

## **EVALUATING THE COST-BENEFITS OF E-GOVERNMENT PROJECTS: Rationale for Going beyond Objective Financial Measures**

**Muhajir Kachwamba**

Mzumbe University,  
Lecturer, Department of Economics  
P.O.BOX 32, Mzumbe-Morogoro, Tanzania  
makachwamba@mzumbe.ac.tz

**Iddi Makombe**

Mzumbe University  
Senior Lecturer (PhD), Institute of Development Studies  
P.O.BOX 83, Mzumbe-Morogoro, Tanzania  
iamakombe@mzumbe.ac.tz

### **Abstract**

*The assertion that e-government has myriad benefits exists in the plethora of e-government literature. However, the fact that e-government implementation is costly can not be ignored too. In order to match the two, there have been efforts to suggest models from which the costs and benefits of e-government projects could be assessed to justify their implementation. Since Project Management profession has a unique role for the successful implementation of e-government projects; models for project evaluation in Project Management are also relevant for evaluating e-government projects. Hence, financial measures of project evaluation such as Net Present Value (NPV), Payback period and Cost-Benefit ratio are normally recommended for evaluating e-government projects. We argue however that though financial models are important objective measures, they are maligned in the following grounds. Firstly, while cash flow is a requisite data input for computation of financial measures; not all e-government project benefits can be measured in monetary values. Secondly, not all e-government projects are aiming at profit maximization. Thirdly, the benefits of e-government projects can not be assessed within a single domain because of multiplier effect to other social, political and economic entities. In this paper, authors provide a framework which indicates the broad benefits of e-government in which financial models have limitations in evaluating such e-government projects. A multi-weighted score technique is recommended as a subjective measure to complement financial models in order to nurture those broad benefits of e-government projects during the early phases of selecting viable projects.*

**Key Words:** *Net Present Value, Payback Period, Multiplier Effect, E-government, Multi-Weighted Score*

**JEL Classification:** G<sub>11</sub>, H<sub>43</sub>, O<sub>11</sub>, O<sub>22</sub>

## 1. INTRODUCTION

The assertion that e-government has myriad benefits exists in the plethora of e-government literature. However, the fact that e-government implementation is costly can not be ignored too. Many e-government projects are implemented without a keener analysis for ensuring that project benefits outweigh costs (Amberg, Markov, & Okujava, 2005; Kertesz, 2003). In order to intertwine the two dilemmas, there have been efforts to suggest models from which the costs and benefits of e-government projects could be assessed to justify their implementation. Since Project Management is one of the professions said to have a unique role for the successful implementation of e-government projects (Reffat, 2006); models for project evaluation in Project Management are also relevant for evaluating e-government projects. Hence, objective financial measures of project evaluation such as Net Present Value (NPV), Payback period and Cost-Benefit ratio are found to be recommended for evaluating e-government projects (Heeks & Molla, 2009; Kertesz, 2003).

We argue however that though financial models are important objective measures, they are criticized in many grounds as far as the nature of e-government projects is concerned. Firstly, while cash flow is a requisite data input for computation of financial measures; not all e-government project benefits can be measured in monetary values or quantified (Amberg et al., 2005). Secondly, not all e-government projects are aiming at profit maximization (Kertesz, 2003). Thirdly, the benefits of e-government projects can not be assessed within a single domain because of multiplier effect to other social, political and economic entities. In this paper, authors provide a framework which indicates the broad benefits of e-government in which financial models have limitations in evaluating such e-government projects. A multi-weighted score technique is recommended as a subjective measure to complement financial models in order to nurture those broad benefits of e-government projects during the early phases of selecting viable projects.

The paper is organized as follows. First, a review of the literature on various objective financial models used to evaluate projects and their criticism is presented. Next, a conceptual framework based on the multiplier effect of the benefits of e-government projects is proposed where financial models have

limitations to incorporate such benefits during the selection of viable projects. Lastly, multi-weighted score technique is presented and used as example to justify its power over financial models in evaluating e-government projects.

## **2. FINANCIAL OBJECTIVE MEASURES OF PROJECT EVALUATION**

Due to vast resources commitment required in the implementation of e-government; there has been an increasingly pressure for justification of the e-government projects. Although evaluation of e-government projects is currently one of the contemporary academic phenomena, the task isn't easy. Hence, various evaluative techniques have been suggested to evaluate e-government project (Heeks & Molla, 2009). Among the techniques largely found recommended in the literature include financial models commonly known as Cost -Benefit Analysis models (Amberg et al., 2005; Heeks & Molla, 2009). Financial models consists a class of various techniques such as Payback period, Net Present Value, Cost-Benefit Ratio and Return on Investment. In this section, a detailed discussion of how these techniques are applied is given and their respective criticism.

### **2.1. Payback Period**

Payback period measures the time it takes for the project to recover the entire project investment (Gray & Larson, 2008). In other words, the payback period is the breakeven point which measures the time usually in years or months when the project benefits can recover the project investment cost (Heerkens, 2002). The computation of the payback period is based on the cash flows (Gray & Larson, 2008; Gupta & Jana, 2003). The decision rule is such that projects with shorter period are more preferred than those with lengthy period (Remer & Nieto, 1995b). This method suffers from several criticisms. First, it ignores the time value of money (Gupta & Jana, 2003); secondly, the payback period ignores any cash inflows beyond the payback period (Remer & Nieto, 1995b).

### **2.2. Net Present Value (NPV)**

This method computes the net worth of a project in present value using the discount rate. Future benefits or cash inflows are adjusted by the discount rate and the project investment cost is deducted from the total discounted cash flow (Heeks & Molla, 2009). The discount rate or commonly known as cost of capital (Heerkens, 2002) is determined by the management (Gray & Larson, 2008) and may be interpreted as Minimum Attractive Rate of Return (MARR) in form of interest rate or rate of return (Remer & Nieto, 1995a). Although e-government projects may be entirely financed by public funds from taxes (Di Maio, 2003); the rate of return will still be determined in the public sector using the prevailing

market rate. The reason behind is that resources allocated to an e-government project have another best alternative. In economics this best alternative is always viewed as an opportunity cost (Gupta & Jana, 2003). The decision rule for this method is that a project with a positive Net Present Value is considered economically viable (Heeks, 2003). Despite being considered as a good measure for evaluating e-government projects (Gupta & Jana, 2003); this method is criticized on the ground of data inputs needed for computation of NPV. For example, various authors have argued on the difficulties to estimate quantitatively the cost and benefits during ex-ante evaluation (Irani, Love, Elliman, Jones, & Themistocleous, 2005; Kertesz, 2003).

There are however many financial objectives measures that can be used to evaluate e-government projects than those introduced above. Other common measures include Return on Investment (ROI) and Cost Benefit Ratio (CBR). Remer and Nieto, discusses in detail 25 different possible methods to evaluate a project (Remer & Nieto, 1995a, 1995b).

### **3. LIMITATIONS OF OBJECTIVE FINANCIAL MEASURE IN EVALUATING E- GOVERNMENT PROJECTS**

From the above, it clear that objective financial measures possess many limitations when applied to e-government projects. In this section, we present three limitations which justify why criticisms are increasing regarding the use of these methods to evaluate e-government projects ex-ante. In order to understand these critics, it is imperative to know that project is a one time activity characterized by a start and end time and specified amount of resources. Hence, implementation of a project follows a cycle of phases and logical progression of activities. Various terminologies may be used to describe the phases of a project cycle. The World Bank definition of a project cycle comprises of five phases namely identification, preparation, appraisal, implementation and evaluation (Baum & Tolbert, 1985). Project selection process is normally done at the early phases of the project cycle particular at the appraisal stage. It should be clear that at this stage, the project is not yet implemented and thus there are no observable data on cost and benefit trends from the project. The evaluation process will therefore be based on estimates of expected costs and benefits under the control of a common concept in economics “Ceteris Peribus”. This means that assuming everything remains as it is, and with full utilization of all available information, these estimates are assumed to reflect reality. Therefore, the data input used in financial measures need to be known before project implementation. In this

regards, data on benefits, costs and discount rates are decided prior to project implementation.

The first limitation of objective financial measures in evaluating e-government projects is based on the difficulties to quantify benefits and costs of e-government projects. While cash flow is a requisite data input for computation of financial measures; not all e-government project benefits can be measured in monetary values or quantified (Amberg et al., 2005). Due to multitude and diversity of benefits and costs for e-government projects, the evaluation task has become complex. Organizations have realized that these techniques can not accommodate the full range of all benefits, costs and risks (Irani et al., 2005). There are many intangible costs and benefits not accounted for in the evaluation because of quantification quandary (Markov, 2006). Despite the fact that efforts are made for recognition of all possible benefits, the quantification dilemma will still exist and most of the benefits end up being described by examples such as 'increased customer satisfaction' which of course is difficult to be considered for analysis in the above financial measures (Amberg et al., 2005). Because costs outweigh benefits due to their unproblematic in estimation, there is a tendency to reject strategically important projects (Markov, 2006; Renkema & Berghout, 1997).

The second limitation is that not all e-government projects are aiming at profit maximization. The idea of cash flows as an important data input for the computation of parameters from which evaluation decisions are made is vague as far the public sector is concerned. The concept of cash flow is more attributable to firms with profit maximization objectives where prediction on production units and prices can be made and so is cash flow estimate. Governments just like charitable organizations implement many projects without any direct expectation of profitability gain. Although some of the e-government projects can be implemented for profitability objectives but many of the benefits of e-government projects are not for profit oriented. As Irani et al. argue, while financial measures are relatively easy to conceptualize in the manufacturing environment, there may be of little use when applied in Public Administration (Irani et al., 2005).

The third limitation is that the benefits of e-government projects can not be assessed within a single domain because of multiplier effect to other social, political and economic entities. Although the concept of multiplier has a long history in the field of economics, it can still play an important role in understanding the ambiguities of using cost-benefit models to evaluate e-government projects. As a matter of fact, once cost-benefits measures are applied in the evaluation of e-government projects, either ex-ante or ex-post, they tend to

estimate the direct benefits only (World Bank, 2005). An implementation of e-government project in one sectors or government agency has many indirect benefits which are not normally included in the evaluation process when cost-benefit models are used. Such indirect benefits are called project multiplier impacts (World Bank, 2005). The concept of multiplier effect in e-government projects is not new, concept such as 'multiple stakeholder analysis for e-government' (Amberg et al., 2005) reflects a similar idea. With objective financial models, many intangible benefits are left out in the analysis (Gupta & Jana, 2003). Tangible benefits are also likely to be left out if they are first not captured directly in monetary values and secondly, if they can not be captured indirectly by the financial measures.

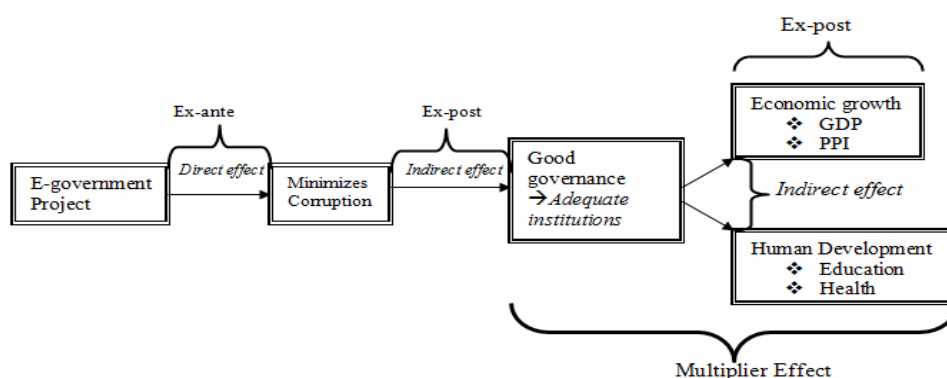
Generally, e-government projects have multitude impacts to various stakeholders. The recognition of such benefits requires a holistic approach which can take into account these benefits from several stakeholders. Some author, for example (Amberg et al., 2005) provides a comprehensive stakeholder approach to e-government projects. The authors analyze the possible impact of e-government projects to several stakeholders such as citizens, private sector and non-profit organizations, employees and government. The benefits may differ from one stakeholder to another, but examples given include benefits such as improved information quality and quantity, productivity, time and financial savings, reduce work load, improved working conditions, reduce cost, increase revenues, increase efficiency, improved location marketing and image and improved citizen participation. In the next section, we present an example where the financial objective measures have limitations to recognize critical benefits of e-government. However, in our example, we opt for a macro perspective using the concept of multiplier effect described above.

### **3.1 Limitation of Objective Measures: A hypothetical framework on multiplier effect**

E-government is said to have several political, economic and social benefits. e-government projects can have impacts on government's efficiencies and effectiveness by reducing bureaucratic burdens, creating sound business environment and promoting the information economy (Lau, 2007) One of the benefits of e-government which is increasingly recognized in the literature is decrease in corruption resulting from rent seeking by bureaucrats. At the same time, corruption is perceived as a symptom of institutional weaknesses and may lead to inefficient economic, social and political outcomes (Akçay, 2006). It is argued that if e-government projects are strategically and carefully implemented

can be an important tool for institutional reform (Pathak, Gurmeet, Rakesh, & Smith, 2007; Saidi & Yared, 2004). The impact of e-government on corruption has been documented by several authors, e.g.; (Cho & Byung - Dae, 2004; Ojha, Palvia, & Gupta, 2008; Shim & Eom, 2008) . This is a direct impact of e-government project. However, there are also indirect impacts as a result of reduced corruption which need to be considered. We use a general macro economic and institutional economics perspective to show that financial objective measures have limitations in evaluating e-government projects. We argue initially that the relationship between corruption, governance and development indicators such Gross Domestic Product (GDP) and human development has empirically been reported by some authors, e.g.; (Akçay, 2006; Kaufmann, 2002; Rajkumar & Swaroop, 2008). The argument is motivated by the fact that reduced corruption leads to strengthening public institutions and quality of bureaucracies which ultimately lead to good governance. Good governance implies government commitments to public expenditures which in turn guarantee good social services and economic growth. A positive correlation between governance and development indicators has been reported in development literature, e.g.; (Kaufmann, Kraay, & Mastruzzi, 2006).

**Figure 1: Multiplier effect of e-government project**



Source: Authors' Construct

Juxtaposing e-government and institutional economics literature, it is expected that when evaluating the benefits and costs of e-government projects, both direct and indirect costs should be considered ex-ante. The problems with objective financial measures to this particular case are two fold. First, the measures consider only direct benefits, in our example, reduced corruption. However, corruption is a complex phenomenon which obviously can not be measured in monetary values.

Secondly, indirect benefits resulting from multiplier effect of reduced corruption can not be considered. The figure below summarizes the impact of e-government on corruption which in turn influences various sectors indirectly through a multiplier effect

### 3.2 Evaluating e-government project using Multi-Weighted Methods

Since financial objective measures have limitations in evaluating most of the e-government project, alternative measures should be sought. We propose a Multi-Weighted method because it has the power to incorporate both direct and indirect impacts. The management identifies the objectives based on their relative importance to the organization. Weights are assigned to each objective and the total weighted average can be computed. With this approach, alternative projects competing for the same resources are evaluated and the best projects can be ranked. In addition, this method can also take into account the risk factors by assigning negative weights (Gupta & Jana, 2003). The Table below indicates how the method can be applied. The Weights distributed to the attributes should sum to one and the ratings can be done subjectively, for example on a point scale.

**Table 1: Multi-Weighted Method**

Hypothetical example							
Attribute	Weights	Project A		Project B		Project C	
		Rating	$W \times R$	Rating	$W \times R$	Rating	$W \times R$
Corruption	0.75						
Governance	0.15						
Efficiency	0.04						
Revenue	0.06						
<b>Total Score</b>			XXXX		ZZZZ		YYY

Source: Authors' construct

$W$  = Weight       $R$  = Rating

From the Table above, total scores for each project are computed and reflect the prioritization of projects based on the attributes. Attributes or criteria may come from the organizational strategy or from the country's national development plans, e.g.; poverty reduction strategy, Millennium Development Goals programmes.

## 4. CONCLUSION

Financial measures have many limitations to be applied in the evaluation of e-government projects. Many e-government projects are not implemented for profit purposes but for other objectives of public interest. With financial measures, many of the projects are likely to be rejected because costs will always outweigh benefits due narrow realm of assessing e-government benefits. The use of multi-



weighted measures may be a reasonable approach when objective financial measures can not incorporate indirect benefits in one hand, but also when direct benefits can not be estimated in monetary values. The concept of “multiplier effect” can be used in the future when designating appropriate frameworks for nurturing a holistic perspective of the impacts of e-government projects.

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