

A framework of Open Government Data (OGD) e-service quality dimensions with future research agenda

Purpose: The research paper seeks to present a framework of Open Government Data (OGD) e-service quality dimensions besides providing further research agenda on the same.

Design/methodology/approach: Literature review pertaining to e-service quality with special reference to e-government is done to deduce the key dimensions of e-service quality for OGD.

Findings: Five e-service quality dimensions of OGD are being identified in the study: website design, fulfillment, service provision to the user while interfacing with the OGD web portal, service provision to the user during and after the value-creation and innovation period, and security/privacy. To further OGD re-use for value creation and innovation, it is important that the e-service quality dimensions be taken care of by the concerned public authority.

Originality: Hitherto, extant research has focused on the quality dimensions of OGD but the dimensions linked with e-service have not been explored-the present seeks to plug this gap besides outlining the suggestive research directions in this realm.

Introduction

Open Government Data (OGD) is conceived as the publicly-made available data that relates to the structural-functional and service provision dimensions. This data is provided in machine-processable formats for facilitating statistical analysis and interpretation (Janssen, 2011). It is provided freely by the government and is license-free. OGD relates to realms like climate, education, industry, economy, and the like (Ubaldi, 2013). OGD has been projected as a potent avenue for stakeholders hailing from diverse backgrounds (i.e. citizens, academia, businesses, non-profit organizations, professionals, etc.) to derive value and innovate their products and services (Janssen, Charalabidis and Zuiderwijk, 2012). OGD initiatives seek to curb corruption and red tape in administration thereby furthering transparency in administration (Grimmelikhuijsen and Meijer, 2014). OGD initiatives help in citizen participation and collaboration in administration. Furthermore, by promoting the re-use of OGD for value creation and innovation, it is anticipated that economic growth of a country shall be propelled as well (Open Knowledge Repository, 2014; Saxena, 2017; Leviakangas and Molarius, 2020).

In the extant OGD-focused literature, the dimension of “service quality” has appeared only once (Fitriani et al., 2017) without defining the dimension at all. Therefore, the present study seeks to provide a more nuanced approach of e-service quality dimensions of OGD for facilitating further dialogue and discussion on the same. Also, the present study addresses the call for research across investigation of the link between the type of OGD utilization and type of users, the investigation of the link between the type of user and type of OGD effect (e.g. societal, economic

and good governance benefits), investigation of the the conditions that moderate OGD effects (e.g. policy, data quality) and establishment of a causal link between utilization and OGD outcomes (e.g. transparency, accountability, or as a source of innovation) (Safarov, Meijer and Grimmelikhuijsen, 2017). The research paper is structured as follows: research methodology based on literature review is briefed wherein a discussion on the e-service quality in the context of e-government research is done and the research question is identified. Thereafter, e-service quality dimensions linked with OGD have been identified, followed by further research pointers and concluded with practitioner implications of the study.

Research methodology

For the present purpose, literature review is done to drive home the arguments. Literature review, as a research methodology, seeks to connect the dots by a careful in-depth study of the research conducted across diverse themes and patterns are synthesized and derived for a prospective study in lines with its nature and scope (Booth et al., 2021). Moreover, literature reviews help in identifying the gaps in research and "reinventing the wheel" such that novel insights are lent to the body of knowledge (Knopf, 2006). Thus, the present study bases its arguments on the literature scanned on the e-service quality dimensions with a particular focus on e-government. Concomitantly, extant literature on OGD was referred to identify the e-service dimensions related therewith, if any. The research question for the study was identified based on the lacuna in the OGD-focused literature. Thereafter, the dimensions culled out from the former set of literature, i.e. the one focused on e-government were adapted and others were added to suit the OGD initiatives' desideratum.

E-service quality dimensions: The context of e-government

The foremost contribution towards e-service quality evaluation came from Parasuraman and his colleagues (Parasuraman et al., 2005) who proposed **E-S-QUAL (e-core service quality scale)** and **E-RecS-QUAL (e-recovery service quality scale)** in the context of e-commerce applications. Thereafter, the frameworks came to be adapted in the e-government domain (Jun et al., 2009) wherein two scales were proposed- the E-G-S-QUAL (a 22-item scale of 4 dimensions: efficiency, fulfillment, system availability, privacy) and the E-G-RecS-QUAL (a 10-item scale of three dimensions: responsiveness, compensation and contact). Thereafter, Papadomichelaki and Mentzas (2009) proposed an e-government service quality model (e-GovQual) wherein six factors were identified as ease of use, trust, functionality of the interaction environment, reliability, content and appearance of information and citizen support. In a follow-up study, it was proposed that e-government service quality may be captured across dimensions like website design, reliability, responsiveness, personalization, information quality and system quality of the portal (Sung et al., 2009). Furthermore, in line with the DeLone and McLean's Information Systems' model (DeLone and McLean, 2009), a new framework was advanced in the context of the e-government veering around six dimensions: information quality, system quality, service quality, use, user satisfaction and perceived net benefit (Wang and Liao, 2008). E-services in the public sector must provide general information and technical information apart from facilitating interactions and transactions (Ancarani, 2005).

Basically, service quality in the context of e-government (provision of public services via the internet) appraises the overall quality in the virtual context (Srivastava, 2011). It has also been



observed that service quality of e-government is not uniform across all the administrative levels and may vary contingent upon a host of factors like the level of IT infrastructure, administrative leadership, development of the region, etc. E-service has been conceived as a citizen experience apart from the user perception of the public sector owned systems (Yang and Jun, 2002). In a well-developed empirically-tested model, E-service quality model has been proposed for the Indian government portals wherein citizen centricity (the extent to which a citizen can comfortably use the services), transaction transparency (the extent to which cost effectiveness, communication for a canceled or incomplete transaction and providing receipt or acknowledgement immediate to a transaction), technical adequacy (fast access, upload and download of information are important, specially for transaction sites), usability (the extent to which the content is reliable and usable to further citizens' trust and confidence in the services), complete/comprehensive information (the extent to which sufficient and comprehensive information is provided to the users), privacy and security (the extent to which there is the transaction is secure and privacy of the data provided by the citizens is ensured), interaction (the extent to which the portal facilitates communication with the users) and usefulness of information (the extent to which the information available via the portal is useful) were delineated for the purpose and it was found that but for the dimension of usefulness of information, others were positively found to impact the e-service quality (Bhattarchaya and Gupta, 2012). E-service quality frameworks for the e-government evaluation may be citizen-centric with a focus on assessing the factors that increase user experiences with the e-government services besides identifying the needs of the users. It has been underscored by Verdegem and Hauttekeete (Verdegem and Hauttekeete, 2007) that the e-government platforms serve as a moral support for the users and the citizens evaluate the e-service dimensions of the



e-government platforms in terms of reliability, security, usability, content readability, ease of use, content quality, cost effectiveness, privacy or personal information protection, transparency, courtesy, responsiveness, accessibility and flexibility.

From the aforesaid, it is clear that whereas the e-service quality dimensions for e-government context have been underlined in the extant literature, it is pertinent to identify the e-service quality dimensions of OGD-the offshoot of e-government-as well. Thus, the research question guiding the present study is: “What are the e-service quality dimensions of OGD?”

E-service quality dimensions for OGD

The rationale for delineating the e-service quality of OGD with the hackneyed yet required, undoubtedly, research on the OGD quality assessment is that whereas the former are hinged upon the "organizational user support processes and technologies with the goal of strengthening customer-service provider relationship", the latter appraise the quality of the web portals solely on the basis of the "usability" (i.e. the extent to which the web portals are user-friendly in terms of the demand-side of the government-user dyad) (Machova, Hub and Lnenicka, 2018; Nikiforova and McBride, 2021) without taking into account the "integrated" dimension involving the demand-supply dyad-therefore, it is important to further our understanding of the e-service quality of OGD. This lacuna gets iterated multifold times in the mainstream OGD-focused research wherein the “quality” characteristics as identified for evaluating OGD relate to:

traceability (track of creation, track of updates); currentness (percentage of current rows, delay in publication); expiration (delay after expiration), completeness (percentage of complete cells, percentage of complete rows, percentage of standardized columns), compliance (eGMS (eMetadata Standard) compliance, Five star open data), understandability (percentage of columns with metadata, percentage of columns in comprehensible format) and accuracy (accuracy in aggregation) (Vetro et al., 2016). Thus, the question arises: “What are the service dimensions of OGD?” which the present study seeks to address here.

As mentioned earlier, the dimension “service quality” appears only once- without defining the same- in the OGD-centric literature wherein it has been hypothesized that “... if the service quality is good then the level of the perceived usefulness will be higher (Fitriani et al., 2017; 6)” and the authors deduce from their empirical investigation that service quality did not significantly impact the behavioral intention to use OGD website. The present study seeks to provide a framework of the OGD e-service quality dimensions for a better understanding of this significant concept. In line with the e-service quality dimensions identified earlier albeit in an e-retail context (Blut, 2016), the present study provides an e-service quality framework for OGD in terms of 5 dimensions: 1. website design, 2. fulfillment, 3. service provision to the user while interfacing with the OGD web portal, 4. service provision to the user during and after the value-creation and innovation period, and 5. security/privacy (Table 1).

Dimension	Sub-dimensions	Key defining features of the sub-dimensions	References, if any
Website design	Information quality	Accuracy, completeness, timeliness of OGD	Blut, 2016; Rasyid and Alfina, 2016
	Website aesthetics	Content, color and display management of the OGD portal	Kaisara and Pather, 2009; Blut, 2016; Rasyid and Alfina, 2016
	Data search	Provision of searching the dataset with a search string; sorting and filtering of datasets; advanced search facility; availability of catalogs	Safarov, Meijer and Grimmelikhuijsen, 2017
	Glitch-free data availability and download	Reliability of the datasets in terms of their being error-free and ease of downloading the same in machine-readable formats	Dawes, Vidasova and Parkhimovich, 2016; Ali et al., 2017
	Maximizing statistical analysis and interpretation experience	Statistical and visualization tools including mapping tools	Graves and Hendler, 2013; Gasco-Hernandez et al., 2018; Wirtz, Weyerer and Rosch, 2018; Ansari, Barati and Martin, 2022



	Website convenience	The ease of using a web portal including its being replete with all features and detailed information regarding the purpose and objectives of the same; availability of a site map	Dawes and Helbig, 2010; Blut, 2016
	Provision of the desired data and the ancillary data	Complete, timely, error-free data; metadata descriptors should be complete; regular updation of the datasets	Alexopoulos, Spiliotopoulou and Charalabidis, 2013
	Website personalization	Web portal should be customized to suit the user needs	Blut, 2016
	System availability	Correct technical functioning of the website	Li, Liu and Suomi, 2009; Blut, 2016
Fulfillment	Accuracy of the dataset (including the metadata)	Datasets should be accurate; metadata should be accurate; error-free and complete datasets and metadata	Machova, Hub and Lnenicka, 2018
	Time taken to retrieve the desired dataset	Minimize the time consumed in retrieving the desired dataset	Authors' contribution

	Quality of the dataset in terms of its usability	Usability dimensions as identified in the extant literature with reference to the structural, functional aspects of OGD, user feedback and request compliance	Kalampokis, Tambouris and Tarabanis, 2013; Alexopoulos, Spiliotopoulou and Charalabidis, 2013; Machova, Hub and Lnenicka, 2018
Service provision to the user while interfacing with the OGD web portal	Online support available for the user (including customer support bot, email, telephone, social media links, contact form)	Being responsive to the user needs via service support (automated, personalized and customized)	Alexopoulos et al., 2014; Blut, 2016; Rasyid and Alfina, 2016; Ali et al., 2017
	Discussion forum	Provision of discussion forum to allow users (existing and potential) to discuss and deliberate upon value creation and innovation potential of OGD	Lnenicka and Saxena, 2021
	Tutorials, blogs, training modules, case studies	Training and educational aids to incentivize and facilitate OGD re-use for value creation and innovation	Gasco-Hernandez et al., 2018
	Provision to contribute to the datasets	Users as proactive data contributors; citizen journalists	Reggi and Dawes, 2016; Luo and Harrison, 2019



	Timely, complete, accurate and reliable service provision	Government as a service provider ensures that the services are flawless, seamless and streamlined	Blut, 2016
Service provision to the user during and after the value-creation and innovation period	Availability of case studies or success stories of the value creation and innovation by other users (via holding hackathons, contests, events, etc.)	Showcasing and incentivising case studies or success stories; conducting events covering value creation and innovation by stakeholders	Authors' contribution
	Ready availability of the concerned support personnel for assisting with the bottlenecks encountered or additional requests during and after the value creation and innovation period	Being responsive to the user needs via service support (automated, personalized and customized); Providing leads of successful OGD value-creators and innovators for further collaboration and doubt clearance	Authors' contribution



	Providing incentives for OGD value creation and innovation via funding opportunities, for instance	Governments provide seed money or facilities for innovators and others interested in value creation and innovation contingent upon the potential of their ideas and market potential, generating solutions for sustainable society or fulfilling critical needs of the citizens, for instance	Jugend, et al., 2020
	Furthering academia-user/industry-government collaboration	Pooling the intellect and resources of the academia, user, industry/entrepreneur/innovator and the government for problem-solving and value co-creation	Jugend, et al., 2020
Security/privacy	Users' identities should not be compromised	Users tapping the OGD portal feeling secure while visiting the OGD portal or working on it for downloading datasets, sharing them, performing analyses or participating in the different fora	Kaisara and Pather, 2009; Blut, 2016; Rasyid and Alfina, 2016

Table 1: E-service quality dimensions of OGD

Website design



Website design pertains to the interface in its totality including information search, decision to refer the dataset, the decision to re-use and combine the datasets, engage with the datasets in terms of statistical analysis and interpretation and value creation and innovation. Thus, the users do the information search linked with their area of interest and depending upon the user-friendliness of the website in terms of the provision of the sought-for datasets, the quality of the portal would be assessed in an affirmative manner. Thus, the users are also keen to appreciate whether the datasets are qualitatively and quantitatively sufficient in terms of the information that they provide, the ease of using the web portal, the glitch-free data downloads, the convenience of browsing the portal from the users' end, the availability of the required and ancillary datasets along with the metadata, the manner in which the website has been adapted for personalization and customized to suit individual ends and the long-term availability of the web portal to provide the datasets in the future as well.

Fulfillment

This relates to the ascertainment from the end of the government body that the user has successfully traced, accessed and downloaded the desired datasets. Thus, facets such as the accuracy of the dataset (including the metadata), the time taken to retrieve the desired dataset and the quality of the dataset in terms of its usability are the key considerations here. Users have the expectations that the OGD portal would serve as a repository of all the datasets along with the correct, complete and detailed descriptions of the same along with that of the metadata and that the datasets are accessible in machine-readable formats that are license free, complete in

themselves and are easily accessible within no time. This could be enhanced with the advanced options of search filters available via the portal apart from the consistent efforts of the government body in question. OGD portal should facilitate interoperability and data linkages as well to draw meaningful inferences (Kalampokis, Tambouris and Tarabanis, 2013). User fulfillment in the context of OGD portal usage is important because it impacts the overall satisfaction of the user with the web portal which goes a long way in building ties with the government.

Service provision to the user while interfacing with the OGD web portal

This dimension is linked with the online support from the government's side that is extended to the user. This online support should be made available before the user begins to understand the OGD portal or sometimes, even before the user taps the OGD web portal itself, during the phase of interaction with the OGD portal or after the tapping of OGD portal (prior to value creation and innovation). At present, many OGD portals provide information regarding the point of contact via phone, email, contact form or even social media channels (Alexopoulos et al., 2014). Users are encouraged to request for specific datasets or to contribute towards the existing repository of datasets, in some cases. It is important that a discussion forum be in place for the users to interact with each other regarding the datasets and the portal. Users should also be able to learn about the utilitarian aspects of the OGD portal via tutorials, training modules, case studies, etc. Thus, with the reliable service support as well as accurate, complete and timely communication from the end of the service employees, user satisfaction would be furthered.

Service provision to the user during and after the value-creation and innovation period

Data-driven innovation has been conceptualized in terms of the "development, production, and marketing of the process, product or service and the creation of new businesses" (Jetzek, Avital and Bjorn-Andersen, 2013; pp. 8). Since OGD-based innovations create social and economic value, therefore, the users might wish to revert to OGD portal repeatedly for ensuring that the products/services thus generated or in the process of being created are meeting the ends for which they were conceptualized in the first instance. For instance, some additional dataset might be required in the course of value creation and innovation or there might be a need to consult the data publisher in the course of the value creation process and this calls for the maintenance and upkeep of the OGD portal such that the concerned service personnel are available at the request or insistence of the user concerned. Events such as contests, hackathons, etc. based on OGD re-use are facilitators for furthering the motivation of the users and knowledge sharing and information exchange. Finally, and extending the argument further, governments may support OGD-hinged innovation and value creation via extending support for sectoral programs and furthering academia-user/industry-government collaboration apart from providing financial support which would go a long way in incentivising the users to harness OGD (Jugend, et al., 2020).

Security/privacy

This is an important dimension because it relates to the safeguarding of users' privacy and confidentiality which should not be compromised while interfacing with the OGD portal. Security safeguards should be in place to avoid untoward incidents given that users' identity should not be revealed especially while interacting on the discussion forums (unless required for value co-creation with other users or information exchange) or while using the OGD, in general. Likewise, in the cases where the users are contributing towards the data repository, it must be ascertained that the users' identities are not being compromised unless required for verification at the end of the government. Web portal's security standards have a large bearing on the overall assessment of the e-service quality of the OGD portal.

Future research agenda

The present study leaves several avenues for further research. First, an empirical investigation is called for to validate the OGD e-service quality dimensions identified in the study. Second, it may be pertinent to assess the impact of e-service quality on user satisfaction, website loyalty and the behavioral intention to reuse the web service (Cristobal, Flavian and Guinaliu, 2007; Kaya et al., 2019; Udo, Bagchi and Kirs, 2010) thereby furthering repeat visits of the users on the OGD portal thereby leading to more value creation and innovation besides keeping the government bodies on their toes for improvising the OGD portal. **Third**, further research may be conducted to ascertain the linkage between e-service quality and e-trust (the extent to which the



users have confidence in online interactions or interfaces) (Ghane, Fathian and Gholamian, 2011) in the OGD context. Another line of research pertains to the influence of cultures on e-service quality perception. Thus, and in line with the previous research (Sigala and Sakellaris, 2004; Blut et al., 2015), an empirical investigation may be conducted to ascertain the cultural differences, if any, among users as far as e-service quality of OGD is concerned. Sixth, since e-service quality has user satisfaction, user re-visit intentions and positive word-of-mouth as the main objectives (Blut et al., 2015), further research may be conducted to ascertain how these outcomes are being realized across time and space. Seventh, further research may be conducted to appreciate the affective (positive and pleasurable experiences with services), continuance (the propensity to stick to a service provider given the cost-benefit analysis) and normative (the obligation to remain committed to the service provider) commitment of the users (Chuang et al., 2016) towards OGD in terms of web portal's visits and re-use of OGD. Eighth, practitioners' and policy-makers' insights may be solicited to appreciate the challenges linked with e-service quality of OGD. Finally, further research is warranted to explore the tangible (web design aesthetics, ease of use, virtual tour, visualization) and intangible (information content, reliability, security, customization) dimensions (Moon, 2013) of the e-service quality of the OGD portal.

Conclusion

The present study was a response to the call made by Charalabidis and his colleagues that OGD research should focus on management and policies, infrastructures, interoperability and usage and value (Chalarabidis, Alexoopulos and Loukis, 2016). Given that quality of OGD plays a



dominant role as far as its re-use for value creation and innovation by a range of stakeholders is concerned, it is surprising to note that there is no research veering around the e-service quality dimensions of OGD-thus, the present study is a step in this unexplored terrain. Basing itself on a qualitative analysis covering the literature review, it was deduced that there are five major dimensions of e-service quality of OGD; viz. website design, fulfillment, service provision to the user while interfacing with the OGD web portal, service provision to the user during and after the value-creation and innovation period, and security/privacy wherein each of these dimensions were further delineated into subdimensions. To realize the aims of economy, effectiveness and efficiency apart from furthering transparency and citizen participation and collaboration in public services, it is pertinent that OGD e-service quality dimensions should be in place. The study was limited in its scope given that a primer was provided into the e-service quality dimensions of OGD. That said, there is no gainsaying the fact that the present study serves as an edifice for further empirical and theoretical research on e-service quality dimensions of OGD. Finally, the study left pointers for further research in this direction so that more insights may be deduced regarding e-service quality of OGD given the potential of OGD in terms of social and economic value generation and the translation of the same into economic growth of a country as a whole.

Practitioner implications

The present study leaves insights for practitioners as well.

- Practitioners may be in a position to appreciate the significance of assigning roles and responsibilities among the manpower for proper implementation of any OGD initiative so that the overarching aims of OGD an initiative may be realized (Shepherd et al., 2019).
- Public authorities need to bear in mind the ways and means in which the accuracy and integrity of data may be maintained (Chorley, 2017).
- Political will and management support is important to ensure that the OGD interfaces are well-maintained in terms of their e-service quality parameters.
- It goes without saying that the government departments need to allocate budgetary support for furthering the OGD agenda and furthering inter-departmental coordination and collaboration for data publication.
- Finally, for the sustenance and sustainability of any IS (Information Systems) platform-the OGD in the present case-it is important that the infrastructural dimensions be in place with a suitable arrangement of control and feedback.

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