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Diffusion of personalized e-government services among Dutch municipalities

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Abstract In this article, we investigate how and why various municipalities in the Netherlands adopt personalized electronic services. More specifically, we analyze the channels of communication and persuasion that are being used in the diffusion process. In order to do this, we analyze a time series of personalization prevalence in more than four hundred municipalities in the years 2006 through 2010 with a quantitative 'rate of diffusion'-model and conclude that diffusion of personalized e-government in the time frame 2006–2010 in the Netherlands can be explained both by municipalities mimicking each other (through horizontal channels of communication) as well as through initiatives from national authorities by means of benchmarking, legislation, and so forth (through vertical channels of persuasion). On the basis of these conclusions, new research directions in the field of e-government are indicated and discussed.

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1. Introduction

Various studies have shown that there has been a steady growth in the presence of electronic services offered by public sector organizations at various levels of government. The increase has been observed in OECD countries (OECD, 2009), European countries (Horst, Kuttschreuter, & Gutteling, 2007), the Arab world (Al-Nuaim, 2009) and, to a lesser extent, sub-Saharan African countries (Heeks, 2002; Schuppan, 2009). In the literature, specific attention has

been given to electronic government in American (Moon, 2002; Reddick, 2009) and British (Gilbert, Balestrini, & Littleboy, 2004) municipalities.

In the literature, the phenomenon of electronic government service delivery has been studied along a number of lines.

First of all, various authors have described various 'stages' or 'levels of maturity' in electronic government service delivery (Anderson & Henriksen, 2006; Layne & Lee, 2001), ranging from public sector organizations offering one-way transmission of static information, to organizations offering on-line transactions, to organizations offering integrated services (which incorporate information from sources external to the organization that the citizen interacts with

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in the first place). Recently, the idea of offering integrated services to citizens has been pushed a bit further by the discussion of *personalized* integrated services (Homburg, Dijkshoorn & Thaens, 2013; Pieterse, Ebbers and Van Dijk, 2007). Pieterse, Ebbers and Van Dijk claim that personalization could reduce administrative burden and, because personalized, one-to-one communication is generally more persuasive than broadcasted public service announcements, citizens' compliance to legal principles and duties implied by law can be enhanced.

Second, within the e-government literature, various studies have provided explanatory models of e-government adoption, and have identified city size, forms of (local) government, location, managerial orientation, management and financial capacity and collaboration as determinants (see Table 1 for a literature review). Some American authors refer to council-manager forms of (local) government as forms of government, which are more conducive to adopt e-government services than mayor-council forms of government. Characteristic for the former is that an elected council drafts legislation that is subsequently implemented by a CEO-like professional manager, with the mayor playing a predominantly ceremonial role.

In this article, we build upon the abovementioned research lines by explaining the diffusion of *personalized* electronic government services in a target population of more than 400 municipalities in the Netherlands in the time frame 2006–2010. At a practical level, such an explanation might aid local politicians, public managers and e-government project managers in enabling future e-government initiatives. At a more theoretical level, the identification of determinants of personalized electronic service delivery contributes to the literature on the adoption and diffusion of information and communication technologies and organizational innovations in general, and in the public sector in particular.

In order to do so, this article is structured as follows. In section two, the object of study, namely, personalized electronic government services, is defined and briefly positioned within the (public) management information systems and public administration literatures, and the field of study (municipalities in the Netherlands) is described. Section three offers a discussion of the institutional perspective adopted in this article and also presents two rival communication channels through which diffusion takes place. Methods and data are discussed in section four, whereas the analysis is reported in section five. Conclusions and discussion are presented in section six.

2. Personalization and personal service delivery in Dutch municipalities

2.1. Definition of personal electronic government services

Until recently, electronic government services were predominantly presented in a 'one size fits all' manner, presumably reflecting the idea that because many public services are universalistic – meaning that services should be available to each and every citizen – they should be

presented in a universalistic way. This mode of public service delivery has been severely criticized. As Leadbeater puts it, "many people's experience is that they are put on hold, kept at arm's length, not told the whole story, tricked by the fine print, redirected to a web site and treated like a number" (Leadbeater, 2004, p. 80). In an attempt to more or less fundamentally change this situation, e-government manifestations borrow ideas and insights from the marketing literature, and the New Public Management wave of reforms (Ho, 2002, Pollitt, van Thiel & Homburg, 2007; Homburg & Bekkers, 2012), in order to foster an actual citizen-centric approach to service delivery (Ho, 2002). In this context, Homburg refers to a 'marriage' between technological and managerial reforms in public administration (Homburg, 2008). According to Bekkers and Homburg (Bekkers & Homburg, 2005), an important political rationale for this orientation is the aspiration to overcome the crisis of institutions in representative democracy by restoring public trust in government and the legitimacy of public policies.

Key in this line of thinking is the notion of personalization and personalized services. In general, personalization as seen from the lens of marketing concerns itself with learning from customer preferences and past interactions in order to deliver a targeted product or service. One of the aspects of such an approach is that contacts are not automatically treated as if they were first time contacts, requiring again and again the submission of individual data supporting a request. By re-using data, it is hoped by the proponents of personalized electronic services that personal relationships between public service providers and citizens can be restored, or, in the words of Leadbeater (2004), to reconnect citizens to the public sector organizations that serve them.

Taking into account the above considerations, personal electronic government services – a subclass of the more general phenomenon of electronic government services – can be defined as those services that are offered by public sector organizations to citizens and corporations, that take into account previous interactions of citizens and corporations with government, and through authorization, profiling and customization, establish one-to-one relationships between public service providers and users. A practical example of a personalized service is a notification sent by e-mail to a citizen when a passport or driver's license is about to expire. Citizens may also be notified of building permits that have been issued to specific companies or other changes in the built environment in the direct vicinity of their homes.

In general, many obstacles have been reported in the literature that render the delivery of personalized services difficult, including socio-political problems of sharing information across traditional organizational boundaries (Homburg, 2008), existence of legacy systems (Pieterse et al., 2007) and problems of how to deal with privacy issues and Digital Acts (Lips, Hof, Prins, & Schudelaro, 2004). Nevertheless, there are ample examples of personalized electronic government services offered at national or federal levels include the Belgian MyMinFin e-tax initiative, the Danish borger.dk portal, the Estonian eesti.ee initiative, the French mon.service-public.fr website, the Norwegian Norway.no portal, the British direct.gov.uk site and the Dutch mijnoverheid.nl site.

Table 1 Review of explanatory e-government studies.

Author(s)	Dependent variable	Determinant(s)
Moon (2002)	E-government adoption (following Hiller & Belanger, 2001)	City size (economies of scale), council-manager forms of government
Holden, Norris and Fletcher (2003)	E-Government adoption (following Layne & Lee, 2001)	Citizen demand, form and type of government, geographical characteristics of city
Gilbert et al. (2004)	Citizens' willingness to use E-Government	Perceived time savings, financial security, trust, information quality, cost savings
Reddick (2004)	E-Government adoption (following Hiller & Belanger, 2001; Layne & Lee, 2001)	City size (economies of scale), council-manager forms of government, geographical location tangible benefits, separate IT department
Moon and Norris (2005)	E-Government effectiveness through e-government adoption	Managerial innovation orientation, financial resources, technical capabilities, city size
Norris and Moon (2005)	E-Government adoption (websites & online services)	City size (economies of scale), council-manager forms of government, geographic location
Horst et al. (2007)	Citizens' willingness to use E-Government	Perceived usefulness of services (determined by trust in government, risk perception)
Homburg and Dijkshoorn (2011)	Adoption of personalized service delivery	City size

In this article, we do not argue that personalized e-government service delivery is or should be a necessary next step; rather, we analyze personalized e-government services as a 'case' of diffusion of a specific innovation and analyze *how* the diffusion of personalized e-government service delivery takes place. We do so by analysing the diffusion of personalized services that may or may not be offered in a population of Dutch municipalities.

2.2. The population studied: municipalities in the Netherlands

In order to be able to actually explain the diffusion, we analyze the diffusion in a population of about 445¹ potential adopting municipalities in a single national jurisdiction, the Netherlands. The Netherlands can be categorized as a decentralized unity state (Esping-Andersen, 1990; Pollitt & Bouckaert, 2004) implying that municipal governments are relatively autonomous vis-à-vis central government with respect to issues of management, including the design and management of electronic services (van Os, 2011). At the central level, e-government initiatives are coordinated by the Ministry of the Interior and Kingdom Relations (services for citizens) and the Ministry of Economic Affairs (services for businesses). A Chief Information Officer (CIO) coordinates e-government initiatives that involve various ministries. Development and implementation of initiatives

that involve various layers of government (provinces, municipalities) takes place under the heading of the ICTU Foundation (which implements the National Implementation Programme i-NUP and is jointly governed by central and local governments) and the Logius agency (who owns and maintains infrastructural components like authentication facilities and is part of the Ministry of the Interior and Kingdom Relations). Municipalities may jointly purchase services under the heading of the GovUnited initiative. Furthermore, there are various forms of cooperation between municipalities and ministries in specific sectors like social security, policing, spatial planning, etc. These initiatives and organizations are mentioned here to illustrate that although municipalities are relatively autonomous, the development and management of ICTs including electronic services does not take place in a vacuum and that explanations that explicitly include contexts might be relevant in the explanation of diffusion of personalized e-government services (King et al., 1994).

3. Theoretical antecedents of diffusion

3.1. A functionalist theoretical perspective on diffusion

Diffusion of a new idea, product or service is defined as the spread of its use in a population of potential adopters (Rogers, 1995; King et al., 1994). The process of diffusion has been linked to characteristics of the innovation itself, the social system (community of potential adopters), channels of communication, and time (Rogers, 1995; Mahajan & Peterson, 1985).

¹ Note that population size has dropped from 458 (2006) to 431 (2010) throughout the time frame covered due to ongoing reorganizations and mergers, particularly of smaller municipalities.

In the literature, diffusion is customarily studied from a rational, functionalist point of view, Rogers' diffusion of innovations approach being a case in point, implying that generally, adoption of technologies by users is dependent on the end-user's attitude towards technology (i.e., the technology's perceived usefulness and perceived ease of use) (Venkatesh, Morris, Gordon, & Davis, 2003), and uncertainty in social networks (Burkhardt and Brass, 1990). Such an approach generally overemphasizes the eventual 'result' at the expense of the process that eventually results in adoption (see also Pettigrew, 1985). In rational, functionalist models of adoption and diffusion (e.g. Rogers, 1995) potential adopters figure as rather passive, entities, adapting to prevailing norms of either efficiency or legitimacy, without paying attention to ways in which actors reflect on external pressure to behave in a particular way, nor to the types of responses actors display in decision-making processes regarding the decision to adopt or not adopt a specific technology. In short, with the exception of studies by theorists like Orlikowski (2000), Czarniawska and Sevón (2005), Bekkers and Homburg (2005) and Homburg and Georgiadou (2009), 'agency' seems to be lacking in existing explanations (see also Orlikowski & Barley, 2001). Therefore, questions like *why* public sector organizations actually adopt (or fail to adopt) e-government innovations, and *how* organizations actually learn to innovate, are scarcely given attention.

3.2. An institutional theoretical perspective on diffusion: horizontal and vertical channels of persuasion

In order to remedy these drawback of functionalist theories of adoption and diffusion, we instead turn to theoretical lines of reasoning that emphasize that organizations (especially public sector organizations, Frumkin and Galaskiewicz (2004)) accept and follow social norms and seek long-term survival through legitimacy rather than efficiency and effectiveness (Orlikowski & Barley, 2001; Mignerat & Rivard, 2009). Zorn et al. (2011) have argued that, especially for non- and not-for-profit organizations, technological innovations are a means for establishing legitimacy in the eyes of key stakeholders as much as they are means for enhancing operational efficiency. Advancements in the disciplines of sociology and organization studies such as the emergence of the new institutionalism (DiMaggio & Powell, 1983; Tolbert & Zucker, 1996), have highlighted the legal system, cognitive structures, norms, and prevailing values in which innovation takes place. Institutionalism holds that adoption of innovations does not take place because individuals or (private as well as public organizations) organizations make rational, calculated decisions regarding costs and benefits (see, for instance, Venkatesh, Morris, Davis & Davis, 2003), but are under the influence of rules, conventions, principles, belief systems and social context criteria that together form the concept of *institutions*. Hence, institutionalism emphasizes the persuasive control over practices, beliefs and belief systems of individuals or organizations under the institution's sway (Kimberley, 1979 in King et al., 1994). Persuasion can be achieved not only through directives, but also through more gentle but nevertheless potentially convincing means like deployment of specific knowledge, subsidies

of activities deemed 'appropriate' by national government, standard-setting, raising awareness and generally promotion of specific technologies (King et al., 1994).

3.3. Conformity through vertical channels of communication: external influence

Various authors have explicitly or implicitly analyzed vertical channels of communication. Vertical channels of communication enable interactions between actors from a set of potential adopters (such as municipalities) and actors outside this set of adopters (such as national, central governments, or knowledge brokers operating on behalf of central governments, or citizens speaking up to local governments, demanding improved levels of quality of public services). Here, one assumes 'external' influence on adoption decisions. Through these vertical channels of communication, actors external to adopters exert persuasive control over the adoption of innovations (such as personalization of electronic services) and adopters (in this case municipalities) are supposed to be responsive to persuasive control from superior hierarchical levels, or from persuasion control exerted by citizens, businesses and societal groups.

In explorative, qualitative studies of adoption of personalization (Homburg, Dijkshoorn & Thaens, 2013), it has been observed that key stakeholders within municipalities explicitly acknowledged the existence of persuasive pressures from other actors than municipalities. As one key stakeholder stated:

"... a clamour for service provision, less bureaucracy, transparency: that is external pressure, as I perceive it. (...) Simply because society does not tolerate other kinds of organizational behaviour ..." (Councillor)

Adoption that takes place through vertical channels of communication can be modelled by assuming that adoption at any time is supposed to be dependent on the number of potential adopters that has yet to adopt the innovation (Venkatraman, Loh, Koh, 1994) and prior adopters do not influence potential adopters. Thus, adoption begins rapidly and slows down as the number of adopters increases. The formal description of this model is presented in Table 2.

3.4. Conformity through horizontal channels of communication: internal influence

As opposed to vertical channels of communication and persuasion, Rogers (1995); see also Leonard-Barton and Rogers, 1981; Moon & Bretschneider, 1997; Bobrowski & Bretschneider, 1994) has identified horizontal channels of communication. Horizontal channels of communication enable interactions among actors that are in a set of potential adopters. Here, we refer to internal influence on adoption decisions. By doing so, horizontal channels of communication give way to persuasive communication between adopters and potential adopters, through which innovations are promoted and eventually, mimicking may take place (DiMaggio & Powell, 1983). This form of diffusion, which takes place as a result of persuasive communication within a set of (potential) adopters, is also referred to as

Table 2 summary and formal descriptions of three rival diffusion models.

Labels	Formal description of model
External influence (Mahajan & Peterson, 1985; Mahajan, Muller & Bass, 1990), diffusion through vertical channels of communication	$dN_t/dt = p[m - N_t]$ which (after integration) equals to the adoption function: $N_t = m[1 - e^{-pt}]$ N_t: cumulative number of adoption at time period t p: coefficient of external influence ($p > 0$) m: number of potential adopters ($m > 0$)
Mixed influence (Bass, 1969)	$dN_t/dt = [p + q \cdot N_t][m - N_t]$ which (after integration) equals to the adoption function: $N_t = m[p(m - m_0)/(p + q \cdot m_0)] \cdot e^{-(p+qm) \cdot t} \cdot [1 + [q(m - m_0)/(p + qm_0)] \cdot e^{-(p+qm) \cdot t}]^{-1}$ N_t: cumulative number of adoption at time period t p: coefficient of external influence ($p > 0$) q: coefficient of internal influence ($q > 0$) m: number of potential adopters m_0: number of adopters at $t = 0$
Internal influence (Mahajan & Peterson, 1985), 'word of mouth' diffusion (Wang & Doong), imitation (Loh & Venkatraman, 1992), institutional isomorphism (DiMaggio & Powell, 1983), diffusion through horizontal channels of communication	$dN_t/dt = q \cdot N_t[m - N_t]$ which (after integration) equals to the adoption function: $N_t = m / (1 + ([m - m_0]/m_0)e^{-qmt})$ $N(t)$: cumulative number of adoption at time period t q: coefficient of internal influence ($q > 0$) m: number of potential adopters m_0: number of adopters at $t = 0$

'word-of-mouth' diffusion (Wang & Doong, 2010) and is also described as the spread of 'fashion' (including management fashions and technological fashions, which may or may not contribute to functional ends (like fashion may or may not be functional to wear). Moreover, persuasion may take the form of emphasizing specific attributes of an innovation in general (like, in the case of personalized service delivery, expected increased levels of customer satisfaction), but it may also entail persuasion in terms of less benevolent properties of, for instance, scoring higher on benchmarks with which the performance of peers is assessed. In qualitative, exploratory research (Homburg, Dijkshoorn & Thaens, 2013), one key stakeholder phrased it like this:

"To score well is felt to be important within municipalities. How often is your municipality mentioned in professional journals, are you in the Top 3.... that is considered to be very important" (Manager of service provision)

The fact that municipalities keep a sharp eye on benchmarks and rankings sometimes results in somewhat perverse

incentives to adopt personalized services, such as one respondent noted:

"Our decision to implement personalized service delivery was due to our low ranking ... Our councillor wanted to improve our ranking, and we found out that we could improve our ranking quite easily by implementing a Personalized Internet Page ... and so we did" (Project manager).

Innovation by means of mimicking, through horizontal channels of communication, is likely to occur under the conditions that the innovations are socially visible (Mahajan & Peterson, 1985; Dos Santos and Peffers, 1998), causes, conditions and consequences are known (absence of causal ambiguity, Barney, 1991; Loh & Venkatraman, 1992) and the success of the innovation is unlikely to be determined by path dependencies (Barney, 1991; Loh & Venkatraman, 1992). Adoption at any time in this line of reasoning is related to the number of adopters that have already adopted, as well as the number of potential adopters (see Table 2 for a formal description).

Table 3 Prevalence of personalization attributes in Dutch municipal e-government services.

	2006 (n = 458)	2007 (n = 443)	2008 (n = 443)	2009 (n = 441)	2010 (n = 418)
DigiD authentication	20.7%	56.7%	76.3%	88.2%	94.6%
Personalized newsletter	16.4%	21.2%	21.2%	N/A	27.9%
Tracking & tracing	10.0%	16.0%	28.2%	26.5%	41.3%
Payment	15.9%	42.4%	61.4%	80.0%	91.6%
Pre-completed forms	N/A	N/A	17.8%	19.1%	33.9%
Personalized counters (MyGov.nl)	5.2%	14.2%	23.7%	28.8%	40.9%
Personalized policy consequences	N/A	N/A	19.4%	18.7%	22.2%

Bass (1969), see also Venkatraman, Loh, Koh, 1994; Dos Santos and Peffers, 1998) has also identified a mixed-influence model as a rival model to both the internal as well as the external model and in which adoption is both determined by vertical as well as horizontal channels of communication and persuasion. The formal description (Table 2) yields an asymmetrical S-shaped adoption function in which external influence results in more rapid early adoption than with imitation alone.

In order to explain the diffusion of personalized e-government services among relatively autonomous Dutch municipalities, we use the formalizations depicted and explained in Table 2 to fit three diffusion-of-innovation models for the purpose of comparing and specifying relevant communication and persuasion channels in the adoption of personalized e-government services, and to test which hypothesized diffusion mechanisms are likely to occur in the case of diffusion of personalized electronic government services among Dutch municipalities.

4. Methods and data

The data that are used in the analysis was gathered by ICTU, a Dutch public joint venture set up by the Association of Dutch Municipalities (VNG) and the Ministry of the Interior and Kingdom Relations, for the purpose of reporting on characteristics of e-government service delivery by Dutch municipalities (for comparable US initiatives and methodology, refer to McClure & Sprehe (2000) and handing out awards for the best performing municipalities. For the study reported on in this paper, researchers requested and received permission to use the data set for their purposes. Subsequently, the data set was also published as open data on the Dutch national open data repository (<https://data.overheid.nl/data/dataset/overheid-nl-monitor-data-gemeenten>). The original data set consisted of annual data covering the time interval 1999–2010. However, data on personalized service was only recorded from 2006 to 2010, a time interval that also marks two elections and thus implies that no major political changes have occurred in municipalities in this time frame. For the analysis reported in this paper, data was extracted from the various annual data, limited to the time frame 2006–2010 and only relating to attributed of personalized service delivery.

By doing so, time series (consisting of five consecutive observations) of adoption rates of personalized service

delivery (more specifically: the adoption of so-called personalized (electronic) counters) in the population of Dutch municipalities could be constructed. Although a time series consisting of five observations can be regarded as a small series (especially when one takes into account that monitoring of data occurred in a larger time interval of 13 years, covering the period 1999–2012), the data satisfies the minimum of five consecutive observations that the fitting procedures described in Table 2, require (Mahajan & Peterson, 1985). In order to actually carry out the fitting procedures, basic statistics software was used². The fitting procedures make use of tests developed by Davidson and MacKinnon, 1981 to choose between alternative models that purport to explain the same phenomenon (Hu, Saunders & Gebelt, 1997). The analytical procedure is as follows:

- (1) parameters of alternative models are estimated;
- (2) all models are tested against the null hypothesis that diffusion is a random event (White Noise), and
- (3) remaining models are contrasted to determine the best diffusion model (Hu, Saunders & Gebelt, 1997; Wang & Doong, 2010).

5. Analysis: explaining the diffusion of personalized e-government

5.1. Description of personalized e-government services in Dutch municipalities

Table 3 lists the prevalence of attributes of personalized electronic service delivery by Dutch municipalities in the years 2006, 2007, 2008, 2009 and 2010. Overall, in the time frame covered, there is an increase in the offered possibility to use DigiD authentication (from 20.7% in 2006 to 88.2% in 2009) and on-line payment (from 15.9% in 2006 to 80% in 2009). Growth of possibilities for receiving personalized newsletters, using pre-completed forms, assessing personalized policy consequences and using personalized counters lag somewhat behind.

² SPSS 16.0 and Marketing Engineering extensions of Microsoft Excel.

Table 4 Parameters for best fit for e-government personalization adoption in municipalities in the Netherlands 2006–2010.

	Influence model		
	External	Internal	Mixed
p	0.11	–	0.079
q	–	0.04	0.000
Adjusted R^2	0.96	0.94	0.50

5.2. Models of diffusion

To determine which influence model best explains adoption, we fit each of the three models described in Table 2 using an iterative non-linear sum of squared residuals regression analysis³ and apply it to the time series of prevalence of personalized counters (see Table 4). The criterion used to determine whether the null hypothesis (stating that diffusion is a random event, and that both diffusion through horizontal channels of communication, as well as diffusion through vertical channels of communication can be ruled out) can be rejected is based on assessing R^2 value and the absolute p - and q -values (for a more elaborate discussion of why significance levels are not being used here, see Mahajan & Peterson, 1985).

As all R^2 indicate a reasonable fit, and p and q estimates are all positive, additional procedures must be taken into account as to compare alternative diffusion models. In a pair wise comparative test, if one or more of the alternative models fails to reject the White Noise model, there is no need to proceed further (Mahajan & Peterson, 1985; Hu, Saunders & Gebelt, 1997). From Table 5 it can be concluded that all three rival models can reject the null hypothesis (which states that diffusion is a random event).

This leaves us the task of determining which of the three alternatives, if any, is the best model that explains diffusion. In order to determine the best explanation, the p -test is used, which determines the truth of H_0 in the presence of an alternative model H_1 (Hu, Saunders & Gebelt, 1997). In any one of the paired confrontations, if α is statistically no different from zero, then H_0 is the true model.

From the results depicted in Tables 4–6 and following the fitting procedures described above, it can be concluded that the White noise model can be rejected and we can assume that diffusion through channels of communication takes place. However, from the results of the p -test reported in Table 6, we can also conclude that we cannot decide on a ‘winning’, fitting model: we are not able to fundamentally rule out either internal influence (assuming mixed influence, or external influence), or any other eventual preference for any single explanatory model. Based on the values in Table 4, and because of the rejection of the White Noise hypothesis, we conclude that horizontal and vertical channels of communication and persuasion can be identified in the diffusion of personalized e-government in the time frame 2006–2010 in the Netherlands.

6. Discussion and conclusion

This paper has explored the process through which public organizations – or rather Dutch municipalities – adopt personalized e-government services. In so doing, it builds upon an institutional tradition of technology diffusion in which technology diffusion and adoption are not associated primarily with individually rational cost/benefit considerations, but rather with organizations’ attempts to cope with a variety of prevailing norms, values, belief systems and rules that are imposed upon them. One notable conclusion is that municipalities are confronted with channels of persuasion that are both vertical (stemming from beyond the set of potential adopters) and horizontal (related to reputation and rivalry considerations that stem from within the set of potential adopters).

One important finding of our research is that municipalities are confronted with horizontal and vertical channels of communication and persuasion, by which pressure (in the form of citizen demand, legislation, rivalry, and relative performance as compared to other municipalities) is put on municipalities to adopt innovations and to gain legitimacy.

The line of reasoning, analysis and conclusions reported in this paper raise a number of new issues and research questions that can be addressed to the e-government research community.

The first one is that in the research reported in this paper, persuasive pressures were analyzed in the specific state regime of the Netherlands, which can be described as a decentralized unitary state. However, power relations and institutional structures can be quite different in other state regimes, such as a decentralized state structure or a centralized state structure. For instance, it can be hypothesized that in a centralized state structure, vertical channels of communication and persuasion dominate over horizontal ones, and that in decentralized state structures, inverse hypotheses can be proposed. Empirical, comparative research is needed to test these hypotheses and to reveal differences and similarities in channels of persuasion across various jurisdictions and state regime structures.

The second one is that, as a strand in the literature known as the Scandinavian Institutionalism (Czarniawska & Sevón, 2005), innovations can be viewed as ‘ideas’ as much as they can be viewed as artefacts. In order for ideas (such as ‘personalization’) to spread (either through internal or external influence) they must be translated into myths or success stories. As such, it may be very relevant not only to study innovations as discrete entities, but as more dynamic ‘ideas’ that may change form and shape during the actual adoption process (Czarniawska & Sevón, 2005), in a process of interaction that involves knowledge brokers, experts, public service managers and politicians. A more qualitative understanding of the actual diffusion process might shed more light on the social and dynamic aspects of the process of diffusion.

The third one is a research direction that stems from the resource-based view on the firm (Winter, 1987; Zahra and George, 2002), that suggests that the so-called appropriability regime (the extent to which organizations are risk averse, or willing to accept ambiguities inherent in adoption and diffusion of innovations) influences the process of adoption and diffusion. Detailed empirical research is needed to

³ We used SPSS 16.0 in combination with the Marketing Engineering utility for Excel.

Table 5 Model comparisons against White noise model.

	Alternative models		
	Internal influence	Mixed influence	External influence
H_0 : White noise	$t = 3.116$ ($p < 0.05$)	$t = 2.830$ ($p < 0.05$)	$t = 2.879$ ($p < 0.05$)

Table 6 Model comparisons among alternative diffusion models.

	Alternative models		
	Internal influence	Mixed influence	External influence
H_0 : internal influence	–	$t = .89$ ($p = .438$)	$t = 1.10$ ($p = .349$)
H_0 : mixed influence	$t = -0.05$ ($p = .962$)	–	$t = .394$ ($p = .72$)
H_0 : external influence	$t = -.439$ ($p = .69$)	$t = 0.113$ ($p = .917$)	–

furthermore unravel the intricate sub-processes beneath more general notions of aspects of diffusion and adoption.

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