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# COMMUNICATION-DRIVEN USEFULNESS HYPOTHESIS FOR ONLINE HEALTHCARE APPLICATIONS

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## **Abstract**

*Healthcare insurance is a complex financial product with many variables involved. What drives perceived ease of use (PEOU) and perceived usefulness (PU) of healthcare insurance applications (HIAs), be they websites and mobile apps? We propose a communication-driven usefulness hypothesis, which posits three aspects of communication with healthcare insurer providers determining PEOU and PU. Those aspects are: information quality (IQ), interaction ease, and provider competence. The results from 333 survey questionnaires from current healthcare insurance customers support our hypothesis. Thus, future studies should examine further the driving factors of PEOU and PU of the apps involving complex products and services besides healthcare insurance.*

**Keywords:** Healthcare Insurance Applications (HIAs), Perceived Ease of Use (PEOU), Perceived Usefulness (PU), Communication-Driven Usefulness Hypothesis

## **1.0 Introduction**

Access to healthcare insurance information is critical for the welfare of both health and financial needs. Fortunately, about three-quarters of Americans now own a smartphone, and 88% of them access to the internet in 2017 according to Pew Research (Smith, 2017). A 2017 survey shows that 64% of patients use mobile devices including mobile application (apps) to manage their health (McCarthy, 2017). Therefore, our focus should be directed not so much as to whether health insurance customers could access insurance information online but as to how insurance providers improve the ease and usefulness of their online apps and websites.

The technology acceptance model (TAM) has been widely used to explain how users accept new technologies and applications (Davis, 1989; Venkatesh, Morris, Davis, & Davis, 2003). In it, perceived ease of use (PEOU) and perceived usefulness (PU) are two key variables that directly impact the attitudes towards usage and the intentions to use them. PEOU is defined as “the degree to which a person believes that using a particular system would be free of effort” whereas PU is “the degree to which a person believes that using a particular system would enhance his or her job performance” (Davis, 1989). Mortenson and Vidgen (2016) identified 3,386 studies using TAM. However, there are a few understudied aspects. Most TAM studies do not focus on health

insurance apps and websites. More importantly, PEOU and PU are treated as independent variables (IVs) in many cases.

In today's environment, many consumers do regularly use websites and mobile applications to obtain healthcare insurance information. However, healthcare insurance service is not a simple form of service delivery. Healthcare insurance involves complex sets of rules, regulations, contracts, and medical circumstances. Thus, what improves PEOU and PU is more pressing and important than what increases use intention of websites and mobile applications. In this study, we focused on factors impacting PEOU and PU of healthcare insurance apps (HIAs) including websites. Our communication-driven usefulness hypothesis for HIAs posits (1) PEOU is driven by information quality and communication complexity, and (2) PU is, in turn, determined by PEOU and customer service competence of insurance provider.

## **2.0 Background and Hypotheses**

A TAM literature review between 1986 and 2013 by Marangunić and Granić (2015) notes a number of factors that possibly influence PEOU and PU including: system characteristics, user training, user participation design, the nature of the implementation process, personality traits, demographic characteristics, computer self-efficacy, technology anxiety, and prior usage and experience. In the design and development phase, consumer healthcare apps should certainly follow the guidelines well-known in the human-computer interaction community; that is, providers develop right “use cases” and identify relevant functional and content and features (Schnall et al., 2016).

Once HIAs are developed and released, however, what drives PEOU is primarily the quality of information (IQ). The Information Systems (IS) Success Model (DeLone & McLean, 1992; DeLone & McLean, 2003) posits that three key drivers of IS success are IQ, system quality, and service quality. Health insurance is a complex financial product that requires consumers to manage intricate tradeoffs over a range of variables (Nadash & Day, 2014). Consumers often grapple with “complex contracts and hard-to-decipher benefits designs” (Kingsdale, 2014). That is, such factors as IQ, interaction ease with the insurance provider, and provider competence likely play critical roles for HIAs, if we treat the quality of HIAs as a constant. This is the basis for our communication-driven usefulness hypothesis for HIAs.

For instance, the positive impact of IQ on PEOU is found for using online retailing websites (Ahn, Ryu, & Han, 2007), where consumers search and compare multiple purchase options. IQ also influence PEOU of community municipal portals that facilitate the delivery of information, services, and resources (Detlor, Hupfer, Ruhi, & Zhao, 2013). Finally, Kuo and Lee (2009) report that IQ significantly impact PEOU in the context of knowledge management systems (KMS), where complexity of task knowledge may often be involved. Thus, we hypothesize:

*H1: The higher the IQ, the higher the PEOU.*

In using HIAs, consumers navigate, search and comprehend their healthcare coverage and expenses for each medical situation. They engage often in multiple iterations of communication and interaction with the provider through HIAs to resolve any issues beyond information

obtainable from HIAs. For instance, providers often “do not completely reimburse the expenses despite their contractual obligations” (Khademolqorani & Hamadani, 2015). On one hand, such difficulty is comparable to obfuscation where consumers experience cognitive limitations due to the interaction complexity associated with price structure and presented information during their search efforts (Choi, Kwon, & Shin, 2017). Obfuscation could be eased by superior HIA designs. On the other hand, the difficulty is also rooted in the underlying communication protocols between consumers and providers. Thus, we posit:

*H2: The greater the interaction ease, the higher the PEOU.*

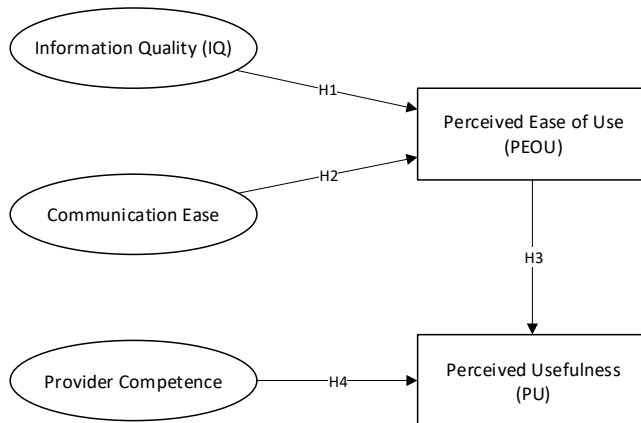
A literature review (Legris, Ingham, & Collette, 2003) find 21 studies supporting the relation between PEOU and PU whereas only 5 do not see a significant relation between them. Thus, we propose:

*H3: The higher PEOU, the higher the PU.*

Service provider competency significantly relates to positive and negative sentiments towards service encounters (Price, Arnould, & Deibler, 1995). We postulate provider competence leads higher PU, which in turn increases positive sentiment. This is consistent with the findings of a study (Featherman, Miyazaki, & Spratt, 2010) that reports a significant positive influence of e-service provider trust worthiness and expertise over PU.

*H4: The higher the provider competence, the higher the PU.*

Our research model is shown in Figure 1.



**Figure 1. Research model**

### 3.0 Method

This empirical study analyzed data collected from Amazon Mechanical Turk<sup>1</sup> using an online survey in 2017. Partial least squares (PLS) modeling was used to analyze the data and to identify

<sup>1</sup> <https://www.mturk.com/mturk/welcome>

factors that lead to dependent variables, PEOU and PU, among consumers of health insurance companies. The survey also consisted of latent independent variables that included information quality, complexity, and provider competence. Each item was measured on a five-point Likert scale anchored by 1 = strongly disagree and 5 = strongly agree (Table 1).

Variable	Construct	Reference
Perceived ease of use	I find that my insurance company's technology is easy to use. I find that my insurance company's technology is easy to learn. Interacting with my insurance company's technology does not require a lot of mental effort.	Davis (1989)
Perceived usefulness	I find that my insurance company's technology is useful. Using my insurance company's technology increases my productivity. Using my insurance company's technology is convenient. Using my insurance company's technology saves me time.	Davis (1989)
Information Quality	Generally, I can find the information that I want from my health insurance company. My health insurance company provides relevant information. My health insurance company provides accurate information. My health insurance company provides timely information. My health insurance company provides up-to-date information.	DeLone and McLean (2003)
Interaction ease	My health insurance company is easy to work with. Dealing with my health insurance company is hassle free. It is simple to work with my insurance company. Interactions with my health insurance company are not complex.	Parasuraman, Zeithaml, and Malhotra (2005)
Provider Competence	The employees at my health insurance company have the required knowledge to solve problems. The employees at my health insurance company are highly skilled at their jobs. The employees at my health insurance company carry out their tasks competently. I believe the insurance company employees have the ability to answer all questions accurately. The behavior of employees at my health insurance company instills confidence in customers.	Dagger, Sweeney, and Johnson (2007)

**Table 1. Construct of variables**

Survey respondents were offered \$1.25 to complete the survey. Responses were screened for completion, duplicates, and location. Only responses submitted from the United States were included in the study. Five hundred twenty-two responses were collected. Duplicates, unfinished surveys and broker responses were omitted. Further, 104 did not use health insurance company technology. Therefore, a net of 333 respondents were included in the study.

## 4.0 Results

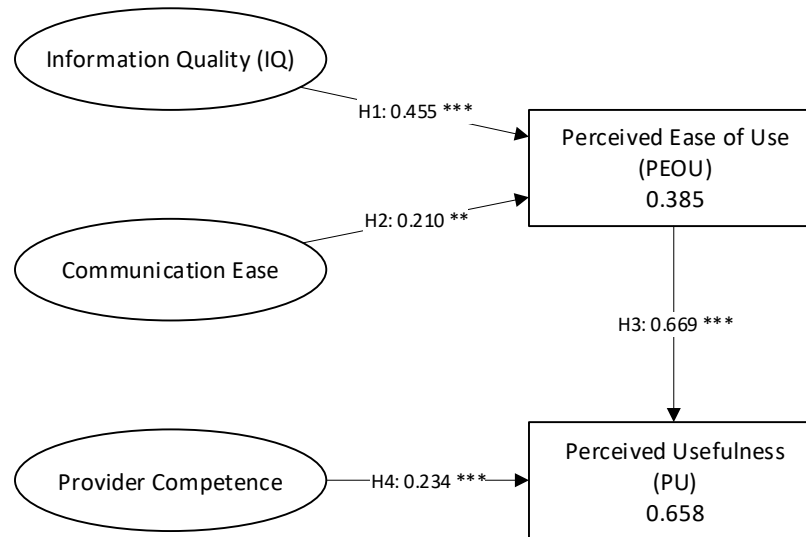
SmartPLS 3 (Ringle, Wende, & Becker, 2015) was used to test our model. Loadings for the variables are all significant ( $p < 0.001$ ). Table 1 shows that all constructs' Cronbach's alpha

values exceed 0.7 and have a high reliability (Petter, Straub, & Rai, 2007). In addition, we conducted convergent and discriminant validity tests based on the average variance extracted (AVE) value for each construct reported (Yoo & Alavi, 2001). Table 2 shows that the square root of these AVEs on the diagonal are larger than the correlations with other constructs. This test result indicates that all questions used to measure constructs in the model have high discriminant and convergent validities.

	Cronbach's $\alpha$	Composite Reliability	Competence	Complexity	IQ	PEOU	PU
Competence	0.960	0.969	0.928				
Complexity	0.948	0.963	0.823	0.931			
IQ	0.936	0.951	0.725	0.703	0.892		
PEOU	0.916	0.947	0.499	0.530	0.602	0.925	
PU	0.903	0.932	0.567	0.579	0.600	0.786	0.881

**Table 2. Variable reliability and correlations**

The PLS model (Figure 2) confirms the basic dynamics for PEOU and PU as our four hypotheses postulate. Concerning the two factors for PEOU, H1 (IQ impact) and H2 (interaction ease) are supported with  $\beta = 0.455$  ( $p = 0.000$ ) and  $\beta = 0.210$  ( $p = 0.001$ ), respectively. As predicted, PEOU strongly influence PU ( $\beta = 0.669$ ,  $p = 0.000$ ). This confirms H3. Finally, provider competence significantly impacts PU ( $\beta = 0.234$ ,  $p = 0.000$ ), affirming H4.



\*\* :  $p < 0.05$       \*\*\* :  $p < 0.001$

**Figure 2. PLS results**

## 5.0 Implications and Conclusion

This study focused on the understudied aspect of TAM and health insurance apps and websites by focusing on factors impacting PEOU and PU involving complex products and services. Health insurance providers should focus on (a) improvement of insurance information quality, and (b) increase interaction

ease with their customers, in order to increase PEOU of their online tools. In turn, improved PEOU increase customers' perceived usefulness of those tools while further improving customer service competence. In a bigger picture, the results are consistent with what the IS Success Model (DeLone & McLean, 1992; DeLone & McLean, 2003) posits. That is, the success of HIAs starts with information quality and service quality, provided the design quality of HIAs is adequate.

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