



Measurement of Public Value of Enterprise Applications in Government and Public Sector

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ABSTRACT

This Paper provides a framework for defining and measuring the public value of enterprise applications for public sector and government organizations. The essential elements of the framework are derived from the concepts of public value in general, public value of IS/IT (PVIT), and value assessment of enterprise applications. The framework recommends the usage of three key dimensions that should be used to measure the public value of enterprise applications – Constituent Service, Productivity and Political Consideration. Each of these dimensions covers several measures which together constitute the public value of enterprise applications. The proposed framework is largely based on literature and authors' experience in the domain and fills the need of such model/framework that combines both public value of IT and value assessment of enterprise applications.

Keywords: Public Value of IT; Enterprise Applications; IT/IS

1. Introduction

Evaluation of investments in information systems, to say the least, is extremely complex. The “perspectives” for such an evaluation are manifold and that has led to development of several “constructs”, “methodologies” and “models” that are mostly suited to their respective perspectives. They vary widely in terms of the variables used and their specifications based on various perspectives such as Stakeholder Category, Ex-Ante or Ex-Post, Time Frame, Private or Public, Enterprise Applications or Information Systems in general, Quantitative or Qualitative, Direct or Indirect etc. Most of the models, however, attempt to develop a scale for quantifying and analyzing the group(s) of factors, and the end result of almost each model usually is a calculated score and some kind of diagram that presents the results. Additionally, it is clear from past research and literature that while there are models for evaluation of investments in the sphere of information systems in general, specific models and methodologies have been developed for use in the public sector and government.

The purpose of this Paper is to summarize the various models (both general and public sector/government related) and propose the “Dimensions” and the associated “Indicators”, and “Metric” that could be used for evaluating investments in Information Systems in general and Enterprise Applications in particular with

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respect to Public Sector and Government, based on Literature and author’s experience.

2. Literature on IS Evaluation and Public Value

The review of literature for the purposes of this paper has been primarily from three points of view – IS Business Value, Public Value of IS and ERP Value (Public Sector/Government or otherwise). In this context, the seminal concepts around D&M Success Model and Balanced Scorecard are also discussed.

2.1 IS Business Value

IS Business Value essentially has its roots in IS effectiveness literature. These evaluation systems, over the years, have evolved from single dimension financial perspectives (*Hamilton and Chervany, 1981a, 1981b*) to several multidimensional models and constructs – *DeLone and McLean (1992)* being one of the popular and most extensively used ones. *Cronk and Fitzgerald (1999)* summarize the plethora of “IS business value” evaluation methods presented in the literature over 15 years that highlight the diversity of measurement approaches.

2.2 Public Value of IS

Public Value of IS finds abundant discussion in Literature. Table 1 below provides an updated summary of various Public ROI/Value Models for IS/IT investments

Table 1: Summary of Public Value Models

Name	Acronym	Year	Source
Social Return on Investment Model	SROI	1996	Roberts Enterprise Development Fund
Balanced E-Government Index	BEGIX	2001-02	Bertelsmann Foundation and Booz, Allen and Hamilton
Value Measuring Methodology	VMM	2001-03	US Social Security Administration and General Service Administration
Public Service Value Model	PSV	2003	Accenture in cooperation with Kennedy School of Government, Harvard University
Performance Reference Model	PRM	2003	US Federal Enterprise Architecture Program Management Office
Interchange of Data between Administrations Value of Investment	IDA VOI	2003	European Commission, DG Enterprise
Demand and Value Assessment Methodology	DAM & VAM	2004	Australian Government Information Management Office
Public Value Framework	PVF	2006	Center for Technology in Government, University at Albany, SUNY and supported by SAP
Performance Measurement for the Government On-Line Initiative	PMAF	2004	Treasury Board of Canada Secretariat, developed for GOL Initiative

Logic Model for Government On-Line Initiative	-	2004-05	GOL Initiative, Government of Canada
Public Value of IT	PVIT	2003-04	Andrea Di Maio, Research Vice President at Gartner
Public Value of IT – Enhanced	PVIT – Enhanced	2007	The World Bank
“Methode d'analyse et de remontee de la valeur” (the method for value analysis and increase)	MAREVA	2003-04	Developed by BearingPoint for the Agency for the Development of Electronic Administration (ADAE), France
e-Government Economics Project	eGEP	2005	The European Commission (EC)
E-Governance Assessment Framework	EAF Version 2.0	2004	Department of IT, India with support from NISG and IIM, Ahmedabad
Impact Assessment Model	-	2005	Developed by NISG, ISG E-Gov, IIMA, LSE supported by The World Bank under JERP
Cyclic Assessment Framework Model	-	2007	Piyush Gupta, NISG, India
Return on E-Government and E-Government Performance Index	-	2003	Gupta and Jana

Maio, Andrea Di, 2003 suggests that rather than business value of IT, governments should adopt a different concept, i.e. Public Value of IT (PVIT). It can be articulated in terms of measures that demonstrate how IT-related changes and investments contribute over time to improved constituent service level, operational efficiency and political return. Constituent service level includes impact on time and cost for external users or beneficiaries of government services to access services, as well as quality and convenience. Operational efficiency looks at the internal impact, both inside individual departments, and increasingly across government organisations. Political return covers the degree of alignment with and impact on key policy areas as well as any impact in terms of political consensus.

2.3 IS Success – The importance of D&M Success Model

In evaluating information systems effectiveness or success, *DeLone and McLean (1992)* proposed a comprehensive IS success model which was updated later in *D&M's 2003*. Their study on IS success is considered very significant in contributing towards a universal model, which many researchers have employed when looking at the IS performance. The essential dimensions of D&M IS Success Model as updated over 10 years are evident from figure 1 and figure 2 below showing the original and updated Models.

Very importantly, in recent times, the D&M IS Success Model has been used in researches pertaining to measurement of effectiveness in the area of Public Sector and E-Government and it is, therefore, important that any study on the related subject must consider the dimensions of the D&M IS Success Model and adapt/include them for development of public value models for IT/IS, as is the case for this Study.

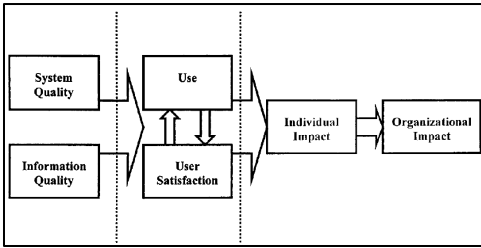


Figure 1: Original D&M IS Success Model (1992)

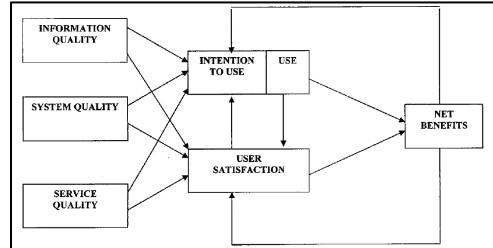


Figure 2: Updated D&M IS Success Model (2003)

2.4 Balanced Scorecard (BSC)

In a conceptual paper, *Martinsons et al.* suggest an adaptation of the *Kaplan and Norton* “Balanced Scorecard” (BSC) approach for the measurement of organizational performance related to IS. The BSC consists of four performance perspectives: the financial perspective, the customer perspective, the internal business process perspective, and the learning and growth perspective. Applied to an IS context, the authors propose a balanced IS scorecard to include a business-value measurement dimension, a user orientation dimension, an internal-process dimension, and a future-readiness dimension. The authors then suggest specific measures related to each IS BSC dimension. Given the significance of BSC conceptually, and its utilization in the context of measurement of organizational performance and IS effectiveness in public sector and government, it is an important model that has a bearing on the proposed model and measures postulated in this Paper.

2.5 Enterprise Applications - Success Measurement and Value

Over the past decade, enterprise applications (ERP and similar systems) have been implemented in many organizations worldwide (*Davenport, 1998, 2000*). Enterprise applications are configurable, off-the-shelf software packages that attempt to integrate all organizational data resources into a unified system. However, study of the literature shows that several researchers have studied the implementation success of enterprise applications in adopting organizations, but only a few (*Gable et al., 2003*) have examined success at later stages. *Gable et al., 2003*, based on survey data gathered from 27 public sector organizations, mapped the first-round survey impacts into both the *Delone and McLean (1992)* IS success model supplemented with the *Myers et al. (1997)* IS assessment selection model, as well as into the *Shang and Seddon (2000)* ERP benefits framework to develop the *a priori* model that consists of System Quality, Information Quality, Satisfaction, Individual Impact and Organizational Impact as dimensions for enterprise system success. The dimensions and measures posited herein provide a useful input to the value framework for this Paper.

3. Key Considerations for the Proposed Public Value Framework

The literature and related discussions provide useful insight towards the development of the proposed public value framework in the context of defining and measuring value achieved from IS in general and enterprise applications in particular in Public Sector and Government organizations. Some of the key considerations and attributes of the proposed public value framework are summarized below:

- Multidimensional model
- Mix of Quantitative and Qualitative Measures
- Common framework for both *ex-ante* and *ex-post*
- Framework which is both diagnostic and prescriptive
- Due importance to existing models from IS, Public Sector and Government, and Enterprise Applications
- Exclusion of resource capability

- Exclusion of profitability measures
- Usage of established theories/frameworks for the proposed dimensions

The abovementioned attributes form the core philosophy for the proposed framework and may also be relevant for developing any alternate set of dimensions and measures.

4. Proposed Public Value Framework for Enterprise Applications - Constituent Service, Productivity and Political Consideration

The pillars for the proposed public value framework for enterprise applications in public sector and government for this Paper are essentially derived from the conclusions of Public Value of IT (PVIT); Consumer Surplus and Productivity; and the Net Benefits (Individual and Organizational Impact) under D&M Success Model. The dimensions and measures for the proposed framework are defined and then mapped to the measures of existing models.

This Paper proposes three Dimensions (Perspectives/Groups) for the public value framework for enterprise applications. They are *Constituent Service, Productivity and Political Consideration*. Mapping of each of these dimensions to the major existing models/frameworks are highlighted, which strengthen the consonance of the proposed framework. Indicators (Measures/Metric) for each of these dimensions are proposed that can be used in any assessment (ex-ante or ex-post; prescriptive or diagnostic) of public value particularly in the context of enterprise applications in public sector and government. Table 2 below shows the Dimensions, Mapping and Indicators of the proposed public value framework for enterprise applications.

Table 2: Public Value Framework for Enterprise Applications

Dimension (Perspective/Group)	Mapping to existing models/frameworks	Indicators (Measures/Metric)
Constituent Service	<ul style="list-style-type: none"> ▪ Consumer Surplus/Benefit Theory ▪ Social Benefits of PVIT ▪ Customer Perspective under BSC ▪ Service Quality of the updated D&M Model 	<ul style="list-style-type: none"> ▪ Number of defined Service Levels ▪ Service Quality (using the SERVQUAL framework) ▪ Off-take of Services (Volume of service transactions)
Productivity	<ul style="list-style-type: none"> ▪ Productivity Theory ▪ Operational ROI under PVIT ▪ Financial, Internal Process, Learning and Growth Perspectives of BSC ▪ Organization Impact under D&M Model 	<ul style="list-style-type: none"> ▪ Value estimates for common functions such as finance, HR, materials etc. ▪ Value estimates for organization or business/department specific functions such as oil exploration, citizen service, works management etc.
Political Consideration	<ul style="list-style-type: none"> ▪ Emphasized primarily for PVIT ▪ Individual and Organizational Impact under D&M Model 	<ul style="list-style-type: none"> ▪ Individual Impact – Recognition, Career Progression, and Learning and Challenge ▪ Organizational Impact- Transparency and Image

4.1 Constituent Service

Public Sector and Government organizations primarily exist for providing Service to its constituents through their operations. The constituents include customers, citizens, suppliers, employees, banks and any other external partner. Any framework for public value must measure the Constituent Service dimension.

The key indicators proposed for measuring this dimension include *Number of defined Service Levels*, *Service Quality (using the SERVQUAL framework)*, and *Off-take of Services (Volume of service transactions)*.

Service and service quality is a concept that has aroused considerable interest and debate in the research literature because of the difficulties in both defining it and measuring it. One service quality measurement model that has been extensively applied is the SERVQUAL model developed by Parasuraman et al. (1985). The dimensions of SERVQUAL framework are:

- *Tangibles*: Physical facilities, equipment, and appearance of personnel.
- *Reliability*: Ability to perform the promised service dependably and accurately.
- *Responsiveness*: Willingness to help customers and provide prompt service.
- *Assurance*: Knowledge and courtesy of employees and their ability to inspire trust and confidence.
- *Empathy*: Caring, individualized attention the service provider gives its customers.

The proposed public value framework uses the above dimensions with respect to measurement of *service quality* apart from directly measuring the *number of Service Level Agreements (SLAs)* that the organization has defined and the *off-take of services* as measured by incremental volume of service transactions.

The measures need to be used across all the constituents that derive service from the public organization – customers/citizens, suppliers, employees and other external partners. The combined metric would yield the true measure of impact on constituent service as “Value” derived from enterprise applications.

4.2 Productivity

Amongst the various related but distinct issues of IT/IS Value is whether investments in IT/IS have increased Productivity. The rationale for using the productivity measure (as against profitability) essentially rests in the concept of productivity paradox and the fact that government and public sector are not-for-profit organizations. The key question is whether IT has enabled the production of more “output” for a given quantity of “inputs”. For the purpose of the proposed public value framework for enterprise applications, usage/implementation of enterprise applications is taken as the input (without complications of costing it) and the process (operational) benefits across various functions of the public enterprise are estimated and monetized to yield the productivity value of enterprise applications. The productivity equation can thus be defined as:

Productivity of Enterprise Applications = Value estimates for common enterprise functions + Value estimates for organization or business/department specific functions

The process of value estimation and monetization for the various functions of a public enterprise requires not only the data with respect to various parameters/KPIs governing the different functions, but also the benchmarks and assumptions with respect to productivity improvements. This data needs to be gathered to yield the productivity calculations.

The productivity measure under the proposed framework provides the operational efficiency achieved through enterprise applications. While accurate cost-benefit analysis is difficult in the context of public sector and government, the monetization of the estimated benefits through the abovementioned standard process should provide good and usable results.

4.3 Political Consideration

Political support is an important prerequisite for effective program delivery. When politicians care about a particular program, they are more likely to insist on effective implementation by the civil service. Civil

Servants responsible for managing such programs are likely to be given more autonomy, as well as administrative and financial resources. Programs that enjoy political support are better positioned to ward off rent-seeking behaviour of influential groups. Building Political support can thus be an important instrument for ensuring the success of a program (*Building Political support for program delivery, 2006*). Additionally, the civil servants themselves care a lot for recognition for self and the organization while implementing any program, more so in IT/IS as has been shown in several E-Governance programs. Most of the successes have been shown to be highly dependent on specific individuals who cared for success and then got recognized for it. This and related set of reasons which specifically and uniquely drive the public sector and government organization and their IT/IS programs are key considerations for driving and measuring public value. They are necessary to be considered and, therefore, forms the third dimension of the proposed public value framework for enterprise applications. This dimension is collectively termed as *Political Consideration* and covers both *personal and organizational impacts* of political consideration. It is worthwhile to note that most studies make a mention of these but there is very little, if any, by way of any strong theoretical foundation that models it or measures it objectively. This paper attempts to provide a structured framework for political factors that need to be measured to determine public value as suggested in the Table above.

The factors/measures that constitute the political consideration are key and unique in the context of measuring public value of IT. The measures need to be evaluated for the key officers and project leaders who conceptualize, prepare and execute the IT/IS and enterprise applications project. It is theorized that a positive influence on these factors will indicate value from the enterprise applications project.

5. Concluding Remarks

This Paper provides a literature backed framework for defining and measuring the public value of enterprise applications for public sector and government organizations. The essential elements of the framework are derived from the concepts of public value in general, public value of IS/IT (PVIT), and value assessment of enterprise applications. The framework clearly shows a distinct difference in value measurement for public sector and government as compared to any other sector. The proposed (derived) framework recommends the usage of three key dimensions to measure the public value – *Constituent Service, Productivity and Political Consideration*. Each of these dimensions covers several measures which together constitute the public value of enterprise applications. As mentioned earlier, Public Sector and Government organizations are unique in their own ways and so is the measurement of public value of any program that they carry out including, of course, an IS/IT program. Hence, any framework for measurement of public value of IS/IT needs to consider this uniqueness along with the key purpose of such organizations. *Constituent Service* and *Political Consideration* as key dimensions of the framework clearly reflect this uniqueness. Additionally, enterprise applications also have their uniqueness with respect to bringing process efficiencies and transformations that go well beyond a traditional (build approach) IT/IS implementation. In fact, the concept of *Productivity* fits in well for the enterprise applications approach and is thus considered as a key measure. At this juncture, it can be stated that the framework provided herein can be legitimately used for measurement of public value of implementations of enterprise applications in public sector and government organizations. While frameworks for public value of IT and value assessment of enterprise applications exist separately, there is very little, if any, by way of a framework for a combination of the two. The framework provided in this Paper fills that gap.

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