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E-Governance systems as socio-technical transitions using multi-level perspective with case studies

Lakshminarayana Kompella*

Department of Information Systems, Indian Institute of Management Indore, Prabandh-Shikhar, Rau-Pithampur Road, Indore, Madhya Pradesh 453 556, India

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ABSTRACT

E-Governance systems are socio-technical systems. The change affects socio-technical systems by shifting assemblies of constituent sub-systems. Using Multi-Level Perspective, MLP, technology transition literature has numerous instances explaining shifting of assemblies for socio-technical systems from stability, change, and transitions based on neo-Schumpeterian approach. Two approaches mainly characterize evolution and are 1) neo-Schumpeterian - variation, selection, and retention, and 2) naturalistic - novelty, emergence, and dissemination. Unique characteristic exists between society and E-Governance where one influences the other and acted upon by the other. E-Governance literature has relatively little attention as transition studies analyzing the interplay of developments at macro, meso and micro levels. Therefore, the author extended MLP to E-Governance systems by considering both approaches of evolution. It is essential to understand the context in which the interplay of developments takes place; moreover, transitions can have several trajectories or pathways. Therefore, the author selected case study with multiple E-Governance cases to represent various trajectories. The selected cases were from Central and state governments of India and represented domains citizen services, workflow automation of different magnitudes, and integration of departments. The case selection considered all three government scenarios. Governments implement E-Governance with a participating organization, the author during case selection ensured diverse participating organizations. In doing so, did analyze the interplay of developments in E-Governance and developed a multi-scalar MLP for E-Governance. Structuration and temporal dimensions along with spatial explain interoperations in E-Governance. By improving spatial dimension, actors can develop organizational capabilities to share information and increase knowledge management resulting in better interoperations within and among themselves. In doing so, actors can improve processes by developing activities that help in the better cumulation of the radical innovations as stable designs. In other words, process innovations assist to stabilize product innovations. The author from the selected cases noted a technology deterministic approach with the latest ICT innovations and traditional forms of organizing, with cases that exhibit new forms of organizing it is possible to obtain more insights to improve interoperability.

1. Introduction

Society consists of living and non-living things influenced by citizens, also termed as built environment. The purpose of built environment is in meeting citizens' wants and needs. It also collects psychological and social needs, another characteristic of built environment. It shapes psychological and social needs basing on the way we relate to a string of events that happen in the built environment. Government systems with heterogeneous configurations comprising technology, regulations, user-practices, culture, and so forth work closely with built environment; therefore, are socio-technical systems. Government systems with Internet and Communication Technologies (ICT) provide

various services to entities of built environment (West, 2004). Governments define governance structures to ensure delivery of services to entities of built environment. When governance structures use ICT, it is E-Governance. The services provided by governments need to focus beyond enhanced public services and on high quality and cost-effective government operations, citizen engagement in democratic processes, and administrative and institutional reform along with effective policy formulation (Dawes, 2008). According to (Coleman, 2007), E-Governance research has been utilitarian, addressing questions of efficiency and practicality of public services than addressing purpose and role of government and rights and preferences of people. This led to Dawes (2009) using qualitative products to arrive at six themes for a dynamic

and open E-Governance system. The author in the literature review did note extension of efficiency and practicality of public services to integration, interoperability and information sharing between computer systems, and within and between organizations (Scholl and Klischewski, 2007), (Scholl et al., 2012), (Kubicek et al., 2011), (Yang and Maxwell, 2011), (Yang et al., 2012). From the literature review of E-Governance studies in India, the author did also note a similar focus (Kumar and Best, 2006), (Kuriyan and Ray, 2009), (Naik et al., 2012), (Prakash and Gulla, 2008), (Raja et al., 2012), and (Ramani, 2004). The author also noted in the literature review that when governments include various communities with ICT marginalized need not exit but voice their opinion ((Martinez et al., 2011) and (De and Singh, 2011)), reduce the digital divide (Ferro et al., 2011), reduce gap between rich and poor (Helbig et al., 2009), and minimize ethical quandaries (Fedorowicz et al., 2010) and social quandaries (Thomas, 2009) and (Ramakumar, 2010). E-Governance studies did so far, in and outside India, with empirical illustrations only considered the interplay of developments within and between organizational levels (micro level). Limited studies did consider the interplay of developments at macro, meso and micro levels. This paper addresses the gap of limited studies on E-Governance transitions at macro-level and the interoperability requirements that assist interplay of developments by considering E-Governance activities in India. In the subsequent paragraphs of this section, the author discusses the linkages that exist between various entities that exist in the environment in which governments operate. The author based these linkages according to Scholl and Klischewski (2007) definition of interoperability. Scholl and Klischewski (2007) defined interoperability as the ability of different types of entities to work together dynamically with changing rulesets.

Built environment consists of society, government, and organizations. All these entities and external triggers shape it. These entities interoperate among themselves to meet their objectives, redefine objectives, and to respond to the changes caused by external triggers. For each entity to meet its objective, it is essential to harmoniously interoperate with other entities; moreover, governments accomplish ICT-based governance with the help of a participating organization, either a public or private organization. For entities to meet their objective, it is imperative for entities to benefit from their harmonious interoperation at least in the long-term and not by exploiting their relationship. Organizations evolve in relation to their environment while at the same time these environments evolve in relation to organizations (Porter, 2006). Coevolution is well suited for organizations and its natural environment studies (Porter, 2006). Similarly, organizations also need to coevolve with built environments. Depending upon the entity coevolution is either micro or macro. The entities society or environment trigger changes and cause transitions while entities such as organizations respond to these triggers. The organizations and society coevolve in heuristically and ontologically different ways (Witt, 2008). Improved responses to transitions are possible when organizations interoperate within and with other entities. The author in Fig. 1 depicts society encapsulating organizations along with their respective evolutionary theories and interoperability linkages at micro and macro coevolution levels. Fig. 1 depicts how coevolution of organizations and society together constitute evolution of built environment. With organizational forms and absorptive capabilities, organizations can respond to coevolution requirements (Van den Bosch et al., 1999). Organizations' inter-organization (IO) and inter-organizational information systems (IOS) assist absorptive capabilities, therefore interoperability characteristics influence its coevolution of all other entities. With improved interoperability, entities can also assist to stabilize innovations that are responses to external triggers. In the next paragraph of this section, the author discusses creation and dissemination of novelty in organizations and society.

Sub-systems characterize socio-technical systems. When sub-systems undergo changes, it results in changes to its constituent elements and its associations with other sub-systems, with changes to the

interconnection of elements (Geels, 2002). This necessitates changes in one element leading to events or string of events in other elements. The events along with its antecedents and the string of events that follow in other elements' diffusion take place based on human cognition and reasoning. Influencing diffusion by culture, attitudes, and values are a part of the genetic endowment. These set of actions, though, temporal manifest in different forms and influence the observable characteristics of the actors and systems. Observable characteristics are cognitive learning, knowledge creation, belief, insight, social efficiency, sharing of knowledge between and within generations (dissemination of novelty), economic prosperity, group specializations, and so forth. Therefore, the socio-technical changes happen at two planes. One at the elements, involving technical and social along with their linkages, based on certain rules that develop engineering practices, products, skills, knowledge creation and sharing embedded in institutions and infrastructure. On the contrary, the other plane happens with external factors that enable and/or constrain elements by cultural learning, human cognition, and new knowledge creation and dissemination within and between generations. The change in the first plane, seen in organizations, follows neo-Schumpeterian, while the other follows a naturalistic approach. Society follows naturalistic approach with a generic concept of evolution and an endogenous characteristic for novelty, emergence, and dissemination. The two approaches initiate change using different ontological stance and heuristic strategies (Witt, 2008). The heuristic and analytic view that helps in understanding socio-technical transitions of E-Governance not only need to explain the complex interplay of developments but also expand by providing views towards absorbing innovations (novelty) as stable designs. The purpose of this paper is towards developing such an analytic and heuristic perspective.

The composition of this paper is as follows. In the next two sections 2 and 3, the author discusses research questions and methodology. In the subsequent section, section 4, the author discusses the perspective that provides a heuristic and analytic view to analyze E-Governance as socio-technical transitions, followed by section 5, that lists the cases selected by the author as part of this paper. In section 6, the author further elaborates the key aspects of the perspective along with organizational activities required for organizations to develop capabilities to manage in transitions. Sections 4 and 6 apply the perspective to provide heuristics and analytic views to explain E-Governance dynamics. Finally, the last section concludes the paper.

2. Research questions

Socio-technical transitions require firms to select from diverse routines and retain routines that help them to stay competitive. This selection process does not follow a deliberate optimizing choice between alternatives. Various pressures influence organization's selection process and vary based on the domain in which they operate. With multi-level perspective (MLP), we can attempt a unique heuristic and analytic view of technical transitions (Geels, 2002). The author attempts a similar MLP for E-Governance that combines neo-Schumpeterian and naturalistic approaches. Therefore, the author states the first question as, '*For E-Governance MLP, what specific interplay of developments are necessary to manage in socio-technical transitions, and what dimensions of MLP assist in managing developments?*' Actions from the interplay of developments can enable innovations to cumulate as stable designs. Actions or process innovations not only assist organizations to absorb innovations resulting in stable designs at the regime level but can also assist society in absorbing novelty. In doing so, can bring changes in human cognition/cultural learning and enable interoperability within and outside E-Governance systems. Therefore, the author states the second research question as, '*what are the key activities that assist organizations to manage in transitions by continuously improving IO and IOS for improved interoperability?*'