A NOMOLOGICAL NETWORK OF E-GOVERNMENT EVALUATION

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Abstract

An emergent epistemology has been developing in the field of e-government evaluation as disparate attempts are made in the literature to evaluate and measure different aspects of e-government. To formalize it, this paper proposes a nomological network as an organizing concept for plotting e-government evaluation research. It proposes different forms of evaluation, pre-evaluation, ex-ante, in-itenere, and ex-post as fulfilling different and complementary roles in e-government evaluation. E-Government concepts such as agenda, strategy, processes, and performance are plotted within the nomological network with matching modes of evaluation.

Keywords: E-government, Evaluation, Pre-evaluation, Ex-ante, In-itenere, Ex-post, Nomological network

1 INTRODUCTION

E-Government evaluation has not kept pace with the actual development in e-government practice. Public administrations are facing a "lack of evidence about results and impacts, both during and after the implementation of e-government projects" as the drive was mostly for applications of e-government technology in public administration without due concern for assessment (Mele, 2003). This is largely due to the 'proof of concept' of e-business technologies in the corporate world where the e-commerce paradigm has taken root and infiltrated organizations at all levels (Asgharkhani, 2005). A second factor has to do with the perceived and 'opportunistic' justification for the lower need for a thorough evaluation of investment decisions in ICT in the public sector in comparison with the private sector where ICT has to be justified on the same terms as other investments (Jones et al., 2006). Foley and Ghani (2004) predict that it will be harder to fund e-government in the future unless public administration can make a convincing business case. The OECD (2003) urges a thorough justification of the demand, costs, benefits, and impacts of e-government to sustain the e-government momentum.

Yet another reason for a non sustained approach to e-government evaluation is the paucity of relevant approaches and models (Jones et al., 2006; Gupta & Jana, 2003). E-government seems not to be well understood beyond its technological artifacts; evaluation is thus largely restricted to technology and system usage, access and accessibility, and IT infrastructures supporting e-government. The UN (2005) report on e-government readiness adopts a proxy approach to e-government evaluation wherein

a technology index (measuring telecommunication infrastructure), a human capital index (measuring skills and competencies in the information society), and a web measure index (measuring e-service delivery) are aggregated to prefigure the readiness level of a country in the e-government sphere. That the UN report chose to measure readiness rather than actual performance has to do with the philosophy of the international body which invests primarily in e-government enabling infrastructures (both human and technological) but also because of the absence of a clear and established model of e-government evaluation. Likewise, Gupta and Jana (2003) ascribe the absence of a proper evaluative framework for e-government projects in India, to "an administrative culture that may not be able to cope with the demands of a digital world." (p.367)

The absence of established models of e-government evaluation is mirrored in the type of research that is attempted in this respect as most research tends to be qualitative, exploratory and inductive rather than quantitative, confirmatory and deductive. This is expected to continue until established models of e-government evaluation are developed and are validated in practice. However this will also depend on a rigorous process of construct validation given the nebulous character of the e-government construct. This does not however mean that qualitative approaches to e-government evaluation are only driven by the uncertainty of the construct definition. As will be argued later, certain elements of evaluation (i.e. *in-itenere* evaluation) will generally be best appraised through complex and qualitative research designs. It is thus hoped that through qualitative and grounded approaches, relevant themes or dimensions of e-government could be identified for later confirmation and validation by more conventional normative approaches.

This paper will introduce a nomological network of e-government, wherein the theoretical domain of e-government and its manifestations in the 'validation space' are clearly outlined. A brief overview of e-government evaluation within the realm of relevant theoretical domains will help identify the ramifications of such a construct and point to relevant measurements. Prior to such a review, we define what a nomological network is and justify using such an approach.

2 NOMOLOGICAL NETWORK

2.1 Definition

Cronbach and Meehl (1955) developed the idea of a nomological network to guide efforts of construct validation in psychological testing. The basic premise is that measures have to be related to the constructs they are measuring within a network of causal relationships.

"This network would include the theoretical framework for what you are trying to measure, an empirical framework for how you are going to measure it, and specification of the linkages among and between these two frameworks." (Trochim, 2006)

As such the network (or model) would relate different theoretical constructs, theoretical constructs to observables (measurements) and observables to each other (see Figure 1).

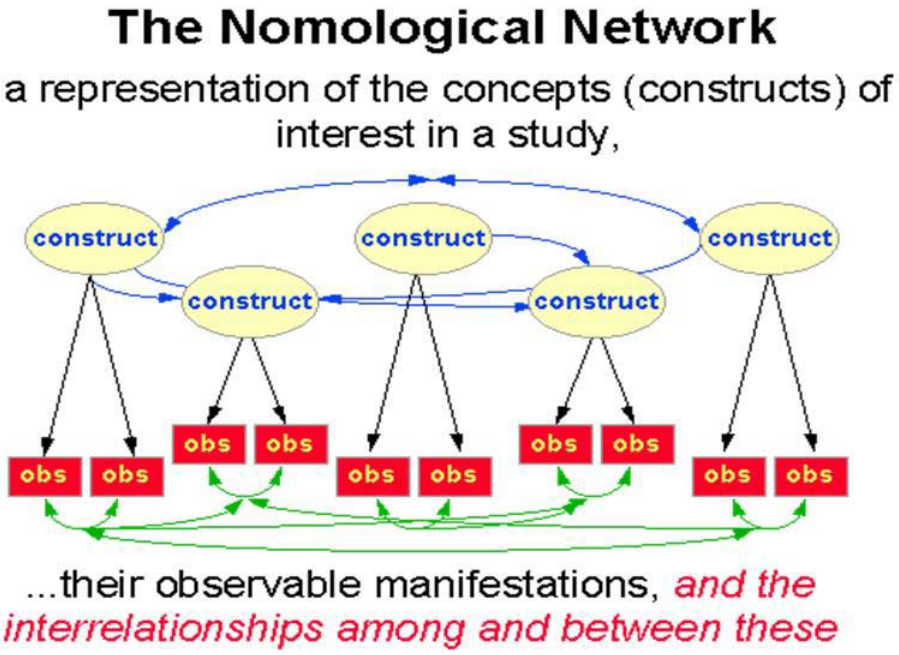

Figure 1 . Structure of Nomological Network (adapted from Trochim, 2006)

The nomological network approach is most useful in new areas of research where there are few established models or in areas where there are problems of measurement validation for theoretical constructs, including disagreements about the validity of measures (Nadon, 1997). Building a nomological network is part of the cumulative tradition of research wherein a number of constructs and measurements are added over-time to configure a 'grand' model for a particular area of scientific enquiry.

The area of e-government evaluation is a suitable candidate for a nomological network as it displays the following features:

- It is a new area of research with disagreements over evaluation models and measures
- The e-government construct itself is ill-defined beyond the provision of electronic services to businesses and citizens
- There are no established theories of e-government evaluation (exp. e-government readiness will translate in better e-government strategies) nor are there solid construct validation studies that would relate different observables among each other (exp. information sharing in public administration will drive a higher accountability in public service delivery to citizens).
- The dominant research focus in e-government evaluation has been to relate some e-government processes to hard and soft measures with little attention paid to the web of interconnectedness between different facets of e-government evaluation on one hand and the multitude of manifestations, hence measures, of the e-government performance on the other hand.

2.2 A Nomological Network of e-Government Evaluation

In light of existing literature depicting causal models of e-government, Figure 2 attempts to configure a nomological network of e-government evaluation.

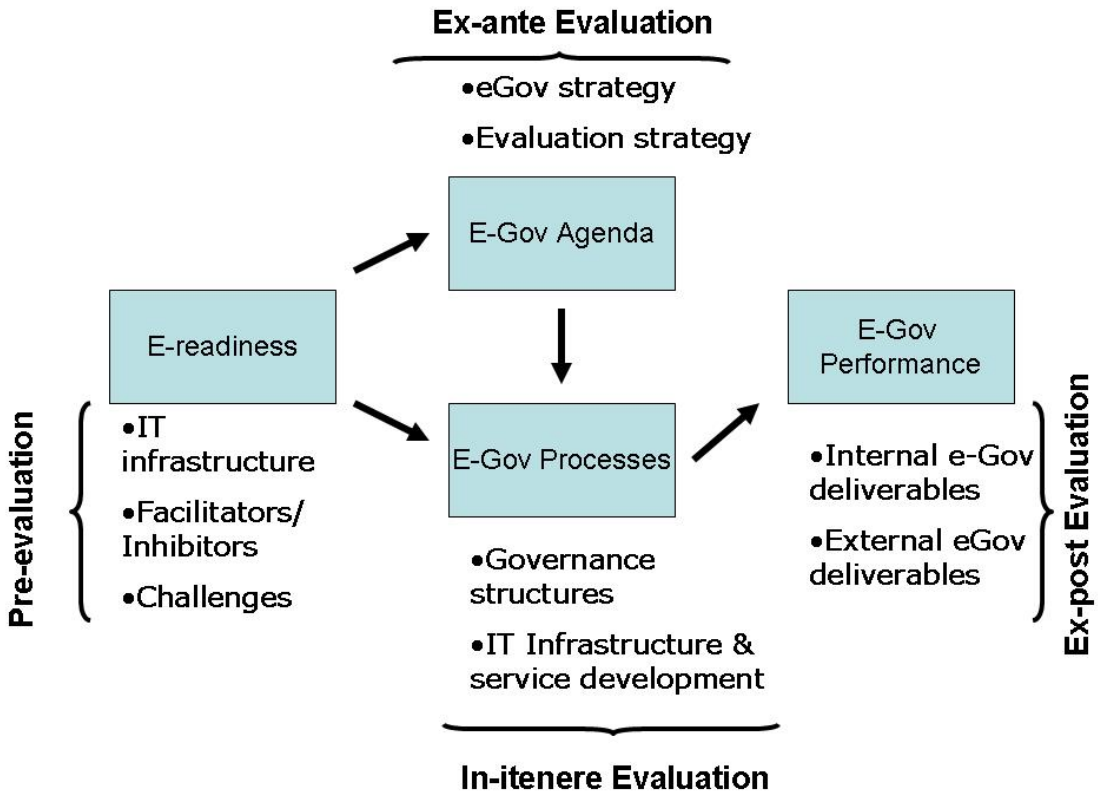

Figure 2. A homological network of e-government evaluation

As the UN (2005) report presupposes, a national e-government agenda is predetermined by a set of readiness factors which ultimately dictate the success or failures of e-government initiatives. Other research has reported facilitators and inhibitors of e-government performance (Gichoya, 2005), or challenges for e-government strategies and programs (Lau, 2003, Sahraoui, 2005). This first component of our nomological network is pre-evaluative because readiness, facilitators/inhibitors, or other challenges will significantly determine the e-government agenda and subsequent processes.

The e-government agenda defines a strategy for e-government which includes a portfolio of applications and policies and methods for their implementation. Whether it is part of this agenda or separately from it, an evaluation agenda is concurrently defined. It will establish an evaluation philosophy, a policy for evaluation, a method or a set of methods for evaluations and a number of measures and techniques to evaluate e-government *ex-ante, in-itenere, and ex-post.*

The e-government agenda is enacted through a set of processes which include the development or reengineering of governance structures, organizational change management, and IT infrastructure and e-service development. Development and reengineering of governance structures includes defining a clear ownership for e-government projects, a clear locus of decision-making with regards to different

aspects of the project including evaluation, and reengineering of organizational processes to harness the enabling power of chosen technologies for more efficiency and effectiveness of government services. Development of the e-government IT infrastructure and assorted e-services forms the core of the technical construction process which has long been considered as the only tangible development in e-government. Management of change is a critical process in the development and reengineering of governance structures on one hand and IT infrastructures and service development on the other hand. It consists of the management framework within which all development processes take place and are eventually evaluated (*i.e. in-itenere evaluation*).

E-government processes yield a number of outcomes that have been planned for. These include information sharing within the public sector, transparency and accountability of public service, growth in e-service delivery (i.e. stage model), efficiency and effectiveness of service delivery, better access and accessibility to government services, e-inclusion, etc. These outcomes are measured trough a variety of methods and techniques. Some are inductive and others are deductive. In the deductive approach, both hard and soft measures can be used. In the inductive approach, the measurement process resembles a complex research design to match the complexity of outcomes.

Evaluation is conducted *ex-ante*, prior to starting development and implementation of a program or a specific project, *ex-post* at completion time, and *in-itenere* while execution is unfolding which is generally continuous. The objective of *ex-ante* evaluation is to rationalize investments and validate the overarching e-government agenda. *Ex-post* evaluation is necessary to evaluate success and replan strategies and resources accordingly. Finally *in-itenere* evaluation is meant to reflect and recycle newly produced knowledge and meaning into e-government development (Burke et al., 2006). The three forms of evaluations form the essence of the evaluation model presented here. They are delimited in different zones of the nomological network.

3 E-GOVERNMENT EVALUATION METHODS AND MEASUREMENT

Methods and measurements are meant to measure the observables of a theoretical construct in the nomological network. Given the structuring of the model into traits and manifestations of those traits at different levels, we should expect different types of measures, hence different evaluations, for e-government. IT project evaluation, including e-government, increasingly fosters the creation of an evaluation culture that is conducive to transparency in public investment, hence reaching beyond analyzing the returns on specific products or services (Vasconcellos & Rua, 2005). This may explain why the e-government evaluation literature was pursuing an elusive construct and trying to focus its efforts on measuring something that was not monolithic to start with. However this also gives a better outlook of existing research which largely looks coherent in its various methodological approaches. Indeed different studies were measuring different things and in so doing were working within different portions of the nomological network. They were thus looking to relate a set of theoretical constructs to their observables whether for pre-evaluation, *ex-ante*, *ex-post* or *in-itenere* evaluations. More complex research designs tried to relate theoretical constructs and produce 'theories of e-government.'

Most of the literature on e-government evaluation is unanimous as to the applicability of both hard and soft measures of e-government performance (Gupta & Jana, 2003; Jones et al., 2006, Burke et al., 2005).

"Evaluation activities at the 'hard' end of the spectrum involve, primarily, reference to efficiency and efficacy considerations whilst those at the 'soft' end are concerned with a more diverse range of performance criteria which include efficacy but can extend to, for example, ethicality and social responsibility." (Burke et al., p.5)

Whenever formal methods "to prove best use, value, and benefit…obtained from the investment" (Jones et al., 2006, p.4) are discounted, it is usually on the ground that formal and accounting methods in line with those used in capital budgeting have an economic bias which is inappropriate for a holistic phenomenon like e-government. Moreover, "there is still widespread and continuing disagreement as to the factors and metrics to include in any formal, quantitative approach to e-government evaluation." (Jones et al., p.5). The two case studies analyzed by Jones et al. have not reported any alternative qualitative methodology to remedy the inherent limitations of accounting methods.

Both methods and measures of evaluation will hence be determined by the e-government agenda that would have been specified at the beginning. In the absence of such an agenda, evaluation can become random or simply reduced to artifacts of e-government, namely on-line service delivery, access, accessibility and the like. Conversely, measures either hard or soft can be arbitrarily dismissed if they are not driven by a clear evaluation agenda. Mele (2003) argues for the inclusion of a program of assessment (i.e. evaluation agenda) in the e-government evaluation framework.

4 CONCLUSION

The nomological network engenders several benefits for e-government evaluation research:

It is a grand model (or theory) of e-government evaluation illustrating causal links between different (1) theoretical constructs of e-government, (2) theoretical constructs and their observables, and (3) e-government observables. Other than enabling the systematic production of theories of e-government evaluation, it also provides for a validation of evaluation constructs.

- It organizes knowledge and strengthens the cumulative research tradition of research in the area.

- It allows the reinterpretation of existing research under a new light. For example, Heeks (2003) design-reality gap findings could be reinterpreted as differential testing in different ' branches' of the nomological network rather than a new theory of e-government evaluation.

- It enables more coherent approaches to e-government evaluation by relating them more explicitly to the e-government agenda. The UN e-readiness measures are an example of incoherent measurements because their lump together pre-evaluative (human capital and technological indices) with ex-post measures (web measure index). Implicit in the UN approach is a theory of e-government that is not tested despite the availability of data (i.e. e-readiness leads to e-government performance).

- It classifies methods and measurements as pre-evaluative, *ex-ante*, *in-itenere*, and *ex-post*, thus providing a systematic way of matching evaluation objectives to a method of measurement

- It helps identify an appropriate research design for different evaluation objectives. For example, *in-itenere* evaluation is best fulfilled through qualitative research designs whereas performance measurements befit hard and soft *ex-post* measures.

As a concluding statement, caution has to be enunciated as to the totalizing nature of a nomological network. The model illustrated above is not meant to be the canon for research in e-government evaluation. It is simply an epistemic perspective on a particular field of research. As such it is not exclusive and many will find it rather constraining. It will be of great benefit to a cumulative tradition in the field if collective efforts are oriented towards establishing such a meta-model. However it will be equally beneficial if other epistemologies are proposed to organize knowledge in the field. It is precisely this epistemological void that this essay attempted to address.

There has been a similar attempt by Mele' (2002) to develop a grand model of e-government evaluation which she termed the 'locus and focus of e-government impacts'. In her theoretical

framework, the locus of evaluation can be internal, at the boundaries of the organization, or external to it. The focus is institutional, at the level of policy and decision-making or implementation and operations related. The 3X3 matrix yields six general areas of evaluation. Whilst her framework has the merit of plotting a larger domain of e-government evaluation, it does not outline relations of causality between different constructs nor does it indicate the direction of causality (i.e. for purposes of theory building and construct validation). As a result, she subsequently uses this framework to recommend evaluation methods within each quadrant of the matrix thereby assuming again independent measures of e-government. It is however a major contention of this work that evaluation takes place only within a set agenda and context.

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