Understanding the Adoption of Voice Activated Personal Assistants

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ABSTRACT
This study aims to investigate the factors that affect the usage of voice-activated personal assistants (VAPA) which are mobile device applications such as Siri, Google Now, S Voice, Cortana, Alexa, etc. A theoretical framework is proposed based on the relative technology acceptance model constructs in the light of literature. Data are collected from a total of 183 people with a survey questionnaire. Structural equation modelling (SEM) was applied as the major statistical technique for data analysis. The proposed model has the potential to help technology companies to understand some of the factors influencing user’ behaviors and attitudes toward VAPA and improve the technology quality. There are few researches about voice-activated technology adoption in the literature and this is first paper that proposes a research model for acceptance of VAPA.

KEYWORDS
Intelligent Personal Assistants, Structural Equation Modeling, Technology Acceptance Model, Voice-Activated Personal Assistants

INTRODUCTION
Human-computer interaction (no matter size and shape of the computer) changes the development of computer history (Huang, 2015). He stated that three main input devices are the keyboard, the mouse and lastly finger which is used for touch screen of smartphone, tablet, etc. Now voice/speech also can be used as input mechanism for technology products and it can be defined as one of the more natural, convenient way of information communication. A large part of the communication in human daily life is occurring through speech. It is faster than other input types like full-word input, single keypresses, and mouse clicks; and user productivity can be increased since it provides an additional response channel (Martin, 1989).

There is a huge growth in the area of conversational interaction technologies. A growing number of people now communicate with their mobile devices via intelligent voice assistants like Siri (Apple), S Voice (Samsung), Cortana (Windows), Google Now (Google) and Echo (Amazon). They ask them to send e-mail and text messages, set an alarm, open an application, search for directions, or find information on the Web by using speech recognition technology (Sarma & Sarma, 2014). There are various terms which are used for this technology: “Intelligent Virtual Assistant”, “Mobile Virtual Assistant”, “Virtual Personal Assistant”, “Intelligent Software Assistant”, “Voice-Activated Personal Assistant”(VAPA) and “Voice-Activated Digital Assistant” (Riccardi, 2014). On the other hand, speech and voice can be used interchangeably.

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This study aims to investigate the acceptance of VAPAs and the factors that affect the acceptance of VAPAs. In part two, literature is reviewed. Theoretical model and hypotheses are given in part three. Data, sample, and measures are explained in part four. Data analysis results are given and discussed in part five. Finally, conclusion and limitations of the study are stated in part six.

LITERATURE REVIEW

With the technology advances, machines are able to speak, hear, and “understand” via a speech interface (Furman et al., 1999). The five broad technology areas of the field of speech processing for man-machine communication are given by Drygajlo (2003): speech recognition, speech synthesis, spoken dialogue, speaker recognition, and speech compression.

In last years, various applications based on voice recognition and voice-enabled user-interfaces that will provide a natural interaction are integrated in mobile devices. They are preferred in the following cases: users with various disabilities, users who are in an eyes-busy, hands-busy situation, users who don’t have access to a keyboard and/or a monitor and user who are not aware of computer skills (Nielsen, 2003).

Voice-activated intelligent assistants, such as Siri, Google Now, S Voice, Cortana and Alexa are prevalent on mobile devices. In 2011, Apple’s Siri started the trend providing a voice-enabled user-interface which users could get answers to a variety of questions, find information, or perform tasks. Awareness was created about that smartphones could speak (Riccardi, 2014). Then, Google’s Voice Search, Samsung’s S Voice, Microsoft’s Cortana and Amazon’s Alexa followed this development. Such tools are very important in terms of saving time and improving the effectiveness of search (Bengtson, 2014). According to Riccardi (2014), all of them have the ability to interpret Natural Language with spoken interaction and providing responses. They can perform many actions: sending e-mail and text messages, opening an application, making calls, setting alarm, find information on the Web, etc. Some of them (Google Now and Cortana) can make proactive recommendations such as predicting and alerting the user about weather, meetings, traffic, airlines information (Riccardi, 2014).

In literature, there are some studies which introduce these VAPAs (Canbek & Mutlu, 2016; Brunsell & Horejsi, 2013) or on their uses and purposes (Rodger & George, 2013; Sadun & Sande, 2014; Lovato & Piper, 2015). Some of them specialized on the VAPA usage for people with disabilities (Tsui et al., 2013; Ashok et al., 2014). In addition, there are some studies which developed VAPA (Celikkaya & Eryiğit, 2014) while others studied on improvement of current applications (Venkateshan et al., 2013). Current applications were analyzed or evaluated by Jiang et al. (2015) and Guy (2016). Moreover, Dale (2015) studied on the limitation of VAPAs while Cohen et al. (2016) studied on future of VAPAs. Privacy issues about VAPAs are also handled in literature (Diao et al., 2014; Easwara Moorthy & Vu, 2015). On the other hand, some researches took the user’s opinion into consideration in order to evaluate interaction quality of VAPAs (Jeong & Shin, 2015; Saad et al., 2016) and user satisfaction with VAPAs (Kiseleva, 2016).

There are few researches about the issue acceptance of VAPAs. Google’s mobile voice study looks at voice search habits among 1400 American smartphone users across different age ranges (PR-Newswire, 2014). Their results show that the majority of U.S. teens and adults (about 55%) use hands-free search every day, and 76% of all Americans think voice search is great for multitasking. Voice search was found as cool by two-thirds (64%) and 58% say they feel tech savvy. 89% of teens and 85% of adults agree that voice search will be “very common” in the future. Another study examined how the perceived acceptability of using the VAPA in smartphones influences its reported use (Moorthy & Vu, 2014). According to results, participants are using the VAPA in a private location, such as their home and they are hesitant about using it to input private or personally identifying information. There is not any study about the factors influencing the usage of VAPA although it is important to understand these factors for many technology companies.
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