

Digital Divide in eGovernment: The eInclusion Gap Model

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Abstract. The Digital Divide is a matter of fact in most countries. For instance, senior citizens, citizens without employment, or citizens with low education utilise online services in a distinct way, often to a lesser extent. Within this paper, we examine how such digital divide groups make use of different online services. Here, four types on services are taken into account and contrasted with each other: Internet usage, E-Commerce usage, E-Government for Information and E-Government for Transaction. As a result, we develop the E-Inclusion-Gap Model which addresses gaps between such service-specific usage and we discuss possible reasons behind them.

Keywords: E-Inclusion Gap Model, Digital Divide, E-Government, Technology Adoption.

1 Introduction

E-Government (Electronic Government) is the key element to modernising public administrations. In the move of the Lisbon-Agenda, all EU (European Union) member states have committed to implementing an E-Government-oriented strategy of public administration modernisation. Web-based information and communication technologies are intended to become the primary channel for public service delivery. According to the European Commission [1], in 2004 an average of 84% of all public services was available online in the EU member states and 40% of such online services enabled transactional E-Government. For 2007, the average level of the sophistication of online government services is the transactional level [2].

Despite such positive efforts to provide (transactional) E-Government services, analyses of usage numbers and user structures indicate that digital exclusion today is primarily a demand side rather than a supply side issue [3]. Here, especially senior citizens, and people without employment or with low education are still very much excluded from participation in electronic services [4-6]. In June 2006, the EU ministerial conference declared to strengthen digital integration by E-Government (electronic inclusive public services), to include elderly people (E-Aging), to widely distribute electronic services (geographical digital divide), to increase accessibility of e-public

services (E-Accessibility), and to strengthen digital competency (E-Competency) and cultural diversity by digital integration (cultural E-Inclusion). Such strategy reflects in specific efforts to provide citizen-centric services [7], which aim at understanding the problems and issues of those who are supposed to use them.

While both recent literature and political practice acknowledge the variety of problem spheres behind non-usage of the Internet and, in alignment, E-Government (see, for instance [8-10]), there is little empirical explanation of which distinct factors impact on the E-Government inclusion gap and to what extent [11, 12]. Accordingly, it is not yet clear to a necessary extent which actors should be involved in and hold responsibility for what share of an inclusion strategy in order to overcome the digital divide in E-Government. Taking the example of Germany, we therefore seek to address the research question of:

“What is the current state of inclusive E-Government and which factors could explain a possible inclusion gap to which extent?”

In order to address this research question, the following section will relate our analysis to prior studies and the existing literature. Section 3 presents a model for detailed analysis of the E-Inclusion gap, after that the research methodology will be introduced in Section 4, focusing on a quantitative analysis of comprehensive newest Eurostat data from digital divide group perspectives. Following a comparative presentation and discussion of relevant data (Section 5), a comprehensive data interpretation shall offer explanations for inclusion gaps in (German) E-Government and identify potential operational strategies to overcome a digital divide in E-Government (Section 6). The paper will conclude with a summary of results and an outlook to potentially fruitful avenues for future research (Section 7).

2 E-Inclusion Related Work

The topic of E-Inclusion – participation for all in the digital, knowledge-based information society – has been gaining significant awareness across European public administrations with the upcoming of the European Commission’s strategic policy framework program i2010 and its implications for an inclusive information society. In June 2005 the i2010 EU initiative¹ was launched and devoted to a set of broad policy guidelines and prioritises three major policy fields: creating a single information space, fostering innovation and investment in research and technological leadership in the EU and promoting an inclusive European information society. Focusing on the third pillar of the i2010 initiative, social inclusion in the digital information society (E-Inclusion) becomes the key to an inclusive e-society. However, the i2010 initiative does not just suggest inclusion in general, but specifies priority issues, such as more inclusive public services, which leads us to inclusive E-Government.

With the Riga Ministerial Declaration [1], the European Commission has further specified this goal of E-Inclusion in an E-Government context. Here, E-Government, in a wider sense, is to be understood as information technology (IT) usage in governments/public administrations. Within this paper, we will focus on those elements of E-Government that involve the demand side in terms of citizens. Accordingly,

¹ http://ec.europa.eu/information_society/europe/i2010

E-Government here circles around the web-based electronic public service delivery. Such inclusive E-Government means, for example, that by 2010 all public websites are to be compliant with the relevant W3C common web accessibility standards and guidelines. Furthermore, it is stated that the design and delivery of key services and public service policies shall be user-centric and inclusive, “using channels, incentives and intermediaries that maximise benefits and convenience for all so that no one is left behind.” [1] Finally it also proposes to ensure “that electronic documents are available in such a way that they can be used by people with disabilities in an appropriate and, where possible, EU-wide recognised” [13] format. With these statements, declared by 34 member countries, E-Inclusion in E-Government or inclusive E-Government becomes a key issue in many EU countries. A major measurable goal, set by the Riga Ministerial Declaration – and also motivating this study on barriers for inclusive E-Government – is the ambition to address E-Inclusion by reducing “the differences in Internet usage between current average use by the EU population and use by elderly people, people with disabilities, women, lower education groups, unemployed and ‘less-developed’ regions” [1] by half, comparing 2010 to 2005. With our study we seek to contribute to this timely topic and identify possible rationales for existing E-Inclusion gaps, so that future studies can focus on how to properly address these barriers to inclusive E-Government.

Much related work on E-Government and E-Inclusion exist. Core questions in this field are, for instance, of E-Government barriers [14], user perception of E-Government initiatives [15], Digital Divide in E-Government [16].

3 E-Inclusion Gap Model

Starting point for our analysis of the digital divide in Germany and other European countries is the assumption that there are several factors influencing the usage of E-Government by citizens, e.g. costs, qualification or trust [17]. However, not all of these factors are exclusive to E-Government. Some address the participation in the information society in general. In order to perform a more detailed analysis of these factors we introduce an “E-Inclusion gap model”. In this model we distinguish different steps of participation in the information society and analyse the gaps between these steps.

The basis for taking part in the information society is access to the internet. Without this access, advanced services like E-Government or E-Commerce cannot be used by citizens. In the literature, access to the internet has been identified as an important factor influencing the adoption of E-Government, as well [18, 19].

Gap A (Total population – internet usage): Following the explanation above, the first gap in the model is the gap between the total population and the part of it using the internet. People in this gap do not take part in the information society as they are missing the basic requirement of access to the internet. Possible reasons for this gap are costs for internet access or mistrust towards the internet [17, 20].

The second figure used to analyse the barriers to the usage of E-Government is the use of E-Commerce by individuals. The usage of E-Commerce shows that an individual is willing and able to engage in more complex actions in the internet. Literature

points out similarities between the adoption of E-Government and E-Commerce [21, 22].

Gap B (Internet usage – E-Commerce usage): The individuals in this gap fulfil the elementary requirement of having access to the internet. However, they do not engage in transactions. Reasons for this might be security aspects [20, 23] or a lack of internet skills [24, 25].

The third figure of relevance in the model is the E-Government usage for information retrieval. In common models of E-Government service development the provision of information is the first step when deploying E-Government services [2]. Accordingly the retrieval of this information can be seen as the first step in using E-Government services.

Gap C (E-Commerce usage – E-Government usage for Information): People in this gap are performing transactions using the internet. Therefore they have the qualification necessary to engage in more complex actions and also no trust issues with the internet. However they do not participate in E-Government at all. This gap could be explained through a general preference for personal contact when performing government transactions or missing knowledge about the available E-Government information and services.

The fourth and last measure of the model is the usage of E-Government transaction. The use of transactional E-Government services by an individual marks the full usage of the potential of E-Government services. It therefore represents the desired for all individuals of an inclusive information society.

Gap D: (E-Government usage for Information – E-Government usage for transaction): Individuals belonging to this gap are aware of the presence of E-Government as they use it as an information source. However, they do not use E-Government for transactions. Possible explanations for this gap are missing trust in E-Government services [26, 27], deficits in the implementation of E-Government services or even the lack of transactional E-Government services.

4 Research Methodology

In order to answer the research question and populate the model, a comprehensive quantitative analysis of current Eurostat data from 2006 [28] on individual internet-based service usage was conducted. A methodological description of the survey is

Table 1. (Individual) Usage of Internet, E-Commerce, E-Banking, and E-Government and Corresponding Questions

Analysis Dimension	Question
Internet	I have used the Internet in the last 3 months
E-Commerce	I bought or ordered goods or services, over the Internet, for non-work use, in the last 3 months
E-Government for Information	I have used Internet, in the last 3 months, for obtaining information from public authorities web sites
E-Government for Transaction	I have used Internet, in the last 3 months, for sending filled forms

given by the European Commission [29]. While such data is secondary data and publicly available, a specific investigation into the in- and exclusiveness in European, and specifically German E-Government has not yet been undertaken. Consequently, the analysis of such comprehensive and high quality and comprehensive data (sample size: $n=21.160$) offers great potential to shed new light on the question of the status-quo of inclusive E-Government and on the question of which factors could explain possible inclusion gaps. Table 1 shows questions used to collect the data for the different variables.

Moreover, in order to allow for a deeper analysis of non-usage of E-Government services, reasons for non-usage (on an individual basis) are taken into account and range from non-availability of services over concerns about data security, privacy or costs to complexity of (electronic) public services (see Table 2).

Table 2. (Individual) Reasons for Non-Usage of E-Government and Corresponding Questions

Reason	Question
Service not available / to difficult to find	I'm not using Internet for dealing with public services or administrations, because: The services I need are not available on-line or difficult to find
Personal contact missed	I'm not using Internet for dealing with public services or administrations, because: I miss personal contact
Immediate response missed	I'm not using Internet for dealing with public services or administrations, because: I miss immediate response
Concerned about data security	I'm not using Internet for dealing with public services or administrations, because: I'm concerned about protection and security of my data
Concerned about additional costs	I'm not using Internet for dealing with public services or administrations, because: I'm concerned about additional costs
Too complex	I'm not using Internet for dealing with public services or administrations, because: it's too complex
Other reasons	I'm not using Internet for dealing with public services or administrations, because of other reasons

These two analysis dimensions (usage data and reasons for non-usage) are mirrored against potential digital divide group perspectives (besides population average: senior citizens of age 55 to 74, citizens with low education,² citizens living in thinly populated areas,³ and citizens without employment).

5 Data: In- and Exclusiveness in E-Government

Analysing in- and exclusiveness of electronic public service delivery in Germany, data regarding internet, E-Commerce, and E-Government usage was contrasted (Table 3). Here, distinct levels of interaction in E-Government were differentiated (E-Government for information, and transaction).

² Areas with up to 100 inhabitants per square kilometer.

³ ISCED Education Levels 0, 1 or 2.

Table 3. Usage of Internet and E-Government by population groups in Germany

	Total Population	Senior citizens (55-74)	Citizens with low education	Thinly populated areas	Unemployed citizens
Internet	69%	37%	61%	65%	66%
E-Commerce	38%	15%	29%	35%	31%
E-Government for Information	28%	12%	17%	22%	29%
E-Government for Transaction	9%	n.a.	5%	8%	7%

Source: Data based on Eurostat (2006).

Table 4. eService Usage Ratio of Digital Divide Group Onliners and Population Average in Germany

	Total population	Senior citizens (55-74)	Citizens with low education	Thinly populated areas	Unemployed citizens
Internet	1.00	1.00	1.00	1.00	1.00
E-Commerce	1.00	0.74 ^a	0.87	0.98	0.85
E-Government for Information	1.00	0.78	0.70	0.86	1.10
E-Government for Transaction	1.00	n.a.	0.56	0.91	0.76

Source: Data based on Eurostat (2006).

- a - eService Usage Ratio describes the relation of specific eService usage within a certain digital divide group to eService usage among the average population, e.g., (SeniorCit.-CommerceUsers/ SeniorCit.Onliners) / (Aver.Pop.E-CommerceUsers/Aver.Pop.Onliners); $(15\%/37\%)/(38\%/69\%)=0.74$

In order to analyse the role of certain digital divide groups regarding the in- and exclusiveness of German E-Government, group-specific data on internet, E-Commerce, and E-Government usage was examined (Table 4).

All digital divide groups feature generally lower usage numbers in all analysed dimensions compared to the German population average (single exception: informational E-Government by unemployed citizens). Senior citizens are most affected by the digital divide and show lowest usage numbers in all dimensions.

Even though citizens with low education use the internet less often than the average (low educated: 61%, average: 69%), the usage of E-Commerce, and E-Government is over-proportionally little. For instance, 55% (=average E-Commerce Usage/average Internet usage; $32\%/69\%$) of all population Onliners use E-Commerce, while only 47% of the Onliners with low education do so. Comparing these two groups, the Onliners' usage in E-Commerce (population average: 38%, low educated: 29%), and transactional E-Government (population average: 13%, low educated: 8%) provides a similar picture. Analysing the specific reasons for non-usage in such digital divide group perspectives led to the following key findings (see Table 5).

As for the population average, missing personal contact, concerns about data security, and the complexity of services are considered as major reasons for E-Government non-usage among digital divide groups in Germany. Concerns about data security were mentioned as reasons for non-usage of E-Government 1.27 times and 1.22 times more often by senior citizens resp. citizens from thinly populated areas than the population average. The complexity of E-Government services was mentioned as a reason for non-usage 1.24 times and 1.13 times more often by senior citizens resp. unemployed citizens than the population average.

Table 5. Reason for Non-Usage by Population Group in Germany

Relation to population average ^a	Total population	Senior citizens (55-74)	Citizens with low education	Thinly populated areas	Unemployed citizens
Service not available / too difficult to find	1 (21%)	0.78	0.96	0.99	n.a.
Personal contact missed	1 (48%)	1.08	0.92	1.04	1.03
Immediate response missed	1 (13%)	n.a.	1.04	0.94	n.a.
Concerned about data security	1 (40%)	0.93	0.85	1.03	1.11
Concerned about additional costs	1 (13%)	1.27	0.87	1.22	n.a.
Too complex	1 (24%)	1.24	0.95	1.01	1.13
Other reasons	1 (16%)	0.89	1.17	0.90	n.a.

Source: Data based on Eurostat (2006).

- a - Relation to population average used to highlight group specific reasons
E.g., 0.78 (Senior citizens, Reason: Service not available) represents 16% ($0.78 \cdot 21\% = 16\%$) of the senior citizens giving that very reason.

6 Discussion and Interpretation: Gap Analysis

Operational strategies for inclusive E-Government necessitate a specification of the inclusion gap. In order to be able to derive toeholds for operational steps to overcome the given inclusion gap in German E-Government, a detailed analysis of the inclusion gap is necessary. Here, full inclusiveness could be understood as (process towards the) ideal state in which the number of actual users of a certain technology or service converges towards the number of all of its potential users. In this context, the total population (100%) can be considered as the full potential of users. On the other hand, only 9% of such total population did use E-Government for transaction (within the given time frame). The resulting inclusion gap concerning E-Government in Germany, in the widest sense, comprises 91%. However, to answer the question of why 91% of the population did not use transactional E-Government needs further explanation and differentiation. Therefore, the E-Inclusion gap model, which was presented in section 3, is applied to the data for detailed analysis (see Figure 1):

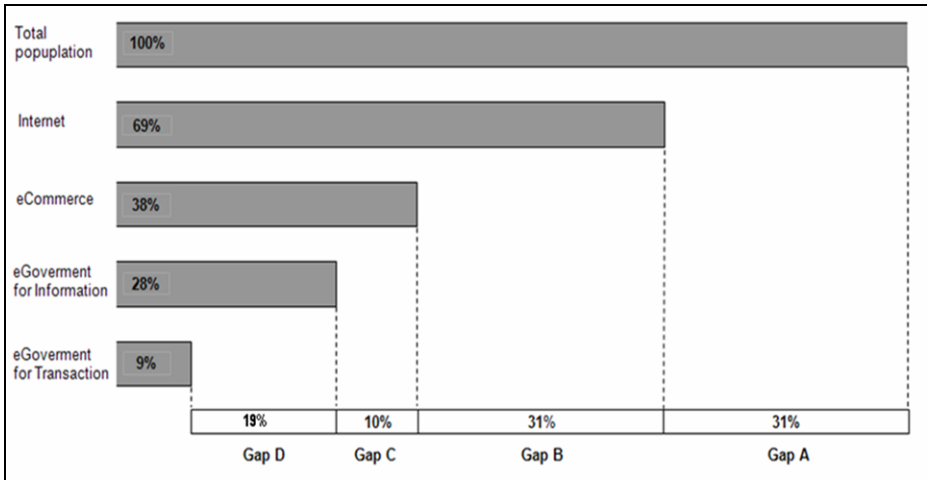


Fig. 1. E-Government Inclusion Gaps in Germany

Gap A: [Total Population – Internet Usage] In Germany, only 69% of the total population have used the internet (during the last three months). Consequently, a number of 31% of the population (Gap A) have not used the internet during this time frame. The following aspects could offer footholds for interpreting such inclusion gap:

Infrastructure. E-Inclusion literature offers several issues which might impact on infrastructure availability. For instance, internet and broadband connection is not given in some under-populated areas (see internet usage in thinly populated areas is 0.65; compared with 0.69 average).

Accessibility. Taking into account the social and socio-demographical view on inclusion, age and education influence internet usage. For instance, senior citizens (of age 55 to 74) did use the internet in only 37% of all cases, citizens with low education in 61% (compared with 69% population average).

Gap B: [Internet Usage – E-Commerce Usage] While 69% of the total population have used the internet (during the last three months) only 38% of the population have used it for buying or ordering goods over the internet. This leaves a number of 31% of the population being online but not utilising E-Commerce services (Gap B). The following aspects could offer footholds for interpreting this inclusion gap:

Security, trust, complexity. Besides such factors of infrastructure and accessibility (as discussed above), E-Commerce usage involves issues as security, trust, and service complexity [30]. E-Commerce habitually involves financial transactions and monetary investments, often requiring providing credit card details, security mechanisms, personal data etc. Here, for instance, 55% of all population Onliners use E-Commerce, while only 47% of the Onliners with low education do so. Moreover, only 41% of the senior citizen Onliners did use E-Commerce offerings during the last 3 months.

Gap C: [E-Commerce Usage – E-Government for Information] While 38% of the Germans used E-Commerce services (during the last three months) only 28% have used it for obtaining information from public authority websites (E-Government for Information). This leaves a number of 10% of the population being willing to utilise

E-Commerce but not E-Government (Gap C). The following aspects could offer toe-holds for interpreting such inclusion gap:

Marketing and marketability. Besides such factors mentioned above (e.g., accessibility, trust, complexity etc.) marketing and marketability of electronic public services might influence on E-Government non-usage. While commercial services are habitually higher frequented than governmental services, still 21% of the German population state as a reason for not using E-Government that the demanded services would not be available or would be hard to find. While commercial internet has already developed and made use of technology potential, such as amazon.com, ebay.com or diverse social network services, public sector offerings are still missing such 'killer applications'. The simple fact of missing marketing budgets for advertising E-Government services, at least in German public administrations, adds on to such E-Government inclusion gap.

Personal contact. 48% of the population is reluctant to make use of E-Government services due to missing personal contact. Interpretations could be that a) E-Commerce services are nowadays much more established and perceived to be on an adequate security level, b) E-Government services are a more sensitive field to the citizens, and/or c) E-Government services and their underlying processes are perceived as very complex and intransparent so that people seem to be in need of reliable and personal guidance through the complexity of administrative issues.

Gap D: [*E-Government for Information – E-Government for Transaction*] 28% of the German population made use of informational E-Government during the last three months, while only 9% conducted online transactions in this area. This leaves a number of 19% 'looking, but not booking' (Gap D). The following aspects could offer toe-holds for interpreting such inclusion gap [see also 31]:

Security and service complexity. While factors of security and service complexity have been discussed relating to transactional E-Commerce (38% usage), these issues seem to affect on transactional E-Government in an even stronger manner (only 9% usage). Here, 40% of the population name concerns about data security as a major reason for not using E-Government. Service complexity, mentioned in 24% of the cases, plays an evenly important role in non-usage behaviour. Regarding such complexity concerns, digital divide groups are strongly affected, e.g. senior citizens naming complexity as non-usage reason 1.24 times as often as the population average (unemployed: 1.13 times, thinly populated: 1.01 times).

Costs. Going hand in hand with security issues in E-Government, costs become an important reason of non-usage. This holds specifically true for transactional services which, in governmental fields, require rigid authentication and authorisation mechanisms. While E-Commerce often only relies on password or credit card details and E-Banking often utilises a PIN & TAN-method, transactional E-Government (in Germany) in most cases requires an electronic/digital signature. Investment costs regarding necessary equipment seem to be a major concern for senior citizens and people from thinly populated areas which mentioned costs as reason for non-usage of E-Government 1.27 respectively 1.22 times as often as the average population (giving this reason in 13% of the cases).

Taking into account these different inclusion gaps in German E-Government and their underlying currents, operational inclusion strategies have to be developed. This may include, for instance, general measures in order to further establish an inclusive

information society, e.g. measures to increase internet literacy, infrastructure projects etc. Such measures would increase the web usage among the population and/or specific digital divide groups (Gap A). On the other hand, one might also identify shares of the inclusion gap which might possibly be addressed by E-Government managers. For instance, corresponding measures could address creating a certain awareness among citizens for available services (Gap C) or engineering E-Government services in a way that they are less complex, easier to understand, bundled more accessibly [32], or guided by avatars, e-learning sessions etc. (Gap D).

7 Summary and Future Research

From the perspective of E-Government managers, there is an uncertainty of which measures to undertake in order to increase inclusiveness of electronic public service delivery. One can identify several problem streams, issues and barriers overlapping and adding upon one another creating the current picture of prevailing E-Government exclusiveness. But which measures are to be undertaken from the perspective of an E-Government manager, maybe on the local administrative level, and to which extent do such measures potentially impact in- and exclusion? Here, an analysis of different inclusion gaps in Germany, based on current Eurostat data, provided a more differentiated picture. 18% of the population make use of informational, but not transactional E-Government services. In this regard, concerns regarding service complexity, data security, and costs are mentioned as major reasons for non-usage. Such issues were even over-proportionally often named by senior citizens, people from thinly populated areas, and citizens without employment. Getting citizens 'from looking to booking' seems to necessitate measures aiming at the general population, but also measures taking into account specific digital divide group needs. Moreover, as 38% of the population utilise E-Commerce services, seemingly, e.g. accessibility, security, and service complexity issues did not hold back more than a third of the Germans from high value internet services. This leaves implications for E-Government managers to further improve electronic public services delivery and maybe also to stimulate an awareness for such services by means of marketing.

Further research might aim at collecting best-practices and successful projects on inclusive E-Government. Here, the analysis undertaken to identify specific inclusion gaps (E-Inclusion Gap Model) might help to structure such efforts.

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