Planning e-government start-up: a case study on e-Sri Lanka

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Abstract: This paper analyses the proposed implementation strategies of e-government in Sri Lanka. Firstly, the vision of e-Sri Lanka is presented, that is the information and communication technology development roadmap to achieve e-governance. Secondly, a literature study on e-government start-up is given. Also given in the literature study is an approach for analysing implementation strategies; this approach is based on the theory of connection. Thirdly, the proposed implementation strategies are presented and, finally, the strategies are analysed.

Keywords: e-government; e-Sri Lanka; theory of connection; e-readiness.


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1 Introduction

As the internet’s reach has expanded, so has the movement of government services online. Nearly all countries in the world now have some sort of internet presence, or so-called e-governance. Some countries are still at the entry-level, publish only stage but many countries are at the advanced transaction stage. Industrialised countries take advantage of e-governance to achieve benefits, such as providing citizens and enterprises with more convenient access to government information and resources, delivering public services to citizens and conducting transactions with businesses and with those working in the public sector. In addition to these benefits, the objectives of any developing country to utilise e-governance should be the development of the nation’s economy and improvement of the quality of life and opportunities of all the citizens of that country, as the digital divide is paramount in developing countries.

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1.1 E-Sri Lanka

In November 2002, the government of Sri Lanka launched e-Sri Lanka, the information and communication technology development roadmap to achieve e-governance by the year 2007. Sri Lanka’s first ever e-government conference was held in May 2003. The event was given the utmost importance by the government of Sri Lanka and was supported by some inter-governmental organisations such as the United States Agency for International Development and the Swedish International Development Agency [1].

According to the official document, the main purpose of e-Sri Lanka is to achieve the desired levels of development by enhancing national competitiveness and reducing or eradicating poverty by realising enhancements to the quality of life of its citizens [2]. The government of Sri Lanka believes that the vision will take the dividends of information and communication technology (ICT) to every village, every citizen and every business, and also transform the way Government works [1].

Zhou [3] identifies that, in a model of e-government, a society has three constituents: government, citizens, and businesses (Figure 1). Accordingly, we classify the benefits of e-Sri Lanka pointed out in the official document [2] into three different categories. The benefits of e-Sri Lanka are:

For the government:

- to empower civil servants with information and communication tools, to facilitate coordination across government agencies and to improve competition and transparency in public procurement
- to integrate marginalised regions and communities within an equitable resource distribution framework, to facilitate effective decentralisation and broadening of public participation in development policy formulation and program implementation, and to transform government services to become cost-effective and citizen-centred
- to provide quality education at all levels and to all parts of the country. To provide students and teachers throughout the country with access to a world-class educational curriculum via the internet.

For businesses:

- to revitalise Sri Lanka’s main and traditional industries, like agriculture, tourism and apparel, so that the share of value-addition to the end product is increased, and to penetrate into new markets via internet-based sales channels
- to emerge as a major transportation hub for air and sea cargo, by modernising ports and by developing a modern trade net that dramatically reduces transaction costs for importers and exporters. To enable businesses to become increasingly competitive and to attract foreign investors
- to reduce transaction costs to businesses
- to create a communication environment that allows optimal opportunities for businesses to engage in all forms of e-commerce.
For citizens:

- to improve the delivery of public services and knowledge and education to all, and to make government accessible and accountable to the average citizen
- to create a communication environment that allows optimal opportunities for all Sri Lankan citizens to participate fully in the global information economy, and for all citizens to support their economic, learning and personal needs
- to facilitate inexpensive contact with families abroad via e-mail and voice over the internet via Cyber Cafes in all towns.

Figure 1  Three constituents of a society in e-government

1.2 In this paper

The main purpose of this paper is to analyse the official publication on e-Sri Lanka entitled “Policy on E-government” [2] that was released in May 2003. In this the Government of Sri Lanka explains the goals, plans and implementation strategies of realising e-Sri Lanka. In order to do the analysis, we first go through a literature study that is relevant to e-government start-up.

The literature study is presented in Section 2. Section 3 presents the proposed strategy for implementing e-Sri Lanka. In Section 4, these implementation strategies are analysed with the help of an approach that is based on the theory of connection. The results of the analysis and further work are presented in Section 5.

2 Literature study

In the first part of this section, we present a literature study on e-government, especially on e-government start-up. In the second part on this section, we present the basis of our approach to the analysis, called the theory of connection.

2.1 A short literature review on e-government start-up

Before implementing or even planning for e-government, the first thing a government has to think of is whether it is ready for e-governance. Can the country build the basic
infrastructure (technological, financial and legal) that is necessary for doing business over the internet? Do the population have the aptitude (income, life-style, education and cultural inclination) and demand for e-governance? Whether the nation’s economy is agile, competitive and energetic to produce goods that cannot be done without making use of the internet? Questions like these verify a country’s readiness for e-government, called ‘e-readiness’ [4–6]. Bui et al. [4] define e-readiness as the aptitude of an economy to use the internet to migrate traditional businesses into the new digital economy, when the economy is able to create new businesses that could not be done otherwise.

There are various measures that provide comprehensive and comparative perspectives on e-readiness (e.g.: Bui et al. [4] presents a framework for measuring e-readiness). Several studies have been done on the e-readiness of different countries, e.g. Sofres [7]. However, for some countries, like Sri Lanka, either e-readiness is not measured or its results are not available. In this case, we can generally estimate e-readiness of a country qualitatively, by evaluating some of the factors that affect the e-readiness of that country; many works provide comprehensive studies of factors that affect e-readiness in different countries. For example, the World Competitiveness Yearbook grades countries according to their economic performance and the efficiency of their government. The Economist Intelligence Unit assesses countries’ infrastructure and environment.

If a country has scored well on e-readiness measures and has decided to launch e-government, then it must decide the sophistication level and speed of transformation. The sophistication level means whether the country is just interested in the entry-level, publish only stage, the intermediate-level interactive stage, or the advanced transaction stage [8]. By speed of transformation we mean the time frame given to achieve the required level of sophistication.

Zhou [3] suggests completely modelling government business prior to beginning the realisation of e-government; defining all government businesses, both internal and external, is suggested as is thinking how to use ICT to do government business better. Further, as there are differences between central and local government and between departments and agencies, modelling government business should be the first step toward e-government realisation.

Once the level of sophistication is planned and the modelling of government business is complete, then the policy makers must devise the development stages to realise it. Korea’s journey to e-government is planned in three stages [9], and the European Union suggests five stages [10]. Wong [11] proposes a six-stage development process, where the identified stages are information publishing, two-way transaction, multipurpose portals, portal personalisation, clustering of common services and full integration.

Developed or underdeveloped, countries are facing tremendous pressures to move toward e-government. For example, Zhou [3] states that e-government is a must for every government, and the only question is sooner, later and via what approaches. However, there is a danger, especially for developing countries like Sri Lanka, in implementing e-government and investing large sums of money, which may not bring the desired results. Therefore, it is wise for policy makers in developing countries to think about the costs of failure of e-government beforehand. Heeks [12] illustrates specific threats to e-government initiatives for developing countries: barriers to entry in e-commerce are higher for enterprises in developing countries than in developed, developing countries’ communications infrastructure and national policy frameworks are often inadequate and progress is slow, e-commerce will not necessarily improve export opportunities but may
increase imports, and developing countries may end up paying large multinational corporations heavily for providing ICT infrastructure.

2.2 The approach for analysis

For analysing the implementation of e-Sri Lanka, we are going to use an approach based on the Theory of Connection (ToC). ToC is a Scandinavian invention with strong mathematical logic background [13,14]. ToC has been successfully used for the modelling, analysis and implementation of many complex systems in diverse fields like mechatronics [15], consumer electronics [16], production planning [17], material flow [18], and in collaborative supply chain development [19]. In this paper, we apply ToC for the modelling and analysis of e-government.

2.2.1 Theory of connection (ToC)

A detailed treatment on ToC is given in [13]. The approach by ToC is summarised in Figure 2, which shows a system that consists of three fundamental components: elements, connections and sources. The elements carry all the physical properties of the system; thus, elements are the fundamental building blocks of a physical system. Some of the elements in e-government are human resources (government officials, computer professionals), computer and network resources, and buildings for housing computer departments. The property of a computer professional (human resource element) is her capacity to perform her task, whereas the property of a building is its capacity to hold items and humans.

![Figure 2 Components of a system](image)
When there is no connection between the elements, the set of isolated elements (also called *primitive elements*) is called the *primitive system*. Connections reflect how the elements in a primitive system influence each other, thus, connections represents the structure of a system. The set of connected elements is called the *connected system*.

Finally, sources are the environment’s influence on a system; it is the source that ignites a system into action.

### 2.2.2 Formulation methodology

The objective of our approach based on ToC is to offer a strategy by which the behaviour of complex systems could be determined from the known behaviour of its individual elements. The mathematical formulation approach of ToC can be summarised as follows [15]:

**Phase-1: identifying the primitive system**

- break up the system into its basic parts (the primitive elements); this group of isolated elements is called ‘the primitive system’
- set up the governing equation of each element independent of other elements, by that, we isolate the variables in the individual elements
- concurrently, by the process of measurement, we will create an abstract model of the whole system defining the topological structure of the whole system.

**Phase-2: making the connected system**

By means of the topological structure, we connect together the variables in the individual elements. That is to set up the governing equations of the whole system, or ‘the connected system’.

**Phase-3: applying the sources, and solving the connected system**

By applying the sources, we can determine the behaviour of the system governed by the equations of the connected system.

In Section 4, we will follow the three phases in our approach to analyse the proposed strategies for implementing e-Sri Lanka. In phase one, we can already recognise some of the primitive elements: government officials and employees, experts and technologists, computer hardware and software resources, entrepreneurs, and the general public. From the literature study, we can conclude that *e-readiness* is the source for adopting e-governance.

### 2.2.3 Iterative nature of model building with ToC

Although the formulation methodology (section 2.2.2) seems like a bottom-up approach (starting with primitive elements and ending in the whole system), the approach we use for modelling and analysis is basically an incremental (iterative) approach with both top-down and bottom-up views. More explanation is given in Section 4.
3 The proposed strategy for implementing the vision

In this section, we present the implementation strategy for e-Sri Lanka. The implementation strategy presented here is a heavily edited version of the proposals given in the official document [2]. The implementation is planned through a five-program strategy (see Figure 3). The five programs are to run concurrently. Figure 3 outlines the idea that the five-program strategy will realise e-Sri Lanka by 2007.

Figure 3 Five-program implementation strategy to realise e-Sri Lanka

<table>
<thead>
<tr>
<th>Program</th>
<th>Year of completion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Program-A: Building implementation capacity</td>
<td>2003</td>
</tr>
<tr>
<td>Program-B: Building information infrastructure</td>
<td>2005</td>
</tr>
<tr>
<td>Program-C: Develop ICT human resources</td>
<td></td>
</tr>
<tr>
<td>Program-D: Deliver citizen services through e-government</td>
<td>2007</td>
</tr>
<tr>
<td>Program-E: Economic and Social development</td>
<td></td>
</tr>
</tbody>
</table>

Source: based on [2]

3.1 Program A: building implementation capacity

Program A is solely about forming control and coordinating committees to advise the Cabinet of Ministers. A top-level consultative committee will be formed, made up of secretaries of key ministries, industry leaders, etc., to advise the cabinet. In addition, an agency will be established to look into the intricacies of capacity building.

3.2 Program B: building information infrastructure

Program B is about building a national information infrastructure and enabling environment. Program B can be divided into three subprograms B1 – B3.

- subprogram B1 is about building the hard infrastructure to provide affordable telecommunications services for various users
- subprogram B2 is about building the soft infrastructure to support the Sri Lankan software companies who often encounter significant difficulties. Some of the actions planned under B2 are the stimulation of domestic demand for software applications and the establishment of ICT parks and ICT development zones
- subprogram B3 is about building capacity for adaptation, learning, monitoring and evaluation. To build this learning capacity, the government will encourage local initiatives and will also recruit multinational companies to invest and partner with their local counterparts.
3.3 Program C: development of human resources

To develop ICT human resources, the following subprograms are planned for different sections of human resources: C1 for the software industry, C2 for educational establishments, and C3 for the general public.

- subprogram C1 is to increase the supply of ICT professionals, a prudent policy will be devised on the issuing of visas for foreign ICT professionals with the required skill sets and by actively recruiting and providing incentives for leading ICT multinationals and training institutions to invest in Sri Lanka.
- subprogram C2 is for educational establishments. ICT education and training programs will be provided in the use of ICT tools in primary and secondary schools for students as well as for teachers. The undergraduate intake for ICT based University courses will be increased and the training of university staff will also be increased.
- subprogram C3 is for the general public. ICT awareness programs will be relayed through the electronic media. Tertiary education on ICT and e-learning will be increased.

3.4 Program D: delivering citizen services through e-government

Figure 4 shows that e-government services can be classified into five categories: G2G, G2B, and G2C, where the government is the seller, and B2G, and C2G, where the government is the buyer. Program D is further subdivided into three subprograms, D1 for G2G, D2 for G2B and D3 for G2C:

- subprogram D1 is about establishing a forum on e-government to facilitate dialogue and consensus, establishing a government-wide-area-network supporting e-mail and linking every government institution and employee, the development of fundamental data registries/databases of citizen data, and establishing a Sri Lanka portal to serve as a global front-end for administration and as a service delivery channel.
- subprogram D2 is about establishing a G2B interface that will facilitate interaction between businesses and the government.
- subprogram D3 is about establishing a G2C service delivery infrastructure. Also, a government call centre will be established to provide voice based interactive support to citizens.

Figure 4  Classification of e-commerce by the relationships among participants

<table>
<thead>
<tr>
<th>Service Provider</th>
<th>Consumer</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Government</td>
<td>Consumer</td>
<td>Citizens</td>
</tr>
<tr>
<td>Government</td>
<td>G2G</td>
<td>G2B</td>
<td>G2C</td>
</tr>
<tr>
<td>Citizens</td>
<td>C2G</td>
<td>C2B</td>
<td>C2C</td>
</tr>
<tr>
<td></td>
<td>E-Government</td>
<td>E-Commerce</td>
<td>E-Community</td>
</tr>
</tbody>
</table>
3.5 Program E: use of ICT as a key lever for economic and social development

Program E is also divided into three subprograms E1 – E3.

- subprogram E1 is about societal applications and content development. Under this subprogram, among other things, a national fund will be established to support innovative applications of ICT for social and rural development.

- subprogram E2 deals with strengthening connectivity and the establishment of telecommunication centres (‘telecentres’) and other forms of public access to information and communication services.

- subprogram E3 is about strengthening the mass media. Under this subprogram, Sri Lanka’s mass media and multimedia policy will be revised so that they adhere to internationally established principles.

4 Analysing the strategies for implementing e-Sri Lanka

In Section 3, we went through the details of how the vision of e-Sri Lanka is going to be implemented by a five-program strategy. In this section, we analyse the implementation strategy so that we can identify its strengths and weaknesses.

4.1 The model

We follow the three phases in our approach to analyse the proposed strategies for implementing e-Sri Lanka. In phase 1, we recognise a minimal set of primitive elements in any e-governance environment: government officials, policy makers, experts and technologists, government employees, computer hardware and software resources, network equipment, entrepreneurs, investors, buildings, and the general public. Some of these primitive elements can be grouped into the following units: ministries and departments, agencies, regulatory frameworks, financial institutions and banking, communication centres (internet service providers, telecentres), small to medium-sized enterprises (SMEs), and educational establishments. Finally, these units can be combined to form the three major subsystems of e-government, namely Government, Businesses and Citizens. In Figure 5, we indicate e-readiness as the source for adopting e-governance for dealing with the government.

The system model given in Figure 5 is the basis of our analysis. There are three factors that influence the output (e-governance) of the system:

- the primitive elements and their properties
- the connections between the elements (‘processes or services’)
- the sources.

Let's go through each of these three factors in detail:
4.2 Analysing the primitive elements and their properties

To see how the individual programs affect the properties of the primitive elements, we checked each program and subprogram of the five-program strategy against the components of the system; the results are summarised in Table 1. In table-1, abbreviations HRD, GO, T, GP, IE, BIF, HID, SID, ICTP, SMEs, CCs, BF, EDU, RF, S, and ER stands for human resource management, government officials, technologists, general public, investors and entrepreneurs, building information infrastructure, hard infrastructure development, soft infrastructure development, ICT parks and cyber zones, small to medium-sized enterprises, Internet service providers and telecenters, banking and financial institutions, educational institutions, regulatory framework, Source, and E-readiness, respectively.
Table 1 indicates that the proposed implementation strategy is very influential on human resource development, especially on ICT education. This has two effects, a positive one – the population becomes more IT-literate, and a negative one – surplus computer professionals but lack of inventors and entrepreneurs. A country’s capability for innovation and internal improvements cannot be nourished by IT education alone; production technology, supply and demand chain management, economics and psychology are all important too in the digital economy era. The lesson we learn from the ‘dot.com crash’ is that technology is just ‘an enabler’ and it is the business model that makes an enterprise succeed or fail.

Table 1 also indicates that the implementation strategy ignores SMEs. Ignoring SMEs (not helping them) will certainly cause undesirable outcomes, as SMEs are the most important portion of the economy of any country, yet they tend to have fewer funds for exploring the complexities of laws and regulations [20].

### 4.3 Analysing the connections (‘processes and services’)

To do analysis based on connections, we need precise descriptions of the processes involved and the services intended for e-government. The official document on e-Sri Lanka does not state the services the government wants to offer over the internet. Therefore, the analysis of e-Sri Lanka based on connection is not done here. However, we show how government business processes can be modelled and analysed with the help of the ToC, using two views, a bottom – up view and a top – down view.
4.3.1 Bottom-up view

The bottom-up view starts with the current set of primitive elements. The primitive elements are grouped into units (sub-systems) and given side-by-side interface to the respective units. This means that the groups of primitive elements confined into different units are separated to pave the way for incremental and independent development of the units. The functional separation of the units also allows different deployment models and hardware-software platforms to implement the independent units. In addition, an incomplete unit will not block the entire system.

4.3.2 Top-down view

The top-down view starts with the services that are to be provided through government portals. Then, the services or service providers are devolved into (functional) units (sub-systems). This breakdown helps to manage complexity and supports continuous improvements by iterations. The units will be independent and interactivity between these will be clearly identified, see Figure 6. In the business model shown in Figure 6, the flows from higher level entities (an entity can be a subsystem, unit, subunit or element) to lower level entities (top to bottom) are contacts. The flows between same level entities and from lower level entities to upper level entities are services.

**Figure 6** System model by top-down view

4.3.3 Iterative solution

It must be remembered that our approach is incremental, meaning the final model is developed after many iterations, as shown in Figure 7.
If the performance of e-governance does not satisfy the performance requirements then many corrective actions could be taken, like identifying and inducing new entities (an entity can be a subsystem, unit, subunit or element) into the model, combining two or many existing entities into a single entity, splitting an entity into two or more, etc. These changes may introduce newer elements or remove existing elements.

4.4 Analysing the source

In Figure 5, we indicated that e-readiness is the source of the system. E-readiness is something that makes a consumer ‘ready’ to buy products online; e-readiness thrusts a citizen to adopt e-government practices when dealing with government. Thus, more investment in the source (e-readiness) will improve the output (e-governance).

The results of our analysis (Table 1) show that the implementation strategy ignores promoting e-readiness. Whether or not Sri Lanka launches e-Sri Lanka, improving e-readiness must be emphasised for the growth of e-commerce in that country.

5 Concluding remarks

With an approach based on the theory of connection, we analysed the implementation strategy of e-Sri Lanka. Our approach for analysis is simple yet highly effective. The results of the analysis indicate that the policy makers have given low consideration to SMEs, they have not given priority to improving e-readiness, and they have not started process modelling. Based on our analysis, we propose the following for the improvement of the implementation strategy.

5.1 Create a separate program for SMEs

In addition to the five programs, we suggest that a separate program, exclusively for SMEs, must be planned. This is because it is SMEs, and not large corporations, that employ most workers in the global economy; thus, the survival of SMEs is vital for providing jobs to a skilled workforce. In addition, SMEs are increasingly conducting business transaction across borders [4] and, hence, they bring much needed foreign exchange into a developing country.
5.2 Incorporate steps to improve e-readiness in every implementation program

How do we improve e-readiness? To improve the e-readiness of a country, we must go back to basics:

• develop the basic infrastructure (technological, financial, legal and regulatory framework)
• develop the agility of the economy (the ability to produce innovative products faster, cheaper and of high quality)
• develop the consumer base (buying power, credit card usage, living costs and standard of living).

5.3 Start government’s business process modelling at once

Modelling government business processes is the first step in e-government development. Government must define all its processes and then find out how technology can be used to perform the processes better, by whom, when and how [3,21].

5.4 Plan development in stages not by programs

In all the e-government initiatives (excluding e-Sri Lanka) we have studied so far, implementations are planned in a series of consecutive stages [22]. The obvious advantage of implementing in stages is that completion of an intermediate stage always means overall improvement in e-governance and that the extent of e-governance has gone a step further. Whereas, completion of a program that runs in parallel with other programs does not guarantee overall improvement of e-governance, it only ensures that certain aspects of e-governance may have improved.

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