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BIG DATA: Transforming Governance for Enhanced Citizen Participation

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Abstract

There have been changing paradigms for science, technology and management affecting the way we live and the way we are getting governed. India being the largest democracy in the world and the second most populous country in the world has much to gain from e-governance. There is plethora of data generated at an exorbitant speed with disparate sources from multitude of stakeholders.There are existing studies for measuring the e-governance projects in terms of outcomes like reduced costs, speed of delivery, performance effectiveness of implementation, etc. or others parameters measuring the performance directly in terms of transparency, accountability and citizen participation. But there is dearth of empirical studies to measure the influence of using big data on the performance of e-governance projects. But before we try to see the influence of using big data it is important to explore the variables affecting the performance of e-governance projects using big data. This study explores these variable based on Situation-Actor-Process (S-A-P) framework. Further, the SAP-LAP framework is used for developing the conceptual model of inquiry that will exhibit the systemic flexibility for e-governance performance measurement.

The analysis revealed that the e-governance projects using big data with high value of conceptualized S-A-P variables are characterized by high performance. This implies that conceptualized S-A-P variables for big data do influence the performance of e-governance projects. Also the citizen empowerment is enhanced through citizen participation.The study is based on the pilot study in the context of G2C e-governance projects in CGHS. It is required to study more such e-governance projects making use of big data so as to validate and generalize the proposed framework. Also though GCHS does have huge set of data but it is still not being analyzed to the fullest to support citizen centric services.The analysis results may be relevant to the policy makers or practitioners for e-governance projects to improve the performance of implementation of these projects. This may be further compared with similar projects in healthcare like DGEHS run by Delhi government.

Keywords: SAP-LAP, e-government, e-governance, big data, government transformation, innovative government, performance of e-governance projects.

Introduction

Government is a dynamic mixture of goals, structure and functions (Pardo, 2000). E-Governance, an idea by former US Vice President Al Gore, to link the citizen to various government agencies for getting all kinds of services in an automated manner by use of ICT, reduces cost, improves performance, speed of delivery and effectiveness of implementation (Almaraben and Abu Ali,

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2010). E-Governance transforms governance to a transparent, responsive, citizen friendly and efficient regime. E-Governance has emerged as one of the innovative ways of providing information and delivering services to citizens. It is providing governments with new opportunities of bringing services closer to the citizen in cost-effective, efficient and transparent ways. Considering the diversity of India, it has become a necessity to implement e-governance to realise the dream of Digital India. But the effective e-governance implementation requires a lot more than just utilizing the latest means of ICT. There is little research that has been conducted in the context of developing countries to benchmark and appraise the impact of e-government on the target groups. Assessment of impact is important to justify public fund expenditure and inform future projects. Most studies on assessment of e-government have been done in developed countries where the context is different from that of developing countries. Therefore, there is need to develop frameworks that are suitable in the context of developing countries. Studies on assessing impact have been done at macro and micro levels. These studies are largely based on supply-side and a few on demand-sides with little focus on outcomes and impact.

One of the outcomes of effective e-governance is to empower the citizens by meeting all the critical success factors (CSFs) and improvise the services by analyzing their transactional data. But there is huge set of citizen transactional data that is getting generated on daily basis through magnitude of services provided by government departments in India. It is therefore imperative to make use of big data for effective e-governance. Big data analytics has the potential to change the paradigms of governance. Despite these deep impacts on strategy and operations, there is paucity of empirical research to assess the role of big data in e-governance (Wamba et al., 2015). There is hardly any empirical study for success factors in India in the context of big data and e-governance. The models described in literature review are without a base of the data in e-governance. This study aims at developing a conceptual framework for assessing the performance of the e-governance projects by using big data. The conceptualized model will integrate the benefits of big data after taking due care of the challenges posed by big data.

Once the use of big data for e-governance becomes popular, the next set of challenges will be to measure the impact of adoption by devising the Key Performance Indicators (KPIs). E-Government added transparency, accountability, citizen participation for government performance (Mohammad, 2009) and broadens the participation of citizens in decision-making process. These may be the starting KPIs. The purpose of this study is to measure the performance of e-governance projects considering the conceptualized variables based on Situation-Actor-Process (S-A-P) - Learning-Action-Performance (L-A-P) framework (Sushil, 2000) which may be influencing the performance of e-governance projects. The objectives of this study are:

- To develop a conceptual research framework for assessing the performance of G2C e-governance projects using big data
- To explore the likely influence of the conceptualized research variables on performance of e-governance projects (with special case of CGHS e-governance project)

The structure of the paper has an introduction on the subject area followed by the literature review about e-governance, big data and how to assess the performance of e-governance projects. This is followed by the methodology, the conceptual framework for assessing the performance of e-governance projects, description of the selected project into consideration and then how the questionnaire was developed and data was collected. Last section presents the analysis. Finally the research findings and conclusions are presented.

Literature Review

E-Governance

E-Government refers to the use by government agencies of information technologies (IT) to transform relations with citizens, businesses and other arms of government (World Bank, 2009). The term e-government is not uniformly used across the globe. Different terms are used by different countries as per their varying contexts (Verdegem and Verleye, 2009). According to Sheridan and Riley (2006), e-governance is a broader concept that deals with the whole spectrum of the relationship and networks within government regarding the usage and application of ICTs whereas e-government is limited to the development of online services). According to them, e-government is an institutional approach to jurisdictional political operations where as e-governance is a procedural approach to co-operative administrative relations, i.e. the encompassing of basic and standard procedures within the confines of public administration. However, e-governance has been used more frequently throughout this paper keeping in view the Indian context (Planning Commission, 2007).

E-Governance can renovate the relationship between public, private sector and government and enable better policy outcomes, high quality services and greater engagements with the citizens of the country. It has been seen that the government departments work in silos and are not integrated to provide single line of service to the citizens. If the departments are virtually integrated through the service providers then that can be an effective model for delivering citizen centric e-governance solutions (Al-Khouri et al., 2011; Kietzmann et al., 2011). Implementing e-government is a continuing process and most often the development is conceptualized in stages. E-Governance is in essence the application of Information and Communications Technology (ICT) to government functioning in order to create 'Simple, Moral, Accountable, Responsive and Transparent (SMART)' governance (ARC, 2008). The goals of e-Governance are: better service delivery to citizens, transparency and accountability to citizens, empowering citizens through information, improved efficiency within governments and improve interface with business and industry.

Big Data

Big data has been defined in terms of 3Vs as 'Volume' or the large amount of data consuming either huge storage or has large number of records data; 'Velocity', which is the frequency or the speed of data generation or data delivery; and 'Variety', meaning data being generated from a large variety of sources and formats, contain multidimensional data fields including structured and unstructured data (Russom, 2011). Later on 'Value' was added to stress the importance of extracting economic benefits from available big data (IDC, 2012; Oracle, 2012) and 'Veracity' to highlight the importance of data quality and level of trust in various data sources (Forrester, 2012; White, 2012). The values created by big data are multifold (Wamba et al., 2015) like creating transparency, enable need discovery, enable performance improvement, better customization on population segments, data driven decisions, new business models, new products, new services, etc. Big data has multitude of benefits highlighted by various authors. Big data has high operational and strategic potential in generating extensive 'business value' (Wamba et al., 2015). 'Big data' has been defined as "next big thing in innovation" (Gobble, 2013), "fourth paradigm of science" (Strawn, 2012), "next management revolution" (McAffee and Brynjolfsson, 2012) and facilitator for bringing revolution in "science and technology" (Ann Keller et al., 2012). This is possible because 'big data' has the capability of changing the competition by process transformation, alteration of corporate ecosystems and facilitating innovation (Brown et al., 2011) and also create business value by unearthing new organizational capabilities (Davenport et al., 2012). On the other hand, there are issues as well related to use of big data

(Wamba et al., 2015) like data policies, technology & techniques, department change (organizational change) and talent, access to data, industry structure, etc. Big data includes extremely large data sets that may be analysed computationally to reveal patterns, trends, and associations, especially relating to human behaviour and interactions.

There are different set of models to gauge the maturity level of e-governance. In a country like India, with so much of diversity, it is difficult to attain the global standards of good governance like outlined by UN. Need for the use of data to track the minute level of each and every citizen transaction is there so as to analyse it and improve on continuous basis from the feedback (ARC, 2008). To realize these maturity models either for vertical and horizontal integration or transformation, the use of big data is required.

Performance Measures of E-Governance Using Big Data

E-government initiatives are aimed at raising the level of government performance in general by upgrading the level of government services provided to citizens and enhance the effectiveness of government work internally. This also broadens the participation of citizens in decision-making process (Almaraben and AbuAli, 2010). Different set of indicators for measuring/assessing the performance of e-governance projects are used by different researchers. Indicators for measuring are e-government success are information dissemination, two-way communication, services delivered, integration, political participation, security, usability, etc. (Holzer, 2008). E-Government is also modeled as a value chain showing the way inputs are converted into outputs (Heeks, 2006). Using big data in e-governance can be a challenging task and may have different set of requirements. Zoughbi, Saleem (2017) defines the infrastructure requirements for e-governance using big as follows:

- High volume of data that should be supported for long time
- Generation of huge amount of data at high speed
- Distribution and replication of multi-dimensional data
- Support of virtual e-governance communities
- Good security environment for data storage and data retrieval
- Data integrity, data confidentiality and data accountability

Every e-government application requires effective processes technology and data for successful implementation (Dhoot, 2014). But the use of big data in e-governance requires data sharing, learning from data, grouping, mining, etc. The big data framework for e-governance requires the following:

- Resource management
- Data management
- Data Analysis and Data Discovery
- Dynamic Reporting

There are lots of challenges involved like scaling data, auditing, replication, disaster recovery, performance, etc. But for big data has to be used in e-governance there are following requirements:

- E-governance needs big data to be reliable, fast and efficient.
- Faster and efficient policies
- Data efficiency

- Current implementation moving from handling structured data and no sharing between applications

There are inherent differences in traditional e-government and big data e-government as listed in table below (Rajagopalan and Solaimurugan, 2013).

Table 1: Comparison between traditional and big data e-governance

Parameters	Traditional E-Government	Big data E-Government
Architecture	Centralized	Distributed
Data	Structured data	Raw, unstructured and semi-structured
Analytics	• Statistical analytics with known condition • Traditional analytics based on the relation data model and known relationship	• Discovery of unexplored business questions • Unstructured data (images, videos, mobile generated, RFID, etc.) requires specialized algorithms and software
Data size	Tera bytes	Large and messy data
Type of analysis	Text analytics	Graph, audio and video analytics
Data model	Fixed schema	Schema less
Applications	Batch oriented and one need to wait transformation jobs to complete before the required insight is obtained	Big data analytics is aimed at near real time analysis of the data using the support of required software
Types of operation	Relational and conditional	Analytics: Sentimenta l, predictive, behavioural, Machine Learning
Reporting	Ad-hoc query report, high latency for large volume of data	Low latency, interactive, visualization, decision-making and analytics reports

(**Source:** Rajagopalan and Solaimurugan, 2013)

Performance of e-governance projects is measured in terms of transparency, accountability and citizen participation that include interactivity, decision-making or support and empowerment. The study will attempt to show how this is enhanced by use of big data. There are similar set of indicators for measuring the success of big data projects. Based on these a set of conceptualized variables are compiled as in table below to measure the performance of e-governance projects making use of big data.

Methodology

Literature review was conducted for understanding the indicators for measuring the performance of e-governance projects with or without use of big data. There were very few studies on assessing the use of big data in e-governance projects. Macro variables influencing the performance of e-governance projects using big data were identified through review of literature. Experts from the domain were interviewed for further inputs. Macro variables expected to influence the performance of e-governance projects were compiled and categories on basis of situation, actors and processes. SAP-LAP framework (Sushil, 2000) has been used as every managerial inquiry can be modelled using this framework. Though SAP-LAP is a generic management framework but it has been used for analyzing, planning, implementing gaps in e-governance projects (Suri and Sushil, 2017), technology management (Garg and Deshmukh, 2010), etc. A questionnaire was designed and survey conducted to measure the performance of e-governance projects and S-A-P variables in the context of selected project of CGHS under Ministry of Health and Family Welfare (MOHFW). The questionnaire was given to around 56 respondents but was completed by 47 respondents. Survey data have been analyzed to study the influence of S-A-P variables on performance of e-governance projects using big data.

Table 2: Conceptualized variables to measure performance of e-governance projects

Macro variables	Micro variables	Literature review
Transparent Systems (TS)	Sharing: Policies, processes, expenses, agreements, tenders, data and relevant information	Harrison et al. (2011), DeitY (2008)
	Current information (quality)	DeitY (2008), Suri and Sushil (2011)
	No ambiguity	DeitY (2008), Suri and Sushil (2011)
	Easily accessible data from anywhere	DeitY (2008)
	Reduced corruption (online and no middlemen)	DeitY (2008)
	Enhanced Trust	Kearns (2004), DeitY (2008)
Accountable Government (AG)	System Availability	DeitY (2008)
	Accessibility: Easy access to services	DeitY (2008)
	Objectives framed as per the needs	DeitY (2008)
	Met stated objectives	DeitY (2008)
	Reduced poverty	DeitY (2008)
	Increased response	DeitY (2008)
	Safeguard interests	DeitY (2008)
	Effective	DeitY (2008)
	Efficient • Accuracy • Reliability • Minimal data loss • Speed of delivery/faster • Speed of response to queries • Improved service quality/performance • Cost reduction (doctor, medicines, travel, etc.) • Reduced proportion of cost to citizen (subsidy)	Almarabeh et al. (2010), DeitY (2008), Suri and Sushil (2006), Suri and Suhsil (2011), Suri (2014)
Enhanced Citizen Participation (ECP)	Enhanced Interactivity	Napitupulu et al. (2014), DeitY (2008)
	Data Driven (based) Decision making	Napitupulu et al. (2014), DeitY (2008)
	Citizen Empowerment	Napitupulu et al. (2014), DeitY (2008)
	Participation in government processes and major decisions	Napitupulu et al. (2014), DeitY (2008)
	Increased number of transactions executed electronically	Napitupulu et al. (2014), DeitY (2008)
	Provision for submission of proposals on government plans	Napitupulu et al. (2014), DeitY (2008)
	Free and open dialogues with government through various online platforms	Napitupulu et al. (2014), DeitY (2008)

Conceptualized variables

In context of e-governance projects it is imperative for citizens to visit the service centre to avail the services. So government institution providing service can be viewed as a management context where a citizen visiting would face situations like taking an appointment, queuing for the turn, visits the doctor. The citizen interacts with employees called actors involved at the service centre like doctors, pharmacists and support staff who are providing the services by using a set of processes like medicine indent and distribution, etc. Therefore, citizens develop a perception about the performance of the e-governance projects based on the interplay of situation, actors and processes variables. The review of literature facilitated to draw a conceptualized model showing the set of major variables affecting the performance of e-governance projects using big data (William et al., 2010).

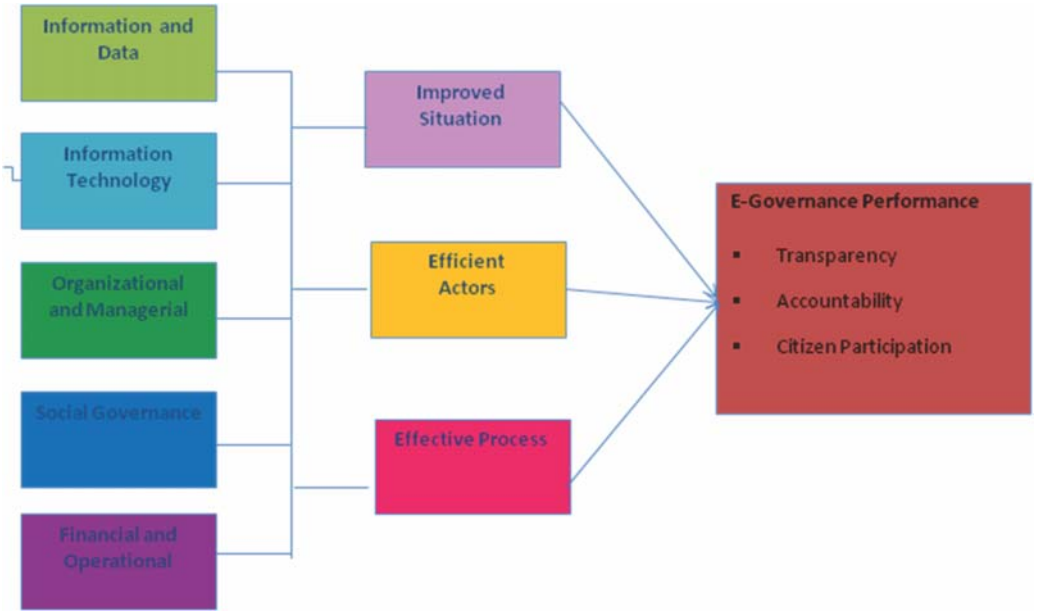

Figure 1: Conceptual Model showing the set of variables affecting performance of e-governance projects

Project Description

Central Government Health Scheme (CGHS)

The "Central Government Health Scheme" (CGHS) provides comprehensive health care facilities for the Central Govt. employees and pensioners and their dependents residing in CGHS covered cities. Started in New Delhi in 1954, Central Govt. Health Scheme is now in operation in Allahabad, Ahemdabad, Bangalore, Bhubhaneshwar, Bhopal, Chandigarh, Chennai, Delhi, Dehradun, Guwahati, Hyderabad, Jaipur, Jabalpur, Kanpur, Kolkatta, Lucknow, Meerut, Mumbai, Nagpur, Patna, Pune, Ranchi, Shillong, Trivandrum and Jammu. The Central Govt. Health Scheme provides comprehensive health care to the CGHS Beneficiaries in India. The medical facilities are provided through Wellness Centres (previously referred to as CGHS Dispensaries) /polyclinics under Allopathic, Ayurveda, Yoga, Unani, Sidha and Homeopathic systems of medicines. CGHS e-governance project was a Mission Mode Project (MMP) under the National E-Governance Plan (NEGP) of the Government. The portal was launched in November, 2005.

The main components of the Scheme are:

- The dispensary services including domiciliary care
- Family Welfare (FW) & Mother Child Health (MCH) Services
- Specialist consultation facilities both at dispensary, polyclinic and hospital level including X-Ray, ECG and Laboratory Examinations.
- Hospitalization.
- Organization for the purchase, storage, distribution and supply of medicines and other requirements
- Health Education to beneficiaries

Table 3: CSFs affecting performance of e-governance projects using big data

Macro variable	Micro variables	Studies
Information and Data (ID)	Accuracy	Napitupulu et al. (2014)
	Consistency	Napitupulu et al. (2014)
	Completeness	Napitupulu et al. (2014)
	Appropriateness	Napitupulu et al. (2014)
Information Technology (IT)	Infrastructure	Almarabeh et al. (2010), Dada (2006)
	Accessibility	Almarabeh et al. (2010)
	Availability	Almarabeh et al. (2010), Napitupulu et al. (2014)
	Privacy and Security	Almarabeh et al. (2010), Smith et al. (2006), Napitupulu et al. (2014)
	Usability	Almarabeh et al. (2010), Napitupulu et al. (2014)
	Interoperability	Almarabeh et al. (2010), Smith et al. (2006)
	Training/capacity building	Almarabeh et al. (2010), Dada (2006), Napitupulu et al. (2014)
	Information, system and service quality	Almarabeh et al. (2010), Napitupulu et al. (2014)
Organizational and Managerial (OM)	Management/government support	Napitupulu et al. (2014)
	Strong Leadership	Napitupulu et al. (2014)
	Clear vision, objectives, targets and outcomes	Sukyoung et al. (2008)
	Skilled resources	Sukyoung et al. (2008)
	Project planning and management	Napitupulu et al. (2014), Ziemba et al. (2013)
	BPR	Sukyoung et al. (2008)
	Training to resources	Almarabeh et al. (2010)
Social/Governance (SG)	Political will and support	Almarabeh et al. (2010)
	Budget allocation and disbursement	Napitupulu et al. (2014), Ziemba et al. (2013)
	Accountability	Napitupulu et al. (2014)
	Transparency	Napitupulu et al. (2014)
	Capacity building	Almarabeh et al. (2010)
	Coordination between government agencies	Napitupulu et al. (2014), Ziemba et al. (2013)
	Monitoring and time bound deliverables	Napitupulu et al. (2014), Ziemba et al. (2013)
	Flexible Policy/legal frameworks	Napitupulu et al. (2014)
Financial and Operational (FO)	Project Mode: PPP	Almarabeh et al. (2010), Ziemba et al. (2013)
	Standardization and benchmarking	Ziemba et al. (2013)
	Cost structures and budgeting	Almarabeh et al. (2010), Ziemba et al. (2013)
	Reduction in duplicate tasks	Napitupulu et al. (2014)
	Reduced dependencies on multiple departments	Dada (2006), Ziemba et al. (2013)
	Efficiency	Napitupulu et al. (2014)

Table 4: Mapping of conceptualized macro and micro variables with literature

Macro variables	Micro variables (Mapping with CSFs in Table III)	Studies
Improved Situation (IS)	WC: Central location and transport connectivity (FO)	Vellakkal et al, (2012)
	WC: Distance from home (FO)	Vellakkal et al, (2012)
	Number of trips made for the service (FO)	DeitY
	Proper/comfortable sitting arrangement (OM)	Vellakkal et al, (2012)
	Cleanliness of centre and washrooms (OM)	Vellakkal et al, (2012)
	Availability of safe drinking water (OM)	Vellakkal et al, (2012), DeitY (2008)
	Grievances Redressal (OM)	Vellakkal et al, (2012)
	Overcrowding of space with patients (SG)	Vellakkal et al, (2012)
	Time to take appointment (FO)	Vellakkal et al, (2012)
	Average waiting time to meet service provider (OM)	Vellakkal et al, (2012), DeitY (2008)
	Availability of medicines in stores (SG)	Vellakkal et al, (2012), DeitY (2008)
	Online facility to check Medical and medicine history (ID)	Vellakkal et al, (2012), DeitY (2008)
	SMS with name of concerned doctor, token number and estimated time for turn (ID)	Vellakkal et al, (2012), DeitY (2008)
Efficient Actors* (EA)	Availability of service providers: Attendance, punctuality and continuous presence during service hours (OM) • Doctors • Pharmacists • Support staff	Vellakkal et al, (2012)
	Competence of service providers (OM)	Vellakkal et al, (2012)
	Knowledge level of service providers (OM)	Vellakkal et al, (2012)
	Faster response because of online systems (OM)	Suri (2014)
	Behaviour: Doctors attentive and sympathetic (OM)	Vellakkal et al, (2012)
	Communication skills (OM)	Vellakkal et al, (2012)
Effective Process (EP)	Flexibility in process of taking appointment (FO)	Lovelock (1983)
	Provision for laboratory services (SG)	Vellakkal et al, (2012)
	Provision for uninterrupted services in case of technical fault (IT)	Lovelock (1983), DeitY (2008), Suri (2014)
	Provision to change rooms if service provider unavailable (IT + ID)	Vellakkal et al, (2012)
	Flexibility of Indent process (OM)	Vellakkal et al, (2012)
	Availability of prescribed medicines (SG)	Vellakkal et al, (2012)
	Adequate working hours to eliminate overcrowding and faster turns (SG)	Vellakkal et al, (2012)
	Adequate number of doctors and other support staff (SG)	Vellakkal et al, (2012)

* Doctors, pharmacists and support staff

Table 5: Summary of selected e-governance project

Attribute	E-Governance Project: CGHS Description
Objective	To provide comprehensive health care facilities for the Central Govt. employees and pensioners and their dependents residing in CGHS covered cities
Scope	Processes in CGHS dispensaries only
Coverage	All CGHS dispensaries across India, CGHS approved hospitals and laboratories/diagnostic centers
Department	Ministry of Health and Family Welfare
Beneficiaries	Central Govt. employees and pensioners and their dependents
Expected Benefits	Automated medical and family welfare services
Services	• Dispensary services including domiciliary care • Family Welfare & Mother Child Health Services • Specialist consultation facilities both at dispensary, polyclinic and hospital level including X-Ray, ECG and laboratory examinations • Hospitalization • Organization for the purchase, storage, distribution and supply of medicines and other requirements • Health Education to beneficiaries
Status	CGHS portal is online since November, 2005

Questionnaire Development and Data Collection

Questionnaire was designed and developed based on the expert interviews and understanding developed through review of literature. The draft questionnaire was again provided to four experts for their inputs and feedback. Feedback was incorporated before distribution to respondents. The final questionnaire is attached in Appendix 1. The mapping of conceptualized macro and micro variables with the corresponding questions is given in Table below. The questionnaire was given to around 56 respondents but was completed by 47 respondents.

Reliability and validity analysis

The internal consistency of items in a construct is measured using Cronbach alpha. The Cronbach alpha values of constructs, i.e. performance of e-governance projects and S-A-P variables were found to be more than 0.85 respectively. The values above 0.6 are considered acceptable for this kind of empirical research (Hair et al., 2006; George and Mallery, 2011)

Analysis and Discussion

The descriptive statistics in Table VII below show the values of range, mean and standard error of the study variables. The relatively higher values of observed mean for transparent systems (TS) and ECP (Enhanced Citizen Participation) may indicate their higher significance. This may be because of the use of big data in e-governance project that may have influenced the performance of the e-governance project. The standard error associated with all the macro variables being negligible.

Table 6: Mapping of conceptualized research variables with questions in Questionnaire

Macro variable	Micro variables	Questions
TS	Sharing: Policies, processes, expenses, agreements, tenders, data and relevant information	TS1
	Current information	TS2
	No ambiguity	TS3
	Easily accessible data from anywhere	TS4
	Reduced corruption (online and no middlemen)	TS5
	Enhanced Trust	TS6
AG	System Availability	AG1
	Accessibility: Easy access to services	AG2
	Objectives framed as per the needs	AG3
	Met stated objectives	AG4
	Reduced poverty	AG5
	Increased response	AG6
	Safeguard interests	AG7
	Effective	AG8
	Efficient	
	Accuracy	AG9
	Reliability	AG10
	Minimal data loss	AG11
	Speed of delivery/faster	AG12
	Speed of response to queries	AG13
	Improved service quality/performance	AG14
	Cost reduction (doctor, medicines, travel, etc.)	AG15
	Reduced proportion of cost to citizen (subsidy)	AG16
ECP	Enhanced Interactivity	ECP1
	Data Driven (based) Decision making	ECP2
	Citizen Empowerment	ECP3
	Participation in government processes and major decisions	ECP4
	Increased number of transactions executed electronically	ECP5
	Provision for submission of proposals on government plans	ECP6
	Free and open dialogues with government through various online platforms	ECP7
IS	WC: Central location and transport connectivity	IS1
	WC: Distance from home	IS2
	Number of trips made for the service	IS3
	Proper/comfortable sitting arrangement	IS4
	Cleanliness of centre and washrooms	IS5
	Availability of safe drinking water	IS6
	Grievances Redressal	IS7
	Overcrowding of space with patients	IS8
	Time to take appointment	IS9
	Average waiting time to meet service provider	IS10
	Availability of medicines in stores	IS11
	Online facility to check Medical and medicine history	IS12
	SMS with name of concerned doctor, token number and estimated time for turn	IS13
EA	Availability of service providers: Attendance, punctuality and continuous presence during service hours	EA1
	• Doctors	EA2
	• Pharmacists	EA3
	• Support staff	EA4
	Competence of service providers	EA5
	Knowledge level of service providers	EA6
	Faster response because of online systems	EA7
	Behaviour: Doctors attentive and sympathetic	EA8
	Communication skills	EA9
EP	Flexibility in process of taking appointment	EP1
	Provision for laboratory services	EP2
	Provision for uninterrupted services in case of technical fault	Ep3
	Provision to change rooms if service provider unavailable	EP4
	Flexibility of Indent processEP5	EP5
	Availability of prescribed medicinesEP6	EP6
	Adequate working hours to eliminate overcrowding and faster turnsEP7	EP7
	Adequate number of doctors and other support staffEp8	EP8

Table 7: Observed Mean values of macro variables for CGHS e-governance project

	N	Range	Minimum	Maximum	Sum	Mean		Std. Deviation	Variance
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	d. Error	Statistic	Statistic
TS	47	.53	2.77	3.30	18.15	3.0250	.08397	.20569	.042
AG	47	1.83	1.36	3.19	42.62	2.6636	.10900	.43599	.190
ECP	47	.47	2.79	3.26	21.16	3.0229	.06361	.16830	.028
IS	47	1.47	1.85	3.32	31.70	2.4385	.11233	.40503	.164
EA	47	.64	2.55	3.19	26.36	2.9289	.07852	.23555	.055
EP	47	.66	2.13	2.79	19.51	2.4387	.09001	.25458	.065
Valid N	47								

Research findings and conclusion

Research findings

The study proposed a S-A-P based framework for assessing the performance of a citizen centric e-governance project. Based on SAP-LAP framework (Sushil, 2000) the research proposed the S-A-P variables that may influence the performance of e-governance projects measured in terms of conceptualized variables Transparent Systems (TS), Accountable Government (AG) and Enhanced Citizen Participation (ECP). One citizen centric e-governance project on CGHS (Mission Mode Project as part of National E-Governance Plan) was selected to conduct the pilot study. A survey of respondents was conducted to measure the performance of CGHS project and influencing S-A-P variables. As per the univariate analysis performed the performance of e-governance projects and the associated S-A-P variables are expected to have a positive relationship. As per the results of the pilot study, CGHS has high value of performance as well as S-A-P variables. This reflects that we need to have a citizen centric approach in G2C e-governance projects for better performance. The pilot study suggests that it may be possible that S-A-P variables may be influencing the performance of the G2C e-governance projects. Therefore, we propose the following research hypotheses to be tested further on detailed study of few more e-governance projects for validating the proposed research framework:

- HA1: An Improved Situation (IS) influences the performance of e-governance projects
- HA2: Efficient Actors (EA) influences the performance of e-governance projects
- HA3: Effective Processes (EP) during the project implementation influences the performance of e-governance projects

Research Implications (practice, research and society)

The study may have applicable in citizen centric e-governance implementations like Delhi Government Employee Health Services (DGEHS), passport seva project (PSP), Aadhaar project from Unique Identification Authority of India (UIDAI).

Limitations

This study is based on a pilot study in context of one citizen centric e-governance project. It is required to study more such projects for the purpose of validating the proposed framework to make generic framework.

Conclusion

Benefits of e-governance projects are realized by countries across the world. But there are very few e-governance projects across the world which are making use of big data. Whether the e-governance uses big data or not the challenge is that the anticipated benefits by the policy maker and implementers do not reach the end user or beneficiary called citizen. It is therefore important for the government institutes to assess the performance of e-governance initiatives, enhance it using big data and identify the variables that influence the performance after implementation using big data. Few outcomes of the study are as follows:

- It attempted to address the research gap in literature in terms of identifying the S-A-P variables that may be expected to influence the performance of e-governance projects using big data. A conceptual framework has been developed for further validation
- A pilot study was conducted on selected citizen centric e-governance project, CGHS that facilitated the development of probable relationship between the S-A-P and e-governance performance variables in context of using big data that is still completely analyzed leaving a lot of scope for enhancing the performance
- We attempted to frame research hypotheses which may further be tested on a big scale on different set of e-governance projects to validate the conceptual framework and relationship. It is very important to en cash the complete potential of big data specially in healthcare sector in India
- Performance of e-governance projects can be enhanced by using big data that will further enhance the citizen empowerment through citizen participation. Further investigation is required to see the influence of using big data on citizen participation. This study may be used in some other sectors that require the service orientation and use of big data to enhance the performance like national healthcare portal for tracking family welfare records and mother child tracking, etc.

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Appendix 1: Questionnaire

Please tick () on the scale below to express your opinion about CGHS: 0 = Nil, 1= Small extent, 2 = Medium extent, 3= Large extent, 4 = Very large extent						
		0	**1**	**2**	**3**	**4**
	In your opinion, the extent to which there is:					
TS1	Sharing: Policies, processes, expenses, agreements, tenders, data and relevant information					
TS2	Current information					
TS3	No ambiguity					
TS4	Easily accessible data from anywhere					
TS5	Reduced corruption (online and no middlemen)					
TS6	Enhanced Trust					
	In your opinion, the extent to which there is:					
AG1	System Availability					
AG2	Accessibility: Easy access to services					
AG3	Objectives framed as per the needs (affordable basic healthcare for all)					
AG4	Met stated objectives					
AG5	Reduced poverty					
AG6	Increased response					
AG7	Safeguard interests					
AG8	Effective					
	Efficient					
AG9	Accuracy					
AG10	Reliability					
AG11	Minimal data loss					
AG12	Speed of delivery/faster					
AG13	Speed of response to queries					
AG14	Improved service quality/performance					
AG15	Cost reduction (doctor, medicines, travel, etc.)					
AG16	Reduced proportion of cost to citizen (subsidy)					
	In your opinion, the extent to which there is:					
ECP1	Enhanced Interactivity					
ECP2	System helps to use data for medical decisions					
ECP3	Citizen Empowerment					
ECP4	Participation in government CGHS processes and health decisions online					
ECP5	Increased number of transactions executed electronically					
ECP6	Provision for feedback on government plans online					
ECP7	Free and open dialogues with government through various online platforms					
	In your opinion, the extent to which there is:					
IS1	WC: Central location and transport connectivity					
IS2	WC: Distance from home					
IS3	Number of trips made for the service					
IS4	Proper/comfortable sitting arrangement					
IS5	Cleanliness of centre and washrooms					
IS6	Availability of safe drinking water					
IS7	Grievances Redressal					
IS8	Overcrowding of space with patients					
IS9	Time to take appointment					
IS10	Average waiting time to meet service provider					
IS11	Availability of medicines in stores					
IS12	Online facility to check Medical and medicine history					
IS13	SMS with name of concerned doctor, token number and estimated time for turn					

	In your opinion, the extent to which doctors, pharmacists and support staff are efficient and capable in terms of:					
EA1	Availability of service providers: Attendance, punctua lity and continuous presence during service hours					
EA2	• Doctors					
EA3	• Pharmacists					
EA4	• Support staff					
EA5	Competence of service providers					
EA6	Knowledge level of service providers					
EA7	Faster response because of online systems					
EA8	Behaviour: Doctors attentive and sympathetic					
EA9	Communication skills					
	In your opinion, the extent to which there is:					
EP1	Flexibility in process of taking appointment					
EP2	Provision for laboratory services					
EP3	Provision for uninterrupted services in case of technical fault					
EP4	Provision to change rooms if service provider unavailable					
EP5	Flexibility of Indent process					
EP6	Availability of prescribed medicines					
EP7	Adequate working hours to eliminate overcrowding and faster turns					
EP8	Adequate number of doctors and other support staff					