EXAMINING THE ROLE OF THE KNOWLEDGE GAP AS A DRIVER TOWARDS E-GOVERNMENT SERVICE ADOPTION

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Abstract
Using data from the multivariable, nationally representative Good State Public Administration Opinion Survey carried out in 2017 by the Institute for Research and Development on State and Governance at the National University of Public Service in Hungary, the aim of the paper is to test the hypothesis that the knowledge gap theory can be applied to the use of online public administration services: higher status equals not only wider and more sophisticated usage of ICT tools (and more awareness of trust in the Internet), but also more knowledge about public administration procedures themselves, which has resulted in various channel-preferences and routines among the users of different public services. The results show that the knowledge gap clearly exists in terms of public administration-related knowledge and it affects the choice of channels for managing administrative issues.

1. Introduction: the adoption of e-government services – a widely researched topic with some imbalances

1.1. The rich field of adoption of e-government services research

The adoption of different e-government services (the use of electronic/digital means instead of personal attendance) by private individuals and enterprises alike is one of the focal points of the rapidly expanding scientific literature on e-government. Van Dijk et al. [26] gave a good summary of the relevant theoretical frameworks that have been widely used in recent decades to describe and understand the proliferation of e-services (or even the lack of it) in the early stages of e-government development:

- The theory of Diffusion of Innovations (DOI) [21]
- Technology Acceptance Model (TAM) [10]
- Social Learning Theory [4, 18]
- The Theory of Technology Domestication [24]
- The theory of Reasoned Action (TRA) [12], or the Theory of Planned Behaviour (TPB) [1].

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Why people use or, conversely, do not use e-government services is a basic research question and as Aranyossy [3] put it, in the past decade the use of the UTAUT model (Unified Theory of Acceptance and Use of Technology) [27] gained acceptance in e-government literature, however, the TAM and the DOI are also popular among researchers who seek to construct technology acceptance models [e.g. 20]. However, many researchers think that the core factors of DOI and TAM are more or less identical: relative advantage can be substituted with perceived usefulness and complexity with perceived ease of use [9]. Shareef et al. [23] developed an e-government specific adoption model (*Figure 1.*), because in their opinion, TAM, DOI, TPB cannot capture and specify the complete essence of e-Gov adoption behaviour of private individuals (however, the model is a good summary of the relevant factors from *all* the models mentioned earlier). The e-Government Adoption Model (GAM) also takes into account the service maturity levels. If we take a closer look at the constructs, one additional and important element can be seen, which is trust.

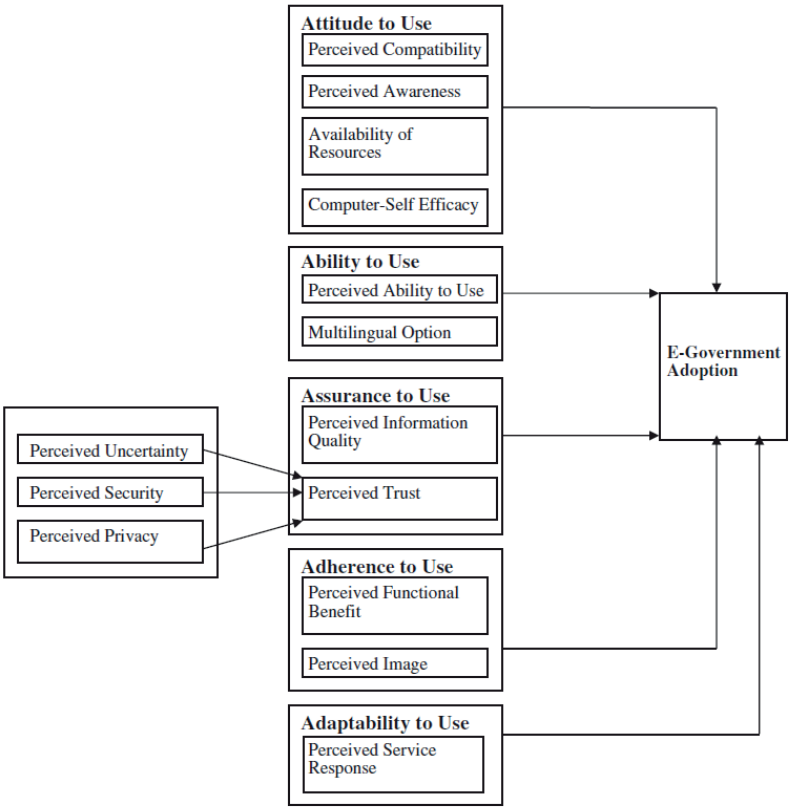

Figure 1. The e-Government Adoption Model (GAM [23])

The presence of trust is not surprising. In the literature dealing with e-government take up, almost every model contains or develops some kind of trust-related construct, which is regarded as a separate dimension in most research. Early research by Wang [28] examined factors affecting the proliferation of an electronic tax return system in Taiwan. The research was based on the TAM model, but expanded it with a "perceived credibility" dimension. The general tendency is to incorporate different constructions of trust into the explanatory variables in the use of acceptance

models. Lean et al. [19] tested a model based on the work of Carter and Bélanger [9] and Bomil and Ingoo [6]. The study integrates constructs from TAM and DOI which have been moderated by a culture variable (uncertainty avoidance) and a trust model in five dimensions (*Figure 2.*). Belanchea et al. [5] also proposed to integrate trust and personal values into the Technology Acceptance Model.

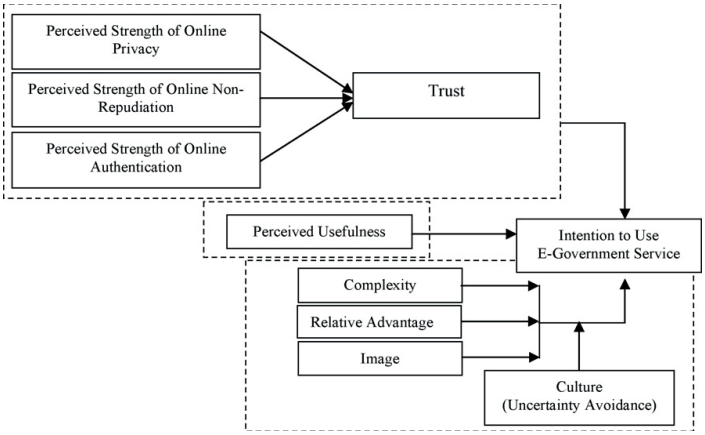

Figure 2. Theoretical framework used by Lean et al. [19]

Individual, personal characteristics became an important part of acceptance models, however, there are only a few studies that look beyond constructs related to technology (which is not surprising as the aim of the used models is to explain technology acceptance). However, other, public administration-related factors can be equally important in the adoption process. There are only a few constructs that appear in the developed models dealing with this topic. As can be seen in *Figure 2.*, Lean et al. [19] placed uncertainty avoidance in the model, which attempted to show discomfort related to complicated administrative matters and fear of possible errors and sanctions (even if its effect was not significant in their case). In the UTAUT model, individual characteristics are also present, where experience is an important factor, however survey data used for this paper show: in Hungary people have only dealt with 1.3 cases on average in the last three years before the survey. In that case, the majority of people do not have the opportunity to become familiar with public administration processes (digitally or not). The GAM model also partially and implicitly contains this aspect in the perceived information quality construct (information at the website is up-to-date, relevant and easy to understand).

Seo and Bernsen [22] were among the few who implemented the knowledge of public administration procedures as an enabling factor while they investigated the attitudes of non-users versus users toward e-government services in two locales. Starting from the original definition of self-efficacy, their hypothesis was that people prefer traditional government services over a counter if they are unfamiliar with and insecure about certain procedures (because they do not understand the procedure, the terms used in the documents etc.) as in that way they can gain support and guidance through the process. The basic knowledge about procedures can empower people to perform relevant tasks. Seo and Bernsen create the factor “perceived necessary knowledge” and define it as “the knowledge one perceives to be required in understanding related terms and

following a given procedure."[2] The construct is a determinant of 'perceived behavioural control' by Ajzen [2] and, as Seo and Bernsen [22] put it, it is important to include factors beyond perceived usefulness and perceived ease of use, because a person is not without limitation (s)he forms an intention to act: limited capabilities, time or environmental resources can limit the freedom or ability to act (and the self-efficacy factor can be seen as being an antecedent of perceived behavioural control).

The research conducted by Dimitrova and Chen [11] among American internet users has shown a strong relationship with the experience and technical skills of internet use and the use of e-government, and also show that personal attitudes toward uncertainty affect adoption. Familiarity with processes ("Prior interest in government", measured by earlier contacts with government officials in the past) was also a significant factor. This leads us to the knowledge gap theory which can contribute to formulating a more precise model of e-government service adoption.

1.2. Knowledge gap hypothesis – is it valid for knowledge about public administration services?

The core statement of the knowledge gap theory is that there is a discrepancy in people's level of knowledge about issues, which varies according to their socioeconomic status (SES) and it is caused by the different ways of engagement with mass media content. The theory was formulated in the early 1970's by Tichenor, Donohue and Olien [25]: "*As the infusion of mass media information into a social system increases, higher socioeconomic status segments tend to acquire this information faster than lower socioeconomic-status population segments so that the gap in knowledge between the two tends to increase rather than decrease.*" The theory also gave five reasons why the knowledge gap exists: 1) communication skills (more education improves reading and memory skills) 2) stored information/prior, already existing knowledge 3) relevant social contact (higher status people have more and more diverse social connections) 4) personal media reference (lower status people may be looking for less domains in the media) 5) resource structure (certain sources are targeted for their specific audiences).

Two narrative reviews of the knowledge gap-related literature [13, 14] and a meta-analysis of 46 knowledge gap studies [17] proves the existence of a knowledge gap. The analysis carried out by Hwang and Jeong also shows that the magnitude of this SES-knowledge relationship varies across different studies ranging from relatively weak to relatively strong, and moderated by the topic of knowledge. The review found that in the case of social-political issue knowledge (which does not equate with public administration knowledge, but could also show the relevance of the theory in this field), the knowledge gap is wider in comparison to other topics (e.g. health, science knowledge).

Bonfadelli [7] examined the knowledge gap theory in the internet era and found that the Internet may have a direct or indirect impact on every member of society as a whole, but those with a higher status also use it more quickly and efficiently, and states that the knowledge gaps in the digital media use may be more extreme than gaps in the uses of the traditional mass media. It can also be observed in the so-called "second-level digital divides", which refers to the gaps in usage skills that can persist after the divides of physical internet access have been overcome [15]. Hargittai and Hsie

[2] The construct of perceived necessary knowledge contained three items: "I had (expect to have) the knowledge necessary to follow the procedures of municipality eServices", "I had (expect to have) the knowledge to interact through municipality eServices", "I had (expect to have) the knowledge necessary to understand the underlying procedures and mentioned terminology in the municipality eServices"

[16] state that digital inequality can refer both to how existing social inequalities can affect the adoption and use of digital technologies, but also how differential uses of the Internet can influence social stratification. While Hwang and Jeong [17] found that there were no significant differences in the magnitude of the knowledge gap between the two time points in classical knowledge gap studies, this may change with the proliferation of interactive, digital media.

As demonstrated in the literature above, the examination of knowledge gaps in e-government service adoption can contribute to the comprehensive understanding of the phenomenon, and provides a wider understanding of the technology-oriented models. The main aim of this paper is – with secondary analysis of an existing database – to validate and conceptualise the knowledge gap theory as a contributor to perceived behavioural control.

2. Methodology

The empirical basis of the research is the Good State Public Administration Opinion Survey which was carried out in Hungary in the middle of 2017 by Szociometrum Social Science Research. The survey questions were tested on a representative sample for the adult (age 18+) Hungarian population. The sampling method was multistage, proportionally stratified probability sampling, while the database was also corrected ex post with matrix weighting procedure in respect to age, gender, region, settlement type and education. The Survey contained 70 questions, some with many sub-questions to explore many aspects of public opinion on public administration including the digitalisation of different procedures. Among others, the survey provided the opportunity to use a large (n=2506) representative database, with data about citizens' usage and experience of different areas of e-government services, their channel preferences and the obstacles they face while dealing with public administration procedures. During the construction of the questionnaire for the survey (as the first of its kind), there was no intention to build or test any adoption models, however many constructs that were presented earlier in the literature section of this paper can be examined. For this paper, three main constructs were built using the items of the questionnaire: trust in the Internet (using questions relating to the intention of giving personal/financial data on the Internet), the difficulty of dealing with public administration (containing items relating to perceived difficulties with communicating and with filling out forms, which can be treated as subscales) and intensity and variety of internet use. As Hwang and Jeong [17] put it, the measurement of knowledge (belief-type, awareness-type, factual-type) was also found to be a significant moderator of the knowledge gap in various studies. The difficulty of dealing with public administration constructs is based on perceived capabilities and therefore of a less factual-type, in that way the results may show a narrower gap. The original questions and the reliability of the scales (Cronbach's Alpha) are included in *Table 1.* The questions were measured on a Likert scale and was used for factor analysis to calculate the constructs (as they can be viewed as an interval scale [8]).

Trust in the Internet, privacy (Cronbach's Alpha: 0,849)	**Answer option**
I never give my bank account data while shopping online.	1-perfectly true …. 4-not true at all
I do not register on online platforms unless I have to.	1-perfectly true …. 4-not true at all
I am averse to giving my personal information on the Internet.	1-perfectly true …. 4-not true at all
There are some personal data of mine that I would not give even while registering on state organisations' websites.	1-perfectly true …. 4-not true at all
Difficulty of dealing with public administration (Cronbach's Alpha: 0,918)	
Official communication (Cronbach's Alpha: 0,895)	
How difficult is for you when conducting a formal/official telephone conversation?	1-I am unable to do it …. 4-I am easily capable of doing it
How difficult is for you to write an official letter?	1-I am unable to do it …. 4-I am easily capable of doing it
How difficult is for you to articulate your case in person with customer services?	1-I am unable to do it …. 4-I am easily capable of doing it
How difficult is for you to prepare a power of attorney?	1-I am unable to do it …. 4-I am easily capable of doing it
How difficult is it for you to commission a lawyer?	1-I am unable to do it …. 4-I am easily capable of doing it
Filling out forms (Cronbach's Alpha: 0,889)	
It is characteristic of me that I have difficulties in filling out official forms.	1-perfectly true …. 4-not true at all
It is characteristic of me that I have difficulties in understanding official forms.	1-perfectly true …. 4-not true at all
It is characteristic of me that I have difficulties in filling out the necessary data in official forms.	1-perfectly true …. 4-not true at all
It is characteristic of me that I have difficulties if I have to justify the data filled in official forms.	1-perfectly true …. 4-not true at all
It is characteristic of me that I usually ask for help in filling out official forms.	1-perfectly true …. 4-not true at all
Intensity and variety of internet use (Cronbach's Alpha: 0,802)	
How often do you carry out the following activities?	
searching online	1 – never …. 4 – almost every day
reading news online	1 – never …. 4 – almost every day
e-mail	1 – never …. 4 – almost every day
online messaging	1 – never …. 4 – almost every day
using social media sites	1 – never …. 4 – almost every day
VOIP	1 – never …. 4 – almost every day
Learning activities online	1 – never …. 4 – almost every day
shopping online	1 – never …. 4 – almost every day
selling online	1 – never …. 4 – almost every day
online banking	1 – never …. 4 – almost every day
managing public utilities	1 – never …. 4 – almost every day

Table 1. The questions and answer options used for the constructs of this study (Good State Public Administration Opinion Survey 2017)

3. Results

One of the main results of the survey was that one third of the respondents (32.5%) had not been involved in any public administration procedures in the last three years. This demonstrates the fact that e-government services cannot be "killer applications" because their rarity, and experience is hardly a relevant factor in this respect. Another important result was that the usage of e-government services was marginal in Hungary: 8.1% of the respondents said that they had used online services

to handle their cases in the last three years. The low proportion of e-government users emphasises the importance of further e-government service adoption-related research in Hungary.

3.1. The existence of the knowledge gap

Our hypothesis is that the existence of the knowledge gap can be observed both in the usage patterns of the Internet and also in the perceived capability to deal with public administration procedures (as a construct for examining public administration related knowledge). Both constructs were calculated in two ways in order to give a deeper understanding: for public administration knowledge, two subscales were also created (communicating with public administration, managing official forms), and the variety and intensity of internet use were further divided into basic, communicational and transactional factors (these distinctions can also be seen in *Table 2.*). To prove the existence of the knowledge gap, we examined our constructs against education, as the main predictor of socioeconomic status (*Figure 3. and 4.*).

As it can be seen in the literature dealing with the secondary digital divide, education significantly affects internet usage habits. As can be seen in *Figure 3*., there are huge discrepancies between people who have or have not at least completed secondary level education (among all internet users in the sample), and people with higher education can make the most out of the Internet. One important and unexpected thing is that people with only primary education use social sites and online actively (while not pursuing any other activities on the Internet frequently). It may provide an opportunity to target customer service to a customer base that is hard to achieve with digital means of communication. Trust in the Internet is showing the same patterns and moving together with the variety and intensity of internet use (this is partially caused by experience with transactional services in general). It shows that computer self-efficacy, a major factor in almost every e-government adoption models, is also deeply rooted in socioeconomic factors.

In terms of public administration knowledge/capabilities, a smoother, cascading transition can be observed (*Figure 4.*) between the educational groups, the more educated someone the less difficulties (s)he has while communicating with public administration or managing/filling out forms. In other words, lesser educated people need more help dealing with their public administration-related cases, so *we can state that the knowledge gap clearly (and significantly) exists in regard to public administration-related knowledge*.

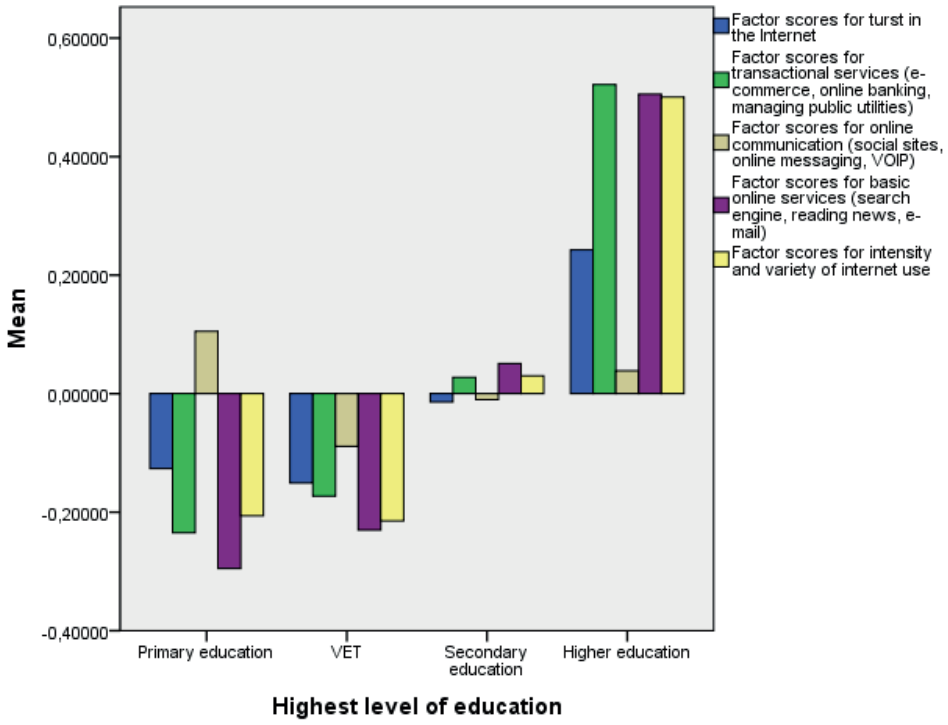

Figure 3. Trust in the internet and the intensity and variety of internet use (in three category and summarised) between educational groups (N=1651, Good State Public Administration Opinion Survey 2017)

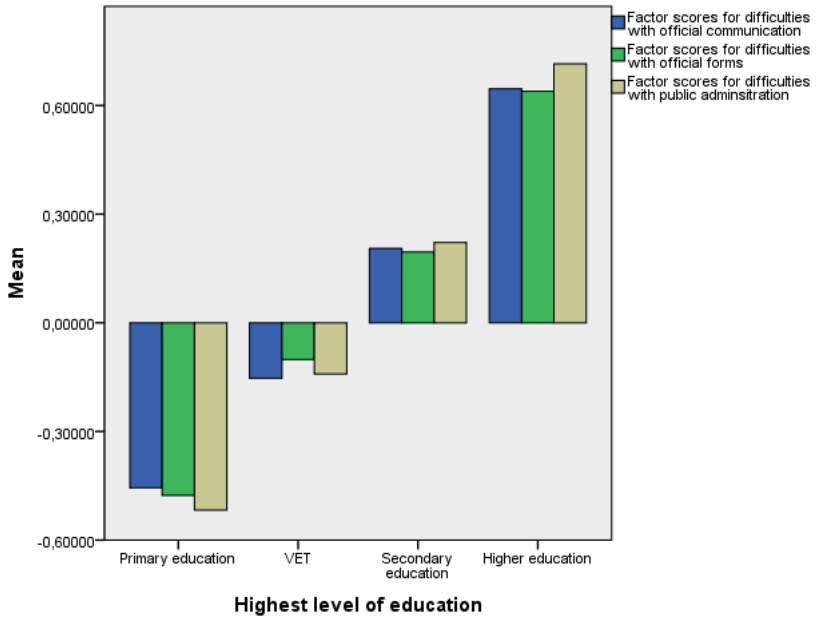

Figure 4. The difficulties with public administration (communication, managing forms and summarised) between educational groups (N=2380, Good State Public Administration Opinion Survey 2017)

3.2. The effect of the knowledge gap on e-government adoption and channel preferences

According to various questions on people's channel preferences (*Table 2.*) we can state that 60% of the regular internet user (!) respondents said that they try to avoid e-government services if possible, and 74% said of them that they prefer personal contact to the Internet. There are many factors that can contribute to these preferences (the heavy development of one stop shop Governmental Windows, the quality and quantity of currently available e-government services etc.), but we can state that the knowledge gap also plays a significant role.

	I try to avoid using online governmental services if possible (N=1667)	I would rather contact public administration in person than on the Internet (N=1660)
Entirely true	36%	52%
Mainly true	24%	22%
Mainly not true	20%	16%
Not true at all	19%	10%

Table 2. Channel preferences of internet users in the sample (Good State Public Administration Opinion Survey 2017)

As the intensity and variety of internet usage and difficulties with public administration case handling are also highly correlating factors, we could state that on the one hand, one is predicting the other, and on the other hand, e-government services - in order to gain more attention and usage - need to be not only easy-to-use, but have to provide guidance and hide potential complexity from the user (*Figure 5.*).

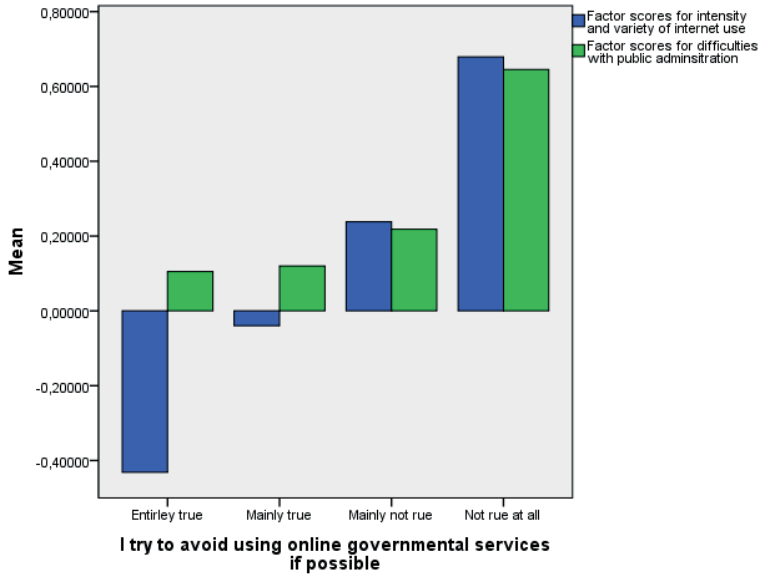

Figure 5. The avoidance of e-government services and factor scores of internet use and PA-knowledge (N=1603, Good State Public Administration Opinion Survey 2017)

4. Conclusion

In times, when a significant amount of public funding is used to develop e-government services (sometimes in parallel with customer service offices and physical one stop shops), to know how the knowledge gap (and other factors) affects e-government adoption or channel preferences is essential in order to optimally use resources. Using the representative database from the Good State Public Administration Opinion Survey the paper showed that a wide knowledge gap exists among Hungarian citizens in terms of public administration-related knowledge and consequently how they can deal with procedures relating to official forms and in communicating their cases. These gaps (together with the discrepancies in internet use) significantly influence the choice of channel for managing administrative issues.

In knowledge gap research, seeing only a given point of time and one issue is only sufficient to say that the gap does or does not exist. Further research is needed in order to compare the knowledge gap over time (widening, stagnating or shrinking) and also to examine not e-government as a whole but rather different cases or group of cases as they have different publicity and media coverage (e.g. the introduction of the widely advertised, proactive Electronic Personal Income Tax Return service). All in all, the knowledge about public administration procedures is an important contributor of e-government adoption and can be used to examine people's channel preferences that could help to optimise resources in public administration.

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