

Leibniz Universität Hannover
Wirtschaftswissenschaftliche Fakultät
Institut für Wirtschaftsinformatik
Prof. Dr. Michael H. Breitner

Consumer Perception of Internet-of-Things Applications and Location Based Services

Bachelorarbeit

zur Erlangung des akademischen Grades „Bachelor of Science (B. Sc.)“ im
Studiengang Wirtschaftswissenschaft der Wirtschaftswissenschaftlichen
Fakultät der Leibniz Universität Hannover

vorgelegt von

Name: Gildehaus

████████████████████

Vorname: Lars

██████████

Prüfer: Prof. Dr. Michael H. Breitner

Hannover, den 09.02.2018

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1 Introduction

The technological environment is continuously shifting towards wireless technologies and embedded wireless devices (Scannell 2003). A very prominent topic in digital transformation is the Internet of Things (IoT), also called the Internet of Everything or Industrial Internet. Due to technological, societal and competitive pressure, companies are increasingly pressurized to innovate and transform themselves and their product portfolio (Lee, Lee 2015). While the hype around IoT is especially apparent in areas such as smart homes (e. g. Google Home, Amazon Alexa), wearables (e. g. Apple Watch) and connected cars, this paper concentrates on smart retail. While the research around smart retail is still in its infancy, the sub-disciplines proximity-based advertising and services already find practical implication in businesses and public spaces (Lueth 2015). This signals the need for research.

A promising approach for proximity-based services and marketing are Bluetooth beacons. They are low-powered radio transmitters that send signals to smartphones and other receptive devices once they enter the beacon's signal range. Applied in stores, this enables companies to precisely target local customers through their smartphone (Martin 2014). However, to be targeted, the customers have to install specific mobile applications beforehand. There are many different locations such as retail stores, airports or museums where beacons could be applied commercially (Kopfstein 2016). Concerning their popularity, beacons are seeing vast development across industries. Since its release by Apple in 2013, proximately six to seven million beacons were deployed by 2016 with forecasts predicting up to 500 million beacons until 2020 (Slette 2016) across industries (Macy's, Citibank, among others) (Chamberlain 2016a). However, the successful adoption by consumers of Bluetooth beacons depends on the massive adoption of Bluetooth itself. Recent developments in the consumer technology industry seem to support the trend of a Bluetooth enabled environment: An example for this is the removal of the headphone jack on smartphones in support of wireless devices, with the most prominent example of the iPhone 7 in 2016 (Benner 2016). The impact can already be seen in Bluetooth headphone sales, as Bluetooth headphone sales already made up 17 percent of unit sales in the US as of 2016 (Scott 2016). This is also represented by current research, suggesting that around 40 to 50 percent of consumers in the U. S. in 2015 and 2016 enable Bluetooth across devices (Chamberlain 2016b; Slette 2016). These developments represent an opportunity for Beacons, since more and more Bluetooth enabled devices are used in everyday life and signalizes the practical relevance for closer examination. However, looking at recent publications, one can identify a lack of empirical research about Beacons.

The field of proximity-based Beacons has potential, but like with other IoT applications, it remains an area with uncertain benefits and high investments cost (Lee, Lee 2015). To reduce uncertainty, a careful assessment of the opportunities and risks is necessary. A key factor for businesses to develop and invest in IoT is the assessment of consumer perception. Thus, the intention of this paper is to assess the potential of proximity- and location-based services of Beacons. For this, the basis of this paper is the assessment of consumer perceptions based on the technology acceptance model by Davis. Thus, this paper addresses the following research questions:

How are Beacons and their respective services perceived by potential consumers?

Which factors drive consumers to use and adopt Beacons and their services?

Which factors hinder consumers to use and adopt Beacons and their services?

The structure of this paper is as follows: To give a theoretical understanding of the research topic, chapter two explains fundamental concepts relevant to the research topic. In chapter three, a theoretical framework to answer the research questions is developed. First, the technology acceptance model is presented, followed by a literature review that extends the research model and generates the hypotheses. Chapter four elaborates on the research design and the methodologies used to answer the research questions. Chapter five thoroughly describes the empirical results. In chapter six, the research results are discussed, followed by a conclusion and the limitations of this paper.

2 Theoretical Background

As a basis for the empirical part of this work, essential concepts and evaluation methods of IoT and Beacons are explained in this chapter.

2.1 Internet of Things Applications

The topic IoT has received special attention in the media, in research as well as in management. This trend is also reflected in the 2017's Gartner Hype Cycle of Emerging Technologies (see Figure 1) rating IoT platforms (such as Beacons) on the Peak of Inflated Expectations¹ (Panetta 2017).

¹ "Early publicity produces a number of success stories — often accompanied by scores of failures. Some companies take action; many do not" (Gartner).

7 Conclusion and Limitations

This paper analyzed consumer perception of IoT applications and LBS on the basis of beacons. The proposed research model based on the TAM was found to be reliable and valid. The analysis of the survey data by means of descriptive statistics found a relatively low interest in Beacons resulting in relatively weak statements. The structural path analysis through PLS found that PU and PEU are reliable constructs that can determine consumers' ATU. PE and PV were found to have a positive significant influence on PU. Consumers' wireless technology usage (WU) was also found to positively determine PEU. Lastly, ATU was found to significantly positively influence consumers' overall B and may be negatively influenced by consumers' PR. Based on these results, practical and theoretical implications for future research have been proposed.

However, the results are subject to a few limitations. First and foremost, while the sample size with 116 respondents is capable of producing significant results, the composition of the sample is relatively homogenous in terms of sociodemographic factors. Thus, the sample is not able to adequately represent large percentages of the overall population.

Another limitation is the theoretical examination and assessment of consumer perceptions. While this paper may address the attitude of consumers toward Beacons, it may not adequately represent their actual usage perception. This is because the research was not conducted in forms of a field study or a laboratory experiment, where first-hand experience could have been evaluated. Due to the novelty of the technology, previous experience with Beacons seems unlikely. However, this may also prove to be a strength for assessing overall market potential in terms of size of possible early adopters. Another limitation may be seen in the focus on the smart retail environment for Beacons. Beacons have a variety of possible usage scenarios and the results of this paper may not adequately represent consumer perception in those scenarios, indicating need for further research.