Organizational Interoperability in E-Governance: An Indian Perspective

A Thesis submitted in partial fulfillment of the requirements for

Fellow Programme in Management (Industry)

Indian Institute of Management Indore

By

Lakshminarayana Kompella
FPMI-201204

Submitted in

February 2016

Thesis Advisory Committee

Prof. Prabin Kumar Panigrahi
(Chair)

Prof. Shubhamoy Dey
(Member)

Prof. Kamal Kishore Jain
(Member)

Author Declaration

Last Name: Kompella **First Name**: Lakshminarayana

Title of Thesis: Organizational Interoperability in E-Governance: An Indian Perspective

Department: Information Systems **E-mail address**: fi12lakshmik@iimidr.ac.in

I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

I hereby state that this thesis is a presentation of my original research work. Wherever contributions of others are involved, every effort is made to indicate this clearly, with due reference to the literature, and acknowledgement of collaborative research and discussions.

I hereby state that companies have participated and provided information towards this thesis and I have agreed with them that I will not be assigning or associating their company's name with the information in writing either in thesis or in elsewhere. I also state that wherever company's name has been associated with information, this information is available in public domain.

I obtained permission for any use made of substantial amounts of published or unpublished copyright material (text, illustrations and so forth) where the rights are owned by a third party, other than as permitted under either The Copyright Act, 1957 (as modified by any related or successor legislation) or the Terms and Conditions of any license governing its use.

I authorize Indian Institute of Management Indore to lend this thesis to other institutions or individuals for the purpose of scholarly research.

I understand that Indian Institute of Management Indore may make my thesis electronically available.

Lakshminarayana Kompella

Abstract

It has been more than a decade since Government of India initiated Internet and Communications Technology (ICT) based delivery of services. Along with delivery of services, ICT has also progressed significantly. Though, governments started ICT enabled services for attaining effectiveness and efficiency in government administrations and public services, there has been continuous change in expectations. Several factors are responsible for the changes and some noteworthy to mention are ICT based government activities in other parts of the world, changing technologies, human elements, societal trends and information management. Government scenarios can be broadly classified into Government-to-Citizen (G2C), Government-to-Business (G2B) and Government-to-Government (G2G). Based on the domains in which these scenarios operate interactions and complexities vary. Governance in government scenario can be defined as improving public services, creating democratic processes and strengthening support to public. E-Governance is congruence of this explanation with governance. Governance involves both governing and being governed. In doing so, it is essential to consider society, various opinion-shaping processes, and increase in regulation and policy-making capabilities with other stakeholders. In other words, interoperability becomes essential to achieve governance.

Interoperability, though initially, defined for technical systems, is extended for organizations. Interoperability involves interactions between both technical and non-technical (organizations) systems. Along with interoperation, integration is also essential. To achieve both integration and interoperation, it is essential to consider E-Governance in three dimensions or views namely function ("what"), institutional ("who") and implementation ("how") (Kubicek, 2011). Technical infrastructure that E-Governance uses addresses 'function' dimension. Committee and officials in Government comprise 'institutional' dimension. However, socio-technical issues arise when E-

Governance goes through social development life-cycle phases of development, diffusion and impact. Committee and officials in 'institutional' dimension address these issues during implementation by developing necessary technical and non-technical interoperations. When interoperability is viewed as layers namely technical, syntactic, semantic and business process alignment (or function dimension), it defines the four interoperability standards. The fourth layer comprises organizational, legal and political interoperability layers, actors in dimensions "institutional" and "implement" define the activities of the fourth layer. As E-Governance moves through life-cycle phases, it is also subjected to socio-technical transitions. It requires actors in functional and institutional dimensions to respond appropriately to socio-technical transitions. Moreover, instead of trying to control these socio-technical transitions managing in these transitions may be a more appropriate approach (Geels, 2002).

To manage in socio-technical transitions, analysis of these socio-technical transitions is very essential. Socio-technical transitions have complex dynamics. Therefore, approach not only provides ontological representation of reality, but also consists of rich analytic and heuristic concepts. The analytic and heuristic concepts in the approach require capturing the change of an object or entity triggered by the change of related object or entity. In other words, changes affect the way in which other object or entity adapts to the environment. Based on the way in which the object or entity adapts to the environment, its characteristics passed on to successive generations. The possibilities or the specific patterns, each entity or object follows varies and is based on the entities nature of being, becoming, existence and the basic categories of being and their relations. In other words, organizations and society can follow very different adaptations (Witt, 2008). Nevertheless, the approach used for E-Governance requires capturing both these different adaptations.

Along with the adaptations of the object or entities, varied pathways can exist for the socio-technical transitions (Geels & Schot, 2007). Therefore, the approach also to provide insights into pathways or trajectories socio-technical transitions can take and provide analytic and heuristic concepts to capture diverse trajectories.

Organizations use interactions to not only interoperate, but also need to implement actions required to manage in socio-technical transitions. Therefore, it becomes mandatory to capture the context in which these interoperations take place. It is also essential to understand the context in which actors take certain actions. Actors when operating in a network structure are operating with a wide range of interdependencies (Ford & Håkansson, 2005). Government scenarios fall exclusively in this category, whereas business scenarios may operate to create a monopolistic competitive situation for themselves. In network structure, relationships are intensive with dedicated resources and are a source of multiple problems for both the government and the participating organizations. Interoperations between government and participating organizations require their problem solving is compatible with each other. Both want to benefit from their relationship at least in the long term, and cannot do it simply by exploiting their relationship. Moreover, when compared to business networks, government interactions may be different empirically but not analytically (Melin & Axelsson, 2011).

IT programs being change programs, introduction of changes require a consensual approach else, conflicts can arise. Therefore, a case study research is better suited to capture the conflicts that arise due to lack of interoperability. Case selection included diverse domains to capture diverse interoperations and provided different analytical perspectives. Government of India has marked certain projects with well-defined objectives, scope and implementation guidelines. Author selected cases to include these projects. Literature on E-Governance studies has numerous

examples of good practice cases, whereas considering bad-practice cases can provide insights into undesired side effects or can produce by lack of interoperability. During case selection author ensured representation of all socio-technical trajectories. Author considered interactions at operational, organizational, inter-organizational, personnel and governance as unit of analysis. Evidence collection involved both organizations and individuals. It consisted of interviews, document-reviews and physical collection of artifacts and contributed to triangulation. Individuals provided inputs towards 'how it works' and 'why it works', and obtained from people who hold managerial positions in government and private enterprises. These persons interface with end-users and hold responsible positions. Author also gathered organizations policies and outcomes. Author selected semi-structure interview respondents to ensure representation of all socio-technical trajectories. Research design ensured all five forms of validity. Author followed case study approach with critical realism perspective.

To represent all three E-Governance scenarios, author selected 60 cases from multiple domains and from both private and public as participating organizations. Author arrived at a Multi-Level Perspective (MLP) approach with rich heuristic and analytic concepts to capture complex dynamics of E-Governance. Using MLP author considered interplay of developments at various levels. International/Industrial Marketing Approach (IMP) provided analytic and heuristic concepts for interactions in network-structure. Author analyzed 60 cases using the two theoretical approaches and the gathered data. The findings suggest E-Governance in India did consider interoperability at only technical levels. Author noted enhanced interoperations between government and participating organization when the participating organization invested in knowledge management and adaptive capabilities. However, in certain instances with similar organizations there has also been need for better interactions. However, both government and

participating organizations have spent huge efforts for “technology-dominated” solution. In cases that involve inter-woven multiple domains, government used “technology-dominated” solution with a unique way to align participating organizations. Inter-woven multiple domains involve numbers of actors, to persuade and socialize usage of ICT other countries utilized similar unique approaches. However, to take the ICT enablement of routines forward, further actions are required from both practitioners and information systems researchers. In this research author identified directions for further actions in form of propositions and schematic representation of constructs and inter linkages. These propositions and schematic representation of constructs help both practitioners and government IS researchers. Practitioners can identify pertinent issues and enable thoughtful resolution of these, whereas IS researchers can identify key issues and advice practitioners.

Table of Contents

List of Tables

List of Figures

List of Abbreviations

The following table describes various abbreviations and acronyms used throughout the thesis. However, author elaborated abbreviations at appropriate places in the thesis, for sake of clarity are listed below.

Abbreviation	Meaning
AAU	Anand Agricultural University
Agile	Iterative and incremental software development method
ANT	Actor Network Theory
AP	Andhra Pradesh - a state in Southern India
Bhoomi or Bhu Bharati	Meaning Land
BOOT	Build-Own-Operate-Transfer
B2C	Business to Citizen
CCI	Competition Commission of India
CCM	Contextual Constructs Model
CDAC	Center for Development of Advanced Computing
CGAP	The Consultative Group to Assist the Poor
CGG	Center for Good Governance
CIT	Critical Incidence Technique
CIPS	Center for Innovation in Public Systems
CoI	Constructs of Investigation
CORE	Centralized on-line Real Time Electronic
COTS	Commercial-Of-The Shelf
CMC Ltd.	A software services company in India
CMO	Chief Minister's Office
CSC	Common Service Center
CSR	Corporate Social Responsibility
CST	Central Sales tax
CTG	Center for Technology in Government
DNA	Deoxyribonucleic Acid
DeitY	Department of Electronics and Information Technology
DRR	Directorate of Rice Research
DSC	Digitally Signed Certificate
DSS	Decision Support Systems
DSSDI	Delhi State Spatial Data Infrastructure
eGOVRTD	An European Commission co-funded project
eINDIA	India's premier annual ICT event
EDS	Electronic Delivery of Services
E-PASS	Electronic Payment and Application System of Scholarships
ERP	Enterprise Resource Planning
GMDC	Gujarat Mineral Development Corporation
GNFC	Gujarat Narmada Valley Fertilizers and Corporation
GoAP	Government of Andhra Pradesh
GSDL	Geo-Spatial Delhi Limited
GST	Goods and Services tax
GPS	Global Positioning System
G2B	Government-to-Business

G2C	Government-to-Citizen
G2G	Government-to-Government
HD-IITS	Home Department – Integrated IT System
ICAI	Institute of Chartered Accountants of India
iCJS	Interoperable Criminal Justice System
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
ICS	Institute of Company Secretaries
ICT	Internet and Communications Technology
ICWAI	Institute of Cost and Works Accountants of India
IKIWISI	I'll Know It When I See It
IMP	Industrial/International Marketing and Purchasing Approach
IOS	Inter-Organizational Information Systems
IO	Inter-Organization
IVR	Interactive Voice Response
IFEG	Indian Framework for E-Governance
IFRS	International Financial Reporting Standard
IT	Information Technology
IS	Information Systems
KM	Knowledge Management
KSLB	Kerala State Land Bank
MCA	Ministry of Corporate Affairs
MCA21	A project initiated by MCA
MDG	Millennium Development Goals
MIS	Management Information System
MLP	Multi-Level Perspective
MMP	Mission Mode Projects
MP	Madhya Pradesh – a state in Central India
MRP	Material Requirements Planning
NeGP	National E-Governance Plan
NGO	Non-Government Organization
NIC	National Informatics Center
NPCIL	National Power Corporation of India Limited
NPO	Non-Profit Organization
NRSA	National Remote Sensing Agency
PKI	Public Key Infrastructure
PLPF	Public Land Protection Force
PDS	Public Distribution System
POS	Point-of-Sale
PPP	Public-Private Partnerships
PVO	Private Voluntary Organization
RE	Requirements Engineering
RKMP	Rice Knowledge Management Portal
RQ	Research Question
SCA	Service Center Agency
SeMT	State E-Mission Team
SDLC	Software Development Life Cycle

SECI	Socialization, Externalization, Combination and Internalization
SNA	Social Network Analysis
SOA	Service-Oriented-Architecture
SPL	Software Product Lines
SSDG	State Service Delivery Gateway
TPS	Transaction Processing System
TRTI	Tribal Research Training Institute
UIDAI	Unique Identification Authority of India
UP	Uttar Pradesh - a state in India
VLE	Village Level Entrepreneur
VA	Village Accountant
WCDSC	Women Child & Disabled Persons
XBRL	eXtensible Business Reporting Language

Acknowledgements

First, I would like to thank my wife Padmalata, my daughters Pranati and Subhasahiti and my mother Balatripura Sundari for their constant support, understanding and encouragement. Without their support and encouragement, it would not have been possible for me to pursue and achieve my educational goals. On this occasion I would also like to remember my father late Dr. K. Subbarao who was a source of inspiration and guidance to me throughout my life.

It would certainly be remiss not to mention and thank my thesis advisor (Chair) Prof. Prabin Panigrahi. He has been a source of encouragement, mentor and advisor. In the same note, would also like to thank other two members of my advisory committee Prof. Shubhamoy Dey and Prof. Kamal Kishore Jain. Without their constructive criticism, support and encouragement this research and thesis would not have happened.

I would also like to thank all the interview respondents who were willing to spend time from their busy schedule and answered all my questions. They were very quick and responded immediately to my requests for additional information. My sincere thanks go to each one of them.

From the start and all along my Fellow Programme, FPM office staff have been supportive and provided timely inputs. They have also been very amenable, cooperative and patient with my queries and inadvertent delays. In the same vein, acknowledge the support of IIM Indore library staff. I also heartily thank Mr. Prabhakar Sharma, Manager, Library of International Institute of Information Technology, Hyderabad (IIIT-H) for permitting me to use institute's library facilities. Without all this support and cooperation, it would not have been possible for me to complete my Fellow Programme.

I should not forget to acknowledge continuous support, understanding and best wishes I received from my siblings, whenever I required. Also, acknowledge the support of all my friends who directly or indirectly helped me to complete this research and thesis.

Lakshminarayana Kompella