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A Review of Factors Influencing Customer Acceptance of Internet of Things Services

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ABSTRACT

Current studies in the field of Internet of Things (IoT) focus on the technical aspects such as programing, hardware, and software. However, studies from the behavioral aspects of the IoT are still in their infancy. In this article, the authors review and analyze theories and models from the literature and subsequently identify factors that influence customers' acceptance and use of the IoT services. Theories such as technology acceptance model (TAM) and unified theory of acceptance and use of technology (UTAUT) as well as number of existing models have investigated the IoT or similar technologies. Using these models and technologies, this article presents the development of a generic model which can be utilized in different domains and regions to study customer acceptance of the IoT services.

KEYWORDS

IT Services, Technology Acceptance Model (TAM), Technology Adoption, User Satisfaction

INTRODUCTION

The Internet of Things (IoT) is a new paradigm shift that has been mentioned for the first time by Ashton in 1999 (Gao & Bai, 2014). It is defined as a connection of devices using sensors and actuators to collect information about objects and control of these objects (McKinsey, 2014). The IoT promises to increase the efficiency of services by increasing users' control of devices in the home, workplace, and cities. However, users are still hesitant to use and implement this technology due to concern over the security and the privacy of their information when they use the technology (Greenough, 2015).

The new technology is a result of the advancement in telecommunication that includes the expansion of broadband, new IP protocol version, and the integration of nanotechnology into countless electronic devices ranging from mobile phones to vehicles, among others. The IoT is driven by the idea of integrating electronic devices into a network and simultaneously allowing the integration between devices and users (Gómez et al., 2013). Recently, the IoT has grown in size and quantity due to the increase awareness of benefits that can be gained from using the technology. Users, business organizations and even governments are increasingly implementing the technology by connecting their devices to the internet (Business Insider, 2014).

The IoT encompasses three levels that include the hardware in the first level followed by the infrastructure in the second level and applications and services in the last level (Gu & Liu, 2013; Gómez et al., 2013). It consists of a group of webs constituted by sensors and appliances that are able

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to conduct structured communication between devices from a remote database (Selby, 2012). The development of IoT is essential to provide the connection to the network represented by the Internet and the physical world. In addition, users must differentiate between the IoT and the internet of media or the internet of services because the IoT is capable of interfacing and controlling the devices. In other words, the IoT technology is able to give users the ability to manage, control, and monitor electrical devices that are set at their homes and in their workplaces. This includes the control of a security system, lighting system, or heating system. It can be done using a smartphone or computers from anywhere at any time (Gubbi et al., 2013).

Previous studies have focused on the technical issues of using IoT such as architectural elements (Gubbi et al., 2013), attribute-based signature (Su et al., 2014), and wireless sensor network (Turkanović et al., 2014). However, these studies paid less attention to users, the ones who use the IoT, and their perception about the technology. In addition, it is found from the literature that Technology Acceptance Model (TAM) are used to assess users' perception about the adoption (Gao & Bai, 2014). Nevertheless, the Unified Theory of Acceptance and Use of Technology (UTAUT) is proven to be more powerful and able to explain the variation in the acceptance of technology better than TAM and any other theoretical model (Alharbi, 2014; Chang et al. 2015; Mathur & Dhulla, 2014).

LITERATURE REVIEW

The IoT Technology

The IoT is a technology that is described as a machine-to-machine communication using the Internet (Uckelmann et al., 2011). Many areas have utilized the benefits of using the IoT, which includes business applications of supply chain management, the planning and design of urban places, the management of educational institutions such as a library, and efficient transportation, among others (Ding, 2013). Higher efficiencies can be gained from using the technology by many industries, but the benefits that consumers obtain from the technology is even more substantial (Uckelmann et al., 2011). An example of a benefit for customers is the use of smart fridges that autonomously monitor the consumption of food and beverages and re-order more foods (Sundmaeker et al., 2010). From this perspective, the IoT technology could bring many benefits and could affect the daily life of consumers' behavior on many aspects (Li and Wang, 2013).

Previous studies focused more on the technical aspects of the adoption and implementation of the IoT technology (Shang et al., 2012). An example of a technical aspect includes the security and privacy issues rather than the behavioral or attitudinal aspects, in which the focus is on the challenges of privacy and security posed by the IoT (Medaglia & Serbanati, 2010). Uckelmann et al. (2011) systematically explained the IoT architecture, while Guinard et al. (2011) discussed the best practices to use IoT based on the web technology such as JavaScript. Guinard et al. (2011) also discussed and suggested prototypes based on the web principles that bring together environmental sensor nodes, system to monitor energy as well as the RFID-tagged to the web.

Previous studies have also focused more on the organizational usages of the IoT or the industrial usages of the IoT from organizational rather than individuals' perspectives (Schlick et al., 2013). Studies that focused on the acceptance of the IoT by individuals are limited (Li & Wang, 2013). In addition, many factors that have played important role in the acceptance of a new technology are not included in the IoT previous studies. This includes the characteristic of the technology (e.g. ease of use, benefits, and cost) or the social impacts of the technology such as the effect of others on individual to use the technology, and the characteristic of individual users such as their IT knowledge. Therefore, there is a gap related to the acceptance of customers of IoT services. Consequently, the study aims to identify the factors that affect the acceptance of the IoT and subsequently develops a generic model of consumers' acceptance of the IoT technology.