Original Article

Healthc Inform Res. 2016 October;22(4):342-350.
https://doi.org/10.4258/hir.2016.22.4.342
pISSN 2093-3681 • eISSN 2093-369X

HIR
Healthcare Informatics Research

Medical Representatives' Intention to Use Information Technology in Pharmaceutical Marketing

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Objectives: Electronic detailing (e-detailing), the use of electronic devices to facilitate sales presentations to physicians, has been adopted and expanded in the pharmaceutical industry. To maximize the potential outcome of e-detailing, it is important to understand medical representatives (MRs)' behavior and attitude to e-detailing. This study investigates how information technology devices such as laptop computers and tablet PCs are utilized in pharmaceutical marketing, and it analyzes the factors influencing MRs' intention to use devices. **Methods:** This study has adopted and modified the theory of Roger's diffusion of innovation model and the technology acceptance model. To test the model empirically, a questionnaire survey was conducted with 221 MRs who were working in three multinational or eleven domestic pharmaceutical companies in Korea. **Results:** Overall, 28% and 35% of MRs experienced using laptop computers and tablet PCs in pharmaceutical marketing, respectively. However, the rates were different across different groups of MRs, categorized by age, education level, position, and career. The results showed that MRs' intention to use information technology devices was significantly influenced by perceived usefulness in general. Perceived ease of use, organizational and individual innovativeness, and several MR characteristics were also found to have significant impacts. **Conclusions:** This study provides timely information about e-detailing devices to marketing managers and policy makers in the pharmaceutical industry for successful marketing strategy development by understanding the needs of MRs' intention to use information technology. Further in-depth study should be conducted to understand obstacles and limitations and to improve the strategies for better marketing tools.

Keywords: Diffusion of Innovation, Drug Industry, Computers, Marketing, Survey and Questionnaires

Submitted: September 21, 2016
Accepted: September 30, 2016

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I. Introduction

In the healthcare environment with limited financial budgets and low medical insurance fee schedules, doctors have to meet more patients; therefore, the time during which patients stay in doctors' offices is becoming shorter. In the United States, for example, doctors who are faced with financial pressure due to limited reimbursement, resulting from managed care and decreased government financing in addition to higher medical practice insurance premiums, are responding by seeing more patients. These changes make the visiting time of pharmaceutical company medical represen-

tatives (MRs) who meet with doctors to provide information on pharmaceutical products very short [1-3].

The traditional pharmaceutical marketing method of face-to-face detailing is still the most often used sales method [4], but MRs now have to wait a long time to meet with doctors, and even once they meet with the doctor, they are given only a short period of time. The effects of marketing are very limited under such restrictive conditions [5]. To be more precise, the efficiency of face-to-face detailing is dropping due to increased costs for MRs [6], limitations in interactions between doctors and MRs, time constraints of doctors, etc., and despite making huge investments, the practical effectiveness does not live up to expectations [7]. In response, due to the rapid development of information and communication technologies (ICT), pharmaceutical companies have developed electronic detailing (e-detailing) utilizing ICT in pharmaceutical marketing as an alternative to face-to-face detailing [2,5,6,8].

E-detailing is defined as a broad and continually evolving term describing "the use of electronic, interactive media to facilitate sales presentations to physicians" in the pharmaceutical industry [9]. E-detailing was introduced as a new communication channel for the pharmaceutical industry to promote products to doctors that has been used for the past several years. Recently, the methods have gone beyond the internet, and they now use various digital technologies, including video conferencing and automatic voice response [10,11]. These new methods provide doctors with the latest information and knowledge at lower costs than face-to-face detailing, and they are intended to efficiently promote products to doctors to increase sales [12].

Starting with the launching of smart devices in 2007, companies such as Apple and Samsung in the ICT industry targeted niche markets between smartphones and laptop computers and launched 7- to 10-inch tablet devices, such as the iPad and Galaxy Tab, which are mobile internet and multimedia devices that are touch-type but have larger displays than smartphones [13]. As such devices have become more common in Korea, e-detailing has also received significant attention in the Korean pharmaceutical industry, and is now showing signs of proliferation.

MRs from the global pharmaceutical company Pfizer Korea also began detailing using laptop computers and tablet PCs, and from 2013, they introduced video e-detailing for the first time in Korea and installed a separate e-detailing operation department where Digital Professional MRs who receive relevant training conduct video detailing. Additionally, relatively large pharmaceutical companies, such as Hanmi Pharm, Janssen Korea, Lilly Korea, and CJ Healthcare, are also beginning to implement e-detailing using ICT, but in some pharmaceutical companies it is being used in a very limited fashion by specific departments. Therefore, in the Korean pharmaceutical industry, e-detailing mostly uses the original method, in which MRs meet with doctors and convey information using laptop computers or tablet PCs.

In conclusion, Korea's current pharmaceutical e-detailing is slow in terms of implementation and proliferation compared to other advanced nations. While there is increased interest and research regarding e-detailing, its cost effectiveness and efficiency has not been verified, and there is nothing known on the use of devices related to e-detailing or on the perceptions, attitudes, and issues of MRs. To overcome the limitations of face-to-face detailing in pharmaceutical marketing and to maximize the strengths of e-detailing to proliferate them, understanding of e-detailing for MRs who play a crucial role in pharmaceutical sales is essential.

Accordingly, this study attempted to identify factors that affect the user's attitude and intention to use IT devices for MRs, who are the main users of e-detailing devices, as new marketing tools in actual sales in order to promote the use of e-detailing in pharmaceutical industry in Korea. In detail, the scope of e-detailing was limited to the range of MRs meeting with doctors to convey information using laptop computers or tablet PCs, which is currently the most common method used in Korea. The study aimed to identify the experiences, user attitudes and intention to use IT devices of MRs in marketing activities. Understanding the use of laptop computers and tablet PCs in the sales activities of MRs can be used as basic data when establishing strategies to spread and improve e-detailing.

II. Methods

1. Conceptual Framework

To understand MRs' behavior and attitudes to e-detailing, this study adopted and modified the theory of Roger's diffusion of innovation model [14] and the technology acceptance model (TAM) introduced by Davis [15]. Based on knowledge gained from the literature review, the research model was derived as shown in Figure 1. The major constructs of the model were perceived ease of use (PEOU), perceived usefulness (PU), individual technology acceptance, and organizational innovativeness. An MR's individual and occupational characteristics were also considered.

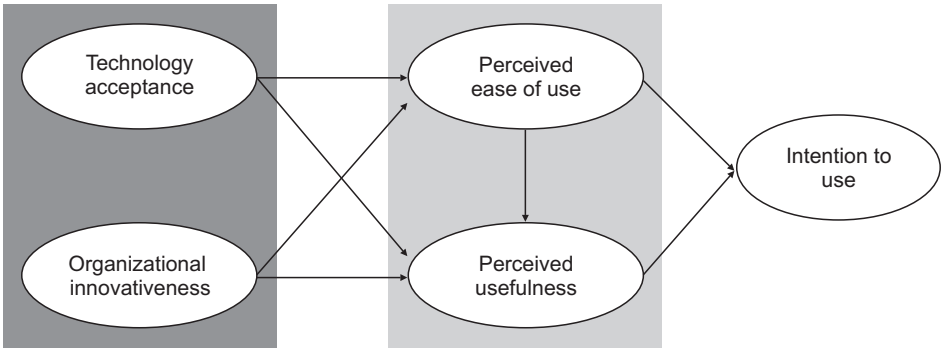

Figure 1. Conceptual framework.

2. Data Collection

The subjects of this study were all MRs who did or did not receive laptop computers or tablet PCs as tools for e-detailing in multinational companies located in Korea or domestic pharmaceutical companies. Non-probability samples of MRs were contacted for two weeks in November 5–24, 2015, using the convenient sampling method focusing on large-scale pharmaceutical companies. A total of 300 questionnaires were distributed to Pfizer Korea, Hanmi Pharm, Jeil Pharmaceutical, and other eleven pharmaceutical companies through e-mails, and 221 were returned with a response rate of 73.7%.

3. Survey Instrument

The survey instruments were comprised by extracting survey items corresponding to each concept based on an analysis of previous studies. First, for the PEOU, which is an important concept of the TAM model, the scale of Davis [15] was modified to fit this study, and it comprised three items on PEOU (easy to learn) and three items on PEOU (convenient), while PU comprised four items on PU (informative) and four items on PU (effective) [16]. Furthermore, organizational innovativeness, which is a feature related to more frequently and more quickly accepting new services, products, systems, etc., in comparison to other organizations, used three questions that were used in research conducted by Yoh et al. [17]. It included five items used in research by Agarwal and Prasad [18] on individual technology acceptance, which is a feature of accepting innovations earlier than other members in a given system. Lastly, for intention to use e-detailing, which is the final dependent variable of the model, five questions were adopted from related studies, such as that by Moon and Chang [19], and were modified. For all of these questions, responses were based on a Likert scale, with 1 point for 'strongly disagree' and 5 points for 'strongly agree'. In addition, demographical features of MRs, such as gender, age, education level, etc., and work environment features, such as assigned region (urban or rural), hospital type in charge, etc., were included.

After a pilot test was conducted on 10 MRs, the question items were edited to draft the final survey tool. Using the 221 collected surveys, validity and reliability analyses were conducted to verify the tool. Upon conducting factor analysis to verify feasibility, the PEOU and PU showed constituent results for each factor. In detail, PEOU was categorized as 'easy to learn', which measures the ease of learning how to use a tool and 'convenient' factor that shows ease in using the tool. PU factors were categorized as 'informative' factor related to the scope of the provided information and its accessibility, as well as the 'effective' factor that represents the sales performance. Other variables, such as intention to use, individual technology acceptance, and organizational innovativeness variables, were made up as single factors. Furthermore, in terms of reliability, Cronbach's alpha coefficient of all of the major concept variables were within the range of 0.78 and 0.94, so it was confirmed that the measurement tools used in this study had high internal consistency.

4. Statistical Analysis

Descriptive statistics were computed for respondents' characteristics. To understand the bivariate relationship between characteristics and device utilization, chi-square tests were conducted. According to the conceptual research model, statistical significances were tested using multiple regression analyses. Explicitly, the major independent variables consisted of PEOU, PU, individual technology acceptance, and organizational innovativeness, while intention to use IT devices and frequencies were dependent variables. All statistical analysis procedures were conducted using the SAS ver. 9.3 program (SAS Institute Inc., Cary, NC, USA), and the significance was tested at the alpha level of 0.05 in general.

https://doi.org/10.4258/hir.2016.22.4.342

III. Results

1. Characteristics of Sample

The general characteristics of the 221 MRs were shown in Table 1. In all, 137 (62.0%) respondents were men, and 84 (38.0%) were women. The age distribution of respondents consisted of 146 (66.1%) in their 30s, 45 (20.4%) in their 20s, 24 (10.9%) in their 40s, and 6 (2.7%) in their 50s, respectively. MRs' education level was concentrated in college graduates (n = 198, 89.6%) with only 23 (10.4%) graduate college graduates. With respect to monthly income, 46.2% were for $300–449, 27.6% for $450–599, 17.7% for $150–299, and 8.6% for $600 or higher, in consecutive order.

Table 1. Socio-demographic characteristics of sample (n = 221)

Characteristic	n (%)
Gender	
Men	137 (61.99)
Women	84 (38.01)
Age (yr)	
20–29	45 (20.36)
30–39	146 (66.06)
40–49	24 (10.86)
50–59	6 (2.71)
Education	
College graduate	198 (89.59)
Graduate college	23 (10.41)
Monthly income (1$ = 1,000 KRW)	
$150–299	39 (17.65)
$300–449	102 (46.15)
$450–599	61 (27.60)
$600+	19 (8.60)
Company	
A	130 (58.82)
B	39 (17.65)
C	38 (17.19)
Others	14 (6.33)
Position	
Staff	41 (18.55)
Chief	41 (18.55)
Assistant manager	59 (26.70)
Manager	55 (24.89)
Deputy general manager	25 (11.31)
Location	
Metropolitan	119 (53.85)
Non-metropolitan	102 (46.15)
Career (yr)	
≤5	68 (30.77)
6–10	99 (44.80
11–15	42 (19.00)
16–20	4 (1.81)
>20	8 (3.62)

For the position of MRs, assistant managers were highest at 26.7% (59), followed by managers at 24.9% (55), and staff at 18.6% (41), while deputy director or higher accounted for 11.3 (25). The Seoul metropolitan area was highest for the area in charge at 53.9%, followed by 18.6% in Chungcheong, 14.0% in Gyeongsang, 11.3% in Jeolla, and 2.3% in Gangwon Province. For experience in pharmaceutical sales, 6–10 years was highest at 44.8% (99), followed by 5 years or less at 30.8% (68), 11–15 years at 19.0% (42), 20 years or more at 3.6% (8), and 16–20 years at 1.8% (4).

2. E-detailing Experience

Of the 221 respondents, the usage rate of laptop computers was 28.1%, while that of tablet PCs was 34.7%. The usage rates of such IT devices showed different modes depending on the characteristics of MRs. Upon making comparative analysis on the usage rate of laptop computers and tablet PCs according to the characteristics of MRs, the results were presented in Table 2.

In the case of laptop computers, it was found that there was higher use in older age groups. The usage rates displayed a linear relationship with those in their age 50s using 100%, 40s using 45.8%, 30s using 26.7%, and 20s using 13.3%. This exhibited a proportional mode with pharmaceutical sales, rise in position, and higher income. For those enrolled/graduated from graduate school, the rate was significantly higher at 60.9% compared to college graduates at 24.2%, and of the pharmaceutical companies, only company A showed exceptionally high rates at 46.5%.

The use of tablet PCs showed different modes than that of laptop computers. There were no differences in relation to age or education level, but there was higher usage among men at 40.7% compared to women at 25%. Among the pharmaceutical companies, company B displayed the highest usage at 94.9%, and in terms of position, higher usage was displayed for staff and deputy directors or higher at 59.0% and 48%, respectively. In terms of experience in pharmaceutical sales, relatively higher percentages were consistently observed in the older and younger age groups at 62.5% for 20 years or longer and 45.5% for less than 5 years.

Table 2. Experience with information technology devices by medical representatives

Characteristic	Laptop computer			Tablet PC		
	n (%)	X^2	$p < X^2$	n (%)	X^2	$p < X^2$
Total	62 (28.05)			76 (34.70)		
Gender		0.56	0.4527		5.66	0.0173
Men	36 (26.28)			55 (40.74)		
Women	26 (30.95)			21 (25.00)		
Age (yr)		24.11	<0.0001		7.06	0.0701
20–29	6 (13.33)			21 (46.67)		
30–39	39 (26.71)			43 (29.86)		
40–49	11 (45.83)			8 (33.33)		
50–59	6 (100.0)			4 (66.67)		
Education		13.70	0.0002		0.00	0.9933
College graduate	48 (24.24)			68 (34.69)		
Graduate college	14 (60.87)			8 (34.78)		
Monthly income (1$ = 1,000 KRW)		30.17	<0.0001		13.31	0.0040
$150–299	1 (2.56)			21 (56.76)		
$300–449	26 (25.49)			34 (33.33)		
$450–599	22 (36.07)			13 (21.31)		
$600+	13 (68.42)			8 (42.11)		
Company		51.51	<0.0001		85.82	<0.0001
A	60 (46.15)			36 (27.69)		
B	1 (2.56)			37 (94.87)		
C	0 (0.00)			0 (0.00)		
Others	1 (7.14)			3 (25.00)		
Position		20.36	0.0004		17.93	0.0013
Staff	4 (9.76)			23 (58.97)		
Chief	10 (24.39)			8 (19.51)		
Assistant manager	12 (20.34)			17 (28.81)		
Manager	24 (43.64)			16 (29.09)		
Deputy general manager	12 (48.00)			12 (48.00)		
Career (yr)		24.96	<0.0001		10.28	0.0359
≤5	10 (14.71)			30 (45.45)		
6–10	28 (28.28)			28 (28.28)		
11–15	14 (33.33)			13 (30.95)		
16–20	3 (75.00)			0 (0.00)		
>20	7 (87.50)			5 (62.50)		

Even when MRs receive laptop computers or tablet PCs from the company, 84.1% and 62.7% still used paper brochures. It was found that the rates of using laptop computers or tablet PCs were only 15.9% and 37.3%, respectively. A comparison of the average time used in sales activities using paper brochures and IT devices showed that it was 4.2 minutes for laptop computers (3.4 minutes for paper brochures) and 3.1 minutes for tablet PCs (2.8 minutes for paper brochures). In the case of e-detailing, the respondents answered that it took more time than paper brochures.

3. Factors Influencing PEOU and PU

To identify the impact of individual and organizational innovativeness on PEOU and PU of e-detailing devices, multiple

 https://doi.org/10.4258/hir.2016.22.4.342

Table 3. Factors influencing perceived ease of use (PEOU) and usefulness (PU) for laptop computer

	Perceived ease of use		Perceived usefulness	
	Easy to learn	Convenient	Informative	Effective
Intercept	2.03†	2.71†	2.86*	1.14
Technology acceptance	0.38**	−0.09	−0.07	0.20
Organizational innovativeness	−0.15	0.05	0.02	−0.02
PEOU (Easy to learn)			0.13	−0.09
PEOU (Convenient)			0.33**	0.50***
Men	0.07	−0.01	−0.02	−0.27
Age 30s	−0.14	0.37	−0.30	−0.29
Age 40+	−0.03	1.21†	−0.52	−0.16
Assistant manager	−0.04	−0.01	0.34	0.28
Manager	0.10	−0.70	0.49	0.36
N (Education)	0.12	0.29	−0.04	0.12
Metropolitan	−0.09	0.45	0.31	−0.03
% (City)	0.00	0.00	0.00	0.00
% (General hospital)	0.00	0.00	0.00	0.00
% (Hospital)	0.00	0.00	0.00	0.00
N (Daily visit)	0.04	−0.02	−0.07†	0.02
N (Drug)	0.01	0.00	0.01	0.00
% (Original drug)	0.00	−0.01	0.01	0.00
F-test	1.07	0.96	1.36	1.90*
R^2	0.26	0.24	0.36	0.43
Adjusted R^2	0.02	−0.01	0.09	0.21

†$p < 0.1$, *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$.

regression analysis was conducted, and the results for laptop computers and tablet PCs are presented in Tables 3 and 4. Personal characteristics, such as gender, age, and position, and sales work characteristics, such as sales area, number of pharmaceutical products, training collection, etc., were included in the analysis model to regulate the personal and sales work characteristics.

For factors that impact the PEOU of laptop computers, it was found that only technology acceptance had a significant impact on PEOU (easy to learn), while organizational innovativeness did not have significant impact on PEOU or PU. For factors that affect the PU of laptop computers, it was found that only PEOU (convenient) had a significant impact on both PU factors of providing information and effectiveness.

Like laptop computers, regarding tablet PCs, it was also found that individual technology acceptance had significant impact on PEOU (easy to learn) among PEOU, and PEOU (convenient) had significant impact on both PU (informative) and PU (effective) for usefulness. Unlike laptop computers, however, it was found that organizational innovativeness had a significant impact on the PU (effective) factor of usefulness. This means that the more innovative an organization is, the higher the possibility to perceive tablet PCs as being effective. Also, for controlled variables, it was found that it tablet PCs were perceived to be more useful when the MRs were men and when there a higher number of pharmaceutical products was being handled.

4. Factors Influencing Intention to Use e-Detailing

Table 5 shows the results of multiple regression analysis on the impact of PEOU and PU that influences intention to use IT devices. In the case of laptop computers, only PEOU (convenient) among PEOU and only effectiveness among PU had a significant impact on intention to use. This means that when people perceive the convenience and effectiveness of laptop computers positively, intention to use rises. Tablet PCs displayed a different mode from laptop computers, and PEOU did not have significant impact on intention to use, while the two factors of usefulness, namely, provision of in-

Table 4. Factors influencing perceived ease of use (PEOU) and usefulness (PU) for tablet PC

	Perceived ease of use		Perceived usefulness	
	Easy to learn	Convenient	Informative	Effective
Intercept	3.54***	1.84†	2.90***	0.14
Technology acceptance	0.24*	0.15	–0.07	–0.01
Organizational innovativeness	–0.18	–0.16	0.21†	0.45***
PEOU (Easy to learn)			0.03	–0.15
PEOU (Convenient)			0.33***	0.52***
Men	0.06	–0.46†	0.37*	0.39*
Age 30s	–0.19	–0.20	0.04	0.12
Age 40+	–0.25	–0.15	–0.49	–0.30
Assistant manager	–0.04	0.22	0.11	0.22
Manager	0.32	0.70*	0.08	0.12
N (Education)	0.01	0.25	–0.20	–0.16
Metropolitan	0.02	0.06	0.11	0.05
% (City)	0.00	0.01	0.00	0.00
% (General hospital)	0.00	0.01†	0.00	0.00
% (Hospital)	0.00†	0.00	0.00	0.00
N (Daily visit)	0.01	0.03	–0.04	0.00
N (Drug)	0.00**	0.00*	0.00†	0.00**
% (Original drug)	0.00	0.00	0.00	0.00
F-test	3.86***	2.00*	4.28***	5.47**
R^2	0.50	0.34	0.56	0.62
Adjusted R^2	0.37	0.17	0.43	0.51

†$p < 0.1$, *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$.

Table 5. Perceived ease of use (PEOU) and usefulness (PU) influencing intention to use IT devices

	Laptop computer			Tablet PC		
	B	SE (B)	*t*	B	SE (B)	*t*
Intercept	–0.20	0.38	–0.53	0.25	0.54	0.45
PEOU (Easy to learn)	0.00	0.09	–0.01	0.11	0.12	0.92
PEOU (Convenient)	0.28	0.08	3.64***	0.09	0.11	0.81
PU (Informative)	0.13	0.09	1.32	0.35	0.14	2.60*
PU (Effective)	0.63	0.10	6.53***	0.33	0.14	2.36*
F-test	34.8	<0.0001		8.97	<0.0001	
R^2	0.71			0.39		
Adjusted R^2	0.69			0.35		

*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$, two-tailed tests.

formation and effectiveness, had significant impact on intention to use. This means that when information provision and effectiveness of tablet PCs are perceived positively, intention to use is higher.

IV. Discussion

Through technological progress in the information communication sector that began in earnest since the start of the 21st century, various types of IT devices became widespread,

https://doi.org/10.4258/hir.2016.22.4.342

and the pharmaceutical industry also began to use laptop computers and tablet PCs as tools to utilize e-detailing; thus, IT-device-based information production and sharing became common [20]. However, as is evident in the results of this study, even MRs who receive laptop computers or tablet PCs still use paper brochures more than IT devices. This is due to various factors, such as the individual characteristics of MRs and their sales environment.

Despite growing use of and interest in e-detailing by pharmaceutical companies, compared to face-to-face detailing, there is almost nothing known about the perception and attitudes of MRs on e-detailing or a method to elucidate this. Also, there is almost nothing known about the intention to use e-detailing by MRs. Despite being supplied with laptop computers or tablet PCs as e-detailing tools by companies, there is a huge variation in the frequency and range of use among MRs. Therefore, this study examined the needs and areas of improvement identified by MRs who use marketing tools in actual sales sites by investigating their usage attitudes based on their experience with using laptop computers and tablet PCs to provide basic data to promote e-detailing in the future.

Based on the TAM model, the impact of individual technology acceptance, organizational innovativeness, and the PEOU and PU of laptop computers and tablet PCs by MRs on the intention to use for e-detailing by MRs was analyzed, and it was found that there were different modes between laptop computers and tablet PCs.

In the relationship of individual technology acceptance and organizational innovativeness with PEOU, it was found that for both laptop computers and tablet PCs, individual technology acceptance had a significant impact on PEOU (easy to learn). This means that, like Rogers [14] who stated that the speed of a new market being accepted by the market becomes faster when the user can more quickly learn how to use the product, MRs with higher individual technology acceptance think that learning e-detailing devices is easier.

On the other hand, for the relationship between individual technology acceptance and organizational innovativeness with PU, only organizational innovativeness of tablet PCs had a significant impact on PU. Based on this, it can be judged that individual technology acceptance has a significant impact on intention to adopt new technologies, but it does not affect usefulness differentially perceived according to technologies [21-23]. It can also be said that companies displaying high organizational innovativeness are companies that aim at innovatively and assertively receiving new processes and ideas [24,25]. Based on research that showed that organizational innovativeness also has significant impact on PEOU and PU, it is evident that when a company is more innovative, the use of tablet PCs is perceived to be more effective.

In the relationship of PEOU and PU, it was found that PEOU (convenient) factor had a significant impact on both PU (informative) and PU (effective) factors for both laptop computers and tablet PCs. This is consistent with the findings of various previous studies that reported that when a technology is easier to use, it is perceived that the technology is more useful in terms of the relationship of ease and usefulness, which is an important concept that makes up TAM [15,26]. In other words, it is evident that when the use of laptop computers or tablet PCs is perceived to be easy, it is perceived that the information provision and effectiveness factors are also useful.

Lastly, in terms of the relationship of PEOU and PU, for laptop computers, PEOU (convenient) and PU (effective) factors had a significant impact on intention to use, and in the case of tablet PCs, only PU (both informative and effective) factors had a significant impact on intention to use. For laptop computers, intention to use was higher when it was perceived that it was convenient and effective, while for tablet PCs, intention to use was higher when information provision and effectiveness were higher. These results are consistent with the findings of Alkhateeb [3] who reported that PU and PEOU affected the intention to adopt e-detailing for medical doctors.

Though interest in e-detailing is increasing and spreading among pharmaceutical companies, there have been few studies from the perspective of MRs who actually use e-detailing; thus, the results of this study can offer insights to support e-detailing services of MRs in pharmaceutical company. However, because the introduction of e-detailing is still in its infancy among pharmaceutical companies in Korea, the scope of research is limited to laptop computers and tablet PCs; therefore, the representativeness of samples is also limited. If e-detailing becomes more common in the pharmaceutical industry, the academic and empirical value of this study will rise; this research can be expanded to take into consideration virtual mobile detail models and devices under the cloud environment for e-detailing tools.

Conflict of Interest

No potential conflict of interest relevant to this article was reported.

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 https://doi.org/10.4258/hir.2016.22.4.342