

# EFFECTIVENESS OF INTERNET OF THINGS IN PRIVATE SECTORS: A PROPOSED FRAMEWORK

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## Abstract

The aim of this paper is to study the effectiveness of Internet of Things among staff in private sector. This paper proposes Internet of Things will be more effective if consumers are aware and understand the knowledge and concept that comes along with Internet of Things so that they could realize its consequences in implementing and using it. This paper also addresses the challenge that they must face in implementing and using Internet of Things such as the security of the data. The usage of Internet of Things also highlighted.

**Keywords:** Internet of Things (IoT), IoT Awareness, IoT Usage, IoT Challenge, Devices, Industry, Communication

## 1. Introduction

The Internet of Things is a modern communication model that visualize today's world, it is where the objects of everyday life will be prepared with microcontrollers or transceivers for digital interaction, and suitable set of rules that will make them able to communicate with users and the consumers, at the same time becoming an essential part of the Internet (Nadzri et al., 2017). The Internet of Things explosion is already around us, in the form of wearable computers, smart health trackers, connected smoke detectors and light bulbs, and essentially any other Internet-connected device that isn't a mobile phone, tablet, or traditional computer according to Khoueiry & Soleymani (2016), machine-to-device (M2D) communication, is a key that allow technology for the Internet of things, allows networked devices to change records amongst themselves with minor or no human involvement. The Internet of Things that was first introduced by Ashton will comprise billions of machine-type communication (MTC) devices with low or no mobility that try to operate a small amount of data in form of data bursts between themselves to the central stations. Nowadays, people are increasingly become fascinated with the concept that comes with this field of study, but the problem is they seem to be lack of the information about it. This is due to the complexities to understand it itself. Chen et al. (2014) proposed that by having technology of Internet of Things, it is parallel to the goal of intelligent by detecting, monitoring, and managing things. It is an addition and development of Internet-based network, which expands the communication from person and person to person and devices or devices and devices. In the Internet of Things paradigm, variety of objects nearby us will be linked into networks in one form or another. This diversity of appliances based on the using of RF identification (RFID) and sensor technology. This research are mainly focusing on the awareness and understanding of Internet of Things among staff in private sector. Much of the current development in Internet of Things has focused on industrial opportunities. However, Internet of Things for media consumers can open up new, intimate entertainment experiences. Consumers already have access to personal devices that can synchronization with their daily

lives. For example, some smart phone applications automatically lock doors, arm the alarm and done tasks that users would have to manually perform on devices that don't "know" them.

In this paper, several issues are discussed regarding on the challenge users have to face in implementing Internet of Things. Based on our observation from the research articles, there is some limitations may occur when using the Internet of Things towards private sector workers. For instance, Ngu et al. (2016) stated that there has been an increase in number of internet protocol and middleware that limit the development of Internet of Things. While Fernandez, P. (2015) proposed that the major issue of Internet of Things application is not technological but it is somewhat cultural. User always have to keep themselves updated with current technology in order to keeping pace with the technology. Meanwhile, Hossein Motlagh, Taleb & Arouk (2016) pointed out that there is also issue arise relating to authentication, security as well as trust for public acceptance on Internet of things services.

The purpose of this paper is to study the effectiveness of Internet of Things among staff in private sector. In order to achieve this aim, this paper prose a research framework to evaluate the effectiveness of Internet of Things. The remainder of this paper is organized as follows. Section 2 is literature review. Proposed framework is in Section 3. Final section contains some concluding remarks.

## 2. Literature Review

In the current world, technology is quickly changing the way we interact with the world around us (Nadzri et al., 2015). Companies are developing products for the consumer market that would have been unimaginable a decade ago in many field of business, manufacturing, health, education and many more. As there is advancement in technology and better standardization of communication protocols of Internet of Things, it is now possible for us to collect data spontaneously more or less anywhere and anytime. Chen et al. (2014) stated that, the concepts of Internet of Things can be explained as a technology and economic wave in the global information industry after the Internet. The Internet of Things is an intellectual new networking method which connects all things to the Internet for the intention of exchanging information and communicating through the information sensing devices in with approved list of protocols.

Nolin & Olson (2016) stated that when having the Internet of Things, human and devices will be connecting anywhere and at any time in the existed of this many services technology by the Internet of Things. According to Darshan & Anandakumar (2015) the Internet of Things contains variety of services technology including health care. Other than that, Hossein Motlagh, Taleb & Arouk (2016) described the usage of the Internet of Things is become near to the future. They also proposed using Internet of things devices will give a lot of benefits. For example, the usage of Internet of Things in terms of drones will further be used to protect the citizen and to help in disaster aid operations in order to help the citizen, business and government services. Tadejko (2015) stated that while user of Internet of Things realizes its benefit they also need to be aware of the privacy and security concerns of Internet of Things. The areas of security and privacy are emphasized by Hossein Motlagh, Taleb & Arouk (2016). They anticipated that it is the most critical issues in Internet of Things because of its danger if such technologies are utilize for a bad intentions. Hence, as a user we must be aware of its downside that could cause harm to us virtually. Similarly, Stankovic (2014) highlighted on of how security attack has become a problem to devices with minimal capacity, sensors, object, the nature of the system which is open and the fact that devices that available nowadays can communicate wirelessly. Parallel to the problem in Internet of Things, there are still major challenges of Internet of Things. Chiang & Zhang (2016) proposed that there are ranges of new

challenges in the development of Internet of Things. This was supported by Aijaz & Aghvami (2015). They suggested the technical challenges with the increasing number of machine to machines connections. Raikar, Desai & Naragund (2016) stated the need for educating the current generation engineers to acquire the knowledge of Internet of Things. They suggested that educating individuals about internet of things has been quite a challenge because we do not know what content should be presented and introduced to them as well as what level of awareness and understanding of this field to them. Da. He & Li (2014) proposed the need to have sufficient understanding to the industrial characteristics and requirement on the aspect such as risk of privacy and security as well as the cost before deploying Internet of Things in industries before it is widely accepted.

### 2.1 Analysis of Review

This critical analysis include three sections which divide as the research objective, the methodology used and the future research recommendation collected by several studies. Kamilaris & Pitsillides (2016) already deal with the rising connection of mobile computing and the Internet of Things in their paper. Yu et al. (2009) had done a research that purposely to investigate the interconnection between the interactivity with the Internet of Things in the concept of business area. In further explanations, Da Xu et al. (2014) also had review several updated research relating to Internet of Things. Based on articles that we had review, we can see that Gao & Bai (2014) in their paper using the methodology in the concept of data collection. This research purposely to analysis the variables of the factors that shows on the users' acceptance in Internet of Things. The methodology is different with Yu et al. (2009). They took a decision to use the method of collecting data in their research by using an online survey. Chiang & Zhang (2016) however chose to create an interview sessions towards their sample that is their own social group that is range from the industrial sector as well as the academic partner..

Table 1. Research Trend in Internet of Things.

Year	Research Trend	Area of Interest
2009	The advantages in usage of Internet of Things.	Entrepreneurship and Business area
2009	Investigation on the interconnection between the interactivity with the Internet of Things.	Entrepreneurship and Business area
2014	The recommendation of using the Internet of Things	Education
2014	Advantages of Internet of Things and the user acceptance in Internet of Things	General Consumer
2014	The application of Internet of Things in industries and the key in enable Internet of Things	General Industries
2016	The issue, key challenges and the requirements of Internet of Things	Unmanned Aerial Vehicle (UAV)
2016	The understanding in current research	Information Technology

	and the issue of Internet of Things with the middleware system.	
2016	The rising connection of mobile computing and the Internet of Things	Health, Agriculture, Gaming, Transportation or in Sport area.
2016	The nature of interaction in Internet of Things	Mobile Phone Computing

Table 2. Research design in Internet of Things.

Research Design	Methodology	Participants
Quantitative	Data collection by survey	The company, research institutes, universities, school and even internet café in their country which is China.
Quantitative	Online survey	The graduate and undergraduate students of the business studies
Qualitative	Interview sessions	Social group that is range from the industrial sector as well as the academic partner
Qualitative	Data collection using the remote location	Technology
Mix method (Quantitative and Qualitative)	Experimental workshop And online survey	Undergraduate student

This research had concluded the changes and challenges in Internet of Things relating to the network context. Different methodology created different finding. We believes that either by using the qualitative way or the quantitative ways have their own specialty on the accuracy to the finding of the studies. Other than that, we also come out with several future research recommendations from different article in this literature review. Gao & Bai (2014) encouraged that future study can use qualitative research methodology as their method to complete the research. This encouragement aim to create more enhances understanding for the users in the Internet of Things perspectives. However, to create a more secure and safe in implementing Internet of Things, Alsaadi & Tubaishat (2015) suggested to future research explore more on how to identify the challenge. This is supported by Li, Tryfonas & Li (2016) who said that protection strategies for Internet of Things should be highlighted and designed. This can be managing by reviewing the security, utility and the privacy in each element of Internet of Things. Stankovic (2014) however hopes that collaboration with the communities with the researchers should be increase in future research to explain the countless problems in Internet of Things

### 3. Proposed Framework

Figure 1 is a proposed theoretical research framework that will be used to guide this research. Based on the previous study, the proposed theoretical framework illustrates a dependent variable (effectiveness of Internet of Things); and three independent variables (awareness of Internet of Things; the usage of Internet of Things; and the challenge In Internet

of Things). The framework will be used to answer our main research questions which is how does acknowledging the level of awareness, usage and challenge of Internet of Things will make Internet of things more effective? The first variable is the awareness of Internet of Things. It has been crucial to be aware of Internet of Things among us. Living in the world with emerging technology it is vital for a consumer to be aware and understand the knowledge and concept that comes along with Internet of Things, its importance and how Internet of Things has contributed to a lot to many industries in public as well as private sector. The second variable is the usage of Internet of Things. The Internet of Things is used in many fields. Hence, it is essential to know where is such technology is applied according to guidelines or protocols. When such things are known, user can effectively utilize and realize its potential in many fields and sectors. The third variable is the challenge in internet of Things. In order to use Internet of Things applications successfully, a user must know how to identify its challenges and find solutions to those problems that occur consequently it will gain its acceptance in its implementations.

This research will give further explanation in issue and challenge relating to Internet of Things. Other than that, throughout this study, we hope that we can know and list out the common usage of Internet of Things among the workers in private sectors. We choose this population because there are plenty of research towards public sectors but limited research in private sectors. We also want to gain a better understanding relating to this topic by conducting this research. Furthermore, we hope that by conducting this study, we can gain a better understanding towards our research topic and it give advantages to us where at the same time our aim towards this research will meeting our goals. We also hope that this research can be complete well with full collaboration from relating participants. Last but not least, we expect this research progress will run smoothly without any major conflicts.

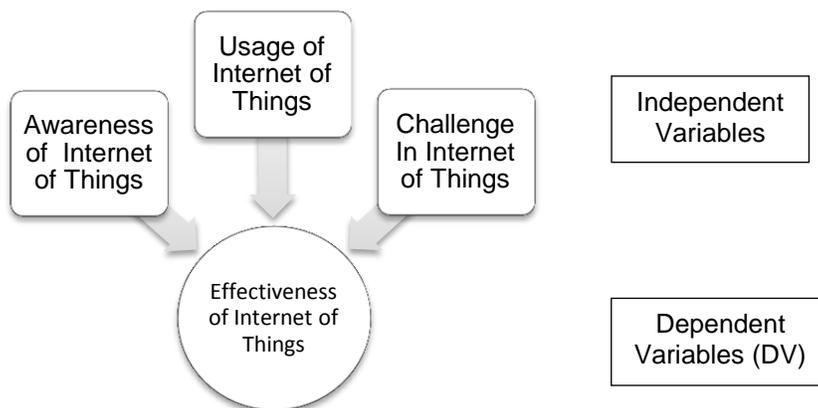


Figure 1. Research Framework.

#### 4. Conclusion

We have found several ideas and view point relating to the Internet of Things. We can see that this technology is rising up and become a crucial part in human's routine life. The technology is everywhere without we realize in the first place. The benefit that we can extract is that we need to fully utilize this technology in our life in order to take advantages in this real life. This is including all the facilities at home, the new way to deliver information, new way to gather the information or data in education or workplace, to the business concept in terms of Internet of Things. We believe that this technology will create more opportunities in the future.

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