

University of East London Institutional Repository: <http://roar.uel.ac.uk>

This paper is made available online in accordance with publisher policies. Please scroll down to view the document itself. Please refer to the repository record for this item and our policy information available from the repository home page for further information.

Author(s): Athif, Ahmed; Pimenidis, Elias

Title: Ecrime threats on Egovernment – the case of Maldives

Year of publication: 2009

Citation: Athif, A. and Pimenidis, E. (2009) 'Ecrime threats on Egovernment – the case of Maldives' Proceedings of Advances in Computing and Technology, (AC&T) The School of Computing and Technology 4th Annual Conference, University of East London, pp.16-25

Link to published version:

<http://www.uel.ac.uk/act/proceedings/documents/FinalProceedings.pdf>

E-CRIME THREATS ON E-GOVERNMENT – THE CASE OF MALDIVES

Ahmed Athif and Elias Pimenidis

School of Computing, Information Technology and Engineering, University of East London
ahmed.athif@gmail.com, e.pimenidis@uel.ac.uk

Abstract: E-Government implementations are nowadays common even amongst the smallest and countries around the world. The challenge of building such systems is even greater for developing countries, in particular those who are struggling against considerable penetration of the Digital Divide in their society. This paper proposes a theoretical framework for implementing e-Government in the Maldives, a small country aiming to overcome the difficulties of offering twenty-first century services to a small by widely dispersed population. The particular interest in the case of the Maldives is that the technological infrastructure is sensitive and dependent on external condition, while there is wide chasm in society due to the effects of the Digital Divide.

1. Introduction:

Electronic Government (e-Government) is the new delivery model many governments are adopting, for which major changes in technology and organisational structures are required. Governments are under increasing pressure towards transformation, and are innovating service delivery with ICT, which Kifle (2008) refers to as “the new wave of reformation effort in the public sector”.

Implementation of e-Government has been challenging in numerous ways – predominantly in the developing world, constrained by the disparity and persistence of digital divide.

The focus of this work is on e-Government development and e-Policing in the Maldives. A theoretical framework for adoption of e-Policing in the Maldives has been proposed. Finally the potential of e-policing and cyber-policing, and their relevance to the fighting against ever increasing cybercrime is explored.

2. Fundamentals of e-Government:

Over the past decade the way governance is exerted has been closely scrutinized and citizens are constantly questioning the level of services they are receiving from their governments across the world.

E-Government or electronic government means office automation, internal management information systems and expert systems, as well as client-facing web sites (Heeks, 2006). Although the definition varies from author to author, e-government in general is the utilisation of ICT by the government in providing efficient, cost-effective, reliable, and participatory services, to its citizens, in a timely manner (Athif, 2008).

2.1. Advantages of e-Government:

In the context of modern e-Government design and implementation, organisational processes are reengineered and redefined to engage ICT as a tool rather than a “solution-to-everything” (Savvas et al 2008). Creating an umbrella website as a gateway to a plethora of government services enhances

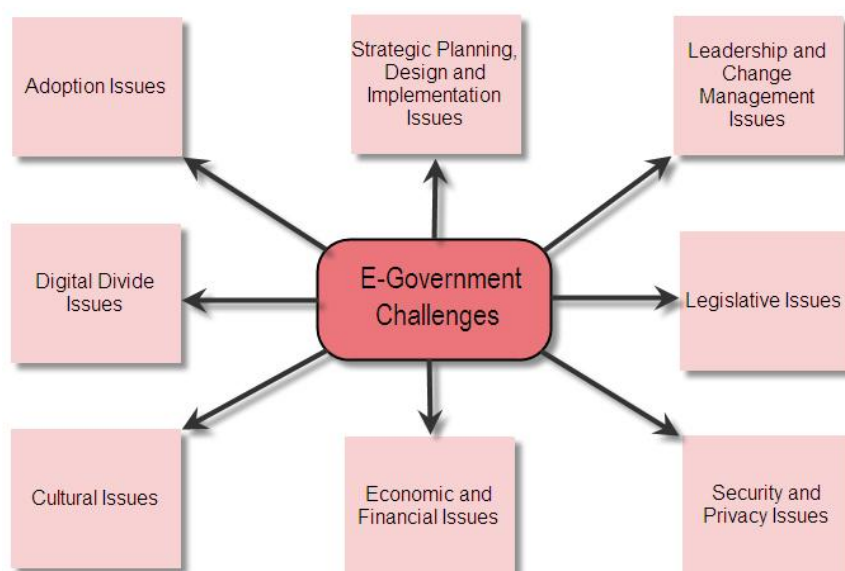


Figure 2.2: Critical issues in e-Government systems (Athif, 2008)

efficiency and effectiveness of service delivery, while eliminating red tape, and trimming down cost for citizens, businesses and government are among few aims and goals driving adoption of e-Government.

In the information age convenience and efficiency are the twin vigour, the most significant drivers, for momentous growth of inevitable e-Government. Some of the key benefits of e-Government, as identified by the OECD (2003a; 2005), are as follows:

- *Improved efficiency*
- *Improved service quality*
- *Helps achieving specific policy outcomes*
- *Contributes to building trust between government and citizens*

2.2. Challenges to e-Government:

A fully functional e-Government system results from combined efforts of all government agencies for which agencies at all levels of governance have to be much flexible and adaptable to organisational change. The Digital Divide (DD) is a critical issue that can adversely impact e-Government initiatives. The most disadvantaged people are mostly those who would benefit from e-Government the most,

but the deeper the DD the more potential users of the system would be left out. The urgency of this issue has to be realised and driven strategically while e-Government is in its infancy.

3. Considering e-Government in Maldives:

Maldives is a small island nation in South Asia. The Maldives archipelago in the Indian Ocean consists of 1192 low-laying coral islands clustered into twenty six atolls, regrouped to twenty atolls for administrative purposes. The territory of Maldives is about 859,000 square kilometres, out of which approximately 300 square kilometres is land, with a population of 298,968 distributed over 196 administrative islands. Approximately, 34.68% of the population, 103,693 people, resides in the capital city, Male', which is about 1.97 square kilometres (MPND, 2007). Population density varies considerably as shown in table 3.1.

Population	Number of Islands
100,000 +	1
More than 3,000	6
Between 1,000 and 2,999	56
Between 500 to 999	58
Less than 500	75
Total Inhabited Islands	196

Table 3.1: Inhabited islands by population size (Source: MPND, 2008)

3.1. ICT in Maldives:

In October 1986, Maldives was first connected to the Internet via a dialup with speed up to 28.8kbps. Although no formal survey has been conducted, according to internet world stats, Internet users in Maldives were 33000 as of March 2008 (Internet World Stats, 2008). The first fibre-optic cable connecting Maldives to the outside world was installed in 2006, followed by an additional one in 2007.

The backbone infrastructure consists of mostly microwave radio links. Currently two international gateways operate, providing better service to the people of Maldives.

3.2. Digital Divide:

The Digital Divide is the gap between people who have access to Internet and those who do not (infoDev, 2002); or the difference in access to computers – “computer haves and have-nots” (Glantz, 2004). However when the gap among rural and urban areas within the nation, the national development would not be able to take full advantages of ICT – not to mention closing the gap with other countries. Heeks (2006) argues that “IT is a very much two-edged sword as regards access to government data”; on one hand it reduces barriers to access, while on the other hand it creates a digital divide making it costly and

somewhat inaccessible for the poor and illiterate.

ICT usage in the outer islands is significantly lower in comparison to islands of the capital. Significant causes of low ICT penetration in Maldives are:

- Insufficient / limited telecommunication infrastructure;
- Insufficient / limited Internet connectivity;
- Expensive ICT equipment and access;
- Absence of sufficient legal and regulatory framework;
- Shortage of necessary human capacity;
- Insufficient development of local language content;
- Lack change, transparency, and social equity in business culture;
- Lack of awareness; and
- Minimal ICT education in general curriculum and lack of opportunities for further development in the rural islands.

According to TAM (2008) there are total 33,487 registered fixed line telephones in the islands of the capital, Fixed line telephone service is available in those islands only (excluding resorts) which is 7.7 percent of inhabited islands with 47.9 percent of the population and telephone lines are distributed as 74 percent in islands of the capital and remaining 26 percent distributed. Data from Census 2006 (MPND, 2007b) shows that 27.9 percent of households in Maldives have a computer and 7.9 percent of households have internet connection .

3.3. E-Government Development in Maldives:

NCIT, established in 2003 as the main government agency responsible for development of ICT in Maldives, is tasked with designing, coordination and implementation of e-Government in

Maldives. NCIT's mandate includes (NCIT, 2006b):

- GNM establishment, operation, maintenance and development.
- Advice the Ministry on formulation of National IT Strategy.
- Implementation of e-Government and development of information system plans of the government.
- Accelerate development of local IT.
- Establishment of national guidelines, standards and benchmarks, and dissemination to the public.
- Review and approve information system plans, and provide IT consultancy to government agencies and private sector.
- Conduct periodic information system surveys in the Government.
- Advice and assist government agencies in review and design of IT education.

3.3.1. The e-Government Initiative:

E-Government initiative is aimed to provide better management of country's social and economic resources for sustainable development by assisting strengthen the government's drive towards effective and more transparent governance. NCIT (2006c) envisages e-government having the potential required to overcome many development challenges faced in Maldives by bringing public service delivery to island communities and allowing different island communities to interact online, and set forth the following goals:

- Citizens Online – not inline
- Improving government service accessibility to all communities
- Improving productivity and efficiency of government agencies
- Creating a better business environment

3.3.2. The Information Technology Development Project (ITDP):

ITDP is the government's first and main initiative, at national level, in taking advantage of ICT for better governance and establishment of e-Government in the country, and is carried out by NCIT. With US\$ 9.5 million loan assistance from ADB and US\$ 2.5 million by the government (ADB, 2001), this is the most heavily financed ICT project in the government. This project consists of three major components (NCIT, 2007); namely a network, an application, and public kiosks, and also includes telecommunication sector reform as an integral part.

- NETWORK – the establishment of Government Network of Maldives (GNM) that would enable secure communication between agencies.
- APPLICATION – establishment of the eGovernment Services Platform (eGSP) enabling electronic delivery of information and public services.
- PUBLIC KIOSKS – establish ICT kiosks in the capital and other islands, providing public with better access to e-Government services.
- TELECOMMUNICATION SECTOR REFORM – Providing internet and other ICT services at affordable prices.

However, much progress has not been made in modernising government processes. The NCIT website lacks information on e-Government and is mostly used as a 'billboard' to communicate brief statements about status of projects.

The ITDP project in Maldives is going very slow, while development in this area is very much needed for the country.

3.4. Security Issues:

Security is an essential management responsibility in the development of e-Government, targeting fundamental security requirements of confidentiality, integrity, availability, accountability, and information assurance (Joshi, J. et al, 2001). Information security needs to be addressed carefully in e-Government systems where personally identifiable information is being transmitted and disseminated over Internet and other insecure public networks. Guaranteed security is absolutely necessary for e-Government to function to the expectation of people.

Creating 'one-stop government' is one of the most prominent and focused area of e-Government development, which is pretty much eased with state-of-the-art technologies available. Developing countries might not have security even close to technologically advanced states. However, it's the developing countries that are mostly victimised because they do not have sufficient security mechanisms as a result of budgetary constraints, experienced security professionals, user base lacking awareness, and nonexistent ICT and security legislations. Developing countries are hosting majority of malware on the web (Forbes, 2007), where in most cases, these highly exposed infrastructures are used by international crime syndicates as scapegoats. Nonetheless, it is also the developing countries that are hit hardest by scam (Techweb, 2005) which sucks up negligible resources available and daunt consumers from using the web.

"Privacy and security" is one of the most concerned issues of transacting digitally (OECD, 2003a; Min and Malladi, 2004; Conklin. and White, 2006; Chellappa, 2007; IBRD, 2008), and a major reason for non-users to still avoid Internet (IBRD, 2008).

In providing services to the public, data ranging from education, health, financial, employment, property ownership, and other sensitive data may be collected and transferred over the Internet. Policy-makers and those involved in e-Government management must address privacy and security issues at the planning and designing phase of e-Government – for most effective promotion of trust in online applications (IBRD, 2008) – which is also much easier to implement than trying to put security after the system is built.

4. E-Policing, e-Government, and the Way Forward:

The MPS has its own web-based system called Police Information Management System (PIMS). PIMS includes criminal records, crime records, Police Custodial System (PCS), traffic management, and forensic evidence management.

The MPS has its own fibre-optic network connecting all MPS office buildings and police stations in Male'. This network, Police Information Infrastructure (Pii), also covers most part of the city extending to IP-based security cameras installed at traffic lights, and many other areas of the city. All 39 Island Police Stations are connected to 'Pii' enabling officers based in remote stations instant access to information required to provide fast service to the island communities.

The MPS Strategic Plan includes following statement regarding the use of ICT: "We believe in change, we believe in positive changes for positive changes are the bedrock of any forward thinking organisation. Therefore, we have opted to take an incremental project based approach to institutionalising new processes, procedures, structures and standards which underpin

enhanced and more responsive service delivery.” (MPS, 2007).

Therefore, with this mindset MPS can replace slow bureaucratic processes with fast and reliable ICT-enabled processes in providing transparent, and more responsive policing service to Maldives.

E-Policing is defined as the effectual exploitation of ICT in every aspect of policing. Using technological advancements as a tool in, both, internal and external processes of a police organisation would be beneficial for the government and its citizens. Since 2001 Woods had stressed the immense potential of e-policing in both developing and developed worlds and had highlighted the values it would bring to the public and the police service nationally and internationally. E-Policing is an element of broad spectrum of e-services in the umbrella of e-Government.

4.1. Elements for successful e-Government:

blocks that heavily contribute to successful roll out of e-Government (Athif, 2008).

- **E-Government System** – The portal or “one-stop-shop” to all e-Government services. Single point of access to all government services.
- **Legal & regulatory framework** – Traditional laws and regulations need to be adapted and more specific enactments are required for e-Government and other ICT based activities.
- **Users** – User willingness and their capability to use the system are vital to e-Government.
- **Leadership** – Official(s) with ICT knowledge, who have a clear vision and understating of all aspects of e-Government.
- **Infrastructure** – This includes the physical and technical infrastructure of the government hosting the system, and the national communication infrastructure providing access to customers.

Figure 4.1 presents the six essential building

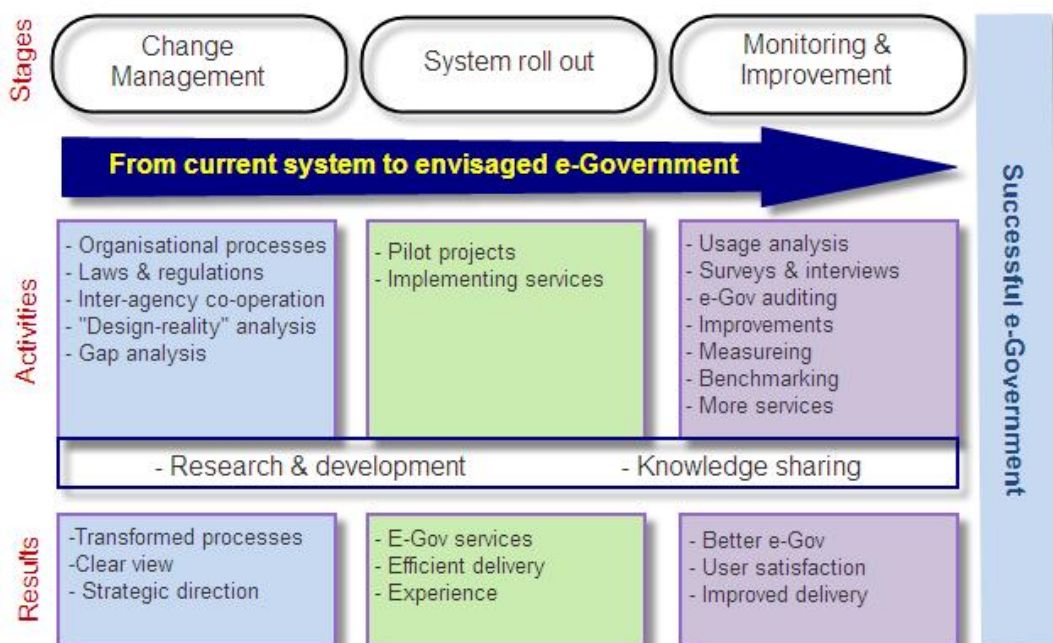


Figure 4.2: E-Government implementation framework for the Maldives (Athif, 2008).

Taking into account the above key factors and those identified from the study of e-Government experiences throughout the world and considering the particular challenges in the Maldives, a framework for implementation of e-Government in the Maldives is presented in Figure 4.2 (Athif, 2008). This framework consists of three main stages – change management, system rollout, and monitoring and improvement – which are explained below:

- **Change management:** This stage is about adopting government systems for new changes. Results from this stage need to be reflected on the country’s e-Government strategy.
- **System roll out:** A pilot program needs to be carried out before full service delivery can be provided.
- **Monitoring and improvement:** e-Government implementation never ends. It’s an ongoing process, with improvements, and new services being developed accordingly.

4.2. E-Policing Framework:

E-Government is the parent domain of E-Policing. Therefore, e-Policing must be planned and designed within the context of

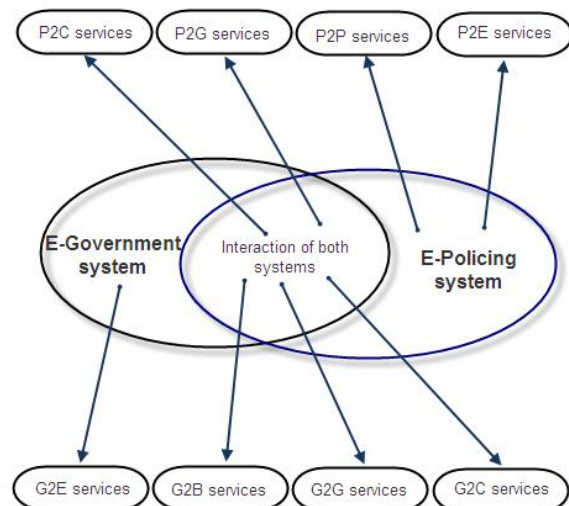


Figure 4.3: Relationship between e-Government and e-Policing (Athif, 2008).

e-Government and services of e-Policing have to be deliverable via the e-Government system (Athif, 2008). In its day-to-day work, MPS does deal with other government agencies, and its customers and those of e-Government are the same. That is where these two systems meet, as illustrated in figure 4.3.

The proposed e-policing framework for the Maldives (Athif, 2008) comprises four key elements:

- **E-Policing architecture:** The current and desired relationship between policing processes and IT is a vital part of this component.

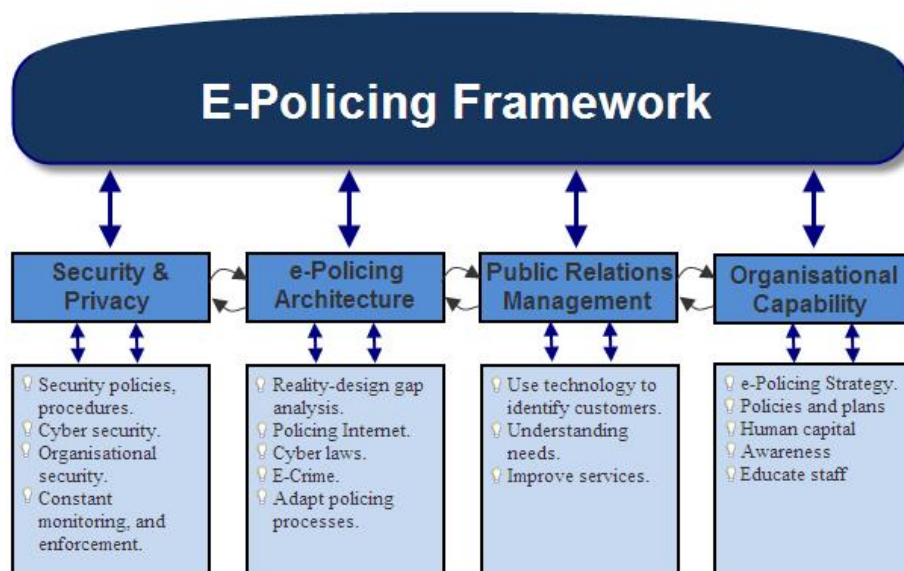


Figure 4.4: E-Policing framework for MPS (Athif, 2008)

- **Public relations management:** It is essential to identify the ‘customer’, understand their needs, and constantly improve services.
- **Organisational capability:** For e-Policing to be successful, policies, plans, organisational processes, and people need to support it. Capacity building is important within the police service. The e-Policing strategy has to be formulated, and has to be in accordance with the national e-Government strategy and goals envisaged in it. Leadership is also very important for uptake of e-Policing.
- **Security and privacy:** This is crucial for all stakeholders. Security has to be well planned, maintained, and policies and procedures needs to be formulated accordingly, communicated and enforced.

This e-Policing framework is concise and would serve the needs of MPS to initiate e-Policing (Athif, 2008). However, as e-Policing is a part of e-Government, when designing the system, e-Government strategy and its requirements must be adhered to.

5. Conclusions:

E-Services in the country are extremely low compared to other countries with similar economies, geographies, and population. Development in e-Commerce is minimal. Studies show that in countries where e-Government is happening and is successful, it always follows behind e-Commerce. Consequently, service delivery on the internet is limited in the Maldives. This study also sheds light on the importance of security and privacy in the digital world. It is evident, from the analysis of government websites, that security and privacy on the Internet is not regulated within the

government – most government websites does not have a privacy policy.

Efficient and sufficient telecommunication infrastructure is essential for ICT penetrations, particularly e-Government. In the case of the Maldives 72.1 percent of households do not have a computer and 92.1 percent of households do not have internet connection. It is evident that the impact of the digital divide on the country is considerable. Closing the gap is mostly hampered by the insufficient and high price of Internet and other telecommunication services. In ICT penetration and usage, there is a growing disparity between the capital and rest of the inhabited islands which is extreme.

For e-Government implementations to be successful, providing accessibility and usability is crucial. Furthermore, legal framework, sufficient infrastructure, and closing digital divide are vital, as mentioned earlier. The Government of Maldives needs to concentrate in development of these areas before implementing e-Government.

The main aim of this work was to propose a framework for e-Government implementation in Maldives, and supplementing this with an e-Policing framework that can be used alongside e-Government. These frameworks are particularly tailored for the unique situation of Maldives. However, the authors believe that they can be used or adapted for use in similar countries and other nations.

E-Government in Maldives is very much a new concept and not much data has been published or readily available. Therefore, this study was limited to brief information available mainly on the Internet. This work is in progress and input from semi-structured interviews with officials from government ministries, e-government entity, and other stakeholders is expected to complement the initial stages of the work.

Subsequent stages of this research would focus more closely on particular aspects covered here, such as, digital divide, causes to e-Government failure, and e-Policing development.

6. References:

- Athif, Ahmed (2008) *A theoretical framework for e-Government implementation in the Maldives* Unpublished MSc thesis, University of East London
- Attorney General's Office (2007) The Constitution [Online] Accessed: 10 August 2008, Available at: <http://www.agoffice.gov.mv/english/constitution.html>.
- Chellappa, R. K. (2007) Consumers trust in electronic commerce transactions: the role of perceived privacy and perceived security. [Online] Accessed: 5 September 2008 Available at: <http://www.bus.emory.edu/ram/Papers/sec-priv.pdf>
- Conklin, A and White, G. B. (2006) 'e-Government and cyber security: the role of cyber security exercises', *Proceedings of the 39th Hawaii International Conference on System Sciences*, 2006, pp.79b.
- Forbes. (2007) *The top countries for cybercrime*. [Online] Accessed: 5 September 2008 Available at: http://www.forbes.com/technology/2007/07/13/cybercrime-world-regions-tech-cx_ag_0716cybercrime.html.
- Glantz, Michael. H. (2004) Use radio waves to bridge the digital divide in Africa. [Online] Accessed: 4 September 2008. Available at:
- http://www.fragileecologies.com/aug18_04.html.
- Heeks, Richard (2006) *Implementing and Managing eGovernment*. London: SAGE Publications.
- IBRD. (2008) 'e-Government toolkit', *infoDev e-Government*. [Online] Accessed: 6 September 2008. Available at: <http://egov.sonasi.com/toolkit>.
- infoDev. (2002) The e-Government handbook for developing countries. [Online] Accessed: 4 September 2008 Available at: <http://www.infodiv.org/en/Publication.16.htm>
- Internet World Stats (2008) Maldives – Internet usage, broadband and telecommunication reports. [Online]. Accessed: 20 August 2008. Available at: <http://www.internetworldstats.com/asia/mv.htm>.
- Joshi, J. et al.(2001) 'Digital government security infrastructure design challenges' *IEEE Computer* 34 (2), pp. 66-72
- Min, K.J. and Malladi, S. (2004) E-government in rural communities: issues and trends In: *Proceedings of the 2004 Annual National Conference on Digital Government Research* (Seattle, WA, May24-26, 2004).
- MPND. (2007) Population and Housing Census of Maldives 2006, Quick Facts, Media Release Edition [Online] Accessed: 10 August 2008. Available at: <http://www.planning.gov.mv/publications/Population%20and%20Housing%20Census%202006/home.htm>

MPND (2007b) Statistical year book 2007 [Online] Accessed: 1 September 2008 Available at:
<http://www.planning.gov.mv/en/images/stories/publications/yearbooks/2007/yearbook.html>.

MPS. (2007) 'The way forward – MPS Strategic Plan 2007 – 2011'. Male': Maldives Police Service

NCIT. (2006b) Mandate. [Online] Last accessed: 25 August 2008. Available at: <http://www.ncit.gov.mv/page/38/Mandate.htm>.

NCIT. (2006c) E-Government [Online] Last accessed: 25 August 2008. Available at: <http://www.ncit.gov.mv/page/39/e-Government.htm>.

NCIT. (2006d) E-government services platform [Online] Accessed: 25 August 2008. Available at: http://www.ncit.gov.mv/page/93/EGovernment_Service_Platform.htm.

NCIT. (2007) Information technology development project. [Online] Accessed: 26 August 2008. Available at: http://www.ncit.gov.mv/page/7/Information_Technology_Development_Project.htm.

OECD. (2003) *The e-Government Imperative*. Paris: OECD Publishing.

OECD (2005) *e-Government for better government*. Paris: OECD Publishing.

Savvas I, Pimenidis E, Sideridis A. (2008) Using eGov Systems to Remedy Public Service Failings: In Search of a "Transformation" Algorithm, in Proceedings of the eGovernment Workshop '08 (eGOV08), September 8 2008, Brunel University, London, UK

TAM. (2008). Telecom statistics – June 2008. [Online] Accessed: 20 August 2008, Available at: <http://www.tam.gov.mv/articles.php?artID=39>

Techweb. (2005) *Developing countries hit hardest by spam*. [Online]. Accessed: 5 September 2008. Available at: <http://www.techweb.com/wire/security/showArticle.jhtml?articleID=163702425>.

UN (2005) *The digital divide – ICT development indices 2004*. New York: United Nations (UNCTAD/ITE/IPC/2005/4)