www.ees.uni.opole.pl
ISSN paper version 1642-2597
ISSN electronic version 2081-8319
Economic and Environmental Studies
Vol. 17, No. 2 (42/2017), 363-388, June 2017

The Adoption of The Internet of Things by Young Consumers – an Empirical Investigation

Radosław MĄCIK
Maria Curie-Sklodowska University in Lublin, Poland

Abstract: On the background of theoretical considerations and literature review, this article presents the results of the preliminary study of young consumers about their adoption of the Internet of Things (IoT) - treated as the emerging technology, creating a new quality of information technology usage, despite perceived costs and privacy concerns. The data for the analysis came from purpose sample of 223 young consumers from Eastern Poland via CAWI questionnaire. The primary goal of the research was to explore the adoption of IoT by young consumers in Poland regarding the level of adoption and factors explaining this phenomenon. The main analysis used univariate analysis of variance (UNIANOVA) and covariance-based structural equation modelling (CB-SEM). The current level of adoption of IoT by young consumers looks rather high (80% of respondents used at least one IoT-enabled device), although 78% of owners of IoT devices were not aware of Internet of Things concept. Study participants rather declared the usage of connected things recognised by connecting technology (Wi-Fi, Bluetooth), than the conscious usage of IoT. Among factors influencing IoT adoption the Performance expectancy and Habit constructs, as well as Personal innovativeness in the domain of information technology (PIIT), had an impact on Behavioural intention to use IoT. For some groups of devices, the gender impact was significant. Declared income, including lack of funds as the reason of not to use IoT, was not relevant as an explanatory variable.

Keywords: Internet of Things, IoT, consumers, information technology adoption, preliminary model

JEL codes: O33, D12

https://doi.org/10.25167/ees.2017.42.13

1. Introduction

The Internet of Things (IoT) is an emerging technology, and some of its applications grow in its popularity among consumers, despite perceived costs and privacy concerns.

Correspondence Address: Radosław Mącik, Chair of Marketing, Faculty of Economics, Maria Curie-Sklodowska University, 5 M. C. Sklodowska Square, 20-031 Lublin, Poland. Tel.: +48815375155 Fax: (none) E-mail: radoslaw.macik@umcs.pl.

The Internet of Things (in a simplified view) is an ecosystem where objects (things), equipped with sensors, communicate with each other and computers or mobile devices, often autonomously, without the need for user interaction, through a variety of networking solutions, especially wireless ones. This concept proposed in 1999 by Kevin Ashton (Ashton, 2009: 97–114) won considerable popularity in the last 2-3 years, mainly in engineering environments. Researchers interest in the Internet of Things viewed from the demand side in the consumer studies is still low.

The primary goal of this paper is to explore the adoption of IoT by young consumers in Poland regarding the level of adoption and factors explaining this phenomenon. To complete this goal, the questionnaire research was conducted via CAWI as data collection technique. Particularly IoT users and non-users knowledge, beliefs, and attitudes toward the technology and devices working in IoT networks are the author points of interest leading to two main research questions answered by presented research:

RQ1: What is a level of adoption of IoT by young consumers?

RQ2: What factors are influencing this adoption (positively and negatively)?

As research is exploratory in its design, there are no exact hypotheses tested, although there were attempts to explain the adoption of IoT by preliminary structural equation models as well as via UNIANOVA between-groups comparisons.

Researching consumers' attitudes toward IoT and usage of IoT is important because of possible the quality of life improvements regarding security, energy savings, and health monitoring. However, on the contrary, there are serious concerns about the privacy of users, including the use of sensitive data, and lack of human control over autonomous devices. There is no research of young consumers in Poland, significantly being the group readily adopting new wireless technologies from the one hand, and as a group with increasing incomes and activity on the labour market from the contrary.

Areas of application the IoT are variously classified. For this article purpose the division into four groups is used: wearable devices (e.g. smartwatches), smart consumer electronics (used individually e.g. printers, audio devices), smart home appliances (used on the household level e.g. washing machines), and intelligent building automation (e.g. monitoring, lighting control). Outside the focus remain cars connected to the internet, due to the different characteristics of their use, and smart cities applications, where the collective consumption of services and social aspects outweigh the individual needs and experiences.

2. Literature review

2.1. Internet of things - definitions and scope of implementation

In 1999 proposal the Internet of Things (IoT), is seen as a complex system in which objects (the material world), equipped with sensors, are collecting information from the environment, and communicate (exchange data) with computers via telecommunication networks, mainly the Internet (Ashton, 2009: 97). Practical implementations of this vision have spread in almost a decade later, in 2008-2009. The situation when the number of devices connected to the Internet exceeded the number of inhabitants of the world was considered the real birth of the Internet of Things (Evans, 2011: 2). Further development was made possible with the spread of automatic identification technology (RFiD), and most of all the wireless networks (Wi-Fi), the mobile broadband Internet access and the increasing saturation of mobile devices (mainly smartphones and tablets).

More formally the contemporary IERC (IoT European Research Cluster) definition states that IoT is "*A dynamic global network infrastructure with self-configuring capabilities based on standard and interoperable communication protocols where physical and virtual "things" have identities, physical attributes, and virtual personalities and use intelligent interfaces, and are seamlessly integrated into the information network.*" (Vermesan and Friess, 2015: 25).

In other words in IoT networks, any object or device (called a "thing" or "smart object") can automatically connect to the Internet, acting as a network node, and communicate with any other object (device) connected to it. In practice, this communication is sometimes limited, requiring the authorization of access and assigning specific permissions. So this is the departure from the traditional concept of the Internet, understood as a combination of servers, and data access terminals for end-users. Instead, dynamically configured networks consisting of "smart objects" that exchange data with each other only if necessary, or upon request, make interaction with human users (Ożadowicz, 2014: 88).

In effect, IoT is often also used as an umbrella term for a broad group of technologies, devices, and their today's or future applications, such as (Vermesan and Friess, 2015: 29-53):

- wearables – integrating nanoelectronics and sensors to expand the functionality of clothes, watches, and other body-mounted devices – most popular in this group are smartwatches and smart bands offered as supplementing devices to smartphones,

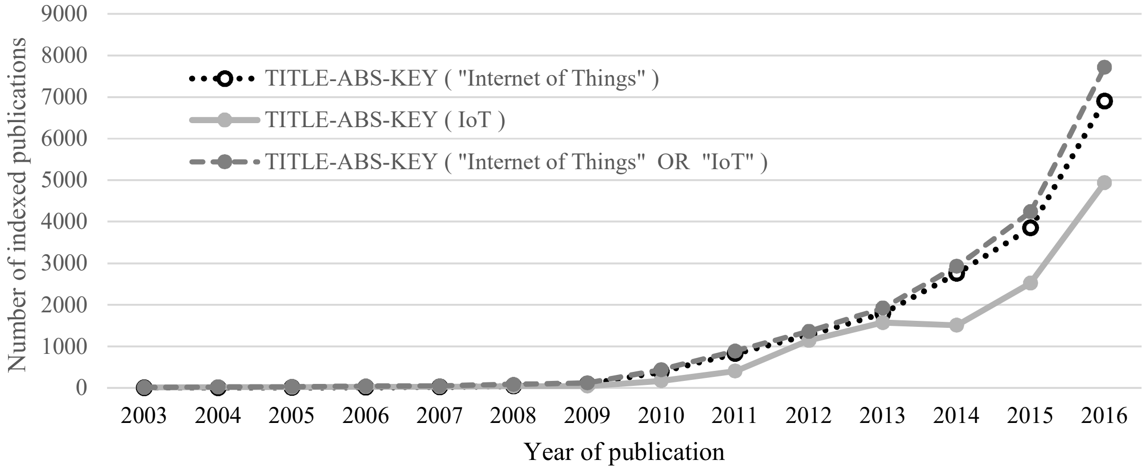
- smart health, and wellness – in clinical and home care of patients requiring monitoring of life functions, and physiological parameters during physical activity (in this case often using wearable devices),
- smart homes and buildings – including home networks of smart consumer electronics and appliances like washing machine, as well as buildings automation solutions based on intelligent sensors to monitor and manage heating, ventilation, air conditioning, lighting, security ect.,
- smart energy – managing energy use and also generation (e.g. from photovoltaic cells) and storage of electricity on distributed (household/building) level in so-called smart grids,
- smart mobility and transport including self-driving (autonomous) vehicles, intelligent sensors in the roads and traffic control infrastructure,
- smart manufacturing – providing access to production-plant systems for sharing its capacity, allowing for more flexibility of manufacture and production management,
- smart cities – monitoring and integrating city's all transport modes, communication, water, electrical power to optimise usage of resources while maximising service quality to its citizens,
- smart farming and food security – monitoring, control and treatment (even allowing autonomous interventions) in agriculture – for plant and animal production - on farm and area level to increase food security, lower ecological footprint and decrease costs.

The paper focuses on first three areas of mentioned applications, and they were the subject of preliminary survey research among young consumers.

2.2. The state of research on the Internet of Things

Interest in the topic of Internet of Things in scientific research, identifiable at the level of the published papers started to rise about 2010. As articles published in scientific journals have typical publishing cycle of 1-2 years, more serious research interest in IoT connected topics started about 2008. The rate of growth in the number of publications increases between 2013 and 2014 (Figure 1) Choice of Scopus database comes from seeking the source of data with broad coverage and high quality, so Web of Science – from coverage reasons – and Google Scholar – because of lack of quality control – are not suitable).

Figure 1. Scientific publications on the Internet of Things indexed in Scopus database



Note: The figure shows the number of scientific articles indexed in Scopus database for queries specified as lines descriptions. "TITLE-ABS-KEY" expression means searching for a particular phrase in the title, the abstract and keywords. "IoT" phrase often coincide with "Internet of Things," so the query with OR operator better reflects the total.

Source: Elaboration based on data from Scopus database (retrieved January 2nd, 2017).

Of the approximately 18 thousand unique publications found in Scopus, the vast majority (over 2/3rd) was ones belonging to the field of computer science, and about 42% to the engineering. Only 5.1% of the identified work had subjects classified to the social sciences, and approximately 3.5% of them to management science and related fields. It is worth to note that majority of the texts the Scopus included as interdisciplinary in several areas. Hence the mentioned values do not add up to 100%. Provided numbers suggest little interest in research of IoT-related topics in the field of economics and management. Also, up to 63.5% of the identified publications were presentations on scientific conferences, which indicates a high degree of novelty of this subject, as well as reflects the results from the publishing styles in computer science and engineering.

From the scope of the article, the most relevant publications are those relating to consumer use of the IoT and their attitudes toward this technology. Unfortunately, there is a limited number of such papers, especially presenting the results of empirical research. Relevant articles are typically the reviews made to build awareness of new business opportunities (Chui *et al.*, 2010: 70–79), including forecasts of the IoT devices market and their commercial applications (Wei, 2014: 53–56). Popular is also to discuss social challenges arising from the new IoT technologies (Dutton, 2014: 1–21), particularly issues related to the privacy of users of such systems (Brill, 2014: 205–217; Corcoran, 2016: 63–68). In Polish literature, it is even harder to identify the works close to the subject of the article. From a theoretical point of view, the selected elements of IoT ecosystem and its features discuss only the authors of a few scientific articles (Kwiatkowska, 2014: 60–70; Ożadowicz, 2014: 88–93). The only identified broader empirical study on the consumer aspects of the use of the Internet of Things is a thematic report of IAB Polska (IAB Polska, 2015).

2.3. IoT in the context of the acceptance of information technologies by users

A poorly explored aspect of the Internet of Things applications is the acceptance of this technologies by users. As IoT is relatively new technology and being relatively transparent to the users, it is likely, that same of consumers use at least some simple IoT networks without knowing about it. It means that some traditional information technology theories may not be adequate for explaining the adoption of IoT devices and their applications among consumers.

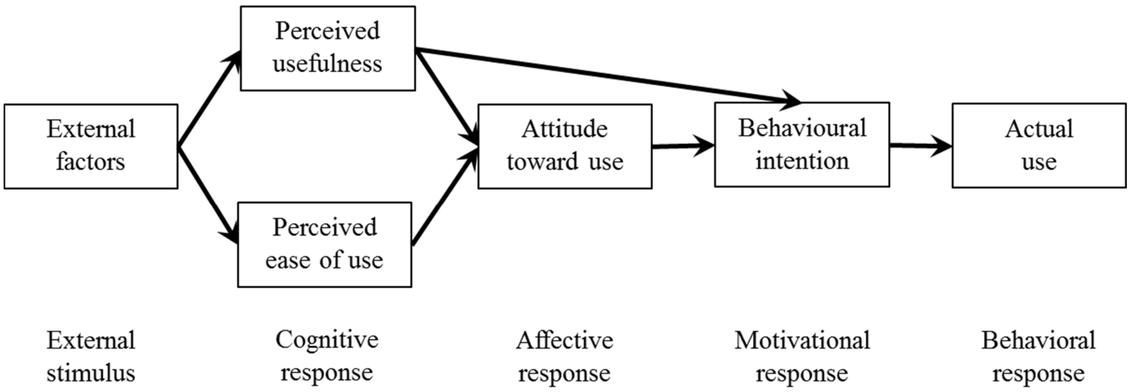
For instance, that can be the case of the hierarchical approach, proposed by van Dijk (2005). In mentioned approach conscious and full use of the specific information technology needs firstly motivation (possibly intrinsic one), then getting physical access, next acquiring a variety of skills, and finally, use stage is archived (Dijk, 2005: 22). Lack of motivation, access, skills or use, despite the fulfilment of the previous conditions, means rejection of particular technology. For every significantly improved information technologies and their applications, the same stages apply again.

In the context of IoT networks, the situation when access is first than motivation to use is easy to imagine. The scalability of the IoT solutions makes easy for a user to add new devices working within already-accepted technologies (like Wi-Fi, Bluetooth, NFC), for instance, adding new devices - wireless printers or speakers - to the existing home network requires no significant effort – it is easy, both cognitively and emotionally. Rare is the need for a one-time approval of a relatively complex system, e.g., fully integrated building automation networks. Also, the autonomy of many IoT devices and their control or data exchange with mobile devices suggests no need to gain particular new skills by their users. As a result, usage of IoT does not require unique skills nor breaking serious psychological barriers. From those reasons, the hierarchical approach seems to be not valuable in explaining the acceptance of IoT among the consumers.

Most widely used models of ICT acceptance are the models derived from the TAM (Technology Acceptance Model) (Davis, 1989: 319–339), including the contemporary concept of

UTAUT (Unified Theory of Acceptance and Use of Technology) (Venkatesh *et al.*, 2003: 425–478). The classical TAM explains technology acceptance as a response to external factors regarding perceived usefulness and perceived ease of use (treated as a cognitive response), both influencing attitude toward use (affective response) and later behavioural intention to use and actual use (behavioural response), as shown in Figure 2.

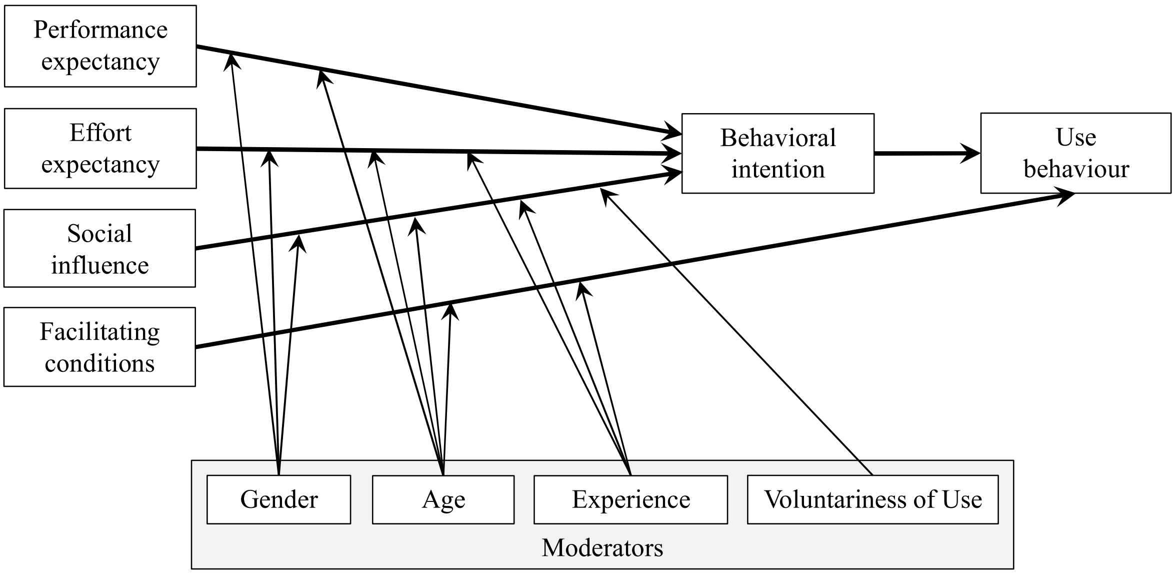
Figure 2. Structure of classical TAM



Source: Based on Davis (1989: 319–339).

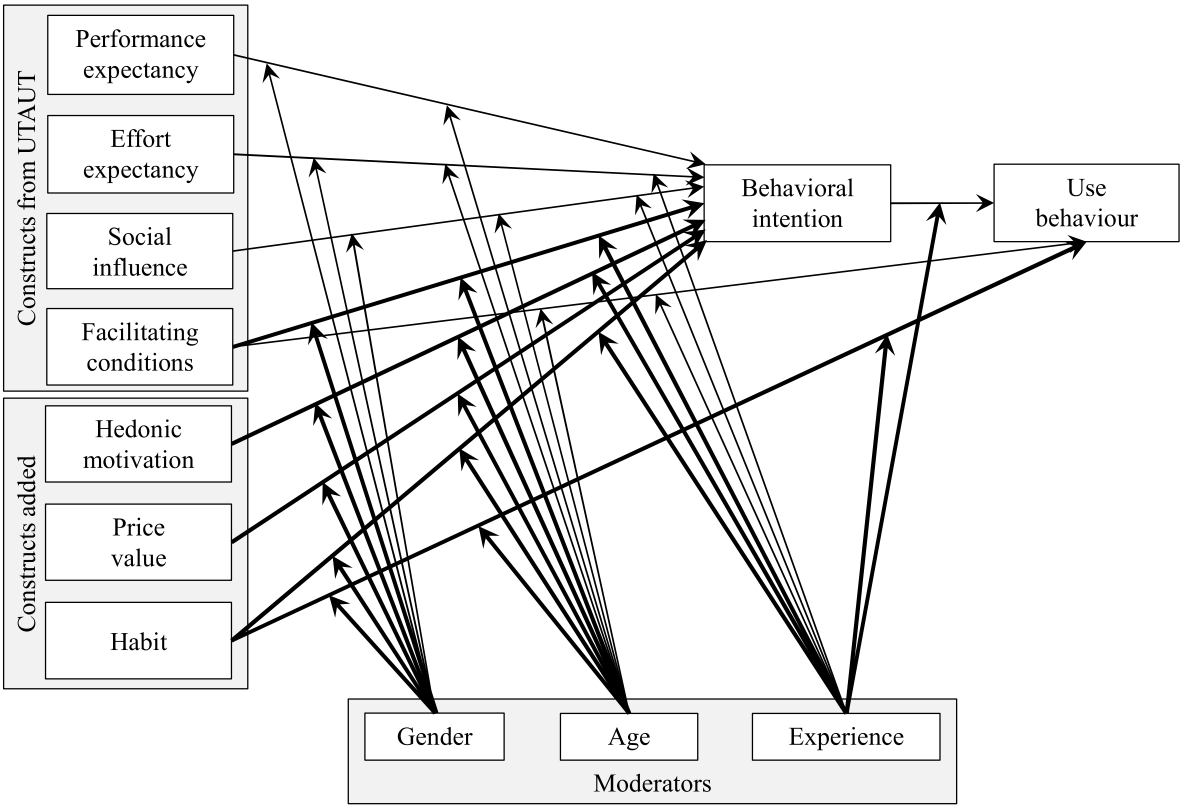
Classical TAM and its simple extensions were heavily criticised (Bagozzi, 2007: 244–254; Benbasat and Barki, 2007: 211–218) as beeing too simplified. The inclusion of more antecedents of information technology adoption was necessary, and led to mentioned UTAUT and later UTAUT2 models (Venkatesh *et al.*, 2003: 425–478, Venkatesh *et al.*, 2012: 157–178). In UTAUT (Figure 3) a significant role in the acceptance of information technology play: Performance expectancy and the Expected effort (analogues to the Perceived usefulness and Perceived ease of use from TAM) and Social influence as Behavioural intention antecedents and Facilitating conditions with Behavioural intention as constructs explaining Use behaviour. Gender, Age, Experience, and Voluntariness of use moderate described relationships. UTAUT2 (Figure 4) contains additional constructs explaining Behavioural intention and Use behaviour (namely: Hedonic motivation, Price value, and Habit) as well as new direct relationships and interactions, creating complex structural model reflecting factors of individual adoption of information technology.

Figure 3. Schematic representation of the UTAUT



Note: Bold lines represent direct relationships, thin lines – interactions.
Source: Venkatesh *et al.* (2003: 447)

Figure 4. UTAUT2 as extension of UTAUT



Note: Bold lines represent paths introduced in UTAUT2, thin lines – paths present in UTAUT
Source: Based on Venkatesh *et al.* (2012: 157–178).

Also, the simple construct explaining the general attitude towards innovation in the field of information technology (PIIT - Personal Innovativeness in the domain of IT) can be useful to explain IoT adoption by consumers. The PIIT is "an individual propensity to try new information technologies" (Agarwal and Prasad, 1998: 206). Persons with high innovation level in this field should be more willing to acquire and use new information technologies, and the subsequent use of those technologies will be easier for them. Openness to experience (as one of Big Five personality dimensions), and (lack of) resistance to change, are some of the best variables explaining the PIIT (Nov and Ye, 2008: 448). In other studies (Agarwal and Prasad, 1998: 204–215; Yi *et al.*, 2006: 393–426) the PIIT was significantly connected with the behavioural intention of explaining the use of the technology (as measured in TAM). On the Polish ground, the PIIT is one of the strongest antecedents of virtualization of consumer behaviour, including usage of interactive shopping aids and online shopping (Mącik, 2014: 392–403, Mącik, 2015: 211–229).

Author approach was to investigate if some of the UTAUT2 constructs (and possibly the whole model) with PIIT and selected demographic variables are useful to explain the IoT adoption by consumers. In the case of the Internet of Things, there is a lack of such research, besides one using modified TAM (Gao and Bai, 2014: 211–231). It is evident that IoT adoption differs from other information technologies for several reasons, and unlikely is that even complicated IT adoption models apply without changes to investigate IoT adoption. Although IoT should be may be relatively easy for consumers, because potential users see the benefits of their use, mainly in facilitating life, for instance, the elimination of wired connections between used devices, or labor-intensive activities to manage the system. Also using modern technology is today well perceived socially, and the time makes IoT solutions cheaper, which also favours the use of them. From the other side some objections, particularly because of privacy issues exist and may make the IoT adoption slower and harder.

3. Method

3.1. Sample

In this preliminary study performed using an online questionnaire (CAWI) participated 240 persons (out of 342 invited by e-mail to complete one), of which 223 provided complete responses, and this is sample size used for analyses. The resulting rate of return of questionnaires is 70.2% and the effective rate - 65.2%. Selection of respondents was on the base of non-probability sampling in the form of purposive sampling with control of selected demographic variables. Participants were the students of the economics department of a public university located in Eastern Poland, declaring the use of the Internet and having at least one mobile device (population size is about 4100 persons). Participation in the survey was voluntary. Participants got the incentive to participate in the study in the form of small reward in grade points in exchange for activity during classes conducted by the author. Study participants did not know the real purpose of the study - in the invitation and the introduction it has the label: "Use of ICT by consumers - Spring 2016 edition." The actual subject of the study revealed after the first few questions in a questionnaire.

The resulting structure of the sample by gender of the respondents (exactly 2/3 women and 1/3 men) does not differ significantly from the population of students of the department of the mentioned university. The average age of respondents is 20.6 years with a standard deviation of 1.8 years. Place of residence divides the sample into three nearly equal groups: 37.2% ar rural areas residents, 31% inhabitants of towns up to 200 thousand residents and 31.8% - cities with over 200 thousand inhabitants. Among the respondents were some fluently speaking Polish persons with the Ukrainian or Belarusian background. As in the questionnaire, there was no question about the nationality their share in the total sample cannot be precisely determined, by analysis of the e-mail addresses used in invitation send this proportion does not exceed 5%). The largest group of respondents identified their financial situation as good (48.9%), slightly less - as average (39.5%). Less than 5% of declared weak or bad financial position and 6.7% - an excellent financial situation. On average, respondents reported using the Internet in any of the ways available to them, for 5.6 hours a day in average (with a standard deviation of 2.8 hours). The share of heavy Internet users declaring usage more than 10 hours a day was 8.5% (10.7% in women group and 4.1% among men).

The used online questionnaire consisted of 28 questions worded in Polish and spread over 21 screens, mostly in the form of Likert-type or multi-item position scales, as well as a range of single-choice or multiple-choice demographic questions and also two open questions. The average time to fill in the questionnaire was about 32 minutes.

Because of the scope of this paper the analysis in the text regards only selected questions and scales, particularly those measuring acceptance of IoT by the consumers.

3.2. Measures

Used measures constitute four groups:

- demographic variables, gender and income per capita in the household used in further analysis, the latter used in quartile steps and refusal to answer (treated as an additional group, not as missing value) in UNIANOVA analysis,
- IoT capable devices ownership and wants to buy – total and divided into five groups
- personal innovativeness in the domain of information technology items – used as a composite in quartile steps in UNIANOVA analysis and as measurement variables for PIIT construct in structural equation modelling (SEM) part,
- selected items from the UTAUT2 questionnaire to measure Performance expectancy (PE), Habit (H) and Behavioural intention (of use)(BI) for SEM, there is the need to note that other dimensions from UTAUT2 as relatively uncorrelated with the behavioural intention of use the IoT are not analysed.

The structure of the sample regarding gender resembles the structure of investigated population, as stated in sample description earlier in the text. Table 1 contains descriptive statistics for income per capita (IPC), PIIT, and the numbers of owned/wanted IoT capable devices.

Table 1. Descriptive statistics for IPC, IoT ownership/wants and PIIT composite

Variables:	Mean	Standard deviation	Minimum	Maximum	Quartiles		
					Q1	Q2	Q3
Income per capita (PLN)	1324.25	913.21	125.00	4333.33	600.00	1000.00	1666.67
Owns: # of wearables	.13	.42	.00	3.00	.00	.00	.00
Owns: # of connected consumer electronics	2.00	1.58	.00	5.00	1.00	2.00	3.00
Owns: # of connected appliances	.50	1.57	.00	8.00	.00	.00	.00
Owns: # of inteligent home devices	.39	.51	.00	2.00	.00	.00	1.00
Owns: # of other connected devices	.34	1.24	.00	9.00	.00	.00	.00
Owns_total	3.35	3.17	.00	18.00	1.00	2.00	4.00
Wants: # of wearables	.21	.43	.00	2.00	.00	.00	.00
Wants: # of connected consumer electronics	.20	.48	.00	2.00	.00	.00	.00
Wants: # of connected appliances	.20	.58	.00	4.00	.00	.00	.00
Wants: # of inteligent home devices	.36	1.18	.00	9.00	.00	.00	.00
Wants: # of other connected devices	.03	.17	.00	1.00	.00	.00	.00
Wants_total	1.00	1.66	.00	1.00	.00	.00	2.00
PIIT composite (rescaled to 1-5 scale)	3.11	.66	1.25	5.00	2.75	3.25	3.75

Source: Own research.

Similarly, Table 2 contains information about measurement items for latent variables finally used for SEM. All used for SEM measurement variables have the five-point Likert-type structure of answers, considered as the ordinal level of measurement. Initial correlation analysis and Exploratory Factor Analysis (more precisely Principal Component Analysis) on descriptors of latent variables for SEM led to dropping one from four items from each construct due to low factor loadings (denoted in Table 2).

Table 2. Items of constructs finally used in structural equations modelling

Construct	Source of items	Item name	Item wording	Notes
Personal innovativeness in domain of IT (PIIT)	Translated into Polish from Agarwal and Prasad (1998: 210)	PIIT1	If I heard about a new information technology, I would look for ways to experiment with it	O
		PIIT2	Among my peers, I am usually the first to try out new information technologies	O
		PIIT3	In general, I am hesitant to try out new information technologies	R, D, O
		PIIT4	I like to experiment with new information technologies	O
Performance expectancy	Adapted to IoT context from own travesty of UTAUT2 scales in Polish (Mącik 2013: 331-332)	PE1	I find the use the Internet of Things and its devices useful in my life	T
		PE2	Using the Internet of Things and its devices increases my chances of achieving the objectives important to me	T
		PE3	Using the Internet of Things and its devices allows me to live more comfortably	T
		PE4	Using the Internet of Things and its devices makes me more productively use of my time	D, T
Habit		H1	Using the Internet of Things and its devices became a habit for me	T
		H2	I'm addicted to the use of the Internet of Things and its devices	D, T
		H3	I feel that I have to use the Internet of Things and its devices	T
		H4	Using the Internet of Things and its devices became natural for me	T
Behavioral intention		BI1	I intend to continue in the future use of the Internet of Things and its devices	D, T
		BI2	I try to use the Internet of Things and its devices as often as I can	T
		BI3	I'm going to continue to use the Internet of Things and its devices frequently	T
		BI4	I'm going to continue to use the Internet of Things and its devices in the future	T

R – reverse coded, D – dropped due to low factor loading, O – in original English wording, T – English translation.
Source: Own research.

3.3. Reliability and validity of measures

Constructs used for structural equation modeling exhibit adequate reliability, assessed by Cronbach's *alpha* coefficient and Composite Reliability (CR, also known as Jöreskog's *rho*) measure. Those measures represent lower and upper boundaries of true scale reliability respectively. Using both criterions, reliability of all constructs meets established requirements –

values of *alpha* and CR are all over .6 suggested as acceptable in exploratory research (Hair *et al.*, 2011: 145; Hair Jr. *et al.*, 2013: 7) – Table 3.

Table 3. Reliability and convergent validity of measures used in SEM

Constructs	Reliability		Convergent validity (AVE)
	Cronbach's *alpha*	Composite reliability (CR)	
Personal innovativeness in domain of IT (PIIT)	.653	.667	.414
Performance expectancy (PE)	.736	.746	.497
Habit (H)	.675	.712	.454
Behavioral intention (of use)(BI)	.758	.788	.554

Source: Own research.

Validity check for used constructs required to use confirmatory factor analysis (CFA). CFA results gave the possibility to assess correlations between latent variables representing constructs and also calculate CR and AVE values. The fit of obtained CFA model is excellent – see table 10 in the results section of this paper. Convergent validity of used measures is for 3 of 4 constructs below suggested value of 0.5 (Fornell and Larcker, 1981: 39–50) – Table 3. It is the lowest for Personal innovativeness in the domain of information technology (PIIT), slightly less than required for Performance expectancy (PE) and Habit (H), and above 0.5 for Behavioural intention to use.

Table 4. Discriminant validity of measures – Fornell-Larcker criterion

Constructs:	PIIT	PE	H	BI
Personal innovativeness in domain of IT (PIIT)	**.414**			
Perfomance expectancy (PE)	.088	**.497**		
Habit (H)	.152	.315	**.454**	
Behavioral intention (to use)(BI)	.141	.526	.707	**.554**

Note: Numbers on matrix diagonal are AVE for each construct; numbers off-diagonal are squared correlations between constructs, to report Fornell-Larcker Criterion (Henseler *et al.*, 2014: 17).
Source: Own research.

Discriminant validity of used measures is acceptable, particularly for an exploratory study. All constructs besides two pairs: Habit and Behavioural intention (to use) and also (partially) for Performance expectancy and Behavioural intention (Table 4) met the Fornell-Larcker Criterion. It states that AVE for each construct should be higher from all squared correlations between the construct, and other measures (Fornell and Larcker, 1981: 39–50).

4. Results

4.1. Awareness of IoT and its usage in the sample

The study subjects know about the concept of the Internet of Things (IoT) rather little – more than three-quarters of them said they did not hear such term. Of the approximately 23% of people declaring its awareness, the vast majority heard about IoT during the last year, and only a few in the earlier period (more men than women, although the overall awareness of the term is higher in the latter group) – Table 5.

Despite the fact that majority of respondents were not aware of Internet of Things, almost 80% of them had at least one device functioning in the IoT ecosystem (beyond the computers, smartphones, and tablets) – Table 6.

Table 5. Awareness of the Internet of Things (IoT) term

Answers for Question: Have you heard the term Internet of Things (IoT)?	Gender		Whole sample
	Female (n=149)	Male (n=74)	
No, I have not encountered with such term	76.5%	79.7%	77.6%
Yes, the first time during last year	20.8%	13.5%	18.4%
Yes, the first time 2-3 years ago	2.7%	5.4%	3.6%
Yes, the first time earlier than three years ago	0.0%	1.4%	0.4%
Total	100.0%	100.0%	100.0%

Source: Own research.

Table 6. Awareness of the Internet of Things (IoT) and ownership of IoT capable devices

Answers for Question: Have you heard the term Internet of Things (IoT)?	Ownership of any IoT capable device		Total
	No (n=46)	Yes (n=177)	
No, I have not encountered with such term	22.0%	78.0%	100.0%
Yes, the first time during last year	14.6%	85.4%	100.0%
Yes, the first time 2-3 years ago	25.0%	75.0%	100.0%
Yes, the first time earlier than three years ago	0.0%	100.0%	100.0%
Whole sample	20.6%	79.4%	100.0%

Source: Own research.

Interesting is that a large part of the respondents uses the technology for which does not know that it has a specific name. Probably the reason is to perceive used devices as connected to the home network or the Internet.

At the time of research, the most popular owned IoT capable devices are those from connected consumer electronics group, particularly printers (of multi-function printers – MFPs). Also, scanners, audio systems with speakers and cameras were quite popular. Below 10% of the respondents declare usage of connected appliances. Wearables and Smart home devices are even less popular. In detail ownership or IoT devices and stated intention to purchase them over the next year is shown in Table 7.

Table 7. Ownership of IoT capable devices and declared intention to buy over next year

Groups of IoT devices	Selected IoT capable devices	Owned (n=223)	Wanted to buy over next year (n=179)
Wearables	smartwatch	6.3%	21.8%
	smartband	2.2%	2.8%
Connected consumer electronics	printer or MFP	61.4%	4.5%
	scanner	38.1%	3.9%
	camera	36.8%	5.6%
	audio system or speakers	37.2%	5.6%
	MP3/MP4 player	26.0%	5.6%
Connected home appliances	washing machine	9.4%	3.9%
	refrigerator	9.0%	3.4%
Smart home devices	lighting control	4.5%	3.9%
	heating control	5.8%	3.4%
Other devices		12.1%	2.2%
None of the above		20.6%	45.8%

Note: Percentages do not sum up to 100 because of multiple choice possibility.
Source: Own research.

About 20% of respondents do not own any IoT devices. No intention to purchase over the next year any of IoT equipment declares almost 46% of those surveyed. This lack of interest in IoT devices loosely connects with financial reasons (stated by about 16% of this group). The main reason not to engage in IoT usage is a lack of need to do this (47%). Other more frequent one – having older devices, not IoT-enabled, as stated about ¼ of respondents. It is worth noting that the declared reason for not using the IoT not connects with the level of personal innovativeness in the domain of information technology (PIIT). Also, IoT users vs. non-users are not differing significantly in the PIIT.

4.2. Selected factors explaining IoT ownership and wants – UNIANOVA approach

The influence of selected demographic variables (including gender and income per capita in household – IPC – denominated in Polish zloty – PLN), and psychographic construct – PIIT (measured as the aggregate of 4 measurement variables) required the use of the univariate analysis of variance (UNIANOVA procedure) (Table 8). This method provides regression analysis and analysis of variance for one dependent variable by one or more factors and allows to find possible interactions of factors. Homogeneity of the sample regarding age excluded this variable from consideration to use it in univariate ANOVA.

Mentioned three-way analysis with main effects of gender, PIIT, and IPC, as well as their interactions, suggest that most of the reasons influencing IoT usage and wants to use are beyond presented in Table 8 model. Mostly not significant results for the corrected model, with significant F-test values for intercept, and also the very low coefficient of determination (R-squared) values are arguments for this interpretation. The intercept, in this case, captures all factors not included directly in the models.

Only for smart home devices ownership, the corrected model is meaningful – main effects of gender and PIIT are significant as well as their interaction term. Smart home devices are owned in greater numbers (creating more advanced IoT network) by men with higher personal innovativeness in the domain of information technology (PIIT), but the level of income per capita does not differentiate the level of adoption of smart home devices. In other group cases, there are weak tendencies for higher income per capita to increase the number of owned wearables and connected home appliances. Also the higher PIIT, the greater number of owned connected consumer electronics.

For devices considered to purchase during next year, there are in general no significant changes between groups with different income (besides connected consumer electronics, and weakly the wearables). Also, corrected models are all not significant. Interesting is that the general number of planned to buy IoT devices is dependent on the three-way interaction of gender, PIIT and income per capita.

Table 8. UNIANOVA results – three-way analysis of interactions

a) For owned devices

Significance of between-subjects effects (probability from F-tests)		Dependent variable: declared number of **owned** IoT devices: wearables	connected consumer electronics	connected appliances	smart home devices	other connected devices	total
Corrected model		.146	.677	.391	**.006**	.558	.631
Intercept		**.000**	**.000**	**.000**	**.000**	**.018**	**.000**
Main effects	Gender [1]	*.086*	.612	.520	**.017**	.965	.535
	PIIT [2]	.814	*.053*	.477	**.010**	.452	.869
	IPC [3]	*.081*	.968	*.070*	.836	.548	.692
Interactions	[1] * [2]	.333	.453	.868	.376	.768	.874
	[1] * [3]	.286	.518	.220	.680	.793	.357
	[2] * [3]	.702	.947	.304	**.040**	.854	.527
	[1] * [2] * [3]	*.090*	.595	.405	*.058*	.698	.370
Model fit	R^2	.209	.153	.179	.270	.164	.158
	Corrected R^2	.046	-.022	.010	.120	-.009	-.016

b) For devices desired to purchase

Significance of between-subjects effects (probability from F-tests)		Dependent variable: declared number of **desired** IoT devices: wearables	connected consumer electronics	connected appliances	smart home devices	other connected devices	total
Corrected model		.102	.133	.454	.219	.691	*.057*
Intercept		**.000**	**.000**	**.000**	**.000**	**.110**	**.000**
Main effects	Gender [1]	.583	.768	.935	.834	.743	.656
	PIIT [2]	.125	.535	.510	.406	.624	.131
	IPC [3]	*.092*	**.005**	.731	.485	.409	.475
Interactions	[1] * [2]	.279	.708	.796	.552	.642	.400
	[1] * [3]	.482	.917	.965	.059	.770	.288
	[2] * [3]	.574	.180	.485	.472	.662	.498
	[1] * [2] * [3]	.344	.191	.199	.247	.803	*.052*
Model fit	R^2	.217	.211	.173	.198	.152	.230
	Corrected R^2	.056	.048	.003	.032	-.023	.071

Note: p<0.05 – bolded, 0.05<p<0.1 – italicized
PIIT – personal innovativeness in the domain of IT, IPC – income per capita (in PLN).
Source: Own research.

As most of UNIANOVA models including income per capita level were not significant, the subsequent analyses take into account only gender and PIIT (Table 9). In this analysis, the PIIT level significantly differentiates the number of owned IoT devices in following groups: connected consumer electronics, smart home devices, and other devices. The higher PIIT, the greater number of particular used IoT devices. Only for wearables the influence of gender in meaningful – men possess a larger number of wearables than women. Also, the interaction of gender and PIIT level is on the level of statistical tendency. Only models for connected home appliances and all devices (total) are not significant regarding F-test used in UNIANOVA procedure.

Table 9. UNIANOVA results – two-way analysis with interaction

a) For owned devices

Significance of between-subjects effects (probability from F-tests)		Dependent variable: declared number of **owned** IoT devices: wearables	connected consumer electronics	connected appliances	smart home devices	other connected devices	total
Corrected model		**.028**	*.077*	.879	**.003**	*.067*	.773
Intercept		**.000**	**.000**	**.000**	**.000**	**.000**	**.000**
Main effects	Gender [1]	**.001**	.613	.936	**.002**	.717	.404
	PIIT [2]	.244	**.012**	.475	**.011**	**.028**	.587
Interaction	[1] * [2]	*.063*	.374	.808	.596	.301	.905
Model fit	R^2	.070	.057	.014	.095	.059	.019
	Corrected R^2	.040	.027	-.018	.066	.028	-.013

b) For devices desired to purchase

Significance of between-subjects effects (probability from F-tests)		Dependent variable: declared number of **desired** IoT devices: wearables	connected consumer electronics	connected appliances	smart home devices	other connected devices	total
Corrected model		.311	.969	.503	.614	.280	.247
Intercept		**.000**	**.000**	**.000**	**.000**	**.010**	**.000**
Main effects	Gender [1]	.802	.772	.514	.923	.300	.669
	PIIT [2]	*.100*	.947	.344	.423	.218	.248
Interaction	[1] * [2]	.595	.757	.729	.414	.283	.319
Model fit	R^2	.037	.008	.029	.024	.039	.041
	Corrected R^2	.006	-.024	-.003	-.007	.008	.010

Note: $p<0.05$ – bolded, $0.05<p<0.1$ - italicized
Source: Own research.

Much worse are models trying to explain the number of IoT device considered to buy in next year by respondents. In this case, there is no evidence that gender and PIIT are influencing the number of desired IoT devices.

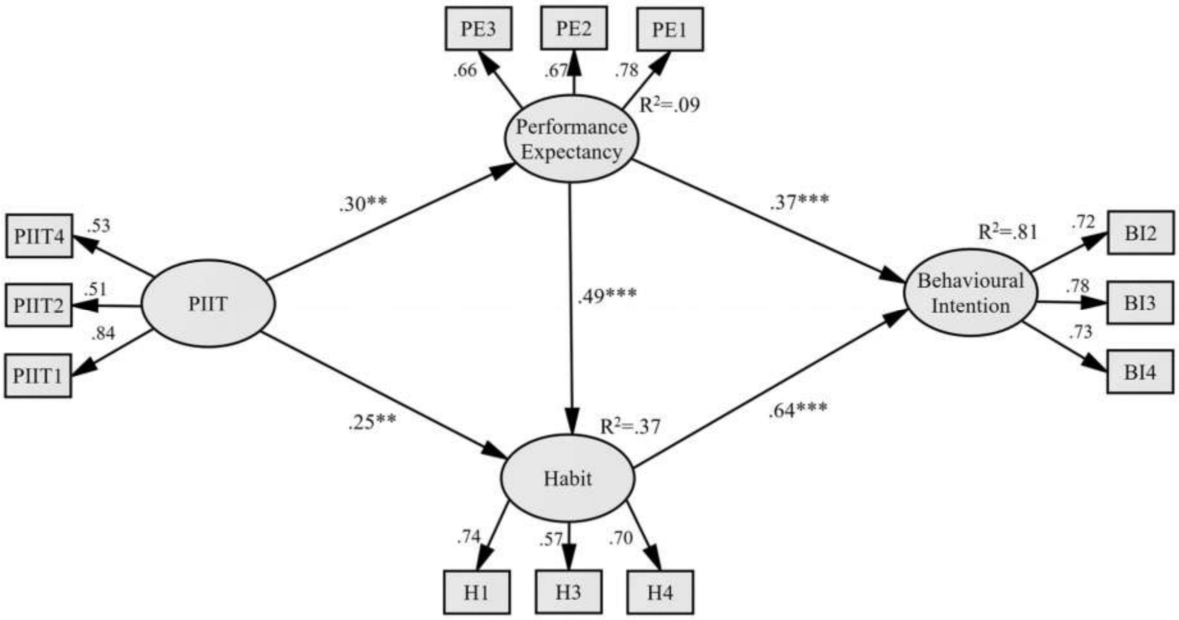
4.3. Preliminary SEM model for behavioural intention to use IoT

One of the goals of the paper was to estimate valid model explaining antecedents of behavioural intention to use IoT and IoT capable devices. As expected, such model should be more/less similar to UTAUT or UTAUT2 structures when taking into account similarities and differences in IoT adoption. Unfortunately, most of UTAUT/UTAUT2 constructs turned out to be uncorrelated with the behavioural intention to use of IoT and capable devices, despite their high enough internal consistency and were useless for structural equations modelling.

The preliminary model estimated via covariance-based SEM (Figure 5), where two primary antecedents of Behavioural intention are Performance expectancy and Habit, fits the data very well (Table 10). Particularly the χ^2/df and RMSEA values are more than satisfactory, although there are minor problems with the convergent and discriminant validity of some constructs.

The model explains about 81% of Behavioural intention to use IoT, mostly via direct paths of Habit and Performance expectancy. The latter also affects the Habit construct. PIIT is the antecedent of both: Performance expectancy and Habit. All paths in the model are significant. Table 11 presents standardised total, direct and indirect effects in research model.

Figure 5. Model explaining behavioural intention to use IoT



** p<0.01, *** p<0.001
Note: Error terms for measurement and latent variables removed for diagram clarity.
Source: Own research.

Table 10. Fit statistics for research models

Measures		Reference values (Hooper *et al.*, 2008: 53–59)	Estimates	
			Main model (Figure 4)	CFA model
Variance explained	Performance Expectancy	n/a	0.090	n/a
	Habit	n/a	0.372	n/a
	Behavioral Intention	n/a	0.807	n/a
Measures of fit	χ^2/df	<2	1.305	1.331
	p (for χ^2) [a]	>0.05 (not significant)	0.078	0.066
	GFI	>0.95	0.958	0.958
	AGFI	>0.90	0.930	0.929
	NFI	>0.95	0.927	0.927
	TLI	>0.95	0.974	0.972
	CFI	>0.95	0.981	0.980
	RMSEA	<0.05	0.037	0.039
	PCLOSE	>0.05 (not significant)	0.794	0.763

[a] for larger samples is often unreasonable to have not significant *p* (Iacobucci, 2010: 90–98).
Shortcuts: *df* - degree of freedom; GFI - goodness of fitness index; AGFI - adjusted goodness of fit index, NFI – normed fit index, TLI - Tucker-Lewis index; CFI - comparative fit index; RMSEA - root mean square error of approximation; PCLOSE - p-value for test of close fit (testing the null hypothesis that the population RMSEA is no greater than 0.05).
Source: Own research.

Table 11. Standardised total, direct and indirect effects in research model

Dependent latent variable:	Independent latent variable:		
	PIIT	Performance expectancy	Habit
Total effects			
Performance expectancy	0.300	0.000	0.000
Habit	0.397	0.486	0.000
Behavioral intention	0.364	0.678	0.639
Direct effects			
Performance expectancy	0.300	0.000	0.000
Habit	0.251	0.486	0.000
Behavioral intention	0.000	0.367	0.639
Indirect effects			
Performance expectancy	0.000	0.000	0.000
Habit	0.146	0.000	0.000
Behavioral intention	0.364	0.311	0.000

Source: Own research.

Although standardised regression coefficient for a direct path from Habit to Behavioural intention is stronger than from Performance expectancy to Behavioural intention, the total effect of the latter as a sum of direct and indirect effect is slightly bigger. Also, the indirect effect of PIIT on Behavioural intention is not negligible. The PIIT also, directly and indirectly, explains slightly more variability of Habit than only directly of Performance expectancy.

5. Discussion

As results suggest in the case of young consumers and IoT applications and devices the large part of the respondents uses the technology not knowing their name. The reason for this situation – concluded from responses on presented questions and also open-ended ones – is that the current number of devices in use in IoT home networks is low (typically one or two). Also, the subjects rather separate from each other different network technologies connecting them, than perceive them as a whole - they separate, e.g. the printer connected via Wi-Fi from the audio system that uses the Bluetooth network. So the respondents do not imagine IoT term as "umbrella" for now separated networks because they do not integrate them, or are doing it on *ad hoc* base connecting smartphone/tablet to other devices when needed. They also don't see in such use anything innovative; that suggests making a step further toward new technology from used now ones. Another explanation is to perceive the integration of some electronics or appliances with IoT as incremental innovations within those product categories only. For instance, possibility to remotely control the washing machine via mobile application in a smartphone does not change essential function of this appliance: to wash clothes but adds the new mode of monitoring its operations.

Symptomatic is that from answers pattern when about 4/5 of study participants owns connected devices almost half of users and non-users have no intention to purchase IoT-enabled devices during next year. In the light of declared reasons to abstain, this means that they do not see real usefulness of that devices – answering in style: "I don't need them," being more or less satisfied with currently owned consumer electronics and home appliances without IoT capabilities. Some of IoT applications seem to be costly, but the lack of funds was the least important reason of not to use IoT.

The potential for sales growth in the near future in researched age group (university students) has only smartwatches (from wearables category), currently perceived as a fashionable electronic gadget, but also sometimes used to cheat on exams. Almost 22% of the respondents declared their intention to purchase smartwatch over the next year. All other devices are planned to buy by 2-5% of study participants. This market potential is much lower than expected in industry report by IAB Polska (2015: 12-13). However, it should be taken into account, that the current status of surveyed young consumers reflects in some parts the resources of their family homes (not only personally used IoT devices), and declarations of purchase - rather their personal preferences.

From both univariate analyses of variance and preliminary structural equation model, it is visible that Personal innovativeness in the domain of IT plays a significant role in IoT adoption. It influences the number of owned IoT capable devices (particularly for connected consumer electronics and smart home devices) and explains a large part of the variance of Habit and Performance expectancy, as well as indirectly explains behavioural intention to use IoT. The literature confirms the substantial impact of PIIT construct on information technologies (Agarwal, 2000: 85–104; Yi *et al.*, 2006: 393–426). Also in the consumer context of online shopping and usage of interactive shopping aids (Mącik, 2013, Mącik, 2014: 392–403), so presented research findings are consistent with previous studies.

Gender (being male in this case) has an impact on adoption level of wearables (particularly smartwatches – styled more suitable for men), and smart home devices. The evidence of gender impact on information technology adoption is mixed. More often it is confirmed in work-place setting than in private use (Hsu *et al.*, 2006: 889–904; Mącik, 2013:149-150; Venkatesh *et al.*, 2000: 33–60; Venkatesh and Morris, 2000: 115–136).

Performance expectancy and habit (both being UTAUT2 constructs) have a substantial impact on Behavioural intention to use IoT (explanation of 81% of the variance is the remarkable result). This result is also consistent with UTAUT2 theory (Venkatesh *et al.*, 2012: 157–178), and those constructs were the two most important antecedents of Behavioural intention in online shopping adoption research (Mącik, 2013: 277-284).

Although preliminary model fits the data well (Table 10) there possibly exist other factors of influence, and their incorporation into research model would be potentially fruitful. One possibility is to include constructs from trust-based information technology acceptance model (Komiak and Benbasat, 2006: 941–960). Trust-based technology acceptance model highlights that cognitive trust affects emotional trust, which further leads to individuals' adoption intention. Research about consumer adoption of internet product comparison engines proved its suitability (Mącik and Mącik, 2016: 193–213). Interesting is also the approach used by Gao and Bai (2014: 211–231), particularly because of inclusion in their research some individual user characteristics (perceived enjoyment and perceived behavioural control).

6. Limitations and further studies

A significant limitation of the presented study is the identification only a few factors influencing IoT adoption by young consumers. This conclusion comes from univariate analysis of variance where the intercept captured all influence factors not included directly in the model. Also despite adequate constructs reliability, it was impossible to confirm the validity of the whole UTAUT2 model for IoT adoption, although estimated preliminary model fits the data well and has good explanatory value, it does not include other possibly relevant adoption factors.

Possible model extensions are in the direction to incorporate trust-based information technology acceptance model (Komiak and Benbasat, 2006: 941–960), as well some of the constructs studied by Gao and Bai (2014: 211–231). Additionally deeper insight into habits of owned IoT capable devices will be valuable.

Also larger and more diversified sample regarding respondent age is reasonable in further studies, allowing to include interactions in the structural model. Now the sample size limits analysis of interactions (usually made as model estimation in groups).

7. Conclusion

This paper provides the answer for two main research questions.

For RQ1 about the current level of adoption of IoT by young consumers, the conclusion is that relatively high ownership of IoT-enabled devices does not automatically mean a high level of actual usage and conscious adoption of IoT. 80% of respondents used at least one IoT-enabled device and at the same time 78% of owners of IoT devices not been aware of Internet of Things concept. Although awareness of IoT is not needed to use such technology, it easily can influence the scope and intensiveness of such usage. Consumers are rather declaring the usage of Internet or other networks enabled things, recognised by connecting technology (Wi-Fi, Bluetooth) than the conscious usage of IoT.

For RQ2 about factors influencing IoT adoption (positively and negatively), there is the mixed answer. Univariate analysis of variance and structural equation modelling provided valuable insights about factors affecting this adoption, particularly Performance expectancy, and Habit, as well as Personal innovativeness in the domain of information technology (PIIT). For some groups of devices, the gender impact was significant. Declared income, including lack of funds as the reason of not to use IoT, was not useful as an explanatory variable.

Further research should lead to an extension of presented model and identification of more influence factors.

Literature

Agarwal, R. (2000). Individual acceptance of information technologies. *Framing the Domains of IT Management: Projecting the Future Through the Past*: 85–104.
Agarwal, R.; Prasad, J. (1998). A Conceptual and Operational Definition of Personal Innovativeness in the Domain of Information Technology. *Information Systems Research* 9(2): 204–215.
Ashton, K. (2009). That "internet of things" thing. *RFiD Journal* 22(7): 97–114.
Bagozzi, R.P. (2007). The legacy of the technology acceptance model and a proposal for a paradigm shift. *Journal of the Association of Information Systems* 8(4): 244–254.
Benbasat, I.; Barki, H. (2007). Quo vadis, TAM? *Journal of the Association of Information System*. 8(4): 211–218.
Brill, J. (2014). The internet of things: Building trust and maximizing benefits through consumer control. *Fordham Law Review* 83(1): 205–217.
Chui, M.; Löffler, M.; Roberts, R. (2010). The internet of things. *McKinsey Quarterly* (2): 70–79.
Corcoran, P. (2016). The Internet of Things: Why now, and what's next? *IEEE Consumer Electronics Magazine* 5(1): 63–68.
Davis, F.D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly: Management Information Systems* 13(3): 319–339.
Dijk, J.A.G.M. van. (2005). The Deepening Divide: Inequality in the Information Society. SAGE.
Dutton, W.H. (2014). Putting things to work: Social and policy challenges for the Internet of things. *Info* 16(3): 1–21.
Evans, D. (2011). The internet of things: How the next evolution of the internet is changing everything. *CISCO white paper* 1: 1–11.
Fornell, C.; Larcker, D.F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research* 18(FEBRUARY): 39–50.
Gao, L.; Bai, X. (2014). A unified perspective on the factors influencing consumer acceptance of internet of things technology. *Asia Pacific Journal of Marketing and Logistics* 26(2): 211–231.
Hair, J.F.; Ringle, C.M.; Sarstedt, M. (2011). PLS-SEM: Indeed a silver bullet. *The Journal of Marketing Theory and Practice* 19(2): 139–152.
Hair Jr., J.F.; Ringle, C.M.; Sarstedt, M. (2013). Partial Least Squares Structural Equation Modeling: Rigorous Applications, Better Results and Higher Acceptance. *PLS applications in strategic management: Partial Least Squares modeling in strategy research* 46(1–2): 1–12.
Henseler, J.; Ringle, C.M.; Sarstedt, M. (2014). A new criterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of the Academy of Marketing Science* 43: 115.
Hooper, D.; Coughlan, J.; Mullen, M.R. (2008). Structural Equation Modelling: Guidelines for Determining Model Fit. *Electronic Journal of Business Research Methods* 6(1): 53–59.
Hsu, M.-H.; Yen, C.-H.; Chiu, C.-M.; Chang, C.-M. (2006). A longitudinal investigation of continued online shopping behavior: An extension of the theory of planned behavior. *International Journal of Human Computer Studies* 64(9): 889–904.
IAB Polska. (2015). Internet Rzeczy w Polsce. IAB Polska: Warszawa.
Iacobucci, D. (2010). Structural equations modeling: Fit indices, sample size, and advanced topics. *Journal of Consumer Psychology* 20(1): 90–98.
Komiak, S.Y.; Benbasat, I. (2006). The effects of personalization and familiarity on trust and adoption of recommendation agents. *Mis Quarterly* : 941–960.
Kwiatkowska, E.M. (2014). Rozwój Internetu rzeczy–szanse i zagrożenia. *Internetowy Kwartalnik Antymonopolowy i Regulacyjny* 8(3): 60–70.

Mącik, R. (2013). Technologie informacyjne i komunikacyjne jako moderator procesów podejmowania decyzji zakupowych przez konsumentów. Lublin: Wydawnictwo UMCS.
Mącik, R. (2014). Osobista innowacyjność w dziedzinie technologii informacyjnych a wirtualizacja zachowań konsumenta. *Marketing i Rynek* (nr 11 (CD)): 392–403.
Mącik, R. (2015). Courtesy shopping online-between digital exclusion and rational behaviour. *Economic and Environmental Studies* 15(2): 211–229.
Mącik, R.; Mącik, D. (2016). Trust and Product/Sellers Reviews as Factors Influencing Online Product Comparison Sites Usage by Young Consumers. *Managing Global Transitions* 14(2): 193–213.
Nov, O.; Ye, C. (2008). Personality and Technology Acceptance: Personal Innovativeness in IT, Openness and Resistance to Change. In: *Hawaii International Conference on System Sciences. Proceedings of the 41st* Annual: 448–448. Presented at the Hawaii International Conference on System Sciences.
Ożadowicz, A. (2014). Internet Rzeczy w systemach automatyki budynkowej. *Napędy i Sterowanie* 12: 88–93.
Venkatesh, V.; L. Thong, J.Y.; Xu, X. (2012). Consumer Acceptance and Use of Information Technology: Extending the Unified Theory of Acceptance and Use of Technology. *MIS Quarterly* 36(1): 157–178.
Venkatesh, V.; Morris, M.G. (2000). Why don't men ever stop to ask for directions? Gender, social influence, and their role in technology acceptance and usage behavior. *MIS Quarterly: Management Information Systems*.24(1): 115–136.
Venkatesh, V.; Morris, M.G.; Ackerman, P.L. (2000). A Longitudinal Field Investigation of Gender Differences in Individual Technology Adoption Decision-Making Processes. *Organizational Behavior and Human Decision Processes* 83(1): 33–60.
Venkatesh, V.; Morris, M.G.; Davis, G.B.; Davis, F.D. (2003). User acceptance of information technology: Toward a unified view. *MIS Quarterly* 27(3): 425–478.
Vermesan, O.; Friess, P. (2015). *Building the Hyperconnected Society: Internet of Things Research and Innovation Value Chains, Ecosystems and Markets*. River Publishers.
Wei, J. (2014). How wearables intersect with the cloud and the internet of things: Considerations for the developers of wearables. *IEEE Consumer Electronics Magazine* 3(3): 53–56.
Yi, M.Y.; Fiedler, K.D.; Park, J.S. (2006). Understanding the Role of Individual Innovativeness in the Acceptance of IT-Based Innovations: Comparative Analyses of Models and Measures. *Decision Sciences* 37(3): 393–426.

RADOSŁAW MĄCIK

Akceptacja internetu rzeczy przez młodych konsumentów – wyniki badań

Streszczenie

W artykule przedstawiono, na tle rozważań teoretycznych i przeglądu literatury, wyniki wstępnych badań młodych konsumentów na temat akceptacji tzw. *internetu rzeczy* (IoT) - traktowanego jako technologia tworząca nową jakość korzystania z technologii informatycyjnych przez konsumenci, pomimo zauważalnych kosztów jej wdrożenia i obaw związanych z prywatnością. Badanie zostało przeprowadzone za pomocą ankiety internetowej (CAWI), na celowej próbie 223 młodych konsumentów z Polski Wschodniej.

Głównym celem badania była eksploracja poziomu akceptacji technologii *internetu rzeczy* przez młodych konsumentów w Polsce oraz czynników wyjaśniających to zjawisko. W analizie wykorzystano jednozmiennową analizę wariancji (UNIANOVA) oraz oparte na kowariancji modelowanie równań strukturalnych (CB-SEM).

Obecny poziom akceptacji *internetu rzeczy* przez młodych konsumentów nie może być uznany za wysoki, pomimo stosunkowo wysokiego odsetka badanych posiadających urządzenia zaliczane do IoT (80% respondentów) Jednak aż 78% właścicieli urządzeń IoT nie zetknęła się z takim pojęciem, więc korzystanie to nie jest świadome. Uczestnicy badania deklarowali raczej wykorzystanie pojedynczych urządzeń podłączonych do internetu lub sieci domowej przez znane technologii (Wi-Fi, Bluetooth) nie widząc szerszego kontekstu takiego ich wykorzystania.

Wśród czynników wpływających na akceptację *internetu rzeczy* zidentyfikowano następujące konstrukty: oczekiwana wydajność i nawyk, jak również osobista innowacyjność w dziedzinie technologii informacyjnych (PIIT), które w modelu strukturalnym wyjaśniały behawioralną intencję wykorzystania *internetu rzeczy*. Ponadto dla niektórych grup urządzeń IoT znaczący był wpływ płci. Natomiast poziom deklarowanego dochodu, a także brak funduszy jako powód nie używania urządzeń IoT, nie miały znaczenia jako zmienne objaśniające akceptację *internetu rzeczy*.

Słowa kluczowe: internet rzeczy, IoT, konsumenci, akceptacja technologii informacyjnych, wstępny model