

# Examining open government data (OGD) usage in India through UTAUT framework

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## Abstract

**Purpose** – This paper aims to examine the use and acceptance of open government data (OGD) of different stakeholder groups in India.

**Design/methodology/approach** – Following an empirical investigation among 244 respondents in India, the paper deploys path analysis via LISREL. The conceptual construction of the Unified Theory of Acceptance and Use of Technology (UTAUT) framework is used to assess the behavioral intention to use and accept OGD. Multiple regression analysis informs the relationship of demographic variables with the behavioral intention to use and accept OGD.

**Findings** – Path analysis showed that there is an increased use and acceptance of OGD among the respondents. Multiple regression analysis shows that men are more likely to use open data sets than women. Individual differences are found among the respondents with regard to OGD usage. Thus, while men may tap open data sets in line with their purposes and professional backgrounds, women are likely to tap the data sets even for non-professional purposes. Furthermore, the respondents who are younger in age are more behaviorally inclined to accepting and using OGD than their older counterparts.

**Practical implications** – The Indian government needs to popularize and familiarize OGD initiatives among the people to a greater extent. The utilitarian value of OGD may be provided when data sets are more user-friendly, frequently updated and accurate. This would facilitate in better provision of public services besides appreciating the public sentiment. Further, with increased interaction between citizens and the government, public accountability and transparency may be better realized.

**Social implications** – The study shows that different groups of people are engaging in tapping information through government websites and related portals. Societal influence was found to be an important factor which predicts the acceptance and usage of OGD. An infrastructure can help to enable the use of OGD.

**Originality/value** – Hitherto, studies have focused on OGD initiatives in the developed countries, but extant literature is scarce on developing countries. Therefore, this study seeks to fill the literature gap by probing OGD use and acceptance among different stakeholder groups in India.

**Keywords** Open data, India, UTAUT, Acceptance, Open government data

**Paper type** Research paper

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## 1. Introduction

The role of information and communications technology (ICT) in furthering economic development is clinched in extant literature (Pearson, 2006). Governments have been tapping ICT to institutionalize reforms to ensure greater transparency and efficiency in public service delivery. Therefore, the governments made a transition to being e-governments whereby ICT could be used for improving public service delivery mechanisms. In this regard, and to further the trust of the citizens in the government activities, governments across the globe undertook the initiative to “open” their administrative data to the general public, and this data were freely accessible and re-usable for all. Hitherto, the same data were stored in silos to maintain confidentiality and secrecy in the government. With the gradual progress of the transition of governments from “e-government” toward “open government”, some governments sought to provide as much information to the people. This is how the “open government data” (OGD) got rooted in the

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politico-administrative soil. The underlying philosophy of OGD is “making data freely available to everyone, without limiting restrictions” (Kalampokis *et al.*, 2011, p. 236).

Alongside the increasing impetus to further the OGD initiatives across several countries (Linders, 2013), there have been numerous challenges before the government *vis-à-vis* the implementation of OGD initiatives (Bates, 2014; Ohemeng and Ofosu-Adarkwa, 2015; Wang and Lo, 2016). However, despite increasing attention on OGD at different levels of government, there is little knowledge regarding the associated benefits, costs and barriers (Conradie and Choenni, 2014). OGD has been defined as the free availability of public sector information in open formats such that public access and exploitation thereof is enabled (Kalampokis *et al.*, 2011; Ubaldi, 2013). OGD is also referred to as open public sector information (PSI) which facilitates greater interaction, self-empowerment and social inclusion between the government and the citizens (Zuiderwijk and Janssen, 2014). OGD may be raw or processed; assume diverse forms; located in different parts of the government or related to public services or internal processes (Zeleti *et al.*, 2016). Eight principles characterize OGD: data should be complete, primary, timely, accessible, machine-processable, non-discriminatory, non-proprietary and license-free. OGD may be related to diverse sectors such as tourism, education, science and technology, agriculture or even war (Whitmore, 2014).

OGD has gained the interest of both researchers and practitioners from various disciplines like information systems, management sciences, political and social sciences and law (Charalabidis *et al.*, 2016). Factors influencing OGD adoption by the government agencies has been empirically investigated using the technology-organization-environment (TOE) model (Wang and Lo, 2016). Likewise, another study utilized the Unified Theory of Acceptance and Use of Technology (UTAUT) framework for ascertaining the OGD usage by individuals (Zuiderwijk *et al.*, 2015). However, while these studies have been undertaken in the West, academic investigations around OGD from the perspectives of the stakeholder groups – in the developing countries – are lacking.

This study seeks to plug the research gap by underscoring the extent to which OGD initiatives have been accepted, acknowledged and harnessed in a developing country – India. For the present study, following the study of Zuiderwijk *et al.* (2015), the UTAUT framework (Venkatesh *et al.*, 2003) was deployed for an empirical investigation of OGD usage by citizens in a developing context. Specifically, this study pertains to India where the government has launched its OGD initiative (<https://data.gov.in/>) and is encouraging government bodies to make the public data – hitherto reserved in silos – more accessible and available at no cost. This portal (<https://data.gov.in/>) is a potent application of providing better public services through e-government.

In this paper, a background on OGD and previous research around OGD shall be covered in Section 2. Thereafter, the research model, supported with hypotheses, is discussed in Section 3 followed by the research approach section in Section 4. There are two dimensions along which the paper will run its course: path analysis using LISREL was used in the first part of the quantitative analysis wherein hypotheses derived in line with the UTAUT model were tested. In contrast, multiple regression analysis was used to inform the second part of the statistical analysis wherein key demographic variables were scrutinized in terms of their relationship with the behavioral intention to use and accept OGD among different types of respondents. Thereafter, the findings will be discussed followed by a discussion of the social and practical implications of the study in Section 6. The final section provides a brief about the limitations and further research suggestions.

## 2. Background

OGD has been used interchangeably with PSI in research. For instance, PSI has been defined as “the re-use of data held by public sector bodies” (Janssen, 2011, p. 21), and this

definition is similar to that of OGD which is defined as “data that can be freely used, re-used and distributed by anyone, only subject to (at most) the requirement that users attribute the data and that they make their work available to be shared as well” (Ubaldi, 2013, p. 6). While “data” are “the unit used to represent information”, information is the interpretation advanced to a data by an individual and because the terms “data” and “information” are being used interchangeably nowadays (Burglund and Engvall, 2014, p. 167).

Over the years, the internet has been instrumental in facilitating the emergence of more accountable and transparent government (Pina *et al.*, 2009). OGD is one of the ways in which the government has sought to forge ties with the citizens. OGD is a concrete evidence of the evolving phenomenon of “open government” which rests on three bases: transparency, participation and collaboration (McDermott, 2010). As such, “open government” involves building collaborative bridges between citizens and government through the deployment of information technologies (Evans and Campos, 2013). OGD ensures that principles of transparency, reusability, standardization and updation are being adhered to (Sandoval-Almazan and Gil-Garcia, 2016).

OGD may be related to different aspects which promise social and economic value generation (Ubaldi, 2013, p. 6): business information (including chamber of commerce information, official business); registers; patents; trademark information and public tender databases; geographic information (including address information, aerial photos, buildings, cadastral information, geodetic networks, geology, hydrographical data and topographic information); legal information (including decisions of national, foreign and international courts and national legislation and treaties); meteorological information (including climate data and models and weather forecasts); social data (including various types of statistics on economics, employment, health, population and public administration); and transport information (including information on traffic congestion, work on roads, public transport and vehicle registration). With growing impetus on economies being fueled by innovation (Gackstatter *et al.*, 2014), OGD is one of the potent ways of securing innovation through co-creation and collaboration.

Countries across the globe have been adopting OGD. Initially spearheaded by the USA in 2010, OGD was launched to further public trust in the government, thereby leading to increased transparency and citizen participation (The White House, 2012). Other countries like Chile created an OGD portal in 2011 and joined the Open Government Partnership in 2012 (OGP, 2017). Similarly, in Denmark, the Danish Basic Data Program (BDP) was launched in 2012. OGD was launched in South Korea for providing machine-accessible data to be exploited for appropriate purposes (Jung and Park, 2015).

OGD may be used for five main activities: searching for and finding OGD (browsing, querying and exploring data sets), OGD analysis (statistical analysis; transforming data; viewing data online; downloading data), OGD visualization (generating plots, maps, graphs; interactive data set representations), interaction about OGD (the use of feedback from end users as training input; collaboration through discussion forums, messaging, user groups and other functionalities) and OGD quality analysis (analysis and assessment of the data set quality) (Zuiderwijk *et al.*, 2016) While there are advantages of using OGD, there are concomitant barriers in using OGD which may be related with data fragmentation, terminology heterogeneity, search support, information overload; data context, data interpretation support, data heterogeneity, data analysis support, data visualization support, lack of interaction, interaction support and tools, dependence on the quality of open data, poor data quality, quality variation and changes.

### **2.1 Previous research on OGD: a review**

Hitherto, five types of research approaches have been adopted retaining the OGD theme. While some of these are conceptual and seek to define the features of OGD, others are case studies or focusing on specific contexts. The first type of research approach pertains

to strengthening the conceptual and theoretical understanding of OGD (Charalabidis *et al.*, 2016; Okamoto, 2017). Specifically, defining features of OGD have been provided, or models to understand the OGD adoption and implementation have been propounded. The basic understanding is that because OGD is an emerging phenomenon, a clear-cut definition is difficult to provide at this formative stage. Other aspects like performance appraisal and evaluation of OGD initiatives in terms of the quality of data sets have also been undertaken (Vetro *et al.*, 2016). Among the models advanced around OGD, there are models which point out the “maturity” levels of OGD in terms of “stages”, or there are models which point out the manner in which OGD may be tapped to secure collaboration and exchange among citizens and the government (Kalampokis *et al.*, 2011; Sieber and Johnson, 2015).

The second type of research approach pertains to the identification of the major impediments or catalysts in OGD adoption, diffusion and implementation by the government in different settings (Janssen *et al.*, 2012). Some of these research works underline the prospects of harnessing OGD in different sectors for public value creation or innovation (Zeleti *et al.*, 2016). While some of the researches are conceptual and descriptive in scope, others are empirical and provide aspects like socio-cultural, politico-legal, economic or infrastructural hindrances in OGD implementation (Evans and Campos, 2013; Hardy and Maurushat, 2017).

The third set of research on OGD pertains to case studies in which researchers have picked evidentiary support from countries where OGD initiatives have been undertaken at the national, state or local levels (Sataslaatten, 2014; Liu *et al.*, 2015). These studies are mainly undertaken in Western settings, and there are only a few studies based in developing countries (Kassen, 2013; Kunkel, 2016; Ohemeng and Ofosu-Adarkwa, 2015; Yang and Wu, 2016).

The fourth type of research is linked with undertaking a cross-country comparison whereby two or more countries have been compared against their OGD initiatives. Specifically, such studies aim at appreciating the cultural and legal differences between the countries and trying to derive lessons for the governments as to how OGD initiatives may be further strengthened by learning from each other (Nugroho *et al.*, 2015; Saxena, 2017).

Finally, the fifth type of research has been undertaken to ascertain the extent to which the users have been accepting, acknowledging and tapping OGD for different purposes. Such types of studies are less in the developing countries and more in the Western settings (Wang and Lo, 2016; Zuidervijk *et al.*, 2015). Moreover, there are more of qualitative discussions in such studies, and empirical works are visibly lacking.

The present study belongs to the fifth category wherein the degree of OGD use and acceptance has been empirically probed in a developing country – India. Therefore, the key research question guiding the present research is: “what is the extent to which OGD is used in India given the recent launch of OGD initiative in the country?” To the best of the researcher’s knowledge, no empirical study has been conducted so far on OGD acceptance in Indian context, and the present study seeks to plug this gap.

## ***2.2 OGD in India***

Launched in October 2012, the Open Government Initiative (OGD) platform (<https://data.gov.in/>) seeks to ensure dissemination of information held by public authorities like ministries, departments and other agencies. Therefore, users are encouraged to tap data sets from this portal and other governmental websites for securing information about various dimensions. According to the National Data Sharing and Accessibility Policy (NDSAP, 2014), data have been defined as “a representation of information, numerical compilations and observations, documents, facts, maps, images, charts, tables and figures, concepts in digital and/or analog form”; a data set has been defined as “a named

collection of logically related features including processed data or information”; and OGD has been defined as “a dataset (which) is said to be open if anyone is free to use, reuse, and redistribute it-Open Data shall be machine readable and it should also be easily accessible”. The OGD platform also provides the opportunity of suggesting a new data set by individuals. Table I provides a brief list of data sets available at the OGD platform (<https://data.gov.in>). Besides, the individual ministries and government bodies are encouraged to provide relevant information on various indicators on their online portals. Table II provides a summary of key statistical indicators of the OGD platform (<https://data.gov.in>).

### 3. Open government data usage research model

As indicated aforesaid, this study adopts the adapted UTAUT framework for OGD (Zuiderwijk *et al.*, 2015) (Figure 1). In contrast with other models, UTAUT is known to explain about 70 per cent of the variance in the behavioral intention to use and accept a system or technology (Venkatesh *et al.*, 2003). OGD has been treated as a “technology” because of its inherent dependence on an information technology (IT) platform where information exchange happens between the government (supplier of OGD) and the citizens (users and suppliers, in some instances) via the internet. The rationale behind deploying the UTAUT framework is that it helps in examining the social and other factors which impact the IT linked with open data. The basic premise of UTAUT model rests on the factors which impact behavioral intention of acceptance and use of a system or technology and the predictors of this use and acceptance of a system or technology (Venkatesh *et al.*, 2003). Besides the behavioral intention to use and accept a system or technology, there are a number of facilitating conditions which impact the actual use and acceptance of a system or technology (Sykes *et al.*, 2009). These facilitating conditions have been included in the conceptual framework of the present study.

The UTAUT model has five constructs which directly predict the behavioral intention to use information technologies, namely, performance expectancy (PE), effort expectancy (EE),

**Table I** OGD examples

<i>OGD</i>	<i>Ministry</i>
Annual health survey: combined household houselist information	Ministry of Health and Family Welfare, Department of Health and Family Welfare
Production and disposals – fisheries statistics 2014	Ministry of Agriculture and Farmers Welfare, Department of Animal Husbandry, Dairying and Fisheries
Main workers by educational level, age and sex, census 2011 – India and states	Ministry of Home Affairs, Department of Home, Registrar General and Census Commissioner, India
Exploration and production of crude oil and natural gas in India	Ministry of Petroleum and Natural Gas
Passport seva	Ministry of External Affairs
Annual survey of industries	Ministry of Statistics and Programme Implementation

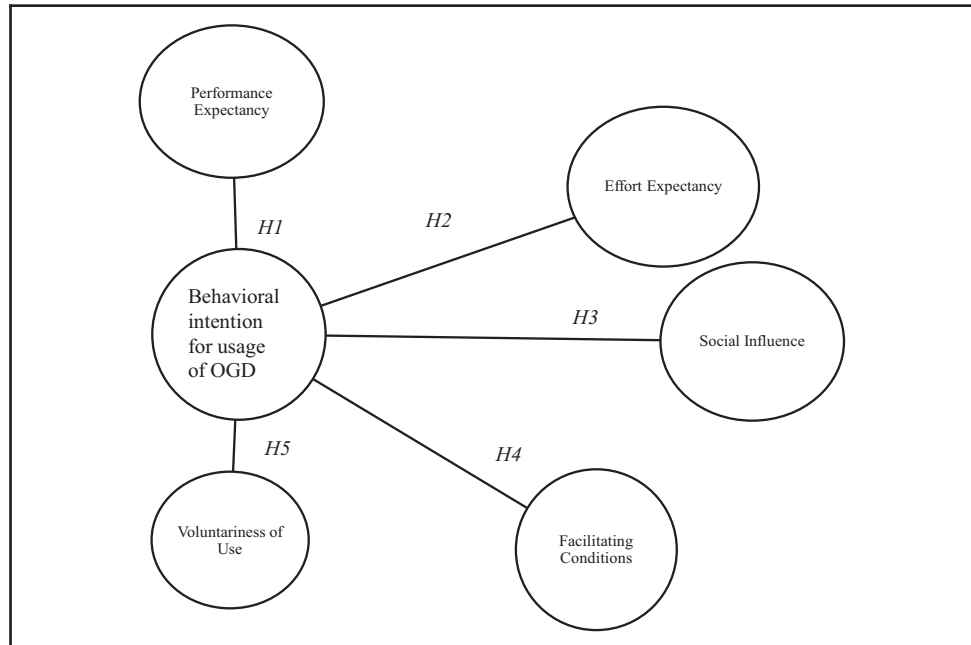
Source: <https://data.gov.in>

**Table II** Key statistical indicators of the OGD platform

Number of resources	23,855	Number of OGD catalogs	3,817
Number of departments providing OGD	101	Number of times OGD is viewed	6.37 million
Number of times OGD is downloaded	2.55 million	Number of chief data officers	111
Number of APIs	327	Number of OGD visualizations	765

Source: <https://data.gov.in> (accessed 30 April 2016)

**Figure 1** Model for evaluating the BI for usage of OGD



social influence (SI), facilitating conditions (FC) and voluntariness of use (VU). Behavioral intention implies an individual's intention, prediction or plan to use a technology in the future. We have also included the demographic variables in the study which will be invoked while conducting multiple regression analysis in a subsequent section.

Figure 1 provides an outline of the framework used for the present purpose. "Performance expectancy" is defined as the extent to which an individual believes that if he/she uses a particular system or technology, there would be a resulting increment in job performance (Venkatesh *et al.*, 2003). Implicitly, individuals are more inclined to use open data technologies like open data platforms, software, tools and interfaces, when they believe that these technologies would help them in earning more income or deriving some extrinsic benefits which would, in turn, increase their expectancy to perform better professionally. Therefore, the first hypothesis is:

*H1.* PE is positively linked with the behavioral intention to use and accept OGD.

"Effort expectancy" implies the degree of ease linked with the use of a technology (Venkatesh *et al.*, 2003). Contingent upon the ease or difficulty of using open data technologies, an individual's propensity to use open data technologies will vary. This is also linked with the ease of locating OGD and the skills required to extract and utilize the required data sets. Therefore, when individuals perceive that data sets are easily accessible and they do not have to expend much efforts in utilizing them, their inclination to use these data sets increases. Hence, the second hypothesis is derived as:

*H2.* EE is negatively linked with the behavioral intention to use and accept OGD.

The third construct defined as "Social influence" implies the extent to which an individual perceives that significant others influence him/her in using the new system or technology (Venkatesh *et al.*, 2003). Therefore, it is possible that the influence of colleagues, peers, family members, supervisors and others could determine an individual's usage of OGD. Hence, the concomitant hypothesis is stated as:

*H3.* SI is positively linked with the behavioral intention to use and accept OGD.

“Facilitating conditions” (FC) are those which provide the required conditions for accepting and using a technology. Implicitly, the supporting organizational and technological infrastructure has a direct bearing on the individual’s propensity to use and accept a system or a technology (Venkatesh *et al.*, 2003). Therefore, an individual’s use and acceptance of OGD will depend upon the availability of requisite infrastructure like internet access or appropriate data infrastructures. Our fourth hypothesis is stated as:

*H4.* FC are positively linked with the behavioral intention to use and accept OGD.

Lastly, “Voluntariness of Use” implies the degree to which individuals believe that the use and acceptance of open data technologies are perceived as voluntary or of free will, and there would be greater propensity to accept and use OGD technologies when the same are exploited without any obligation. Therefore, the hypothesis is:

*H5.* VU is negatively linked with the behavioral intention to use and accept OGD.

## 4. Research approach

### 4.1 Sample

This study was conducted with a sample of actual or potential users of OGD in India. Individuals were contacted through informal and formal contacts. Mostly, students, faculty and bureaucrats from capital cities and urban areas constituted the sample of the study. A structured questionnaire was administered through online mode or offline mode. Face-to-face meeting was arranged with some respondents contingent upon their availability and mutual convenience. Primarily speaking, convenience sampling and snowball sampling frames informed the purpose of the present study. Overall, 314 individuals were contacted, out of which, the usable questionnaires were 244. Items used in the questionnaire are provided in [Appendix 1](#), and these items are measured on a Likert scale ranging from 1 to 5, where 1 indicates “strongly disagree” and 5 indicates “strongly agree”. The average time for completion of the questionnaire was about 20-30 min. The respondents were provided a brief introduction about the objectives of the study, with particular focus on the launch of OGD initiative in India.

### 4.2 Data analysis

In this section, results are being provided in line with the statistical analysis conducted on the data.

*4.2.1 Descriptives.* [Table III](#) provides a descriptive summary regarding the respondents. Most of the respondents in the sample were men. A sizeable number of respondents use OGD weekly or monthly. The respondents use OGD for varied purposes like statistical analysis, data linking (combining and integrating different data sets), writing academic publications, doing policy research, etc.

*4.2.2 Reliability and validity of the model.* The first step was to ascertain the reliability of the model. The model’s reliability is confirmed as the values of Cronbach’s alpha are greater than 0.7. [Table IV](#) summarizes the values for Cronbach’s alpha. For assessing convergent validity, the smallest within-factor correlations are provided in [Table V](#). As these correlations are significant, convergent validity is supported.

*4.2.3 Path analysis.* Path analysis is a common research method wherein a path model is defined by exogenous, endogenous or intervening endogenous variables. Exogenous variables are those which do not have any causes, and endogenous variables are those which are dependent variables. Besides, there are residual error terms associated with every variable which account for the unexplained variance of the variable. The path model defines two types of relationships: correlations and cause-and-effect relationships. For path analysis, it should be important that there is model linearity and additivity, lack of correlation of residual variables with the variables in the model, negligible or absence of

**Table III** Descriptive summary of the respondents

<i>Respondents' characteristics</i>	<i>(%)</i>
<i>Gender</i>	
Male	70.5
Female	29.5
<i>Age (years)</i>	
18-28	10.7
29-38	49.6
39-48	19.3
49-58	11.9
59 or above	8.6
<i>Field of work (occupation)</i>	
Social sciences	38.5
Natural sciences	18.0
Non-scientific (semi-) governmental	16.0
Non-scientific industry (e.g. private company)	21.7
Other	5.7
<i>Frequency of OGD usage</i>	
Daily or multiple times a day	13.1
Weekly or a few times in a week	38.1
Monthly or a few times in a month	35.2
Yearly or a few times in a year	10.2
Do not know	3.3
<i>Purpose of OGD usage</i>	
To perform statistical analysis	4.9
For data linking (combining and integrating different data sets)	6.1
To write academic publications	11.1
To perform policy research	15.2
To perform investigations (non-scientific and non-policy)	15.2
For political and policy-making decisions	8.2
For curiosity and/or recreation	14.3
For daily operation in work	11.9
For news reporting	9.8
Other purposes	3.3

**Table IV** Cronbach's alpha

<i>Construct</i>	<i>No. of items</i>	<i>Cronbach's <math>\alpha</math></i>
PE	4	0.908
EE	4	0.914
SI	3	0.879
FC	3	0.835
BI	3	0.891
VU	4	0.934

**Table V** Ascertaining convergent validity

<i>Construct</i>	<i>Minimum within-factor correlation</i>	<i>Significance</i>
PE	0.728	0.000
EE	0.698	0.000
SI	0.645	0.000
FC	0.602	0.000
BI	0.725	0.000
VU	0.761	0.000



multicollinearity and adequate sample size which is representative of the population (Mueller, 1996).

Path analysis, using LISREL (version 8.80), was conducted for determining the direct effects between chosen constructs (Figure 1). Path analysis helps to assess the quality of the fit between the data and the model (Hancock and Mueller, 2013). Likewise, to assess the data-model fit in the present study, indices like CFI (comparative fit index), NFI (normed fit index), NNI (non-normed fit index), RMSEA (root-mean square error of approximation) and SRMR (standardized root-mean square residual) show conformity with acceptable standards (Hair *et al.*, 2006; Joreskog and Sorbom, 1989; Segars and Grover, 1998). For instance, CFI value is found to be 0.98 which is greater than the minimum acceptable norm of 0.96 (Hu and Bentler, 1999); NFI of 0.97 is higher than the minimal acceptable value of 0.95; NNI is 0.98 which is far more than the acceptable value of 0.95 (Hu and Bentler, 1999; Schumacker and Lomax, 2004); RMSEA of 0.043 is less than the maximal acceptable norm of 0.06; and SRMR of 0.033 is less than the maximal acceptable norm of 0.09. This confirms the soundness of the path model.

In the present study, behavioral intention (BI) is an endogenous variable and PE, EE, SI, FC and VU are exogenous variables. The analysis shows that *H2* through *H5* were supported and *H1* was not supported. This is evidenced in the structural model as depicted below:

$$BI = -0.30PE + 0.094EE + 0.025SI + 0.88FC - 0.28VU, R^2 = 0.94$$

Thus, the respondents do not perceive that OGD usage would be instrumental in contributing toward their job performance, and hence, there is a low BI to use and accept OGD (*H1*). *H1* is not supported. In terms of EE, the respondents perceive that they are able to use OGD easily because data sets are easily available and accessible and less effort is exerted in tapping these data sets. Therefore, *H2* is supported. *H3* is supported and the respondents perceive that their family, peers and supervisors do influence their intention to use and accept OGD. *H4* is supported in line with the model developed in the study wherein an individual's use and acceptance of OGD depends upon the availability of requisite infrastructure like internet access and the like. The respondents perceive that they use data sets owing to the availability of the supporting infrastructure in terms of easy access to the internet and the necessary tools and technologies to tap these data sets. It is likely that this finding is a function of the fact that all the respondents in the study are from urban areas of India where gaining access to the internet is not a problem. Finally, *H5* is supported as the respondents perceive that they are using OGD out of their own volition and there is no obligation to tap data sets as such.

*4.2.4 Assessing the relationship between demographic variables and the BI to use and accept OGD: using multiple regression analysis.* This is the second part of the quantitative study wherein the relationship of demographic variables is being assessed *vis-à-vis* the BI to use and accept OGD. Multiple regression analysis is performed using the popular software SPSS 20.0. Multiple regression is an analytical tool which helps to examine the relationship between a single outcome or criterion measure and several predictor or independent variables (Cohen *et al.*, 2003). Further, it helps to test a theory about presumed causal influences on the criterion variable.

In the present study, the dependent variable (BI) is reformulated as BIAU wherein the original three dimensions of BI, namely, BI1, BI2, BI3, are aggregated. Thus, BIAU is the outcome or criterion variable. Gender (G), Age (A), Purpose of use (P), Type of data (T), Field of work (F), Frequency of OGD usage (Freq) and Purpose of OGD usage (Purp) are used to predict BI to use and accept OGD (BIAU). Therefore, G, A, P, T, F, Freq and Purp are predictors or independent variables. The regression equation to be tested is as follows:

$$BIAU = G + A + P + T + F + Freq + Purp$$

The correlations of the variables are shown in Table VI. As may be seen, only some correlations were statistically significant. Parallel to the regression equation, BIAU was uncorrelated with all but two variables; Freq was found to be negatively correlated with BIAU ( $-0.738^{**}$ ,  $p < 0.01$ ) which is surprising. Likewise, younger respondents found OGD more purposeful than the older ones. There are gender variations in terms of OGD usage as per the purpose for which OGD is being exploited. F is negatively correlated with P which is suggestive of the fact that users tap data sets not purposely but also voluntarily, and they use varied sets of data which may or may not be directly related to their professional fields. This is an interesting finding as it shows that users are motivated to tap data sets for multifarious purposes. However, men are more likely to use datasets purposefully than the women.

Further, the regression results show some interesting insights about OGD use and acceptance among the respondents (Table VII). The prediction model was statistically significant,  $F(6, 237) = 51.487$ ,  $p < 0.001$  and accounted for approximately 56.6 per cent of the variance of BIAU ( $R^2 = 56.6$  per cent, adjusted  $R^2 = 55.5$  per cent). BI to use and accept OGD was predicted better by frequency with which OGD was used than by gender; other variables failed to predict BIAU. Implicitly, men tap open data sets more than women, and the increased frequency of tapping these data sets is reflective of the increased intention to accept and use OGD.

## 5. Discussion

The present study sought to probe the extent of use and acceptance of OGD among respondents in Indian context where the Open Data Initiative was initiated in 2012. The UTAUT model was adapted in line with the previous research on this theme in another setting (Zuiderwijk *et al.*, 2015). There were two parts of the empirical probe: in the first part, path analysis, using LISREL, was deployed for understanding OGD use among respondents, and in the second part, multiple regression analysis was conducted to gauge the prediction of the BI to use and accept OGD by invoking demographic variables into the multiple regression folds.

**Table VI** Correlations matrix

	BIAU	A	G	P	F	Frequency	Purpose
BIAU	1	0.021	0.115	0.088	0.020	-0.738**	0.066
A	0.021	1	-0.007	0.053	-0.081	0.074	-0.197**
G	0.115	-0.007	1	-0.007	0.098	-0.024	0.134*
P	0.088	0.053	-0.007	1	-0.250**	-0.038	-0.107
F	0.020	-0.081	0.098	-0.250**	1	0.019	0.152*
Frequency	-0.738**	0.074	-0.024	-0.038	0.019	1	-0.057
Purpose	0.066	-0.197**	0.134*	-0.107	0.152*	-0.057	1

Notes: \*\* $p < 0.01$ ; \* $p < 0.05$

**Table VII** Regression

Model	b	SE-b	$\beta$
Constant	4.642	0.297	
A	0.084	0.045	0.082
G*	0.221	0.107	0.090
P	0.051	0.032	0.071
F	0.038	0.038	0.046
Frequency**	-0.889	0.052	-0.738
Purpose	0.013	0.021	0.029

Notes: \*\* $p < 0.01$ ; \* $p < 0.05$

While there is increased acceptance and use of open data sets, the respondents do not perceive that tapping these data sets may have any professional gains for them. Similarly, there are possibilities of lack of metadata in these data sets, which may impede OGD use (Christian, 2001; Quam, 2001; Whitmore, 2012). OGD is not always available in current format, and most of it is in archived form (Janssen *et al.*, 2012; Lee and Kwak, 2012); therefore, the intention to use these outdated data sets is less. On the other hand, it is also possible that given the diverse sample, many of them do not possess the requisite technical expertise to tap OGD knowledge even if they are well versed with the subject-matter of OGD (King *et al.*, 2011; Janssen *et al.*, 2012) – this is a bottleneck in making effective and efficient OGD use.

The respondents find that the data sets are available and accessible, and this may be attributed to their easy access to the internet. Implicitly, there is proper infrastructural support which enabled them to use the data sets. For instance, internet connectivity is better in urban areas, and this helps the users to access OGD quicker and efficiently. They have ample resources available to access and use the open data sets in whichever manner they want. The role of the friends, family, colleagues and supervisors is amply evident in influencing an individual to use the open data sets. Therefore, the social networks of an individual are significant indicators for him/her to use OGD. Finally, the respondents are self-motivated to use these open data sets and do not feel any external pressure to use them. This is important because the more the individual is self-propelled to harness these data sets, the more frequently will he/she visit the online portals of ministries and government bodies without any constraint.

Our study showed that younger respondents are more inclined to accept and use OGD than the older ones. This may be attributed to the fact that an individual's age impacts the propensity to be influenced by social norms or be more risk-taking, and both these factors are more pronounced in younger generation (Lehmann *et al.*, 2013). Therefore, while the younger generation would be more motivated to try discovering new data sets and be influenced by the friends or family, the older generation is more stable and may not prefer to take decisions which are risky or counter-productive. Besides, men and women are guided by different motivations to pursue any goal. Thus, while men are more amenable to accept and use the open data sets than women, the former tap OGD more for professional purposes, whereas women are more inclined to tap the data sets even if these data sets are not directly relevant to their professional background. On the one hand, this may be a consequence of the differential interest in the data sets such that "one data set would be more interesting to researchers (e.g. historical data), another to media and journalists (e.g. budget data) and yet another to businesses (e.g. weather data)" (Susha *et al.*, 2015, p. 184). On the other hand, this may also be attributed to the fact that men are more decisive and assertive than women (Estes and Felker, 2012; Weisberg *et al.*, 2011), and therefore, men are more inclined to tap open data sets for purposes which are in line with their professional aims in comparison with women who might be emotionally driven and gregarious to tap OGD out of personal interest or societal influence.

## 6. Social and practical implications

The study holds a number of social and practical implications. First, the study shows that societal influence is an important factor which predicts the acceptance and usage of OGD. Therefore, the role of family, peers and supervisors assumes critical importance here. In this sense, the public authorities must convey social messages via different channels to encourage the usage of open data sets and impress upon them the need to create social and economic value of them. Second, OGD initiatives propel innovation and economic growth (Shepherd, 2015; Zuiderwijk *et al.*, 2012; Yang and Wu, 2016). Therefore, on the one hand, businesses and small-and-medium enterprises

may tap these data sets for identifying and producing new products and services; others may use OGD for furthering their research or academic activities. Therefore, the governmental bodies should eschew themselves from masking the data sets and try to promote the inherent public value which may be derived post-usage of these data sets. Finally, it is important the OGD initiative be institutionalized in India, and there is constant and consistent revamp of data sets on a real-time basis. Collaboration and participation from external stakeholders like the private sector and non-government bodies or other interested individuals is required to stir a participative democracy in the country where mutual information exchange is facilitated. Therefore, the government may conduct OGD contests (Sieber and Johnson, 2015) wherein users may contribute to data sets or report about specific issues besides creating technological support solutions.

## 7. Limitations of the study and future research directions

The present study is limited in its scope and leaves significant indices for future research. First, the study was conducted adopting a cross-sectional approach, and this leaves an option for conducting a longitudinal research covering the changing patterns of OGD use among the respondents in a developing country's context. Second, further studies may be undertaken regarding the quality issues pertaining to OGD to ascertain users' perceptions regarding the quality of OGD. Third, the present study remained silent on the "digital divide" (Gurstein, 2011) in India which is indicative of differential OGD use. As this study covered respondents comprising of well-educated and urban populace, the impact and utility of OGD for rural areas remain to be explored. Such a study would provide insights into the socio-technical bottlenecks in OGD use (Zuiderwijk *et al.*, 2012). Future research may look into the lessons which may be derived from developing countries in terms of their OGD use and implementation, especially in terms of OGD quality and user-friendliness. Finally, the present study may be extended to cover politico-legal and administrative factors which impact OGD implementation in a developing country at the national, state and local levels.

## References

- Bates, J. (2014), "The strategic importance of information policy for the contemporary neoliberal state: the case of Open Government Data in the United Kingdom", *Government Information Quarterly*, Vol. 31, pp. 388-395.
- Burglund, E. and Engvall, T. (2014), "Open data?: data, information, document or record?", *Records Management Journal*, Vol. 24 No. 2, pp. 163-180.
- Charalabidis, Y., Alexopoulos, C. and Loukis, E. (2016), "A taxonomy of open government data research areas and topics", *Journal of Organizational Computing and Electronic Commerce*, Vol. 26 Nos 1/2, pp. 41-63.
- Christian, E. (2001), "A metadata initiative for global information discovery", *Government Information Quarterly*, Vol. 18 No. 3, pp. 209-221.
- Cohen, J., Cohen, P., West, S. and Aiken, L. (2003), *Applied Multiple Regression/Correlation Analysis for the Behavioral Sciences*, Lawrence Erlbaum Associates, Mahwah, NJ.
- Conradie, P. and Choenni, S. (2014), "On the barriers for local government releasing open data", *Government Information Quarterly*, Vol. 31, pp. S10-S17.
- Estes, Z. and Felker, S. (2012), "Confidence mediates the sex difference in mental rotation performance", *Archives of Sexual Behavior*, Vol. 41, pp. 557-570.
- Evans, M.A. and Campos, A. (2013), "Open government initiatives: challenges of citizen participation", *Journal of Policy Analysis and Management*, Vol. 32 No. 1, pp. 172-185.
- Gackstatter, S., Kotzemir, M. and Meissner, D. (2014), "Building an innovation-driven economy – the case of BRIC and GCC countries", *Foresight*, Vol. 16 No. 4, pp. 293-308.

- Gurstein, M. (2011), "Open data: empowering the empowered or effective data use for everyone?", *First Monday*, Vol. 16.
- Hair, J., Black, W., Babin, B., Anderson, R. and Tatham, R. (2006), *Multivariate Data Analysis*, 6th ed., Pearson Prentice Hall, Upper Saddle River, NJ.
- Hancock, G.R. and Mueller, R.O. (Eds) (2013), *Structural Equation Modeling: A Second Course*, 2nd ed., Information Age Publishing, Charlotte, NC.
- Hardy, K. and Maurushat, A. (2017), "Opening up government data for Big Data analytics and public benefit", *Computer Law & Security Review*, Vol. 33 No. 1, pp. 30-37.
- Hu, L. and Bentler, P.M. (1999), "Cutoff criteria for indexes in covariance structure analysis: conventional criteria versus new alternatives", *Structural Equation Modeling: A Multidisciplinary Journal*, Vol. 6, pp. 1-55.
- Janssen, K. (2011), "The role of public sector information in the European market for online content: a never-ending story or a new beginning?", *info*, Vol. 13 No. 6, pp. 20-29.
- Janssen, M., Charalabidis, Y. and Zuiderwijk, A. (2012), "Benefits, adoption barriers and myths of open data and open government", *Information Systems Management*, Vol. 29 No. 4, pp. 258-268.
- Joreskog, K. and Sorbom, D. (1989), *LISREL 7.16: Analysis of Linear Structured Relationship by Maximum Likelihood and Least Squares Method*, International Educational Services, Chicago, IL.
- Jung, K. and Park, H. (2015), "A semantic (triz) network analysis of South Korea's 'open public data' policy", *Government Information Quarterly*, Vol. 32 No. 3, pp. 353-358.
- Kalampokis, E., Tambouris, E. and Tarabanis, K. (2011), "A classification scheme for open government data: towards linking decentralised data", *International Journal of Web Engineering and Technology*, Vol. 6 No. 3, pp. 266-285.
- Kalampokis, E., Tambouris, E. and Tarabanis, K. (2011), "Open government data: a stage model", *10th Annual International Conference on Electronic Government Research and Practice (EGOV2011)*, Springer, pp. 235-246.
- Kassen, M. (2013), "A promising phenomenon of open data: a case study of the Chicago open data project", *Government Information Quarterly*, Vol. 30 No. 4, pp. 508-513.
- King, R.D., Liakata, M., Lu, C., Oliver, S.G. and Soldatova, L.N. (2011), "On the formalization and reuse of scientific research", *Journal of The Royal Society Interface*, Vol. 8 No. 63, pp. 1440-1448.
- Kunkel, R. (2016), "The US government manual in XML: a case study of a Data.gov open data set", *Legal Reference Services Quarterly*, Vol. 34 No. 4, doi: [10.1080/0270319X.2016.1252227](https://doi.org/10.1080/0270319X.2016.1252227).
- Lee, G. and Kwak, Y.H. (2012), "An open government maturity model for social media-based public engagement", *Government Information Quarterly*, Vol. 29 No. 4, pp. 492-503.
- Lehmann, R., Denissen, J.J., Allemand, M. and Penke, L. (2013), "Age and gender differences in motivational manifestations of the Big Five from age 16 to 60", *Developmental Psychology*, Vol. 49 No. 2, pp. 365-383.
- Linders, D. (2013), "Towards open development: leveraging open data to improve the planning and coordination of international aid", *Government Information Quarterly*, Vol. 30, pp. 426-434.
- Liu, X., Song, Y., Wu, K., Wang, J., Li, D. and Long, Y. (2015), "Understanding urban China with open data", *Cities*, Vol. 47, pp. 53-61.
- McDermott, P. (2010), "Building open government", *Government Information Quarterly*, Vol. 27 No. 4, pp. 401-413.
- Mueller, R.O. (1996), *Basic Principles of Structural Equation Modeling: An Introduction to LISREL and EQS*, Springer, New York, NY.
- National Data Sharing and Accessibility Policy (NDSAP) (2014), "Implementation Guidelines", available at: <https://data.gov.in> (accessed 29 April 2016).
- Nugroho, R.P., Zuiderwijk, A., Janssen, M. and de Jong, M. (2015), "A cross comparison of national open data policies: lessons learned", *Transforming Government: People, Process and Policy*, Vol. 9 No. 3, pp. 286-308.

- OGP (2017), *Open Government Partnership*, available at: [www.ogp.gov.cl/en/](http://www.ogp.gov.cl/en/) (accessed 14 June 2017).
- Ohemeng, F.L.K. and Ofosu-Adarkwa, K. (2015), "One way traffic: the open data initiative project and the need for an effective demand side initiative in Ghana", *Government Information Quarterly*, Vol. 32, pp. 419-428.
- Okamoto, K. (2017), "Introducing open government data", *The Reference Librarian*, Vol. 58 No. 2, doi: [10.1080/02763877.2016.1199005](https://doi.org/10.1080/02763877.2016.1199005).
- Pearson, I. (2006), "The role of future ICT in city development", *Foresight*, Vol. 8 No. 3, pp. 3-16.
- Pina, V., Torres, L. and Royo, S. (2009), "E-government evolution in EU local governments: a comparative perspective", *Online Information Review*, Vol. 33 No. 6, pp. 1137-1168.
- Quam, E. (2001), "Informing and evaluating a metadata initiative: usability and metadata studies in Minnesota's Foundations Project", *Government Information Quarterly*, Vol. 18 No. 3, pp. 181-194.
- Sandoval-Almazan, R. and Gil-Garcia, J.R. (2016), "Toward an integrative assessment of open government: proposing conceptual lenses and practical components", *Journal of Organizational Computing and Electronic Commerce*, Vol. 26 Nos 1/2, pp. 170-192.
- Sataslaatten, O.H. (2014), "The Norwegian Noark Model requirements for EDRMS in the context of open government and access to governmental information", *Records Management Journal*, Vol. 24 No. 3, pp. 189-204.
- Saxena, S. (2017), "Open public data (OPD) and the Gulf Cooperation Council: challenges and prospects", *Contemporary Arab Affairs*, Vol. 10 No. 2, doi: [10.1080/17550912.2017.1297565](https://doi.org/10.1080/17550912.2017.1297565).
- Schumacker, R.E. and Lomax, R.G. (2004), *A Beginner'S Guide to Structural Equation Modeling*, 2nd ed., Lawrence Erlbaum Associates, Mahwah, NJ.
- Segars, A.H. and Grover, V. (1998), "Strategic information systems planning success: an investigation of the construct and its measurement", *MIS Quarterly*, Vol. 22 No. 2, pp. 139-163.
- Shepherd, E. (2015), "Freedom of information, right to access information, open data: who is at the table?", *The Round Table*, Vol. 104 No. 6, pp. 715-726.
- Sieber, R.E. and Johnson, P.A. (2015), "Civic open data at a crossroads: dominant models and current challenges", *Government Information Quarterly*, Vol. 32, pp. 308-315.
- Susha, I., Gronlund, A. and Janssen, M. (2015), "Organizational measures to stimulate user engagement with open data", *Transforming Government: People, Process and Policy*, Vol. 9 No. 2, pp. 181-206.
- Sykes, T.A., Venkatesh, V. and Gosain, S. (2009), "Model of acceptance with peer support: a social network perspective to understand employees' system use", *MIS Quarterly*, Vol. 33 No. 2, pp. 371-393.
- The White House (2016), "Digital government. Building a 21st century platform to better serve the American people", available at: [www.whitehouse.gov/sites/default/files/omb/egov/digital-government/digital-government.html](http://www.whitehouse.gov/sites/default/files/omb/egov/digital-government/digital-government.html) (accessed 26 April 2012).
- Ubaldi, B. (2013), "Open government data: towards empirical analysis of open government data initiatives", OECD Working Papers on Public Governance No. 22, OECD Publishing (accessed 23 May 2014), doi: [10.1787/5k46bj4f03s7-en](https://doi.org/10.1787/5k46bj4f03s7-en).
- Venkatesh, V., Morris, M.G., Davis, G.B. and Davis, F.D. (2003), "User acceptance of information technology: toward a unified view", *MIS Quarterly*, Vol. 27 No. 3, pp. 425-477.
- Vetro, A., Canova, L., Torchiano, M., Minotas, C.O., Iemma, R. and Morando, F. (2016), "Open data quality measurement framework: definition and application to open government data", *Government Information Quarterly*, Vol. 33, pp. 325-337.
- Wang, H.J. and Lo, J. (2016), "Adoption of open government data among government agencies", *Government Information Quarterly*, Vol. 33, pp. 80-88.
- Weisberg, Y.J., De Young, C. and Hirsh, J.B. (2011), "Gender differences in personality across the ten aspects of the Big Five", *Frontiers in Psychology*, Vol. 2, pp. 1-11.
- Whitmore, A. (2012), "Extracting knowledge from U. S. Department of Defense freedom of information act requests with social media", *Government Information Quarterly*, Vol. 29 No. 2, pp. 151-157.

Whitmore, A. (2014), "Using open government data to predict war: a case study of data and systems challenge", *Government Information Quarterly*, Vol. 31, pp. 622-630.

Yang, T. and Wu, Y. (2016), "Examining the socio-technical determinants influencing government agencies' open data publication: a study in Taiwan", *Government Information Quarterly*, Vol. 33 No. 3, pp. 378-392.

Zeleti, F.A., Ojo, A. and Curry, E. (2016), "Exploring the economic value of open government data", *Government Information Quarterly*, Vol. 33, pp. 535-551.

Zuiderwijk, A. and Janssen, M. (2014), "Open data policies, their implementation and impact: a framework for comparison", *Government Information Quarterly*, Vol. 31 No. 1, pp. 17-29.

Zuiderwijk, A., Janssen, M. and Dwivedi, Y.K. (2015), "Acceptance and use predictors of open data technologies: drawing upon the unified theory of acceptance and use of technology", *Government Information Quarterly*, Vol. 32, pp. 429-440.

Zuiderwijk, A., Janssen, M. and Sussha, I. (2016), "Improving the speed and ease of open data through metadata, interaction mechanisms, and quality indicators", *Journal of Organizational Computing and Electronic Commerce*, Vol. 26 Nos 1/2, pp. 116-146.

Zuiderwijk, A., Janssen, M., Choenni, S., Meijer, R. and Alibaks, R.S. (2012), "Socio-technical impediments of open data", *Electronic Journal of e-Government*, Vol. 10 No. 2, pp. 156-172.

Zuiderwijk, A., Jeffery, K. and Janssen, M. (2012), "The potential of metadata for linked open data and its value for users and publishers", *Journal of eDemocracy*, Vol. 4 No. 2, pp. 222-244.

## Appendix

**Table A1** Items in the questionnaire

<i>Construct</i>	<i>Item</i>
PE	Using OGD is beneficial for me (PE1) Using OGD will help me to accomplish my research more quickly (PE2) Using OGD will increase my productivity (PE3)
EE	Using OGD improves my performance in my job/work (PE4) It will be easy for me to become skillful at using OGD (EE1) Learning to use OGD will be easy for me (EE2) I clearly understand how to use OGD (EE3)
SI	I do not have difficulty in explaining why using OGD may be beneficial (EE4) People who influence my behavior think that I should use OGD (SI1) People who are important to me (e.g. family, friends) think that I should use OGD (SI2)
FC	People who are important to me (e.g. colleagues) think that I should use OGD (SI3) I have the resources necessary to use OGD (FC1) OGD is compatible with other systems that I use (FC2) A specific person or group is available for assistance with difficulties concerning the use of OGD (FC3)
BI	I intend to use OGD in the future (BI1) I predict that I will use OGD in the future (BI2) I plan to use OGD in the future (BI3)
VU	Although it might be helpful, using OGD is certainly not compulsory for my research or other activities (VU1) My research and other activities do not require me to use OGD (VU2) My superiors expect me to use OGD (VU3) My use of OGD is voluntary (it is not required by my superiors/research/other activities) (VU4)
G	Are you male or female? (G)
A	What is your age (18-28 (1); 29-38 (2); 39-48 (3); 49-58 (4); 59 and above (5)?) (A)
P	To what extent is OGD purposeful for you? (P)
F	Which of the following occupational fields of work best describes you (Social sciences; Natural sciences; non-scientific (semi-) governmental; non-scientific industry (i.e. private company); Other)? (F)
Frequency	How often do you use OGD (Daily or multiple times a day; Weekly or a few times in a week; Monthly or a few times in a month; Yearly or a few times in a year; Do not know)? (Frequency)
Purpose	For what purposes do you use OGD (To perform statistical analysis; For data linking (combining and integrating different datasets; To write academic publications; To perform policy research; To perform investigations (non-scientific and non-policy); For political and policy-making decisions; For curiosity and/or recreation; For daily operation in work; For news reporting; Other purposes)? (Purpose)

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