists with disabilities is a good business target as well as an alternative to secure competitive edge" (Mean= 3.24). In sum, employees in Korean tourism businesses have a basic understanding of travel desires of people with disabilities. They also know that differences exist in terms of travel needs and requirements according to individual situations of people with disabilities (i.e., type and/or level of disability) and those tourism opportunities for people with disabilities are restricted. Furthermore they generally perceived that economic potentiality obtained from the market for tourists with disabilities is negligible; however they regard customers with disabilities as a valuable one to consider.

Table 3

Perceptions of Employees of Korean Tourism Industry on the market for tourists with disabilities

	Tourism Industry			Accommodation Sector			Travel Agency Sector		
	N	Mean	S.D	N	Mean	S.D	N	Mean	S.D
The market for tourists with disabilities has a great economic potential.	366	2.98	.893	160	3.09	.864	154	2.92	.907
People with disabilities are limited in tourism products/service consumption due to their physical/cognitive/sensual impairments. [a]	367	3.13	1.033	160	3.28	.990	155	2.95	1.056
The market for tourists with disabilities is an unprofitable one.	365	2.88	.946	158	2.84	.996	155	2.86	.919
The market for tourists with disabilities has a great potential as a niche market.	365	3.39	.979	160	3.37	.994	153	3.45	.980

Segmenting the market for tourists with disabilities is not necessary as they are homogenous.*[a]	363	3.63	1.031	157	3.51	1.060	154	3.75	.994
Tourists with disabilities tend to be loyal, thus it's worth considering accommodating them.	367	3.64	.882	160	3.66	.911	155	3.70	.840
The size of market for tourists with disabilities is too small for tourism businesses to give considerable attention to.	366	3.18	.995	160	3.16	1.021	154	3.23	.994
The market for tourists with disabilities is an important future market that tourism businesses should pay much attention to due to its expected expansion.	365	3.55	.855	160	3.60	.877	154	3.51	.865
People with disabilities have the same travel desire as people without disabilities.	362	4.26	.935	157	4.25	.903	153	4.23	.980
The market for tourists with disabilities has different needs and requirements according to individual characteristics such as type of disability, level of disability, usage of assistive instruments. [a]	367	3.90	.753	160	3.82	.800	155	3.99	.664
Understanding customers with disabilities is not crucial for those who manage tourism businesses.	366	3.82	.830	160	3.78	.844	154	3.88	.827
It is challenging for tourism businesses to accommodate people with disabilities as they tend to travel in a group.	367	3.39	.980	160	3.32	.967	155	3.52	.935
The market for tourists with disabilities is a useful alternative to overcome seasonality problems confronted by tourism businesses. [a]	365	3.10	.913	160	3.21	.912	153	3.01	.862
The market for tourists with disabilities is an object related to social responsibility of tourism businesses.	363	3.77	.845	157	3.80	.807	154	3.73	.886
The market for tourists with disabilities itself does not exist.*	363	3.44	1.272	158	3.49	1.266	153	3.41	1.280
The market sufficiently caters to the desires of Tourists with disabilities.*	365	3.98	.846	160	3.98	.861	153	3.97	.838
The market for tourists with disabilities is a good business target as well as an alternative to secure competitive edge.	365	3.24	.882	159	3.28	.954	154	3.22	.850

Note. * Reverse coding
a: statistically significant at α= .05 between accommodation sector and travel agency sector

In the case of Korean accommodation sector, employees tended to highly agree with such aspects as "People with disabilities have the same travel desires as people without disabilities" (Mean= 4.25), "The desire of people with disabilities for tourism are sufficiently fulfilled as it is" (Mean= 3.98), "The market for tourists with disabilities has different needs and requirements according to individual characteristics such as type of disability, level of disability, usage of assistive instruments" (Mean= 3.82), and "Understanding customers with disabilities is not crucial for those who manage tourism businesses" (Mean= 3.78). On the other hand, they showed a relatively low level of agreement on such items as "The market for tourists with disabilities has a great economic potential"

(Mean= 3.09) and "The market for tourists with disabilities is an unprofitable one" (Mean= 2.84). To sum up these results, employees working with the Korean accommodation sector tended to recognize the rights of people with disabilities to travel and their diverse travel related needs and requirements arising from individual characteristics (e.g., type and level of disability). The employees also recognized the importance of people with disabilities as a customer. However the employees in the accommodation sector did not recognize the opportunity for economic benefit to be accrued from the market for tourists with disabilities.

In the case of travel agency sector employees, they tended to highly agree on such items as "The market for tourists with disabilities has different needs and requirements arising from individual characteristics such as type and level of disability, and/or usage of assistive instruments" (Mean= 3.99), "The desire of people with disabilities for tourism are sufficiently fulfilled as it is" (Mean= 3.97), "'Understanding customers with disabilities is not crucial for those who manage tourism businesses" (Mean= 3.88), "Tourists with disabilities tend to be loyal, thus it's worth considering" (Mean= 3.70). On the other hand, items such as "The market for tourists with disabilities has a great economic potential" (Mean= 2.92), "The market for tourists with disabilities is an unprofitable one" (Mean= 2.86), and "The market for tourists with disabilities is a useful alternative to overcome seasonality problems confronted by tourism businesses" (Mean= 3.01) were relatively less agreed. Thus, employees in the travel agency sector tended to recognize the rights of people with disabilities to travel and their diverse travel related needs/requirements according to their disability characteristics (e.g., type and level of disability). Additionally, they also agreed that people with disabilities are important customers. On the other hand, employees in the travel agency sector did not recognize some economic benefits (e.g., increased revenues and seasonality problem reduction) accrued from serving the market for tourists with disabilities.

Meanwhile there existed statistically significant differences in the perception between two sector employees. They included several items such as "People with disabilities are limited in tourism products/service consumption due to their physical/cognitive/sensual impairments," "Segmenting the market for tourists with disabilities is not necessarily as they are homogenous," "The market for tourists with disabilities has different needs and requirements according to individual characteristics such as type of disability, level of disability, usage of assistive instruments," and "The market for tourists with disabilities is a useful alternative to overcome seasonality problems confronted by tourism businesses." With regards to these items, employees in the accommodation sector perceived the market for tourists with disabilities more accurately than those of the travel agency sector.

3. Readiness states of Korean tourism businesses for the market for tourists with disabilities

In order to identify Korean tourism businesses' readiness states for the market for tourists with disabilities, respondents were asked to express their impression on items showing the readiness states according to a guiding question "The Company I work with." Table 4 reveals the results. As can be seen in the table, Korean tourism businesses seem to be ill-prepared for the market (i.e., mean scores of most of the readiness states were less than 3.0 on a five-point scale). In particular, aspects such as "Reflects the level of accessibility for people with disabilities to facility/service in the company's performance indicator" (Mean= 2.15), "Monitors the level of accessibility of facilities/services for people with disabilities and then promotes it internally and externally" (Mean= 2.23), "Educates and/or trains employees regularly concerning customer service for people with disabilities" (Mean= 2.29), and "Implements extra policies for the convenience of customer with a disability beyond standards or regulations set by disability related laws" (Mean= 2.30) were seldom paid attention to. Only one item was above the medium score: "Has facilities for people with disabilities (ex: ramp, parking spaces for people with disabilities, Braille menus, etc.)." In short, Korean tourism businesses seems to have some facilities for people with disabilities and past experiences of serving customers with disabilities; however, they do not act proactively to enhance their accessibility levels with information provision, employee education/training, reflecting accessibility preparedness into business performance evaluation, or voluntary disability related policies.

Table 4

Readiness states of the Korean tourism businesses for the market for tourists with disabilities

The company I work for…	Tourism Industry			Accommodation Sector			Travel Agency Sector		
	N	Mean	S.D.	N	Mean	S.D.	N	Mean	S.D.

Has facilities for people with disabilities (ex: ramp, entrances, rooms, bathrooms, elevators, emergency lights, emergency alarms, parking spaces, Braille menus, etc.) [a]	366	3.12	1.186	159	3.57	1.628	155	2.65	1.177
Has a customer service manual for people with disabilities [a]	364	2.51	1.032	158	2.87	1.081	155	2.16	.922
Educates and/or trains employees regularly concerning customer service for people with disabilities. [a]	365	2.29	1.050	159	2.58	1.081	154	1.95	.881
Monitors the level of accessibility of facilities/ services for people with disabilities and then promotes it internally and externally [a]	366	2.23	.968	159	2.47	.967	155	1.91	.817
Implements extra policies for the convenience of customer with disabilities beyond standards or regulations set by disability related laws [a]	366	2.30	.967	159	2.57	.964	155	1.97	.829
Makes all employees understand different needs, desires, and requirements of segmented market for tourists with disabilities [a]	366	2.59	1.021	159	2.77	1.025	155	2.37	1.001
Makes all employees be aware of facility/service/ policy for customers with disabilities in their workplace. [a]	363	2.61	1.031	158	2.84	1.002	153	2.33	.987
Provides appropriate accessibility information about facilities/services with the consideration of various types of disabilities [a]	366	2.69	.996	159	2.92	.958	155	2.39	.963
Reflects the level of accessibility for people with disabilities to facility/service in the company's "performance indicator" [a]	365	2.15	.944	158	2.46	.914	155	1.85	.854
Checks the existence of impairments and encourages customers with disability to inform their special service needs upon arrival	366	2.79	1.041	159	2.75	.953	155	2.84	1.148
Thinks that the investment on the accessibility improvement of facilities/services/information too costly	361	2.82	1.003	158	2.80	.954	152	2.79	1.059
Provides accessibility information on facilities and services (e.g., ramps, entrances, rooms, bathrooms, elevators, emergency lights, emergency alarms, parking spaces, braille menus, etc.) in various methods [a]	366	2.89	1.042	159	3.16	1.012	155	2.55	1.007

Note. a: statistically significant at α= .05 between accommodation sector and travel agency sector

In the case of the Korean accommodation sector, the current conditions were generally poor and similar to those of the Korean tourism industry. The result revealed that they did not pay much attention to such aspects as "Reflects the level of accessibility for people with disabilities to facility/service in the company's performance indicator" (Mean= 2.46), "Implements extra policies for the convenience of customer with disabilities beyond standards or regulations set by disability related laws" (Mean= 2.57), "Monitors the level of accessibility of facilities/services for people with disabilities and then promotes it internally and externally" (Mean= 2.58), and "Educates and/or trains employees regularly concerning customer service for people with disabilities" (Mean= 2.58). However, aspects such as "Has facilities for people with disabilities (ex: ramp, parking spaces for people with

disabilities, Braille menus, etc.)" (Mean= 3.57) and "Provides accessibility information on facilities and services (e.g., ramps, parking spaces for people with disabilities, Braille menus, etc.) in various formats" (Mean= 3.16) were relatively well-prepared. Hence, it can be said that Korean accommodation sector seems to be aware of the existence of customers with disabilities, but they do not proactively approach the customers; thus many things need to be done.

In the case of the Korean travel agency sector, the industry seemed to be worse-prepared in many aspects than the accommodation sector. In particular, aspects such as "Reflects the level of accessibility for people with disabilities to facility/service in the company's performance indicator" (Mean= 1.85), "Monitors the level of accessibility of facilities/services for people with disabilities and then promotes it internally and externally" (Mean= 1.91), "Implements extra policies for the convenience of customer with a disability beyond standards or regulations set by disability related laws" (Mean= 1.97) and "Has a customer service manual for people with disabilities" (Mean= 2.16) were seldom considered by the sector. In sum, Korean travel agency sector's readiness states for tourists with disabilities were terrible.

A comparison of the two sectors (accommodation and travel agency) in terms of the readiness states for the market for tourists with disabilities revealed that there were statistically significant differences in ten aspects out of twelve and that the accommodation sector is better prepared than the travel agency sector. Aspects that did not show statistical differences were "Checks the existence of impairments and encourages customers with disability to inform their special service needs upon arrival" and "Thinks that the investment on the accessibility improvement of facilities/services/information too costly."

V. Discussion and Implications

Recently, the market for tourists with disabilities has gained much attention from both academics and practitioners as a niche market due to the increasing acceptance of the right for people with disabilities to travel. However, tourism environments are not entirely suitable for the market. Accordingly there is still much gap between reality and ideals. In this sense the role of the tourism industry in enhancing accessible tourism environments becomes important as they are the suppliers of tourism products/services. This study aimed to investigate how Korean tourism companies' employees perceive the market for tourists with disabilities, what the current readiness states of Korean tourism industry are for the market, and whether differences exist in these aspects between two leading tourism industry sectors (i.e., accommodation and travel agency). Major summaries of the results are below.

First, according to the results, Korean tourism companies' employees agree basically that people with disabilities have desires and a right to travel as people without disabilities do, but, generally speaking, their opportunities for travel are restricted. They also recognize that there exist differences in terms of travel needs and requirements according to the characteristics of people with disabilities (i.e., types and/or levels of disability). However, the employees generally fail to recognize the economic potentiality of the market for tourists with disabilities, even though they regard people with disabilities as valuable consumers to consider. These findings stand with the results of previous studies (Burnett & Baker, 2001; Darcy & Pegg, 2011; Grady & Ohlin, 2009; O'Neill & Knight, 2000; Open Doors, 2002; Ozturk et al. 2008; Rice, 2006; Takeda & Card, 2002). When analyzed separately, these results were found to be similar in both the accommodation sector and the travel agency sector. In addition, no significant differences in perceptions of the market for tourists with disabilities between the sectors existed, except for four aspects (i.e., "People with disabilities are limited in tourism products/service consumption due to their physical/cognitive/sensual impairments," "Segmenting the market for tourists with disabilities is not necessarily as they are homogenous," "The market for tourists with disabilities has different needs and requirements according to individual characteristics such as type of disability, level of disability, usage of assistive instruments," and "The market for tourists with disabilities is a useful alternative to overcome seasonality problems confronted by tourism businesses").

Secondly, the results showed that Korean tourism companies are indeed ill-prepared for the market for tourists with disabilities, evidencing little difference from previous research results (O'Neill & Knight, 2000; Open Doors, 2002; Ozturk et al. 2008; Rice, 2006). The companies tend to just abide by minimum requirements (e.g., parking lot for people with disabilities, ramps, etc.) regulated by disability laws. The situation does not differ in both the accommodation sector and the travel agency sector, although the former is a little bit better prepared for the market than the latter. There exist statistically significant differences in ten aspects out of

twelve between two sectors. Usually the accommodation sector is bigger in terms of building size, tends to be more regulated by disability laws, and has more opportunities to deliver services to customers with disabilities than the travel agency sector; thus it has become to be more accessible. This implies that, as McKercher et al. (2003) suggested, the travel agency sector may play a role of an inhibitor rather than a facilitator when it comes to the market for tourists with disabilities.

Recently many countries have declared laws prohibiting discrimination towards people with disabilities. International conventions have also emphasized on encouraging social interaction and leisure for people with disabilities. As a result social attitudes towards people with disabilities, including the right to enjoy culture, leisure and travel, have been changing little by little. Tourism environments have also become more, though not sufficiently, accessible. Many governments provide financial subsidization with the disabled so that they could have more opportunities to travel. For instance, Korean government provides a "Travel Voucher (equivalent to US $150)" for people with disabilities according to a priori arranged criterion. The beneficiary can use it for any purpose related to traveling. Hopefully it is expected that all of these efforts would help people with disabilities be more visible in the tourism context. And then tourism companies' employees would understand more of rights of people with disabilities and desires to travel. Furthermore, as having more experiences of providing services with customers with disabilities, employees would recognize economic significance of the customers, though it might take a small portion of total revenue.

At present, unfortunately, Korean tourism companies' employees do not understand the market for tourists with disabilities correctly. They do not recognize some attainable economic potentiality of the market (e.g., increasing revenue, reducing seasonality problem and enhancing competitive advantage). As a result, Korean tourism companies, regardless of types of businesses, are not vigorously trying to dominate the market in advance. Few companies are willing to invest money for more facilities and accommodations than just the minimum standards required by the law. This phenomenon may be originated from tourism industry's reality, that is, major customers of tourism companies are people without disabilities. For them, a person with a disability is probably not a mainstream customer. In a personal interview, a manager of a top class tourist hotel in a large city in Korea mentioned that "Just with people without disabilities, we have almost 100% room occupancy throughout the year. In this situation, who do you think wants to spend money to provide extra facilities/service for customers with disabilities under uncertainty for profits?" This misperception may find its root in the lack of information on the market for tourists with disabilities (e.g., incorrect statistics on the market in terms of size and travel expenditure) and the tendency regarding people with disabilities as not a customer but an object for mercy. Stakeholders doing their best to enhance accessible tourism environments should first of all collect data on the buying power of the market for tourists with disabilities and share benchmarks that show tourism businesses making a significant profit from the market for tourists with disabilities with the tourist industry. Another reason for the ill-preparedness of Korean tourism companies for the market for tourists with disabilities is the lack of enforcement power of laws related to disability in Korea. At present, the law requires minimum standards to be followed without enacting penalties for failure of compliance. As such, abiding by minimum standards (e.g., some parking lots and two rooms for the disabled, open doors, ramps, and elevators) is considered as enough for five-star hotel certification purposes. However, when setting up a travel agency, nothing is necessary. A staff of a local resort, in a personal interview, said, "We just have two parking lots for people with disabilities, ramps, and elevators. But there would be no such facilities unless the law requires." A strong enforcement of the disability laws combined with the carrot (i.e., financial supports for accessibility enhancement) and stick (i.e., financial and administrative penalties) approach is needed to establish an accessible tourism environment.

This research investigated supply-side perspectives on the market for tourists with disabilities in Korea. Implications discussed are expected to contribute to the enhancement of people with disabilities' right to travel. Items themselves measuring each concept of the research will also guide future research considering similar issues. Even though the generalization of the results was not a concern, limitations should be recognized. The sample was selected conveniently, thus not all tourism business types were included in the sample. More rigorous systematic sampling methods may be required in the future. Korean tourism companies readiness state for the market for tourists with disabilities was measured subjectively (i.e., based on impression of tourism companies' employees), but their impression may not be the same with the factual reality. In the future an objective measure (e.g., a checklist) should be developed for more accurate measurement of the readiness state.

REFERENCES

[1] Abeyraine, R. I. (1995). Proposals and guidelines for the carriage of elderly and disabled persons by Air, *Journal of Travel Research*, Vol. 33, No. 3, Pp. 52-59.

[2] Buhalis, D., Eichopoulou, E., Eichhorn, V., & Miller, G. (2005). *Accessibility market and stakeholder analysis: One-stop-shop for accessible tourism in Europe (OSSATE).* Surrey, United Kingdom: University of Surrey.

[3] Bureau of Tourism Research (2003). National visitor survey: travel by Australians, URL: www.btr.gov.au

[4] Burnett, J. J., & Baker, H. B. (2001). Assessing the travel related behaviors of the mobility-disabled Consumer, *Journal of Travel Research*, Vol. 40, Pp. 4-11.

[5] Card, J. A., Cole, S. T., & Humphrey, A. H. (2006). A comparison of the accessibility and attitudinal Barriers model: Travel providers and travelers with physical disabilities. *Asia Pacific Journal of Tourism Research, Vol. 11, No.* 2, Pp. 161-175.

[6] Cavinato, J. L., & Cuckovich, M. L. (1992). Transportation and tourism for the disabled: An assessment. *Transportation Journal, 31*(3), 46-53.

[7] Charbonneau, G. (2006). "Tourisme et Handicap. Réussir l'Accueil pour la Mise en Accessibilité des Prestations Touristiques." In *Ingénierie Touristique—Guide de Savoir-Faire.* Paris, France: ODIT France.

[8] Daniels, M. J., Rodgers, E. D., & Wiggins, B. P. (2005). 'Travel tales': An interpretive analysis of Constraints and negotiations to pleasure travel as experienced by persons with physical disabilities. *Tourism Management, Vol. 26, No.* 6, Pp. 919-930.

[9] Darcy, S. (1998). *Anxiety to access: tourism patterns and experiences of New South Wales people with a physical disability. Tourism New South Wales*, Sydney, Pp. 1-105.

[10] Darcy, S., & Pegg, S. (2011). Towards strategic intent: Perceptions of disability service provision amongst hotel accommodation managers. *International Journal of Hospitality Management, Vol. 30, Pp.* 468-476.

[11] Dwyer, L., & Darcy, S. (2008). Chapter 4 - Economic contribution of disability to tourism in Australia. In S. Darcy, B. Cameron, L. Dwyer, T. Taylor, E. Wong & A. Thomson (Eds.), *Technical Report 90040: Visitor accessibility in urban centres* (pp. 15-21). Gold Coast: Sustainable Tourism Cooperative Research Centre.

[12] Eichhorn, V., Miller, G., Michopoulou, E., & Buhalis, D. (2008). Enabling access to tourism through information schemes. *Annals of Tourism Research, Vol. 35, No.* 1, Pp. 189-210.

[13] ENAT (2009). UK Tourism Firms Encouraged to Improve Accessibility. Retrieved 26 December, 2009, from http://www.accessibletourism.org/?i=enat.en.news.713.

[14] European Commission. (2010). European disability strategy, 2010-2020: A Renewed Commitment to a Barrier-Free Europe. Retrieved from http://eur-lex.europa.eu/LexUriServ/ LexUriServ.do?uri=COM:2010:0636:FIN:EN:PDF.

[15] Genoe, R., & Singleton, J. F. (2009). World demographics and their implications for therapeutic recreation. In Stumbo, N. J.(Ed.), *Professional issues in therapeutic recreation on competence and outcomes.* Sagamore: Champaign.

[16] Grady, J., & Ohlin, J. B. (2009). Equal access to hospitality services for guests with mobility impairments under the Americans with Disabilities Act: Implications for the hospitality industry. *International Journal of Hospitality Management, Vol. 28*, No. 1, Pp. 161-169.

[17] Imrie, R., & Kumar, M. (1998). Focusing on disability and access in the built environment. *Disability And Society*, Vol. *13*, Pp. 357-374.

[18] Israeli, A, A. (2002). A preliminary investigation of the importance of site accessibility factors for disabled tourists. *Journal of Travel Research*, Vol. *41, No.* 1, Pp. 101-104.

[19] Lee, B. K., Agarwal, S., & Kim, H. (2012). Influences of travel constraints on the people with disabilities' intention to travel: An application of Seligman's helplessness theory. *Tourism Management, Vol. 33, No.* 3, Pp. 569-579.

[20] McGrath, R. (2009). A discourse analysis of Australian local government recreation and sport plans

provision for people with disabilities. *Public Management Review*, Vol. 11, No. 4, Pp. 477-497.
[21] McKercher, B., Packer, T., Yau, M. K., & Lam, P. (2003). Travel agents as facilitators or inhibitors of travel: Perceptions of people with disabilities. *Tourism Management*, Vol. *24, Pp.* 465-474.
[22] Ministry of Health and Welfare. (2013). The disabled enrollement. Retrieved from http://stat.mw.go.kr/front/statDB/statDBView.jsp?menuId=11&nPage=1&sttsDataSeq=38.
[23] Murray, A., & Murray, M. (1995). *Submission on accessible accommodation stock to the industry commission inquiry: Tourism Accommodation and Training*.
[24] Neumann, P., & Reuber, P. (2004). *Economic impulses of accessible tourism for all* (vol. 526), Berlin: Study commissioned by the Federal Ministry of Economics and Technology & Federal Ministry of Economic and Labour (BMWA).
[25] O 'Neill, M., & Knight, J. (2000). Disability tourism dollars in Western Australia hotels. *Hospitality Review, Vol. 18*, No. 2, Pp. 72-88.
[26] Open Doors Organization (2002). Research Among Adults With Disabilities: Travel and Hospitality. Chicago: Open Doors Organization.
[27] Open Doors Organization (2005). Research Among Adults With Disabilities: Travel and Hospitality. Chicago: Open Doors Organization.
[28] Ozturk, Y., Yayli, A ., & Yesiltas, M. (2008). Is the Turkish tourism industry ready for a disabled customer's market? The views of hotel and travel agency managers. *Tourism Management, Vol. 29,* Pp. 382–389.
[29] Prager, J. H. (1999, Dec 15). People with disabilities are next consumer niche. *Wall Street Journal,* Pp. B1, B2.
[30] Ray, N. M., & Ryder, M. E. (2003). "Ebilities" tourism: An exploratory discussion of the travel needs and motivations of the mobility-disabled. *Tourism Management,* Vol. 2, Pp. 57-72.
[31] Rice, P. (2006). Universal management: a proposal to change the direction of accessibility management in the Australian tourism industry to create benefits for all Australians and visitors to Australia. *The Review of Disability Studies: An International Journal, Vol, 2*, No. 2, Pp. 64–69.
[32] Small, J., Harris, C., & Wilson, E. (2008). A critical discourse analysis of in-flight magazine advertisements: The 'social sorting' of airline travelers?. *Journal of Tourism and Cultural Change, Vol. 6*, No. 1, Pp. 17-38.
[32] Smith, R. W. (1987). Leisure of disabled tourists: Barriers to travel. *Annals of Tourism Research, Vol, 14*, No. 3, Pp. 376-389.
[33] Takeda K., & Card, J. A. (2002). US tour operators and travel agencies. *Journal of Travel & Tourism Marketing,* Vol, *12*, No. 1, Pp. 47-61.
[34] Touche Ross (1993). *Profiting from opportunities: A new market for tourism,* London: Touche Ross & Co.
[35] Turco, D. M., Stumbo, N., & Garncarz, J. (1998). Tourism constraints for people with disabilities. *Parks and Recreation,* Vol, *33*, No, 9, Pp. 78-84.
[36] United Nations (2006, December). *Final report of the Ad Hoc Committee on a Comprehensiv and Integral International Convention on the Protection and Promotion of the Rights and Dignity of Person with Disabilities*. Retrived from http://daccess-dds-ny.un.org/doc/UNDOC/LTD/N06/645/30/PDF/N0664530.pdf?OpenElement
[37] Upchurch, R. S., & Seo, W. (1996). Civic responsibility and market positioning: Complying with the American Disability Act. *Facilities*, Vol, *14*, No. 5/6, 25-37.
[38] Westcott, J. (2004). Improving information on accessible tourism for disabled people. *The European Commission*, 2004.
[39] Yau, M. K., McKercher, B., & Packer, T. L. (2004). Traveling with disability: More than an access issue. *Annals of Tourism Research,* Vol. 31, Pp. 946-960.

HAMMING DISTANCE AWARE FAULT ANALYSIS ATTACK FOR A LIGHTWEIGHT BLOCK CIPHER PRESENT

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INTRODUCTION

Various national research institutes have launched studies on lightweight ciphers that require a small amount of calculation and a small area when they are embedded in hardware. Since cryptographic circuits protect confidential information, they are the targets of various types of attacks. A method called side-channel attacks is one type of attack that has been used to target cryptographic circuits. Side-channel attacks estimate the cipher keys by intentionally mixing the faults in a cryptographic circuit or by measuring the electricity consumption of a cryptographic circuit during its operation.

PRESENT [1] is a 64-bit block cipher adopted by the International Organization for Standardization (ISO)/International Electrotechnical Commission (IEC). The safety requirements established by the ISO/IEC indicate computational complexity for decryption. Previous studies on the safety of standard ciphers have investigated many cases of computational complexity for decryption. However, the ability of standard ciphers, such as PRESENT, to safeguard against side-channel attacks has not been secured. Therefore, side-channel attacks against lightweight ciphers must be studied. This study proposes a new side-channel attack which is based on fault analysis. The proposed method utilizes hamming distance between incorrect cryptogram and correct one. Simulation results prove the validity of the proposed method.

1. Related Studies

Fault analysis attacks [2],[3] intentionally generate faults in a cryptographic circuit, cause the circuit to output an incorrect cryptogram (hereinafter referred to as a cryptogram with faults), and maliciously analyze confidential information using a cryptogram with faults and a correct cryptogram. The following methods are used to generate faults in cryptographic circuits: (1) irradiate with a laser, (2) add abnormal voltage, and (3) insert illegal clocks. In particular, the method to insert illegal clocks can be easily implemented, since a clock pulse with a short frequency (hereinafter referred to as clock glitch) can be inserted into a clock that is supplied to a cryptographic circuit. However, since the clock glitch is supplied to all flip-flops, the number and location of the faults to be generated cannot be controlled.

Differential fault analysis (DFA) [4],[5] is a typical fault analysis attack against the data encryption standard. DFA analyzes confidential information using the difference between a correct cryptogram and a

cryptogram with faults. For fault analysis attacks against the advanced encryption standard (AES), several methods have been proposed, such as DFA against the encryption processing section and DFA against the key-scheduling section. For fault analysis attacks against PRESENT [6],[7], a method that was developed based on DFA has been reported. However, in DFA, there are several restrictions on the number and location of the faults to be generated. The present study proposes a new method for fault analysis attacks that places no restriction on the number and location of the fault to be generated.

2. Proposed method

2.1 Analytical Method

The present study defined a correct cryptogram as C and a cryptogram with faults as C'. The proposed method analyzes an output 64-bit cryptogram after dividing it into eight-bit sections. The divided cryptogram is expressed as C[a]. As shown in Figure 1, a fault is assumed to be mixed in C[a] after performing addRoundKey at the 31st round (round 31).

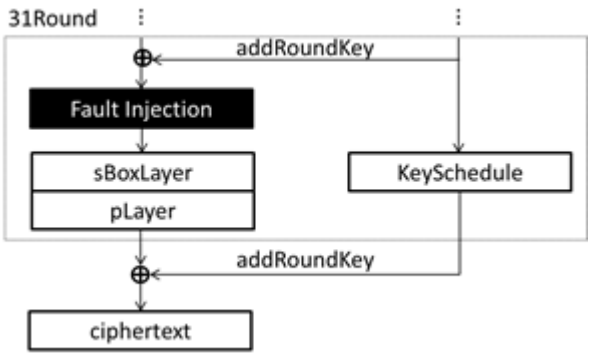


Figure 1 Example of Fault Injection

The intermediate values are expressed as B and B'. The methods to introduce C[a] are expressed as formulae (1) and (2).

$$\mathrm{C}[\alpha] = \mathrm{P}(\mathrm{S}[\mathrm{B}[\alpha]]) \oplus K_{32}[\alpha] \quad (1)$$

$$\mathrm{C}'[\alpha] = \mathrm{P}(\mathrm{S}[\mathrm{B}'[\alpha]]) \oplus K_{32}[\alpha] \quad (2)$$

In these formulae, B[a], B'[a], and K32[a] represent the values that have been divided into eight-bit sections, similar to C[a]. To perform the analysis, the intermediate value must be obtained by the reverse calculation of the cryptogram.

In the reverse calculation, the intermediate value can be obtained by performing an exclusive OR operation with K32, inverse transformation of sBoxLayer $S^{-1}[x]$, and inverse transformation of pLayer $P^{-1}(j)$ from formulae (1) and (2). These calculations are expressed as formulae (3) and (4).

$$B = S^{-1}[P^{-1}(C \oplus K_{32})] \quad (3)$$

$$B' = S^{-1}[P^{-1}(C' \oplus K_{32})] \quad (4)$$

In the case where the reverse calculation is performed in the eight-bit unit, since the transformation has been performed by the 64-bit bijection pLayer, the number of bits is insufficient when performing $S^{-1}[x]$; consequently, the intermediate value cannot be obtained as shown in Figure 2.

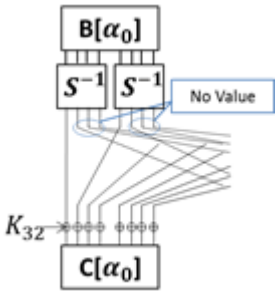


Figure 2 How to calculate the intermediate value

Therefore, when performing the reverse calculation in the eight-bit unit, $P^{-1}(j)$ is first performed for C and C', and an exclusive OR operation with K32, for which $P^{-1}(j)$ has been performed, is simultaneously performed; consequently, the intermediate value immediately after performing sBoxLayer can be obtained. As shown in Figure 3, by performing $S^{-1}[x]$ for the obtained intermediate value in the eight-bit unit (four bits x 2), B and B' can be obtained. These calculations are expressed as formulae (5) and (6).

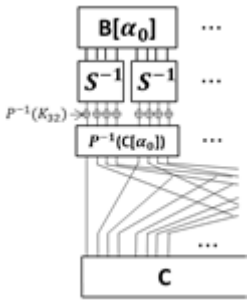


Figure 3 Example of $S^{-1}[x]$ for the obtained intermediate value in the eight-bit unit

$$B[\alpha] = S^{-1}[P^{-1}(C[\alpha]) \oplus P^{-1}(K_{32}[\alpha])] \quad (5)$$

$$B'[\alpha] = S^{-1}[P^{-1}(C'[\alpha]) \oplus P^{-1}(K_{32}[\alpha])] \quad (6)$$

At this stage of the analysis, the value of $K32[a]$ is unknown. Therefore, B and B' cannot be obtained. Then, using an appropriate eight-bit value X instead of K32[a], formulae (5) and (6) are performed. Here,

X is called a key candidate. When the result obtained using X is expressed as Y, formulae (7) and (8) can be valid.

$$Y = S^{-1}[P^{-1}(C[\alpha]) \oplus X] \quad (7)$$

$$Y' = S^{-1}[P^{-1}(C'[\alpha]) \oplus X] \quad (8)$$

When X is the same as K32[a], Y = B[a] and Y' = B'[a] can be valid. However, since B and B' are unknown, the value of K32[a] cannot be specified. Then, the hamming distance (HD) between B and B' is used. The HD indicates the number of bit values that are different between two bit columns. For example, the expected value of HD between two eight-bit columns without correlativity is four (half of eight). Basically, the value of B should be the same as the value of B'. Even if a fault is mixed, all the bit values are not always changed. Therefore, the expected value of HD between B and B' is predicted to be below four.

If the value of X is not K32[a], the expected value of HD between Y and Y' HD(Y, Y') is four, because the non-linear inverse transformation resulted in no correlativity. Based on the above-mentioned matters, formula (9) can be valid from the expected value of HD.

$$\begin{cases} E\big(HD(Y,Y')\big) \leq 4 & (X = K_{32}[\alpha]) \\ E\big(HD(Y,Y')\big) = 4 & (X \neq K_{32}[\alpha]) \end{cases} \quad (9)$$

In the proposed method, even if X = K32[a] at one trial, there is a possibility that the value of HD(Y, Y') is accidentally four. In this case, the analysis cannot be performed. Therefore, a sufficient number of trials are performed, and the average value is used. Actually, (Y, Y') is obtained for a pair consisting of a correct cryptogram and a cryptogram with faults (C, C') using formulae (7) and (8), and statistical analysis is performed. When the sufficient number is expressed as N, the average HD can be obtained using formula (10).

$$\overline{HD} = \frac{1}{N}\sum_{n=1}^{N} HD(Y_n, Y'_n) \quad (10)$$

In the case where the average HD is below four, part of the round keys can be obtained when K32[a] = X. Since a round key consists of 64 bits, the analytical processing must be performed eight times to estimate all the round keys.

2.2 Estimation of an 80-bit Secret Key

In PRESENT, the length of a round key is 80 bits and only 64 of the 80 bits are used. The proposed method cannot be used to analyze the remaining 16 bits. If unknown bits exist in PRESENT, KeySchedule cannot be performed; consequently, the secret key of the cryptographic circuit in which PRESENT has

been embedded cannot be estimated. Therefore, a method to specify the remaining unknown 16 bits in the round key K32 is proposed.

When the round key K32 is obtained in KeySchedule at the final round, 64 bits between the zero bit and the 63th bit from the left side of the 80 bits are used. The values of the remaining 16 bits between the 64th bit and 79th bit are unknown. To obtain the values of these 16 bits, the round key K31, a round before round 32, must be obtained. After obtaining the intermediate value B31 at round 31, a fault is mixed after performing addRoundKey at round 30, a round before round 31. The intermediate value B31 can be estimated since the round key K32 has been specified by the first fault analysis attacks. The intermediate value B'31 with faults can also be estimated, which has been generated by mixing a fault at the second fault analysis attacks.

Therefore, when B31 and B'31 are replaced with C and C', K31 can be specified using a method that is similar to the first fault analysis attacks. Based on the obtained K31 and K32, the secret key is specified. K32 is obtained by applying formulae (2), (3), and (4) to K31. Here, the unknown 16 bits in K32 agree with the 16 bits between the 46th and 61th bits in K31, as shown in Figure 4. However, since the 60th and 61th bits are in the range of masking using a round counter in formula (4), an exclusive OR operation must be performed with a round counter at round 31 (R31_counter).

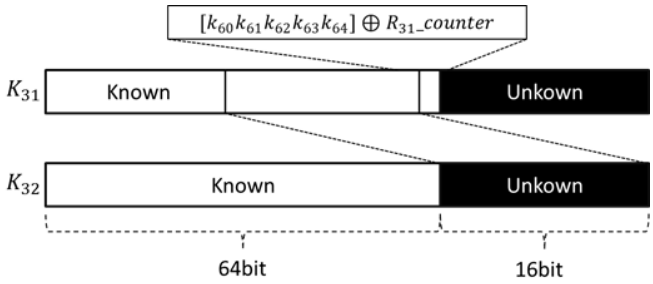


Figure 4 Example of processing between key31 and key32

3. Experiments

To evaluate the validity of the proposed method, a simulation was performed. Table 3 shows the conditions that were adopted in the simulation. To estimate the 64-bit round key K32, it is necessary to acquire a correct cryptogram and a cryptogram with faults from the same plain text and to perform the encryption processing 2000 times in order to compare the findings. To calculate HD, the encryption processing must be performed 256 x 8 times for a pair of cryptograms. Specifically, the encryption processing must be performed a total of 204,800 times (256 x 8 x 1000). This number is extremely smaller than the number of trials performed for all of the 64-bit key candidates (= 2^{64} times). In the simulation, the

occurrence probabilities of a fault were set at 40% and 20%. Figures 5 and 6 show the simulation results. In these figures, the vertical axis represents the average HD of 256 key candidates and the horizontal axis represents each key candidate. In these figures, the value of a point (peak) with the lowest average HD indicates the correct partial key. The eight correct partial keys were then summarized into one and pLayer was performed for the summarized correct partial key. The obtained result indicated that the round key had been actually used for the final addRoundKey. pLayer was performed because the inverse transformation of pLayer $P^{-1}(j)$ had been performed for the obtained result, as shown in formulae (9) and (10). In Figure 5, the maximum value of the graph is 3.8. Therefore, the average HD was generally lower than the expected value (4). This is because the occurrence probability of a fault was 40%. Therefore, a no fault cryptogram was sometimes mixed in the eight-bit cryptogram with faults when the encryption processing was performed 1000 times. As shown in formula (9), when the key candidate was incorrect, the average HD was approximately 3.6 instead of 4 when the occurrence probability of a fault was 40%. When the occurrence probability of a fault was 20%, the average HDs was 2.2.

The average HD was also low before and after the peak. This is thought to be because the value of the key candidate that was used was close to the value of the correct key candidate. This phenomenon was observed in all the results. Figure 7 shows an example of this phenomenon.

Figure 5 Result of occurrence probability 40%

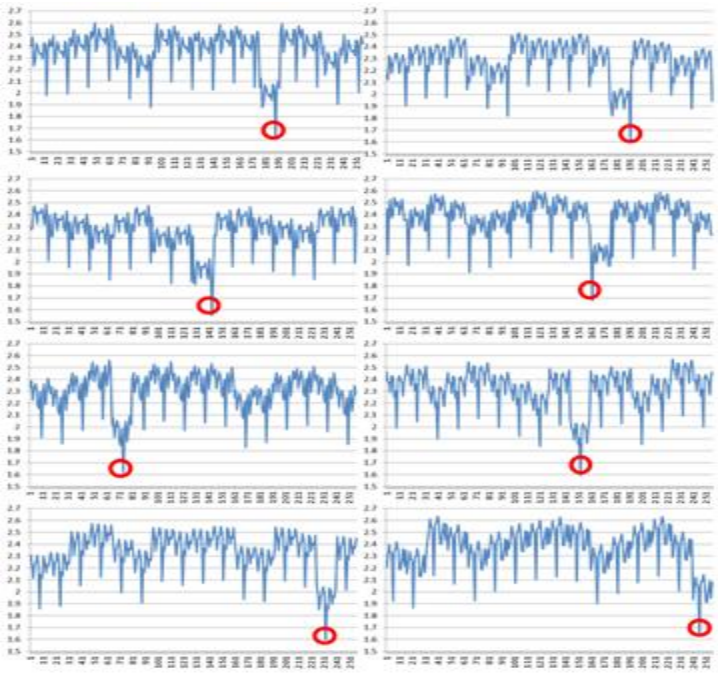


Figure 6 Result of occurrence probability 20%

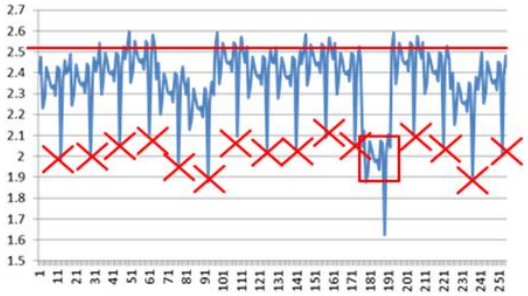
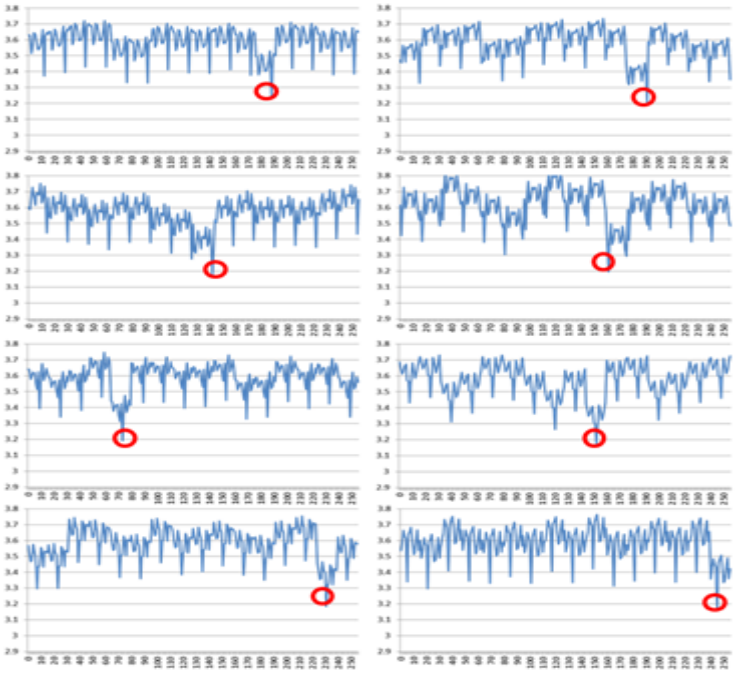


Figure 7 Example of average HD around the peak



CONCLUSION

This study proposed a new fault analysis for a 64-bit block cipher PRESENT which is an encryption standard. The proposed method utilizes hamming distance between incorrect cryptogram and correct one. Simulation results proved the validity of the proposed method. Further works include the experiments using laser fault attack to evaluate the validity of the proposed method on actual devices.

REFERENCE

[1] ABogdanov, L.R.Knudsen, G.Leander, C.Paar, A. Poschmann, M.J.B.Robshaw, Y.Seurin, C.Vikkelsoe, "PRESENT: An Ultra-Lightweight Block Cipher", Proc. of CHES2007, vol.4727, pp.450-pp.466,

2007.

[2] M.Yoshikawa, H.Goto, "Analysis of Operation Errors for Fault Injection Attack", International Journal of Signal Processing System, Vol.2, No.1, pp.74-77, 2014.

[3] H.Bar-el, H.Choukri, D.Naccache, M.Tunstall, C.Whelan, "The Sorcerer's Apprentice Guide to Fault Attacks", Proc.of the IEEE, vol.94, No.2, pp370-382, 2006.

[4] G.Piret, j.j.Quisquater, "A differential fault attack technique against SPN stuructures,with application to the AES and KHAZAD", Proc. of CHES2003, vol.2779, pp.77-pp.88, 2003.

[5] P.Dusart, G.Letourneux,O.Vivolo, "Differential fault analysis on AES", Proc. of ACNS2003, vol.2846, pp.293-pp306, 2003.

[6] K.Jeong, Y.Lee, J.Sung, S.Hong, "Improved differential fault analysis on PRESENT-80/128", International Journal of Computer Mathematics, vol.90, pp.2553-pp2563, 2012.

[7] G.Wang, S.Wang, "Differential Fault Analysis on PRESENT Key Schedule", proc .of CIS2010, pp.362-pp.366, 2010.