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# Strategic Aspects for Successful E-Government Systems Design: Insights from a Survey in Germany

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**Abstract.** The maturity of e-government implementation in research and practice has developed tremendously over the years. Nevertheless, the challenges encountered and the overall growth of e-government in different countries varies; studies by organizations such as the UN and World Bank evidence these variations. To successfully implement e-government, governments are required to deepen their understanding of aspects such as benefits, challenges and success factors. Contributing to this knowledge and understanding, the paper investigates factors framing successful design and implementation of e-government systems. The paper presents and analyses the literature and results from an e-government inquiry in Germany. The paper highlights important factors for successful implementation of e-government and also presents opinions on strategic aspects for e-government systems design with reference to Germany. It finally highlights the need for further research in the domain.

**Keywords:** e-government strategy, e-government design and implementation, benefits, challenges, success factors

## 1 Introduction

Since their beginning, e-government research and practice have matured tremendously over the years, with governments opting to fully utilise the opportunities and benefits of implementing electronic government (e-government). Dynamic developments and resulting innovativeness of information and communication technologies (ICT) largely contribute to the way governments deliver their services to the public. With the increasing desire of realising good governance principles (see [25] for a definition of good governance principles) in e-government implementations, more and more countries transform their governments from traditional forms of paper-based and unconnected organisations to seamless and networked ‘e-’governments. Through recognising the potentials of e-government to improve public service delivery and to achieve good governance principles, governments all over the world have initiated strategies to support e-government implementations. However, the pace at which governments mature in implementing e-government varies immensely. International studies such as an UN e-government survey [29] and a World Bank publication on ICT [33] evidence such variations as most developed countries mature far ahead of developing countries in the up-take of e-government services. Therefore in addition to

the enormous amount of available research, where principles for successful implementation of e-government systems are presented, it is imperative for further research to be conducted to determine the differences in approaches of implementing e-government with country-specific challenges and success factors. This will complement practices in different countries and help understand how these can be transferred from one country to another.

This paper aims to investigate strategic approaches and the understanding of e-government benefits, challenges, and success factors, which are important to successful design and implementation of e-government strategies with reference to Germany. An empirical research conducted among experts attending an e-government event investigates strategic aspects for e-government systems design. In particular, we aimed at receiving feedback and obtaining further understanding of strategic aspects for e-government systems design such as challenges and success factors, which need further investigations and particular attention. Prior to empirical investigations, relevant e-government literature was studied to gain an understanding of different factors influencing e-government development and implementation.

The remainder of the paper is as follows: the next section provides insights into current literature identifying distinct factors influencing e-government development and implementation. In section 3, we detail the research methodology for the study. The results of the survey are presented in section 4. We then discuss the findings with respect to the literature review in section 5 and conclude with final remarks and future research in section 6.

## **2 E-government development and implementation: a literature review of strategies, benefits, challenges and success factors**

Governments continue to initiate e-government strategies with the aim of successfully transforming public sectors into technology-savvy organisations in order to realise the benefits of ICT in public sectors. E-government strategies describe in detail the implementation of e-government by setting objectives, which are further elaborated into programs and subsequently in projects [23]. With the different and changing foci of e-government strategies, attributed by factors such as political interests and financial capabilities among others, it is inevitable also to understand the different approaches adopted by governments to implement their strategies. A study of e-government implementation approaches by OECD unveils the importance of a centralised approach, but - even more importantly - a relationship between centralised approach and coordination with decentralised actors. According to this study, *“the e-government planning process within the central government helps to establish and diffuse the vision and to translate it into goals and targets. Goals serve not only to provide a direction for action and achievement, they can also be used to prioritise and even advance action. Government-wide planning and the setting of objectives can also improve coordination between government organisations, serve to establish criteria for reconciling conflicting approaches and signal preferred approaches and shared resources for overcoming challenges”* [25].

Literature studies further unveil that the on-going efforts of governments initiating e-government strategies imply that the benefits of ICT in the public sector are increas-

ingly acknowledged. Besides other resulting benefits of e-government, ICT is more and more viewed as a tool for seamless and improved interrelations among government organisations, among governments and businesses, and among governments and citizens. Literature study of e-government benefits identified the following: improved efficiency and effectiveness in public processes [2] [4] [8] [15] [17] [19] [22] [24]; cost-effectiveness in public service provision [2] [4] [19] [24] [27] [28]; enhanced quality of public services [2] [4] [19] [22] [24] [27] [28]; increased transparency and accountability [2] [4] [24] [27] [28]; integrated government processes [2] [4] [24] [27] [28] [32]; cost-effective access of public services [19] [22]; ease of access to information [6] [22]; creation of a more knowledgeable society [6] [21]; and reduced corruption [2] [4] [24] [27] [28], which is more reported in literature investigating benefits of e-government in developing countries.

In addition to investigating e-government benefits, the challenges encountered were studied. Many e-government implementation challenges are reported in literature, which are often classified as financial, economic, technological, social and cultural challenges [14] [17] [24]. In a recent study, we outlined thirteen e-government challenges from nine literature studies [23]. Similar to the different ways, in which governments realise e-government benefits as reported earlier, e-government challenges seem to vary in different countries, too. This implies that e-government challenges in respective countries and their ways of addressing these challenges need to be analysed.

Finally, factors contributing to successful implementation of e-government were investigated. Numerous studies have highlighted success factors (see e.g. [3] [10] [13] [15] [17] [19] [23]). Considering the extent of investments and commitment required for successful and sustainable development of e-government endeavours, most scholars point out the importance of political support to e-government implementation [1] [4] [7] [9] [12] [23] [24] [28]. The presence of legal and interoperability frameworks are also regarded as important factor, which should ensure seamless integration of processes and improved coordination among organisations [4] [15] [24] [26].

Based on the literature review studying aspects influencing and contributing to successful development and implementation of e-government, a survey was developed to collect insights on strategic aspects for successful design and implementation of e-government systems. The next section introduces the research methodology, followed by summarizing the insights of the inquiry in Germany (section 4).

### **3 Research Methodology**

Based on the research objective outlined and the review of literature, a qualitative research approach was used to study e-government development and implementation aspects from German practitioners and academicians along an e-government event.

The objective of the study was to gain an understanding of e-government aspects from the perspective of German experts as outlined in the introduction. In such an exploratory study according to Flick et al., qualitative research is suitable to provide the basis of gaining such understanding and describe a phenomenon from the point of view of participants [11]. Germany was used in this study because one key country selected in the overall research works is Germany. The research method selected for

this study was survey using a paper-based questionnaire as data collection method. The questionnaire was designed to capture relevant information and understanding of different aspects identified in literature (cf. section 2) and to gain insights from experts. The questionnaire consisted of eleven questions, with most questions being open-ended, which were assembled in five thematic parts with links and relationships among questions. The first part investigated demographical information of respondents, the second part investigated e-government benefits and challenges, the third part investigated development aspects of e-government, the fourth part investigated e-government supporting frames and the fifth part investigated recommendations for successful design and implementation of e-government systems. The questionnaires were distributed in person to respondents attending an e-government event in Koblenz, Germany. The attendees included e-government experts from academia, private and public sectors. Among 15 questionnaires distributed, 8 questionnaires were returned and used for analysis. Among the unreturned questionnaires, three respondents reported that they do not understand English well, one respondent reported that the questionnaire was too long and three respondents did not provide any feedback.

Qualitative data analysis was used to investigate insights from literature and from the answers to open-ended questions to determining similarities, differences and patterns in responses. The results of the inquiry are summarized in the next section.

## 4 Results and insights from the survey

The first part of the questionnaire aimed at investigating the background of respondents necessary for analysing responses provided therein with respect to the influencing factors leading to the responses. Among 8 respondents, 5 respondents are ICT practitioners in the public sector with an experience in e-government ranging from 20 to 4 years. 3 respondents are academics with an experience in e-government ranging from 8 to 1.5 years.

Next, respondents were asked concerning the benefits of e-government implementation presented in literature, with respect to Germany. Further, the level at which the benefits are realised in Germany should be assessed. All respondents indicated that they are aware of the benefits of e-government implementation and they rated benefits of e-government as shown in Table 1. The assessment indicates the average rates of the level of realisation in Germany. All but one assessments were rather homogeneous. Reduced corruption yielded distinct assessments, with 2 respondents rating reduced corruption as a fully realised benefit of implementing e-government, 1 respondent rated it as not realised and 1 respondent indicated that reduced corruption is “*not among the most realised benefits of e-government*”.

The next part of questions investigated challenges encountered in developing e-government in Germany and possible ways of addressing these challenges. The literature review pointed out that e-government challenges are numerous but yet dissimilar in different countries. Therefore, the questions aimed at investigating what challenges are encountered from a German perspective and what solutions would be applicable. Respondents indicated diverse strategic challenges as listed in Table 2 (each mentioned once), and proposed possible solutions to these challenges (except for one).

**Table 1: Realisation of e-government benefits**  
(N = 8; scale of rating: 1= not realised ... 4=fully realised)

E-government benefits	Average rating
More effective processes	3
Accountability of public authority	3
Ease of access of information	3
Creation of more knowledgeable society	3
Enhanced quality of processes	3
More efficient processes	2
Cost-effective to the public authority	2
Cost-effective to access government processes	2
Transparent processes	2
Integrated services among public authorities	2
Reduced corruption	3

**Table 2: Challenges for developing e-government and possible ways to address them**

Challenges identified	Possible ways to address the challenges
Low interoperability at country level and EU level	Use of standards
Lack of legal frameworks and therefore restrictions in implementing e-government across organisations	Introduce legal and regulatory frameworks supporting e-government
Lack of user-friendly applications hence technology barriers	Develop user-friendly applications and integrate users and usability tests during development
Lack of awareness of the potential of e-government and therefore lack of interest in implementing e-government	Create and promote awareness of the benefits of e-government among citizens, politicians and government employees
Financial challenges	Coordinate efforts among agencies and ministries to reduce reinventing the wheel and promote create-once-use-frequently concept
Cultural challenges	Promote political changes and discussions among government and societies of the purposes of e-government implementation
Lack of concrete privacy laws	Enact and enforce international and national agreements of privacy protection
Lack of structured public procurement platforms	Developing and enforcing use for tendering platforms across the government
Lack of single point of contact to interact with the government at all levels	Developing service directive
Challenges in implementing electronic signatures	Develop and support validation infrastructures for online interaction with the government
Ineffective and inefficient public administration hence challenges in transforming to seamless and one-stop-government	Optimise internal administrative processes such as document management and workflow systems
Lack of cooperation among government organisations	No response

The objective of the subsequent question was to investigate the development and implementation of e-government frameworks in Germany with the basis of literature presented in section 2. Main focus in this study was whether the framework is developed at national level or whether many e-government frameworks exist at different levels and for distinct purposes. Respondents were asked whether they are aware of the presence of an e-government development framework at national level. Five respondents answered 'Yes' and they mentioned the following six different frameworks:

- (i) 'Data exchange standards' to ensure interoperability<sup>1</sup>,
- (ii) DOMEA<sup>2</sup> - an organisational concept for public administration work, especially workflow and archiving,
- (iii) 'IT Planungsrat' – as a coordination framework involving the federal government and the 16 federal states in Germany to coordinate e-government works<sup>3</sup>,
- (iv) V-Model XT of the Federal Government to ensure quality with a standard engineering approach in systems development<sup>4</sup>,
- (v) SAGA - a standards and reference architecture guideline for e-government systems development in German public administrations<sup>5</sup>, and
- (vi) E-government law - a newly introduced legal framework for the federal governments to implement e-government<sup>6</sup>.

Further investigations were conducted to study and assess these frameworks and to get additional insights. One respondent answered that *'there are many initiatives in federal states, cities etc. to standardisation'* and another one stressed that no unique framework for e-government development exists at national level. The latter respondent also commented that the lack of such a unique framework resulted in uncontrolled and diverse (not interoperable) evolutions with isolated applications over the years. The five respondents aware of the frameworks were further asked to assess the adoption level of the frameworks among different government levels in Germany, and further to state the impact of the assessed adoption level – showing results in Table 3.

**Table 3: E-government development frameworks and their adoption level (N=5; scale: 1=not adopted; 2=rather not adopted; 3=rather adopted; 4=fully adopted)**

E-government development framework	Adoption level	Impact of adoption level
Data exchange standards	3	Minimised costs in public sector
DOMEA	2	No response
IT Planungsrat	3	Enhanced exchange of governmental services; Improved cooperation of the federal, federal state and local governments
V-Model XT	3	No response
SAGA	3	Availability and use of agreed and user-friendly technologies, methods and standards
E-government law	-	-

<sup>1</sup> KoSIT - Koordinierungsstelle für IT-Standards, <http://www.xoev.de/>

<sup>2</sup> Dokumentenmanagement und elektronische Archivierung im IT-gestützten Geschäftsgang (DOMEA), [http://www.verwaltung-innovativ.de/DE/E\\_Government/orgkonzept\\_everwaltung/orgkonzept\\_everwaltung\\_artikel.html](http://www.verwaltung-innovativ.de/DE/E_Government/orgkonzept_everwaltung/orgkonzept_everwaltung_artikel.html)

<sup>3</sup> Introduced through German's constitutional law (GG) in art. 91c to foster collaboration in the development of public sector ICT, <http://www.it-planungsrat.de/>

<sup>4</sup> [http://www.cio.bund.de/Web/DE/Architekturen-und-Standards/V-Modell-XT-Bund/vmodellxt\\_bund\\_node.html](http://www.cio.bund.de/Web/DE/Architekturen-und-Standards/V-Modell-XT-Bund/vmodellxt_bund_node.html)

<sup>5</sup> [http://www.cio.bund.de/Web/DE/Architekturen-und-Standards/SAGA/saga\\_node.html](http://www.cio.bund.de/Web/DE/Architekturen-und-Standards/SAGA/saga_node.html)

<sup>6</sup> [http://www.bmi.bund.de/DE/Themen/IT-Netzpolitik/E-Government/E-Government-Gesetz/e-government-gesetz\\_node.html](http://www.bmi.bund.de/DE/Themen/IT-Netzpolitik/E-Government/E-Government-Gesetz/e-government-gesetz_node.html)

Four frameworks were rated as rather adopted. DOMEA was rated as rather not adopted. The e-government law was approved and entered into force only in mid-2013; hence, no indication and evidence of adoption or even impact exists so far.

Political support in the implementation of e-government is deemed in literature among most important factors to establish and sustain successful e-government systems. Therefore, respondents were asked to assess the existing political support in implementing e-government. Two respondents assessed the political support as fully supportive, five respondents assessed it as rather supportive and one had no response.

The response seems congruent with the introduction of CIOs or IT directors in federal, federal state and also larger local governments. The inauguration of the IT Planungsrat (cf. development frameworks above) also evidences political support for e-government developments in Germany.

Following the assessment of political support, respondents were then asked to assess whether the existing legal framework to support e-government implementation is sufficient. Literature review presented earlier revealed the importance of legal frameworks not only to provide an environment for integrated processes, but also for coordination among government organisations at different levels. Since the e-government law was only approved and entered into force in mid-2013, the assessment of the eight experts in regards to adoption level was equally distributed among 'rather sufficient' and 'rather not sufficient'. The impact of the legal framework could not yet be assessed due to the time-span of the e-government law being in force being too short.

As discussed above and in section 2, given the maturity of e-government developments, it is imperative to acknowledge the political, economic, socio-cultural, technological, environmental and legal differences in individual countries. With this regard, the subsequent part of the questionnaire asked for an assessment of selected principles, from literature, in their contribution to ensure successful implementation of e-government in Germany. Results are presented in Table 4.

In the following section, we discuss above findings with reference to presented literature in section 2.



**Table 4: Assessment of the principles to ensure successful e-government systems design (N=8; scale of assessment: 1=not significant.....4=fully significant)**

Principle to ensure successful design of e-government systems	Average assessment
Presence of national e-government strategy	4
Presence of political commitment	4
Presence of committed leadership	4
Presence of financial sources	4
Collaboration among government departments/agencies etc.	4
Digital literacy among government employees	3
Use of government enterprise architecture	3
Digital literacy among users of e-government systems	3
Presence of digital inclusion	3
Prioritisation of projects	3
Integration of processes among government departments/agencies etc.	3
Organisational interoperability	3
Legal interoperability	3
Semantic interoperability	3
Technical interoperability	3
Performance of risks management	3
Performance of change management	3
Implementation of small and/or pilot projects strategy	3
Presence of legal and regulatory frameworks	3
Promote e-government awareness across country	3
Generic approaches for re-usability in other areas	3

## 5 Discussion of findings from survey and literature review

The results and insights from the review of literature generally reveal that the knowledge of e-government development and implementation is immense. However, there is still a need of investigating and embracing the different approaches and perceptions in different countries. This will enable researchers and practitioners to fully collaborate in creating innovative e-government solutions while also tackling challenges in ways that take into account the different settings of particular governments.

The OECD study argues that a government-wide planning and implementation of e-government leads to more coordination among government organisations [25]. The survey results are congruent with the observation that the lack of such a ‘framework’ leads to isolated and un-interoperable e-government initiatives in the long run.

E-government benefits such as more effective processes, accountability of public authorities, ease of access of information, and enhanced quality of public services are among many benefits reported in literature. According to the results, the extent of realising these benefits is diverse. Such diversity highlights the need of not only understanding the benefits of implementing e-government in general, but also of more research into the extent, at which countries realise these benefits. Studies such as [2] [4] [24] [27] [28] indicate that e-government contributes more to reduced corruption in developing countries. Results from the interrogation of German experts reveal a

different view: On average, respondents view reduced corruption among other e-government benefits realised in Germany. However, results also reveal that reduced corruption is not yet among the benefits fully realised. This implies lack of common understanding of how e-government has impacted the level of corruption in public sectors, in developed countries such as Germany.

All e-government challenges that were indicated by respondents are challenges that are also widely documented in literature. The challenges indicated such as lack of political commitment, limited financial resources, cultural change and lack of interest, interoperability and legal challenges presents political, economic, social, technological, environmental and legal challenges categorised in literature [14] [17] [24]. In addition to the challenges identified by respondents, the National E-Government Strategy of Germany points out the following challenges<sup>7</sup>:

- *Global competition to ensure that Germany remains an attractive place to do business*
- *Ensuring Internet access, especially in rural areas affected by demographic change, growing shortages of skilled workers etc.*
- *Paying attention to and participating in the organisation of international processes and standards, to ensure Germany is with growing European integration*
- *Ensuring legal, organisational and technical modernisation to enable public administration to act and respond flexibly in technologically fast moving times*
- *Ensuring that standards and norms, especially when it comes to security and data protection, can be met also in the future*
- *Ensuring willingness to invest to promote innovation in the public sector, e.g. regarding service orientation and the capacity for innovation overall*
- *Ensuring greater agility and flexibility in public administration to make it easier to deal with difficult-to-control risks (such as financial and economic crises).*

Literature studies reveal that lack of evaluation and sustainability frameworks [20] and decline of citizen trust in e-government [5] [31] are among the significant challenges in e-government. However these challenges are not mentioned by respondents of our survey or the IT Planungsrat as important in the German context.

Political commitment and legal frameworks have been regarded as among important factors for innovative and sustainable e-government developments. The importance of political support is evidenced in a study by Furuholt and Wahid [12]. The authors determine lack of political support as one of the main failure factors of an e-government project in Indonesia. Similarly in a case of a developing country, Belachew suggests the need for Ethiopia to develop a suitable legal framework to ensure seamless implementation of e-government services [4]. The responses gathered along the study here are deemed not to be sufficiently expressive, so further investigations will need to be made to confirm the impressions collected so far.

Implementation of successful e-government projects rely largely on lessons learned from previous projects and established knowledge of success principles from practice and research. All principles of success assessed by respondents are regarded as signif-

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<sup>7</sup> National E-Government Strategy, online [http://www.it-planungsrat.de/SharedDocs/Downloads/DE/Strategie/National\\_E-Government\\_Strategy.pdf?\\_\\_blob=publicationFile](http://www.it-planungsrat.de/SharedDocs/Downloads/DE/Strategie/National_E-Government_Strategy.pdf?__blob=publicationFile) (last access 2014/01/17)

icant in e-government endeavours. On the one hand, the results from the survey confirm the success factors reported in literature. On other hand, as results highlight that principles such as presence of national e-government strategy, presence of political commitment and presence of financial sources are fully significant in Germany, literature informs that the same principles might not be fully significant in other countries. Likely, principles such as prioritisation of projects, digital literacy among users of e-government (citizens, businesses and NGOs) and interoperability might as well be fully significant while less significant in other countries. Therefore it is of utmost importance to note that the specific political, economic, socio-cultural, technological, environmental and legal settings of a particular country highly determine the ‘right’ approach and solutions for successful implementation of e-government.

## 6 Conclusion

Many approaches for designing and implementing e-government are documented in literature and in practice. The maturity of e-government over the years is reflected in continuous and innovative solutions of using ICT in public sectors. E-government is not only viewed as the use of ICT in public sector but more broadly, and even more significantly, as a tool for an integrated and better government. As far as e-government benefits are realised, also challenges are encountered and subsequently ways of tackling the challenges. In this study the researchers identified e-government challenges and solutions, which have long informed research and practice of the political, economic, socio-cultural, technological, environmental and legal factors, which highly influence the outcome and success of e-government implementation. Based on the analysis from the survey of experts and literature study, implementing and sustaining e-government systems requires a profound understanding of, first, the expected benefits of e-government. Therefore, the design of e-government systems should be geared towards achieving the perceived benefits of a respective country. Second, the particular e-government challenges encountered and the factors that influence the challenges have to be understood well at the country level. By investigating factors influencing the challenges, governments will be able to find solutions, which will work specifically in the country’s settings. Third, the right approach of formulating and implementing e-government strategies at national level has to be identified and understood. Presence of a centralised strategy enhances coordination and collaboration of solutions at different levels of government. However, it is important that the strategy is adopted throughout the government at different levels for the purposes to be achieved. Fourth, the role of political support is highlighted in the study. Successful and sustainable e-government implementation requires profound political and leadership support at all governance levels. Fifth, formulation of legal frameworks supporting (and enforcing) implementation of e-government is also among the important factors for consideration when designing e-government systems.

Further research of the aspects investigated in this study will be carried out in a wider scope to deepen the understanding of different contexts and, hence, to contribute in theoretical perspectives of e-government research and in practical cases of successfully designing and implementing e-government systems.

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