E-PERFORMANCE OF TURKEY AND A NEW E-TRANSFORMATION METRIC SYSTEM

A THESIS SUBMITTED TO
THE GRADUATE SCHOOL OF INFORMATICS
OF
THE MIDDLE EAST TECHNICAL UNIVERSITY

BY

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IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF
MASTER OF SCIENCE
IN
THE DEPARTMENT OF INFORMATION SYSTEMS

JUNE 2009

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ABSTRACT

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June 2009, 163 pages

Affected by continuous developments and innovations in information and communication technologies, governments have initiated the e-transformation process to adopt the knowledge based economy and to be competitive in global world. Throughout their journey of e-transformation, governments need to learn where they are in order to shift their position to advanced level. To assist governments in their evaluation of e-transformation, this thesis offers a metric system derived from some of the well known e-government evaluation studies. The system proposed is composed of metrics distributed into six main categories: "Technology Infrastructure", "e-Society", "Human Capital", "Political and

Regulatory Environment", "Economy Environment", and "Online Services and Applications". Set of metrics to be attached in these categories are determined in terms of widely recognized measures of the tools reviewed. In order to implement the system, 30 countries are analyzed gathering data published by major research institutions.

Additionally, this thesis examines Turkey's level on e-transformation from the perspectives of e-government evaluation studies reviewed.

Keywords: e-Transformation, e-Government, Metric System, e-Transformation Evaluation

ÖZ

TÜRKİYE NİN E-PERFORMANSI VE
YENİ BİR E-DÖNÜŞÜM METRİK YÖNTEMİ

Afacan, Gülgün
Yüksek Lisans, Bilişim Sistemleri Bölümü
Tez Yöneticisi: Dr. Ali ARİFOĞLU

Haziran 2009, 163 sayfa

Bilgi ve iletişim teknolojilerinde yaşanan sürekli gelişme ve yeniliklerden etkilenmekte olan devletler, bilgi ekonomisine geçiş ve küresel dünyada rekabet güçlerini arttırmak amacıyla e-dönüşüm sürecini başlatmışlardır. Devletler, e-dönüşüm yolunda ilerleme kaydedebilmek amacıyla ne kadar mesafe aldıklarını öğrenmeye gereksinim duymaktadır. Bu tez, e-dönüşüm değerlendirme sürecinde devletlere yardımcı olmak amacıyla bazı önemli e-devlet değerlendirme çalışmalarını baz alarak bir değerlendirme yöntemi önermektedir. Önerilen yöntem, kendine özgü metrikleri kapsayan altı kategoriden oluşmaktadır: "Teknolojik Altyapı", "e-Toplum", "İnsan Kaynağı", "Politik ve Düzenleyici Ortam", "Ekonomi Ortamı" ve

"Web tabanlı Servis ve Uygulamalar". Kategorilerde yer alacak metrik grupları incelenen çalışmalardaki yaygın olarak kabul edilen göstergelere dayanarak belirlenmiştir. Yöntemin uygulaması 30 ülke seçilerek, ülke verilerinin başlıca araştırma merkezlerinden elde edilmesi ile gerçekleştirilmiştir.

Ayrıca, bu tez incelenen çalışmaların Türkiye'nin e-dönüşüm seviyesi konusundaki değerlendirmelerini analiz etmektedir.

Anahtar Kelimeler: e-Dönüşüm, e-Devlet, Metrik Yöntemi, e-Dönüşüm Değerlendirme

To my family

ACKNOWLEDGMENTS

I express sincere appreciation to my advisor Dr. Ali Arifoğlu for his guidance and insight throughout the research. I extend my sincere thanks to my committee members Prof. Dr. Nazife Baykal, Prof. Dr. Ali Yazıcı, Assist. Prof. Dr. Erhan Eren and Dr. Sevgi Özkan for their willingness to serve on the committee and for their valuable contributions, suggestions, and comments.

I would like to express my sincere thanks to my friends Erkan ER, Nurcan Durmaz, Öznur Eroğlu, Oğuzhan Alaşehir, and Gülşah Karaduman for their understanding and help throughout my thesis study. I really appreciate my friends in the dormitory, Arda, Burcu, Elif, Özlem and Şerife for their help and patience. I am also grateful to my friends in the institute, Betül Araç Aygün, Duygu Fındık and Nurcan Alkış for their friendship and encouragement.

I appreciate Ayşe Ceylan, Necla Işıklar, Ali Kantar, Sibel Gülnar, and Songül Acar in the institute for their kindness since the beginning of my M.Sc. study.

I would like to thank TUBITAK for their scholarship which helped me pursue my master study.

I am forever grateful to my father Mehmet Afacan, my mother Nisa Afacan, my sister Nilgün Afacan, and my grandparents. They have provided moral support, encouragement and belief in me throughout my life.

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APEC	:	Asia-Pacific Economic Cooperation
B2B	:	Business to Business
B2C	:	Business to Citizen
CDT	:	The Center for Democracy and Technology
CID	:	Center for International Development
CIO	:	Chief Information Officer
CPP-BU	:	Center for Public Policy of the Brown University
CSPP	:	Computer Systems Policy Project
DAI	:	Digital Access Index
DOI	:	Digital Opportunity Index
DSL	:	Digital Subscriber Line
G2B	:	Government to Business
G2C	:	Government to Citizen
G2G	:	Government to Government
G2E	:	Government to Employee
GDP	:	Gross Domestic Product
GNI	:	Gross National Income
EU	:	European Union
EIU	:	Economic Intelligence Unit
HDI	:	Human Development Index
IBM	:	Institute for Business Value
ICT	:	Information and Communication Technologies
ID	:	Identification
ISDN	:	Integrated Services Digital Network
ISP	:	Internet Service Provider

IT	:	Information Technologies
ITU	:	International Telecommunications Union
LAN	:	Local Area Network
KAM	:	Knowledge Assessment Methodology
KEI	:	Knowledge Economy Index
KI	:	Knowledge Index
NRI	:	Network Readiness Index
OECD	:	Organisation for Economic Co-operation and Development
PDA	:	Personal Digital Assistant
PIACs	:	Public Internet Access Centers
PC	:	Personal Computer
PSTN	:	Public Switched Telephone Network
RSS	:	Really Simple Syndication
SIBIS	:	Statistical Indicators Benchmarking the Information Society
STOPE	:	Strategy, Technology, Organization, People and Environment
TAI	:	Technology Achievement Index
TSI	:	Turkish Statistical Institute
TV	:	Television
UIS	:	UNESCO Institute for Statistics
USPTO	:	United States Patent and Trademark Office
UN	:	United Nations
UNDP	:	United Nations Development Programme
UNESCO	:	United Nations Educational, Scientific and Cultural Organization
US	:	United States
USA	:	United States of America
VAT	:	Value Added Tax
WB	:	World Bank
WEF	:	World Economic Forum
WITSA	:	World Information Technology and Services Alliance
WSIS	:	World Summit on Information Society

CHAPTER 1

INTRODUCTION

1.1. Overview

Today's digital era has enforced governments to absorb innovations and improvements in technology. e-Transformation is gaining importance day by day to adopt knowledge based economy and enhance competitiveness in global world.

In order to accomplish digital transformation, governments are establishing strategies and implementing e-transformation actions. However, planning and implementation efforts do not ensure the success of transformation. Governments need to learn results of their actions to learn whether they are performing well or not.

If governments did not know the progress they achieved, their following actions for digital transformation would be carried on unconsciously. If governments did not know their success and shortcomings, how they will act would not be explicit enough to keep on transformation.

There is a need to make governments aware of their e-performance so that they are able to plan and perform sound e-transformation activities. Particularly, responses

shall be provided to following major questions: “where are the governments in e-transformation?”, “what is the level of achievement compared to their competitors?”, and “what are the worldwide best practices?” The answers provide governments to find out their level in e-transformation, and success and shortcomings of their efforts. Additionally, governments are able to learn their position among their competitors, and appropriate e-transformation practices they can apply. All in all, governments will be capable of using this information to shift to an advanced level transformation.

1.2. Problem Statement

Digital transformation is continuous; therefore it needs to be assessed regularly. In order to respond to this need, various e-government evaluation methods have been developed. Even though there are a number of methods; each produces distinct e-transformation level results for the same countries. This is due to unique purpose adopted in each method. To be more specific, of the methods; some intended to measure level of e-government services, some attempted to measure transformation of information society, some considered e-performance of governments with the environmental factors, and so on. Even if these studies serve the similar purpose, they produce different results and ranking degree for a government. This discrepancy is resulted from involvement of different set of measurement factors in methodologies. Selection of the indicators depends on perspectives of the studies towards assessment of a domain in e-transformation.

Additionally, e-government evaluation studies investigated in literature section is composed of various amount of metrics, changing between 8 and 100. The studies integrating considerable number of metrics in their approaches spend excessive effort in e-government evaluation process. This is because collecting data in country level is not an easy practice. On the other hand, same or close results can be produced with the use of key measurement factors.

1.3. Purpose

The objectives of the thesis are as follows:

- To offer an evaluation method to find out governments' maturity in e-transformation. The evaluation method aims to include measurement categories widely recognized as essential aspects for evaluation of e-transformation.

- To perform the assessment of e-transformation through core measurement factors. To identify key measures, some of the existing e-government methods are examined. During investigation, mutual measures of the previous studies are attempted to be identified. At the same time, reasonable number of metrics is intended to be included to decrease the workload to conduct the assessment. To summarize, in order to offer an appropriate evaluation method for e-government, this thesis intends to provide an e-transformation metric system with integration of measures widely recognized as significant factors to measure maturity of e-transformation.

- Using the system, this thesis aims to analyze e-transformation maturity of 30 countries. Meanwhile, e-performance of Turkey is examined through the tools investigated as well as through the system proposed.

1.4. Thesis Organization

This thesis is organized as follows:

Chapter 2 introduces basic concepts of e-government.

Chapter-3 includes related research on e-government evaluation studies. Concerning studies, their purposes, developers, regions addressed, methodologies, and results are presented. Moreover, this chapter presents Turkey's level on e-transformation in terms of results of the studies investigated.

Chapter-4 is devoted to description of our e-transformation metric system. The structure of the system is introduced, and the methodology developed for the calculation of e-transformation index is explained.

Chapter-5 introduces implementation of our system. The methodology of the system is illustrated with one country analysis. Additionally, overall performance of 30 world countries is provided.

Chapter-6 discusses the justification of our proposed system.

Chapter-7 presents a conclusion including summary and contribution of our study, and provides recommendations for future work.

Following the main text, this thesis includes three appendices. In Appendix-A, list of the e-transformation metrics is provided. Appendix-B includes comparison of e-performance of Turkey with e-performance of world regions. Appendix-C presents country scorecards developed with the use of the metric system.

CHAPTER – 2

E-GOVERNMENT: BASIC CONCEPTS

This chapter introduces basic concepts related to e-government. It provides definitions for e-transformation and e-government, mentions major drivers for e-transformation, explains e-government services, and finally introduces performance measurement process in e-government.

2.1. e-Transformation

In the last years, a shift in era has been experienced from industrial age to knowledge based economy. This is principally consequence of the rapid developments in Internet and communication technologies (ICT).

The impacts of ICT have been reflected in business, education, health, industry and all other fields. The way processes are conducted has been improving in accordance with continuous developments in ICT. Governments and institutions are rebuilding their strategies considering impacts and advantages of ICT. In this regard, governments defined the long term goal as to achieve transformation to information society. This goal is achieved by promoting ICT access and ensuring diffusion of information and technology facilities throughout societies.

The Greek philosopher Heraclitus (c. 535-c. 475 B.C.) emphasized the change

through his popular saying “Change alone is unchanging”. Today, most prevalent change originates from everlasting improvements in ICT field. The transformation in global world is gaining importance to accomplish conformity to knowledge based economy. Through their well qualified human capital, countries aim to reach, produce, and utilize the knowledge. In this way, countries are able to enhance their competitive power, get maximum benefits of information society, and decrease potential risks of the global world.

Governments, businesses and citizens are three major stakeholders inspired with developments and innovations in ICT, hence are encouraged to conform to these changes by restructuring and transforming. This kind of an adoption has generated the e-transformation phenomenon for major stakeholders. The definition of e-transformation has been provided in some sources as follows:

Naismith defined e-transformation as “integrating information and communications technology in new ways to explore and release new productive capacities” [37].

Cheung emphasized the technological innovations by offering a definition for e-transformation “… as the transformation of some operational processes caused by the incorporation of advanced information technology, where paradigm shift and process reengineering are usually resulted” [33].

Considering all affected stakeholders, Arifoğlu provided a more comprehensive definition for e-transformation as “the use of ICT to change the culture, business model, business processes, product and services in an integrated way for the benefits of employees, citizens, business partners, and all other social shareholders” [3].

2.2. Drivers for e-Transformation

Being competitive in global world is one of the major driving factors for governments to engage in digital transformation. Information era provides e-transforming governments to enhance their competitiveness. Mani stated that in Information Age, countries will accelerate development "if they are able to develop knowledge, which, combined with adequate ICT-related infrastructure, can allow successful integration into knowledge-based economies" [34].

With the use of opportunities of ICT, e-transforming governments improve their processes. Effectiveness is satisfied with modernization and automation of public services. At the same time, expenditure of information and service delivery through online means costs less than that of traditional way of delivery. Thus, cost efficiency is achieved in service delivery process by means of ICT [32].

e-Transformation supports strength of government relations with businesses and citizens. Communication and interaction are improved with implementation of variety of service channels. Share of information related to government's processes, procedures and regulations is providing transparency about the functioning of government. Meanwhile, government's enhanced accountability and transparency as well as use of ICT in its business processes support the democracy by allowing citizens to be closely involved with decisions of government [40].

Transition from traditional services to electronic services reduces the time allocated to accomplish business processes of public agencies. Electronic public services are accessible online 7 days, 24 hours and 365 days in a year. Therefore, both crowdedness of agencies and the number of personnel working in government agencies are decreased. For instance, most citizens delay their tax payment operations until deadline of collection, and on the last days long queues

appear in revenue collection agencies. This is problematic because not all the requested payment operations can be realized by agencies on the last day. And this situation prevents governments to collect revenues at decided time. However, through online payment services, citizens can conveniently pay their taxes even on the deadline [32].

In knowledge based economy, key production element is knowledge instead of land, capital or labor force, which are previous economies' major production elements. As a result of this, leading organizations of today's era have to access right knowledge at right time by right technology. ICT provides e-transforming organizations to manage their knowledge. ICT also enables organizations to perform transactions in a faster and cost efficient manner. And this results in increased productivity and cost reduction in business processes.

e-Transformation is civic centered design. Hence, citizens are able to take advantages of e-transformation. One significant benefit is that all citizens living in rural and urban areas covered. This means that ICT access opportunities are provided for every citizen. With these opportunities, citizens can access services independent of place and time. More specifically, citizens can choose suitable hours in a day and convenient places to fulfill their civic responsibilities or to obtain information from service spectrum of public bodies. This kind of access is more convenient for citizens and costs less in comparison to access capability of conventional services. At the same time, online services satisfy time efficiency better than traditional services do because online means accelerate transactions of services.

As the long term opportunity, e-transforming governments are able to gain more prestige and trust from society since quality of citizen life is getting better and transparency of governments is satisfied [40].

2.3. e-Transformation of Government – e-Government

For the e-transformation of government, namely e-government, different institutions offer different literature definitions.

In its definition of e-government, the European Union (EU) emphasizes the use of ICT and service delivery. EU's definition for e-government is "using the tools and systems made possible by Information and Communication Technologies (ICTs) to provide better public services to citizens and businesses." [26]

Focusing on government's use of technology, and interaction with its stakeholders, The World Bank defines e-government as "… the use by government agencies of information technologies (such as Wide Area Networks, the Internet, and mobile computing) that have the ability to transform relations with citizens, businesses, and other arms of government." [14]

CDT and infoDev provide definition for e-government collaboratively. They defined it as "the use of information and communications technologies (ICT) to transform government by making it more accessible, effective and accountable." [5]

Considering the definitions above and similar definitions in the literature, it can be concluded that e-government requires utilization of ICT. With the use of ICT infrastructure, governments are able to provide high quality services to their stakeholders. Hence, governments' capacity of access as well as effectiveness in transactions will be improved. At the same time, governments will become more transparent and accountable to its stakeholders: citizens, businesses and other branches of government.

However, such definitions are not detailed enough to mention deeper concerns of e-government [30]. A definition has been proposed by Grant and Chau (2005) in order to respond to this need. Their definition for e-government is "A broad-based transformation initiative, enabled by leveraging the capabilities of information and communication technology; (1) to develop and deliver high quality seamless, and integrated public services; (2) to enable effective constituent relationship management; and (3) to support the economic and social development goals of citizens, businesses and civil society at local, state, national and international level" [23]. This is more extensive definition that considers technological, economic, managerial, organizational and social/cultural dimensions of e-government together.

2.4. e-Government Services

Governments carrying on e-transformation process successfully are modernizing traditional public services as e-government services. Four major government stakeholders (i.e. citizens, businesses, government employees and other agencies of government) are addressed through e-services of government. Yet, end users of services are not only these stakeholders; there are also non-profits, communities and other agencies that need to take advantages of e-government services. All of these parties form the e-government components, which are depicted in Figure 2-1. According to the consumers addressed, services of e-government are categorized into four types, namely, Government to Government (G2G), Government to Business (G2B), Government to Citizen (G2C), and Government to Employee (G2E) services. [40] [42]

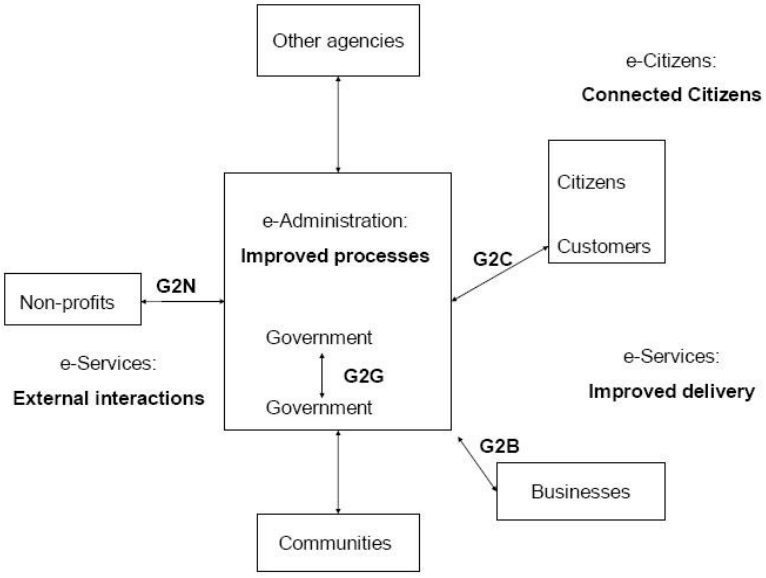


Figure 2-1 e-Government Components (Taken from Heeks, R. [25])

- **Government to Government (G2G) Services:** Interaction in G2G services is provided in local and international level. G2G services in local level take place between national and local governments or between departments and related government agencies. International level G2G services support relations among governments [42]. Utilization of G2G services provides government with cost and time efficiency in its functions, supports new employment opportunities, and enhances the respectability of government [3]. Separate governmental branches can also use G2G services. In this way, data can be shared among branches or information can be transferred from one branch to another. Transfer and sharing process can occur in inter or intra departmental level, and supports the interoperability within whole government. Common G2G services are as follows:
    - ICT Use in fundamental government processes (Legislation, Execution, Judgment)
    - Integrated payment systems
    - Real estate records
    - e-procurement
    - Distributed Data Processing

- **Government to Business (G2B) Services:** Enhanced interaction between businesses and government with use of G2B services supports productivity in functioning and management issues of businesses. Government informs businesses about governmental policies, rules and regulations through G2B services. Furthermore, mutual procurement of goods and services by businesses and governments can be performed using such services. EU identifies eight G2B e-government services as [4] :
    - Social contributions for employees
    - Corporate tax
    - Value added tax (VAT)
    - Registration of a new company
    - Submission of data to statistical offices
    - Customs declaration
    - Environment-related permits
    - Public procurement

- **Government to Citizen (G2C) Services:** With their citizen-centered structure, G2C services are offered to individuals by governmental entities. All country citizens are accepted as potential end users of G2C services. Every individual has opportunity to be informed and to perform civic processes s/he is in charge with the help of these services. Since ubiquitous access is provided, interaction between citizen and government improves. Additionally, government transparency is enhanced as major return. EU defines 12 citizen services as [4]:
    - Income taxes
    - Job search services
    - Social security benefits
    - Personal documents
    - Car registration
    - Application for building permission

- Declaration to police
- Public libraries
- Certificates
- Enrollment in higher education
- Announcement of moving
- Health-related services

- **Government to Employee (G2E) Services:** G2E services include G2C services as well as services developed for use of government employees. G2E services have major goals to improve bureaucracy's day-to-day functions, and to deal with citizens through training and development of human resources [42].

2.5. Measurement and Evaluation in e-Government

In a life cycle of e-government, measurement phase has a considerable role as to identify the progress, success and shortcomings, which become valuable feedback for future studies in e-government. Governments generally invest vast amount of resources in e-government applications, hence they need to be informed about the progress. Moreover, "In order to ensure success, however, it is important to assess the performance of e-government and take necessary actions based on these assessments." [24]

To evaluate e-government, various evaluation methods have been developed. In general, these studies measure e-government level of nations, and rank the governments based on their levels of e-government. Additionally, some studies present best e-government practices of governments. Even if assessment studies involve comparative consequences such as "Country A does better than Country B" or "Country C is the best in e-government", the outcomes of the assessments

would also be guidance for governments in a way that they can realize and learn the best practices, discover the worldwide e-government trends and decide to learn e-government policies of other countries [30].

In the literature, diverse classifications of e-government measurement studies have been offered:

- **Taxonomy According to Region Covered:** This categorization is done with respect to geographical area the studies address. For the regions of e-government, five levels are defined which are local, state/provincial, regional, national and international [25]. Assessments in e-government are performed in one of these five levels.

- **Taxonomy According to Study Focus:** This categorization is built in accordance with value chain of e-government. The main concentration of the evaluation study can be readiness, availability, uptake or impact. Readiness is considered to evaluate existing technological, political, regulatory, organizational, and people related factors towards e-government [39]. Availability concentrates on presence of online services, or use of online services by stakeholders; especially by citizens and businesses. Focus concerning uptake evaluates overall e-government progress. And the final one, impact, measures e-government outcomes such as financial benefits, time saving and citizen satisfaction.

- **Taxonomy According to e-Government Dimension:** In their "Statistical Indicators Benchmarking the Information Society (SIBIS)" project, Essers and Ettedgui [22] divide existing e-government assessment studies into two groups: supply and demand studies. Supply studies evaluate availability and sophistication level of online services, as well as degree of use of these services. Demand studies not only consider service use but also measure

attitudes and preference of citizens and businesses on e-government. It is mentioned that, demand studies have not addressed the government yet. Figure 2-2 shows the groups of studies and the major distinctions between groups.

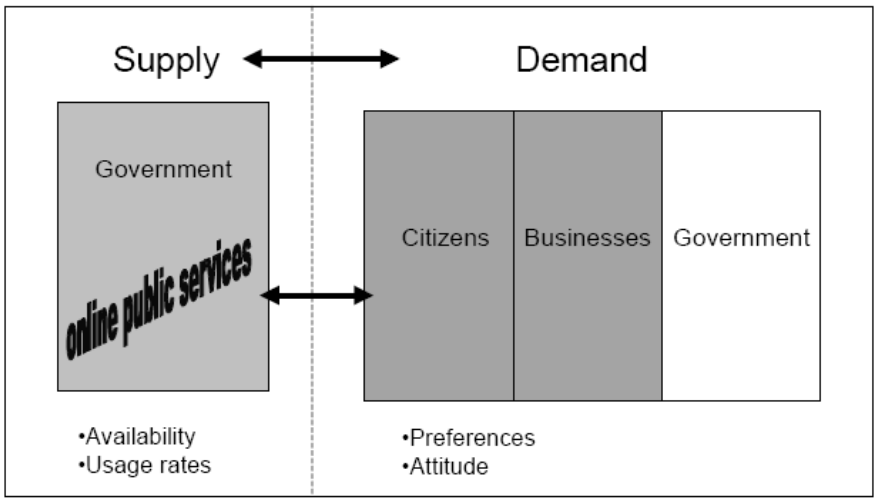


Figure 2-2 Studies' Categorization with regard to e-Government Dimension [22]

CHAPTER – 3

RELATED RESEARCH AND E-TRANSFORMATION PERFORMANCE OF TURKEY

This chapter consists of three major sections. First section introduces the studies proposed for evaluation of e-transformation. Second section presents comparison of the studies. The last section analyzes e-transformation performance of Turkey from perspectives of some of the e-transformation evaluation studies reviewed.

3.1. e-Transformation Evaluation Studies

There are various studies developed to measure capabilities of governments in e-transformation process. This thesis attempts to examine 18 studies developed for evaluation of e-transformation. The list of the studies and their key features are given in Table 3-1. This section aims to describe e-transformation evaluation studies in a systematic way. Each study is investigated to get the answers of following questions:

a) Who developed the study?
b) Which region is the study addressing?
c) What is the purpose of the study?
d) What is the approach of the study?
e) Which metrics does the study use?
f) Which results does the study provide?

Details of the studies are given in the following sub sections.

Table 3-1 e-Transformation Evaluation Studies

Study	Owner	Focus	Region
e-Government Survey	UN	e-Government	UN Member States
e-Readiness Rankings	EIU	e-Readiness	70 biggest economies
Online Public Service Availability	CapGemini	Service Availability	Europe
Network Readiness Index	WEF	Network Readiness	International
Global e-Government	Brown University	Service Availability	International
World e-Government Ranking	Waseda University	e-Government	International
Readiness for the Networked World	CID	e-Readiness	International
Readiness Guide for Living in the Networked World	CSPP	e-Readiness	International
Measuring ICT	ITU, OECD, UN	Information Society	International
e-Commerce Readiness Assessment	APEC	e-Commerce	APEC Members
Seizing the Opportunity of Global E-Readiness	McConnell International and WITSA	e-Business	International
Statistical Indicators Benchmarking the Information Society	European Commission	Information Society	15 EU member states, Switzerland, the USA and 10 candidate countries
Research of ICT Usage in Turkey	Turkish Statistical Institute	ICT Use	Turkey
STOPE Framework for e-Readiness Assessment	Academic Research	e-Readiness	Local
Knowledge Assessment Methodology	WB	e-Readiness	International
Technology Achievement Index	UNDP	e-Readiness	International
Digital Access Index	ITU	Information Society	International
Digital Opportunity Index	ITU	Information Society	International

3.1.1. UN e-Government Survey, 2008

United Nations (UN) introduced e-Government Survey [54] in 2002. This survey was designed to measure readiness level of member states for knowledge economy. The most recent e-government survey has been issued in 2008.

Region Addressed

The e-Government Survey conducted in 2008 has examined 192 UN member states.

Model / Approach

The survey investigates governments' abilities of integrating ICT into processes of implementation, and delivery of online services and products for the benefits of society. The survey also states that UN intends to raise capacities of policy makers by presenting country's respective position, strengths and weaknesses in e-government.

UN's conceptual framework is built around three main aspects that have impact on e-performance: human capacity, infrastructure development, and access to information and knowledge. The aggregate e-government readiness index is composed of sub-indexes related to these three aspects. Criteria of assessment in sub-indexes are summarized as follows:

- **Web measure index** is estimated by checking presence or absence of online services and facilities presented through national portals and/or governmental web sites of Ministries/Departments of Health, Education, Social Welfare, Labour and Finance. Assessment is based on indicators distributed over information dissemination, access/usability, service delivery capability, and citizen participation issues [50]. The overall value of web measure index reflects the capacity of state with regards to services/facilities it provides. States are taking place in one of five levels, which are represented with a bottom-to-up order as emerging, enhanced, interactive, transactional, and connected. Rising to higher stages indicates government progress from static information presented in one-

way, through two-way interaction among its stakeholders, to full online transactions offered by government's structuring as connected entity.

- **Telecommunication infrastructure index** captures the state of the infrastructure for delivery of online services throughout country. Penetration rates of Internet, PC, main telephone lines, cellular telephones, and broad banding are investigated.

- **Human capital index** intends to find out existing workforce potential in a country. In line with this purpose, this index measures percentage of knowledgeable citizens and rate of schooling in the country. Adult literacy rate, primary, secondary and tertiary gross enrolment ratio are decided as sub measures of the index.

- In addition to the above, UN e-government survey has calculated **e-participation index** for 189 countries out of 192 member states. This index examines availability of services provided for citizens to be able to take role in policy decision making.

UN has applied questionnaires for web measurement and e-participation assessment. Technology infrastructure data were acquired from ITU database, and data related to human capital were obtained from UNESCO.

Results Provided

UN has presented results of the survey in a comprehensive manner. Initial output is e-readiness performance of the regions in the world. For each region, average values of e-government readiness index are provided. Regarding country level performance, e-readiness scores and degree of ranking in years 2005 and 2008 are revealed. At the same time, the survey has mentioned leading e-ready countries and the ones performed noteworthy progress in their readiness towards knowledge-based economy. After taking general e-readiness picture of the world, survey has performed deep state analysis with regards to three major aspects of the framework.

(1) Concerning technological infrastructure, survey has presented ICT penetration rates of the countries. (2) Human capital related aspect has revealed the literacy and schooling rates in each country. (3) For the web measurement aspect, rates of worldwide online performance are delivered and overall web measurement index scores of the countries are published. Lastly, UN has presented e-participation index ranking for 189 UN member states.

3.1.2. E-Readiness Rankings 2008 by Economic Intelligence Unit

Every year since 2000, Economic Intelligence Unit (EIU) and IBM Institute for Business Value have collaboratively assessed world's biggest economies' abilities to absorb ICT, and to use these technologies for economic and social gaining of the country.

Region Addressed

e-Readiness Rankings [20] study conducted in 2008 have evaluated e-readiness of 70 world countries.

Model / Approach

The assessment framework uses approximately 100 qualitative and quantitative measures distributed into six main measurement categories. Figure 3-1 demonstrates distribution of weights for each measurement category.

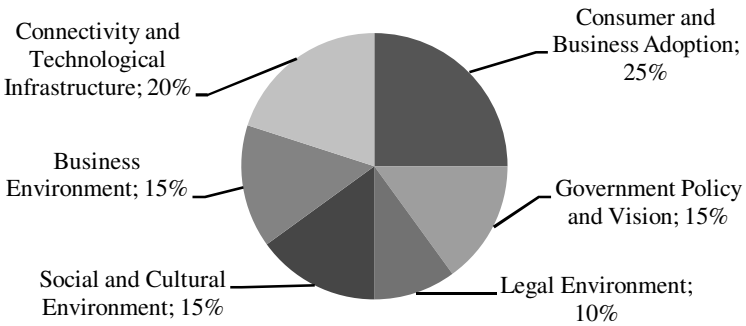


Figure 3-1 EIU e-Readiness Measurement Categories

- Under **connectivity and technology infrastructure** category, ICT infrastructure established for use of individuals and businesses is assessed by means of indicators such as penetration rates of PC, Internet, broadband, mobile-phone, and WiFi. Additionally, affordability level of broadband, security degree of Internet, and use of Electronic ID of the economies are measured.

- The category that refers to **business environment** investigates general business climate and measures contribution level of business to knowledge based economy. As the criteria for measurement, overall political environment, macroeconomic environment, market opportunities, policy toward private enterprise, foreign investment policy, tax regime, and the labor market are included.

- The **social and cultural environment** category monitors rate of adult literacy, quality of basic education, and rate of ICT literacy of the population. Technical skills of the workforce, degree of entrepreneurship and innovation are also considered.

- **Legal environment** category evaluates current laws and regulations developed for use of ICT in business operations. In this regard, effectiveness of traditional legal framework, laws addressing the Internet, level of censorship, and ease of registering a new business are examined.

- The category related to **government policy and vision** intends to assess government vision and contribution to guide technology adoption of businesses and citizens. Governments' digital development and e-government strategies, amount of spending on ICT as a proportion of Gross Domestic Product (GDP) are investigated.

- The final category evaluates **consumer and business adoption** of ICT services, especially e-commerce services. Measures of this category are consumer spending on ICT per head, level of e-business development, degree of online commerce, and availability of online public services for citizens and businesses.

Throughout the implementation e-Readiness Rankings, statistical methodology and questionnaires have been used by EIU [43].

Results Provided

In the beginning, the study has produced average e-readiness scores for world regions. Since this study has not covered all world countries, score of each region is relied on e-readiness of region's countries investigated. Following regional analysis, the study reveals deep findings for measurement categories. Top scorer countries in regions are identified for categories. Ultimately, biggest world economies are rated out of point 10 and ordered according to their e-readiness performance.

3.1.3. European Union Online Public Service Availability, 2007

Through the attempts of European Union (EU), CapGemini Company has carried out the study - EU Online Public Service Availability [4]. Major focus of the study is to investigate European countries' performance in provision of online public services.

Region Addressed

The study examines 27 European Union member countries and 4 additional countries – Iceland, Norway, Switzerland and Turkey. 2007 is the first year in which Turkey has been assessed by this study.

Model / Approach

Concerning online public services, assessment is based on two main aspects: full online availability and level of sophistication. While the former aspect seeks to identify existence of online services in national portals, the latter aspect examines services according to their degree of maturity. Sophistication of each service is determined among five levels.

- **Level-1 Information:** In this stage, information about public services is published online. This level is defined as the most basic one; no interactivity is provided for end users. Instead, detailed description of public services is presented.

- **Level-2 One-way Interaction:** If sophistication of the service is in one-way interaction level, forms relating to that service can be downloaded from the web. Since downloading process is just executed by the users, there exists one side interacting with related service.

- **Level-3 Two-way Interaction:** The services in two-way interaction level provide users to process and submit forms by online means. Both citizens and government agencies interact with the service. To be more specific, users submit documents via electronic means, and then employee of agencies performs the user requests. Authentication is required in this stage.

- **Level-4 Transaction:** In this stage, public is able to access services through web site. Transactions are carried out completely online; any other paper based formal procedure is eliminated.

- **Level-5 Personalization:** This level was introduced in 2007. Users receive services of this level automatically in terms of last login status. Two concepts are involved; pro-active delivery and automatic service delivery. While former concept refers to availability of notifications for the compulsory actions, latter concept provides automatic delivery of services without any user request.

Online public services are categorized into two groups: citizen services and business services. Table 3-2 tabulates online services with their maximum level of sophistication.

Table 3-2 Online Public Services

Public Services for Citizens	Public Services for Businesses
Income taxes (5)	Social contributions for employees (4)
Job search services (4)	Corporate tax (4)
Social security benefits (5)	VAT (4)
Personal documents (5)	Registration of a new company (4)
Car registration (4)	Submission of data to statistical offices (5)
Application for building permission (4)	Customs declaration (4)
Declaration to police (3)	Environment-related permits (5)
Public libraries (5)	Public procurement (4)
Certificates (4)	
Enrollment in higher education (4)	
Announcement of moving (4)	
Health-related services (4)	

Results Provided

Web based survey is applied to gather essential data from countries. The study initially delivers country achievements in full online availability and level of sophistication. Afterwards, country rankings are revealed. At the same time, average EU scores are explored so that individual country performance can be compared with overall EU average. After making a general assessment, the study highlights each country with their overall results. The country performance data are enriched with country's historical progress in service delivery. In addition, general introduction for national portals of the countries is provided.

3.1.4. Network Readiness Index (NRI), 2007-2008

World Economic Forum (WEF) produces an annual index- now in its seventh year – of Network Readiness Rankings [63]. The results are published within Global Information Technology Report.

Region Addressed

In 2007-2008, WEF investigated network readiness of 127 countries.

Model / Approach

Major output of the model is network readiness index (NRI), which reveals nations' preparation level to take advantage of ICT developments. NRI is composed of environment, readiness and usage component indexes, and sub indexes included in component indexes. Figure 3-2 depicts the index structuring of NRI.

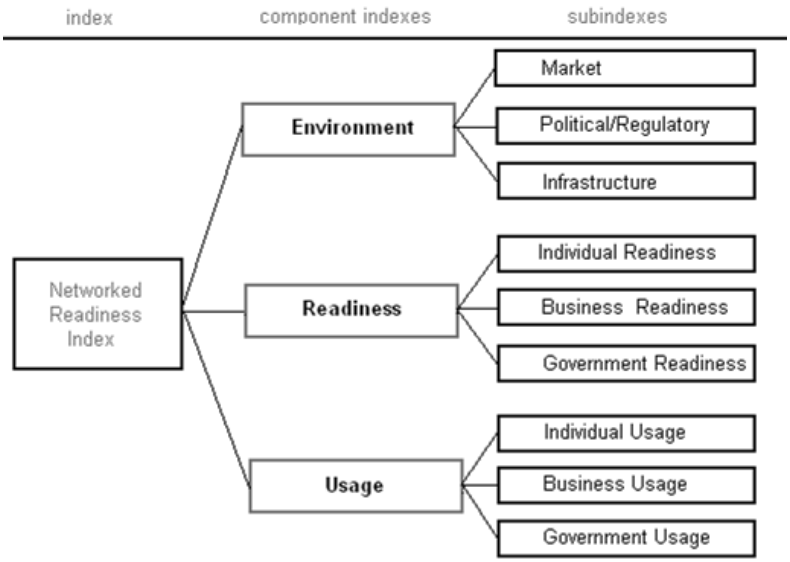


Figure 3-2 Components of Network Readiness Framework [63]

NRI is estimated as average of three component indices. The related formula is as follows:

Networked Readiness index= 1/3 Environment + 1/3 Readiness + 1/3 Usage

Environment: This component index examines overall macroeconomic, regulatory and infrastructure climate supporting developments of ICT. (1) Market environment assesses human resources and supportive businesses for knowledge-based economy, (2) political/regulatory environment investigates policy and regulation issues for ICT development and use, (3) infrastructure environment examines availability and quality of ICT infrastructure.

Readiness: This component index is constructed with purpose of examining readiness level of individuals, businesses, and government to take opportunities of ICT. The individual readiness is meant to measure quality of education system,

affordability level of ICT, and usage level of ICT in schools. The business readiness evaluates training of personnel, degree of investment, university-industry collaboration on research and development, telephone charge and subscription, local supplier quality and quantity, and import of telecommunication services. The government readiness is mainly designed to examine strategy of government towards ICT, and level of ICT procurement.

Usage: This component index aims to measure ICT utilization level of individuals, businesses and governments. Measurement variables applied for each of three groups are varying from each other. According to individual usage, citizens' utilization of mobile phone, Internet, PC, and broadband are considered. The business usage observes technology licensing and absorption, capacity of innovation, Internet and telephone use of corporations. Government usage attempts to evaluate government success in ICT promotion, presence of ICT in government agencies, existence of online services, ICT use, and e-participation index.

Results Provided

Questionnaire and statistics are applied to find out network readiness of nations. Results of the study are explained in a comprehensive manner. At the beginning, all countries are ranked according to each index included in the methodology. Next, profiles of the countries are explored, that is achievement of the countries is posted for all indicators of the approach. The study provides economies' 10 best and 10 worst ranks with regard to the indicators. Additionally, country comparison and historical progress of the countries are explored in the interactive version of the report.

3.1.5. Brown University – Global E-Government, 2007

The Center for Public Policy of the Brown University (CPP-BU) has been publishing an annual report –now in its seventh year – of Global e-Government Survey [13]. Most up-to-date version of the survey was released on August 2007.

Region Addressed

Global e-Government 2007 Study investigated totally 1.687 national government web sites from 198 nations.

Model / Approach

CPP-BU has examined websites of national executive offices, legislative offices, judicial offices, cabinet offices and major agencies carrying out fundamental functions of government. The main principle of the evaluation is to assess national government web sites through features under categories: information availability, service delivery, privacy and security, disability access, foreign language access, fees and public outreach.

Table 3-3 CPP-BU Global e-Government Measures

Category	Feature	Point
Online Information	Publications	4
	Databases	4
	Audio Clips	4
	Video Clips	4
Number of Electronic Services	None	0
	One to twenty-eight	1 to 28
Privacy and Security	Prohibition of commercial marketing of personal information	4
	Prohibition of cookies	4
	Prohibition of sharing personal information without citizen approval	4
	Prohibition of sharing visitor information with law enforcement agents	4
Disability Access	Disability access	4
Foreign Language Access	Foreign Language Translation	4

Table 3-3 (cont.)

Fees	Ads	4
	User Fees	4
	Premium Fees	4
Public Outreach	e-mail	4
	Comments	4
	e-mail Updates	4
	Web Site Personalization	4
	PDA Access	4
	TOTAL	100

All the features with their points of presence involved in measurement categories are listed in the Table 3-3. CPP-BU applies a simple methodology; websites are ranked with respect to availability and sophistication of 22 specific features. The overall score for the country is estimated by taking average of the scores the country obtains for presence and maturity of a feature in its web sites.

Performance and rankings of nations are presented through statistical information. In addition, best practices regarding the features are introduced.

Results Provided

For every country web site, all features of the methodology are inspected and total achievement is estimated. Overall grade for a country is determined by taking average of web sites' scores. Maximum score that a country can obtain is 100. In the report of the survey, nations' overall performances as well as scores in each feature between years 2001 and 2007 are presented. In addition, individual scores and rankings of the participant countries are provided.

3.1.6. The 2008 Waseda University World e-Government Ranking

After carrying out research for four years, Japan Waseda University Institute of e-Government has finalized World e-Government Ranking [38] study and published the results in 2008.

Region Addressed

Waseda's e-Government Ranking study has attempted to monitor and evaluate e-government performance of countries. Totally 34 countries were assessed through the study. Nations are graded with regard to a range of measurement criteria for an "ideal e-government".

Model / Approach

Framework of the study includes 26 indicators distributed over 6 areas, which are constructed as "fields for ideal e-government". Reliability of each area has been checked through quantitative and qualitative measurements.

- Initial area of measurement is related to **network preparedness**, which gives emphasis to existing technical infrastructure. In order to carry out insightful investigation of the area, the indicators – Internet users, broadband users, digital mobile users, PC users, security system – are included.

- Second area of measurement focuses on **required interface-functioning applications** to evaluate online citizen services offered by nations. Online applications, e-tender system, e-tax system, e-voting system, e-payment system are investigated under this measurement area.

- Third area - **management optimization** examines management within government through related indicators such as system optimization, integrated network system, administrative and budgetary systems, and public management reform by ICT.

- Fourth area - **homepage/portal situation** evaluates web sites of government with indicators - updated frequency, public disclosure, link navigation system, and multi-language correspondence.

- Fifth area of evaluation is related to **introduction of CIO** for transforming organizations. Role and function of CIO, and supporting body built for CIO are assessed.

- Final evaluation area is **promotion of e-government,** which examines e-government related priority of planning & strategy, promotion activities, legal framework, and evaluation system.

In order to collect data, and assess findings, various activities were conducted. Conferences were held to invite e-government experts. Institute team attended some international conferences and visited governments. Moreover, discussions with major institutes such as APEC, OECD, ITU and WB were performed.

Results Provided

Initially, average scores of 34 nations are revealed. Then, for each area of evaluation, top 10 successful nations are presented. And finally, historical progress of top 10 countries is compared.

3.1.7. CID's Readiness for the Networked World: A guide for developing countries

Center for International Development (CID) of Harvard University released the Readiness for the Networked World Guide [6] in 2000.

Region Addressed

CID offered this guide for communities of developing countries. By community it is intended to refer a region ranging from village to country level.

Model / Approach

The guide has the major goal of assessing communities' readiness to participate in Networked World. Assessment covers 19 indicators under five linked areas: network access, networked learning, networked society, networked economy and network

policy. For every indicator, four stages of progress (Stage 1-4) are defined to indicate level of community based on related indicator.

- **Network Access:** Guide states that network infrastructure is principal condition to be e-ready. Network access fundamentally requires presence and affordability of network itself. Service and support are significant factors to ensure proper functioning of network. Availability and utilization of hardware and software are also considered. In addition, speed and quality of the network are assessed. Six indicators - Network Speed & Quality, Service and Support, Internet Availability, Hardware and Software, Information Infrastructure, and Internet Affordability are the measurement areas of network access.

- **Networked Learning:** Participating in Networked World requires community people to be knowledgeable about information technologies. Integration of ICT into education system is fundamental step to achieve digitally literate society. Besides ICT training of students, employee training on digital literacy is focus of the guide. Specifically, three indicators - Schools' Access to ICTs, Enhancing Education with ICTs, and Developing the ICT Workplace are determined as the measurement areas.

- **Networked Society:** This area evaluates capability of society to integrate ICT into daily and professional lives. Guide seeks to identify range of ICT use and for which aims society prefers to use ICT. Additionally, presence of online content addressing needs and interests of local people is examined. Four indicators – People and organizations online, locally relevant content, Information and Communication Technologies in Everyday Life, Information and Communication Technologies in the Workplace are decided as the areas for assessment.

- **Networked Economy:** By this area, businesses and governments are investigated with respect to their abilities in use of ICT for business operations. Integration of web technologies into systems (e.g. sales, marketing, procurement and customer service) of businesses is considered. Maturity level of online

government services is investigated. The guide also examines the extent of opportunities to employ knowledge workers in the community. Four indicators - ICT employment opportunities, B2C e-commerce, B2B e-commerce, and e-government are included as the areas of assessment.

- **Network Policy:** Policy and regulations have impact on investment and use of ICT by individuals, businesses and governments. With development of an effective policy, it is declared that internet use will increase and e-commerce will improve. Two indicators - Telecommunications Regulation and ICT Trade Policy are determined as the areas for measurement.

Questionnaire and statistics are the assessment methods proposed by the guide.

Results Provided

With use of 19 indicators, community is graded and its related stage is detected. There are four stages that a community may take place in based on the area being graded. What is more, requirements and explanations of each stage are presented as a roadmap for e-transformation of the communities.

3.1.8. CSPP's Readiness Guide for Living in the Networked World

Readiness Guide for Living in the Networked World [8] was created by CSPP, which is a "public policy advocacy group comprising the Chairman and Chief Executive Officers of US information technology companies." The publication year of the guide is 2000.

Region Addressed

CSPP's Readiness Guide allows individuals and communities to recognize their participation level into networked world.

Model / Approach

The guide offers a self assessment tool to find out e-preparedness level of individuals and communities. The guide refers a town, a city, a county, a state or a country corresponding to community term. During model construction, various criteria are tracked and five major measurement categories are decided as best assessment areas:

- **Category 1 – The Network (Infrastructure):** Focus of this category is on backbone technologies and infrastructure essential for connection of Network. As first sub category, speed and availability over residential and commercial places are taken into consideration. Second sub category examines fixed and mobile wireless technologies with respect to their quality, service capacity, and duration of installation.

- **Category 2 – Networked Places (Access):** Primary concentration of this category is on possible places where network connection is available. Such places address to connection of businesses, governments, K-12, higher education, health and homes.

- **Category 3 – Networked Applications and Services:** In this domain, relevance of transactions over network is realized. Applications and services are investigated according to their availability and level of use by society. Moreover, supportive environment taking place in businesses, governments, K-12, higher education, health and homes is examined.

- **Category 4 – Networked Economy:** The change effect of Internet on economy is considered. This category is composed of innovation, and workforce. Also, consumers are assessed to explore degree of benefit resulted from the change on economy.

- **Category 5 – Networked World Enablers:** This category is introduced to emphasize supportive issues playing role in networked world. In this regard, ubiquity, security, privacy and policy issues are taken into account.

Questionnaire and statistical methods are offered as the assessment methodology.

Results Provided

Guide offers four evolutionary stages: Stage 1-4. Stage 1 is decided as the most basic one. Transition from Stage 1 to Stage 4 shows the progress of community.

With regards to each assessment category, communities take place in one of four progressive stages. Overall score of a community is estimated by averaging the scores achieved for five categories of measurement.

3.1.9. Measuring ICT: the Global Status of ICT Indicators

At the World Summit on Information Society (WSIS) held in 2003, it is emphasized that measurement and benchmarking of information society is significant process. Considering this importance, WSIS Action Plan required countries and organizations to allocate resources for provision of ICT statistics and construction of measurement methods to examine information society.

In the light of WSIS Action Plan, a broad partnership was established involving ITU, OECD, Eurostat, UN, UNESCO Institute for Statistics (UIS) and the World Bank as key stakeholders. The major goals of this partnership are; deciding on global wise information society indicators, supporting developing countries' statistical abilities, and forming an international database to keep the data of core indicators.

Region Addressed

Measuring ICT [56] project addresses totally 86 countries located over 5 regions: Africa, Central Asia and Central and Eastern European, Western Asia, Asia-Pacific and Latin America and the Caribbean.

Model / Approach

Primary concentration of the approach is to reveal existing ICT indicators applied in each region. The "global stocktaking exercise" project was conducted to collect data of available ICT indicators in participant countries. Project also assessed institutional and technical systems developed for collection of ICT statistics. Related metadata of countries were obtained through their responses to questionnaires. Collecting and analyzing results of the questionnaire contribute to specification of core information society indicators at the 2005 February meeting. Core indicators are organized into five main categories:

- **ICT Infrastructure and Access:** This category assesses existing technological infrastructure. Indicators of this category highlight level of citizen access to ICT Infrastructure, the amount of Internet bandwidth, and tariffs assigned on Internet and mobile technologies. This category also measures proportion of public Internet access centers (PIACs) taking place in urban and rural segments.

- **Access to and Use of ICT by Households and Individuals:** The indicators of this category gauge access opportunities and usage rate of ICT. Proportion of households with electricity, radio, TV, fixed line telephone, mobile cellular telephone, computer, and Internet access are estimated. Percentage of individuals using computer, Internet, and mobile phone are measured. Related to Internet use, places of access, frequency of access and purpose of use are taken into consideration.

- **Use of ICT by Businesses:** This category monitors use of ICT by businesses. In this regard, businesses are assessed in their provision of ICT infrastructure (e.g computer, Internet, web, intranet, LAN, extranet) and level of ICT use. Related to Internet use, type of access and purpose of use (e.g. placing/receiving orders, sending/receiving e-mail, getting information, financial services, dealing with government organizations/public authorities, customer services, online delivery of products) are included.

- **ICT sector and trade in ICT goods:** General atmosphere of ICT sector and trade is evaluated. Measures of the area are proportion of total business workforce in ICT sector, value added in ICT sector (as a percentage of total business sector value added), ICT goods imports as a percentage of total imports, and ICT goods exports as a percentage of total exports.

- **ICT in Education:** With this area, existing ICT infrastructure (computer, radio, TV, telephone, Internet connection) of educational structures are explored. Percentage of students enrolled at the tertiary level in an ICT-related field is considered. At the same time, ICT usage level of students and teachers are assessed.

Results Provided

The questionnaire is applied to gather data from countries. Results of the study include assessment of the countries with respect to availability of ICT indicators, and level of demand for ICT indicators. Regional analysis is also performed to observe regional performance related to presence and utilization of ICT indicators.

3.1.10. APEC's e-Commerce Readiness Assessment

In 2000, e-Commerce Readiness Assessment guide [2] was released by the Asian Pacific Economic Cooperation (APEC) e-Commerce Steering Group. The purpose of the guide is to provide opportunities for nations to assess readiness level of e-commerce.

Region Addressed

APEC's guide has been developed to be applied by APEC member economies.

Model / Approach

APEC's guide suggests a broad assessment framework to identify preparedness level of target economies in e-commerce field. Guide is composed of six main measurement indicators:

- **Basic infrastructure and technology** area evaluates infrastructure with respect to access, speed, pricing, reliability, and existing terminal equipment. This area also captures the state of infrastructure market conditions, utilization level of interconnection and interoperability issues.

- **Access to necessary services** indicator focuses on services usually provided by means of ISPs. These services provide opportunities of accessing to basic infrastructure through online applications and digital content. Assessment is based on capacity, availability and pricing of services.

- **Current level and type of use of the Internet** indicator examines penetration rate of Internet, and purposes of Internet usage of governments, businesses and individuals.

- **Promotion and facilitation activities** are considered to determine whether community adoption of information technologies has been achieved or not. For the purpose of facilitation, promotion and technical standards are set as major factors.

- **Skills and human resources** are included to investigate abilities of workforce essential for creating and implementing e-commerce technologies. In addition, basic information, technology skills of users and supportive educational setting features are analyzed.

- **Positioning for the digital economy** is considered to evaluate government policy towards e-commerce. Related policy issues are taxation, legal framework, electronic authentication, security and encryption, copyright, liability, content, privacy, and consumer confidence.

Guide developed an e-commerce assessment questionnaire. Participant economies are required to respond to 100 questions organized into guide's six main indicators.

Results Provided

The results comprise economies' responses to 100 questions of the guide. It is emphasized that assessment results are not used to make comparison among the economies. Instead, results provide an opportunity to make analysis of participant economies.

3.1.11. McConnell International's Risk E-Business

Seizing the Opportunity of Global E-Readiness [35] report is developed in 2000 as the result of collaborative study, conducted by participation of McConnell International and World Information Technology and Services Alliance (WITSA).

Region Addressed

42 critical economies have been assessed according to their e-readiness, which is stated as level of capacity to engage in global digital economy.

Model / Approach

The model is based on five interrelated attributes:

- **Connectivity** emphasizes significance of technological infrastructure available for transfer of information and services among nations of the world. The aim is to analyze availability and reliability of underlying infrastructure. The measures - availability of wire line, wireless communication services, community access centers, and presence of networked computers in businesses, schools, and homes of nation are took place.

- **e-Leadership** attribute is based on leading role of government and industry for participation to networked world. Government's policies, regulations, partnerships between industry, and promotion towards e-society are considered as major assessment elements.

- **Information Security** attribute plays a crucial role in assuring protection of information. To assess nations' actions towards information security, legal policies intended for intellectual property, privacy and electronic signature are taken into consideration.

- **Human Capital** is realized as essential supportive factor for growth of e-business and information society. Measurement elements of human capital are quality of education system, quality of ICT education, culture of society, and presence of skilled workforce.

- **e-Business Climate** is stated as the setting where e-business actions are performed. As key assessment elements, competition among ICT service providers, political stability, financial soundness, foreign investment and financial structure are recognized.

During implementation of the approach, statistics, best practices and historical analysis are utilized [43].

Results Provided

Participant nations are rated according to five assessment attributes. For each assessment attribute, nations are taking place in one of three scales: blue, amber and red. Blue indicates that majority of conditions are appropriate, amber indicates that improvement is required for conditions, and red indicates that considerable improvement is needed for achievement of e-business and e-government. After providing a general picture about country e-readiness profiles, world regions are highlighted, and within regions sample country practices are identified.

3.1.12. Statistical Indicators Benchmarking the Information Society (SIBIS)

SIBIS [21], which is one of the projects of the European Commission, intends to develop methods and data to support European attempts to investigate Information Society. For this purpose, a survey has been applied to European population in April – May 2002 and January 2003.

Region Addressed

All 15 EU member states, Switzerland, the USA and 10 candidate countries of EU are target countries of the survey.

Model / Approach

SIBIS model offers a range of information society indicators under following measurement categories:

- **Basic access and usage** mainly investigates citizens' Internet use with respect to age groups, bandwidth level, usage frequency, and usage location. In addition, access to mobile technologies is examined.

- **Information security** is addressing regular internet users and enterprises. This category measures level of user concerns regarding information security, and impact of security concerns on online shopping behavior. Enterprises are assessed according to presence of information security breaches, availability of information security policy, tools used for and barriers to information security.

- **eCommerce** category performs evaluation through indicators: rate of purchases over internet, percentage of e-commerce users, year of user experience and type of online activities, percent of establishments selling online, share of online sales for B2B and B2C, ecommerce typology for establishments.

- **eWork** category addresses employees and establishments to assess rate of ICT access at workplace, and existence of employee participation in decision making. Also, this category assesses availability of home-based teleworking.

- **eGovernment** category investigates, availability and usage of online services and Internet of public. User preferences towards online services and Internet are examined. Furthermore, viewpoints of regular Internet users about safety degree of online services are considered.

- **eHealth** category mainly investigates users' abilities of online search for health-related information. Additionally, this category measures information sufficiency in mother-tongue websites for finding suitable health-related information.

- **Digital literacy** category considers index of digital literacy in total population and in age groups; gender gap in total population; and level of confidence in communicating via the Internet. Besides, this category evaluates users' level of confidence in using digital media.

- **Learning and training** category is dedicated to investigate employee training issues through the following indicators: share of employed population who participate in work-related training provided by employer or other organizations, share of employed population who participate in any work-related training or self-learning, share of employed population who used electronic learning material for work-related learning.

- **Digital divides** category aims to evaluate existing digital divide among the country people with the following indicators: digital divide index, education divide index, Internet usage drop-outs, barriers to Internet usage, Internet usage of disabled and non disabled people, impact of being connected to the Internet on social integration, existence of formal guidelines for making website accessible to people with special needs, and priority of online accessibility.

Results Provided

Computer-aided telephone interviews were conducted with people from target countries. The participants of the interviews are people aged 15 and over, and speaking the own national language(s). For each indicator, country scores and average performance of participant countries are revealed.

3.1.13. Turkish Statistical Institute: Research of ICT Usage in Turkey

Turkish Statistical Institute developed an approach, namely Research of ICT Usage in Turkey [48], to assess ICT penetration of enterprises and households in Turkey. Key concentration is on identification and construction of information society indicators to support the e-Europe and e-Europe+ actions of European Union. This research was initiated in year 2004. The recent statistics have been released in 2008.

Region Addressed

First intended group of the research is Turkish citizens between the ages 16 and 74 living in rural and urban settling areas. Secondly, enterprises with more than 10 workers are considered to investigate their level of ICT use.

Model / Approach

In order to measure ICT usage of citizens, following eleven indicators are determined as key assessment elements:

- Presence of Internet Access,
- PC usage,
- Internet usage,
- Frequency of Internet Usage,
- Place of Internet Usage,
- Ages of Internet Users,
- Educational Background of Internet Users,

- Occupation of Internet Users,
- Purpose of Internet Use,
- PC Usage of Rural Population,
- Internet Usage of Urban Population

Assessment of ICT use in enterprises is respected somewhat differently. Hence, different indicators are recognized as measures, which are given as follows:

- Percent of enterprises using computer
- Percent of enterprises having Internet Access
- Percent of enterprises having web site
- Internet Connection Type of enterprises (by dial-up, ISDN, DSL< 2 Mb/sec, DSL> 2 Mb/sec and other fixed connections)
- Purpose of Internet Usage (Financial services, market tracing, training)
- Services provided by enterprises from their web sites (marketing, access to catalogue and list of prices, supporting services)
- Percent of enterprises using web for communication between public organizations (to be informed, to download form)
- Percent of enterprises encountered information security breach
- Percent of enterprises employ information expert
- Percent of enterprises selling online
- Percent of enterprises purchasing online

Sampling method has been applied to monitor ICT usage level of citizens and enterprises. Questionnaire forms have been developed to be applied in households and enterprises. Data collection has been conducted through face-to-face interviews with individuals and with representatives from enterprises.

Results Provided

The study provides statistical results for each assessment indicator. Two primary groups of results were established within the research; first group is the statistical

information society results of individuals, and second is same type of results concerning enterprises. In addition, for both group of results, statistical data are analyzed by making a comparison between results.

3.1.14. STOPE Framework for e-Readiness Assessment

Developed by Khalid Al-Osaimi, Abdulmohsen Alheraish and Saad Haj Bakry, STOPE Framework [1] has been proposed for e-readiness assessment of organizations and governments.

Region Addressed

STOPE Framework was applied to three companies. One bank, one private company and one governmental organization were selected among the well-established ones operating in Kingdom of Saudi Arabia.

Model / Approach

During development stage of STOPE Framework, previous e-readiness assessment studies as well as potential assessment factors were considered. Integrated approach was offered as a new framework. Five e-readiness domains are involved in STOPE: **S**trategy, **T**echnology, **O**rganization, **P**eople and **E**nvironment. General structure of STOPE divides each domain into issues. In a similar way, each issue is divided into set of assessment factors.

- **Strategy Domain:** Strategy domain aims to assess directions, commitments and plans relating to ICT development and utilization. In this domain, two issues, ICT leadership and future development plans, are included.

- **Technology Domain:** Technology domain examines level of issues related to ICT facilities. Communications and basic ICT infrastructure, ICT e-services infrastructure, ICT provisioning and ICT support are four issues included in this domain.

- **Organization Domain:** Major goal of this domain is to assess the condition of ICT regulations and management. The issues included in this domain are ICT regulations, ICT cooperation and ICT management.

- **People Domain:** By this domain, ICT users and their skills are assessed through ICT awareness, ICT education and training, ICT skills and jobs, management of ICT skills issues.

- **Environment Domain:** Environment domain addresses issues that are non-ICT based but have effect on current ICT state. Issues included in this domain are knowledge, infrastructure, resources and economy, and management.

Results Provided

STOPE framework applies questionnaire, which consists of 146 assessment factors distributed over 17 issues and 5 domains.

STOPE results involve overall index together with performance of organizations achieved for each domain. In addition, related strengths and weaknesses of organizations are addressed related to domains.

3.1.15. Knowledge Assessment Methodology by World Bank

Knowledge Assessment Methodology (KAM) [64] is a benchmarking tool developed by World Bank. Being updated in 2008, KAM has the main concern of detecting challenges and opportunities countries encounter during their transformation to knowledge economy. Particularly, KAM has attempted to measure level of countries' readiness towards knowledge based economy.

Region Addressed

The KAM has been applied twice to date. Initial version of the study was implemented in 1995, and after a long time, second version has been implemented in

2008. Totally 140 world countries have been evaluated through recent version of the KAM tool.

Model / Approach

The KAM includes measurement variables distributed over 4 Knowledge Economy pillars: Economic Incentive and Institutional Regime, Innovation, Education, and Information and Communications Technologies. The general structure of the Knowledge Economy pillars as well as relationship among KEI, KI, and pillars are demonstrated in Figure 3-3.

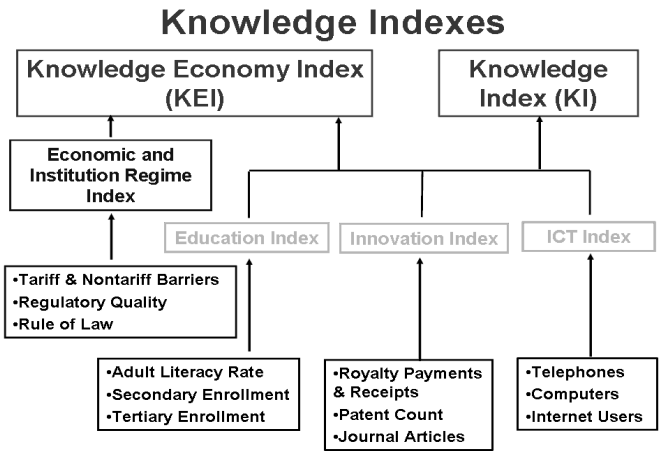


Figure 3-3 Knowledge Economy Pillars [64]

Methodology provides two achievement indexes: Knowledge Economy Index (KEI) and Knowledge Index (KI). KEI examines environment whether it is supportive for effective use of knowledge for economic development. KEI involves four pillars related to knowledge economy: economic incentive and institutional regime, innovation, education and ICT. KI intends to assess countries according to their capability to create, adopt, and spread knowledge. KI is based on three pillars of knowledge economy: innovation, education and ICT. Knowledge Economy measurement pillars are summarized as follows:

Economic Incentive and Institutional regime: This pillar has assessed countries with respect to two categories: the economic regime and governance. To examine

economic regime of a country, two factors – Average Annual Gross Domestic Product (GDP) Growth, Human Development Index (HDI) – are taken into account. Governance related issues of the countries have been measured through following indicators: Tariff & Nontariff Barriers, Regulatory Quality, and Rule of Law.

The Innovation System: This pillar aims to assess participant countries' innovation system through following indicators: Royalty and License Fees Payments and Receipts (US$ millions) per Million Population, Scientific and Technical Journal Articles per Million Population, Patent Applications Granted by the USPTO per Million People.

Education and Human Resources: This pillar consists of education and gender sub domains. For the assessment of education, following indicators are taken into account: Adult Literacy Rate, Secondary Enrollment, and Tertiary Enrollment.

Information and Communication Technology: This pillar has been developed to assess ICT infrastructure of participant countries. It measures number of telephones, computers and internet users per 1,000 people.

For implementation of the methodology, KAM obtains the statistical data from international reputable institutions.

Results Provided

At first, basic country score cards are presented. In the mean time, achievement with respect to 14 variables of the pillars is explored. Second output is created in a more comprehensive manner. That is, countries' custom scorecards involving performance regarding 80 variables are revealed. To present overall performance, values of KEI and KI for both countries and regions are listed.

3.1.16. Technology Achievement Index (TAI)

A measurement approach has been developed by United Nations Development Programme (UNDP) to assess technological achievement of countries. Results of the

assessment are intended to be used by policy makers to enable their countries to take maximum benefits of network age.

Region Addressed

This study has presented Technology Achievement Index (TAI) [36] results for 72 countries. Although more than 72 countries had been measured, insufficiency in data prevents estimation of TAI for all countries.

Model / Approach

Study has offered significant measures that are applicable to all countries at any level of development. To take advantage of network age, four dimensions are proposed for countries: creation of technology, diffusion of recent technologies, diffusion of old innovations, and human skills.

- **Creation of technology:** The focus of this dimension is on ability of countries to achieve technological innovation. TAI includes two indicators under this dimension. As the first indicator, number of patents granted per capita examines country's level of invention activity. Second indicator, receipt of royalty and license fees from abroad per capita, investigates past innovations which are also used presently.

- **Diffusion of recent technologies:** Adoption of new technologies is stated as necessary step for countries to obtain benefits of network age. This dimension is assessed with use of two measures: number of Internet hosts per capita, and the share of high-technology and medium-technology exports in total goods exports.

- **Diffusion of old innovations:** This dimension focuses on basic technologies that are essential to adopt advanced technologies. Two indicators of this dimension are availability of telephones and availability of electricity.

- **Human skills:** The dimension - human skills - is included to assess abilities of people required for adaptability of new technology. Users and creators of

technology are taken into consideration. Two indicators offered by this dimension are mean years of schooling in the population aged 15 and older, and the gross tertiary science enrolment ratio.

Results Provided

Results of eight indicators of the dimensions have been published for every country. Overall TAI value has also been presented for the countries. The resulting TAI values are so diverse that ranges between 0.066 for Mozambique and 0.744 for Finland. Taking into account this diversity, the study has categorized countries into four groups: leaders (TAI>0.5), potential leaders (TAI = 0.35–0.49), dynamic adopters (TAI = 0.20–0.34) or marginalized (TAI <0.2).

3.1.17. Digital Access Index (DAI)

The Digital Access Index (DAI) [28] was developed in 2002 by Market Information and Statistics Unit of International Telecommunications Unit. DAI attempted to assess general capabilities of country citizens towards access and utilization of recent ICT.

Region Addressed

The DAI has measured totally 181 economies of the world.

Model / Approach

Major indicator of the DAI is actual usage of ICTs. Furthermore, there are four critical indicators decided as essential factors for country achievement to access ICT. These four indicators are infrastructure, affordability, knowledge and quality. All major and minor indicators of the DAI are represented in Figure 3-4.

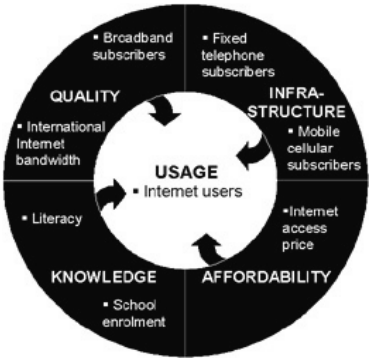


Figure 3-4 DAI Indicators [28]

Totally there are eight indicators within DAI. Infrastructure assesses the number of subscribers of fixed telephone and mobile phone; affordability deals with the price of Internet access; knowledge measures rate of school enrollment and literacy; quality is based on international Internet bandwidth and penetration of broadband; and usage focuses on percentage of Internet users in a country. Statistics are the assessment methodology applied in DAI.

Results Provided

Initial result of the study is division of countries into four levels of achievement: high, upper, medium, and low. Within each level, countries are ranked from top performer to least performer according to their overall DAI score. Besides overall achievement, scores regarding all eight indicators are revealed.

3.1.18. Digital Opportunity Index (DOI)

The Digital Opportunity Index (DOI) [29] was created by ITU. Initial steps for the production of DOI were performed during World Summit of the Information Society (WSIS), which is a two-phased (Geneva 2003, Tunis 2005) UN Summit, organized by ITU. Considering importance of information society, WSIS has addressed that measurement is essential to observe decline in digital divide and progress towards achievement of goals defined in United Nations Millennium Declaration. Primary purpose of the Millennium Declaration goals is to enable more than half of the world population to access and use ICTs by 2015. Towards achievement of this purpose,

policy establishment regarding information society and measurement of progress are identified as key enablers. DOI has been produced related to assessment of country achievement. That is country's movement towards Information society is identified with the calculation of DOI.

Region Addressed

DOI has been estimated for 181 economies during three consecutive years between 2004 and 2006.

Model / Approach

DOI intends to gauge opportunities provided for citizens towards access to information. DOI involves eleven indicators distributed over three areas of measurement: opportunity, infrastructure, and utilization. The average of the scores obtained for measurement categories creates the value of DOI.

- **Opportunity** area considers mobile and Internet technology opportunities offered for use of citizens. Following three indicators are involved in opportunity: percentage of population covered by mobile cellular telephony, mobile cellular tariffs as a percentage of per capita income**,** and Internet access tariffs as a percentage of per capita income. Each of these indicators within opportunity category has equal weight which is 33%. The average of these three indicators forms the score for opportunity.

- **Infrastructure** component is based on penetration of major ICTs, which are fixed line telephone, mobile phone, Internet, mobile Internet, and computer. Every indicator of infrastructure has weight 20%. Score of infrastructure category is estimated by taking average of achievements on five indicators.

- **Utilization** area of measurement examines percentage of Internet users as well as percentage of fixed and mobile broadband Internet users. Each indicator has equivalent weight, which is 33%. Score of utilization is calculated by taking average of achievement regarding these three indicators.

Statistics are the assessment methodology applied in DOI.

Results Provided

In the beginning, countries' overall DOI values are revealed. Country scores on three measurement categories are provided as the other outcome. Additionally, regional analysis is explored.

3.2. Comparison of e-Transformation Evaluation Studies

Investigation of eighteen distinct e-government evaluation frameworks reveals that even though they diverge in their classification or their focus tends to be on more specific issues of e-transformation, they generally share common measurement categories. Table 3-4 demonstrates results of the analysis for identification of major category of measures.

Table 3-4 Major Category of Measures

Category of Measures	UN	EIU	CapGemini	WEF	Brown	Waseda	CID	CSPP	MICT	APEC	McConnell	SIBIS	TUIK	SCOPE	KAM	TAI	DAI	DOI	**TOTAL**
Technology	X	X		X		X	X	X	X	X	X	X	X	X	X	X	X	X	**16**
e-Society	X	X		X		X	X	X	X	X	X	X	X	X		X	X	X	**15**
Human Capital	X					X	X		X	X	X	X		X	X	X	X		**11**
Economy Conditions		X		X		X	X	X		X	X	X		X	X				**10**
e-Services and Applications	X		X	X	X	X		X		X		X		X					**9**
Political and Regulatory Environment		X		X		X	X	X			X			X	X				**8**
TOTAL	**4**	**4**	**1**	**5**	**1**	**6**	**5**	**5**	**3**	**5**	**5**	**5**	**2**	**6**	**4**	**3**	**3**	**2**	

It was also found out that studies provide set of groups under measurement categories. These groups are included to examine different issues related to measurement categories. For instance, related to technology; infrastructure, quality, affordability, ICT sector and information security groups are included. Table 3-5

lists the groups within measurement categories. All the metrics included in groups are provided in Appendix-A.

Table 3-5 Comparison of e-Government Evaluation Studies

Category of Measures	UN	EIU	CapGemini	WEF	Brown	Waseda	CID	CSPP	MICT	APEC	McConnell	SIBIS	TUIK	SCOPE	KAM	TAI	DAI	DOI	**TOTAL**
Technology	X	X		X		X	X	X	X	X	X	X	X	X	X	X	X	X	**16**
Infrastructure	X	X		X		X	X	X	X	X	X	X	X	X	X	X	X	X	**16**
Quality				X			X	X		X	X	X	X				X		**8**
Affordability/Pricing		X		X			X		X	X	X						X	X	**8**
ICT Sector										X	X					X			**3**
Information Security								X			X	X							**3**
e-Society	X	X		X		X	X	X	X	X	X	X	X	X		X	X	X	**15**
ICT Use by Citizens		X		X		X	X	X	X	X	X	X	X	X	X	X	X	X	**15**
ICT Use by Businesses		X		X			X	X	X	X			X						**7**
Promotion and Facilitation Activities						X				X									**2**
e-Participation	X																		**1**
Networked Places								X											**1**
Digital Divides												X							**1**
Human Capital	X					X	X		X	X	X	X		X	X	X	X		**11**
Work force	X	X					X			X	X	X		X	X		X		**9**
Education	X			X			X		X	X	X				X	X	X		**9**
The Innovation System		X		X											X	X			**4**
Economy Conditions		X		X		X	X	X		X	X	X		X	X				**10**
Business Environment		X		X		X					X				X				**5**
Economy and Market Conditions				X			X	X						X	X				**5**
Positioning for Digital Economy										X									**1**
e-Commerce												X							**1**
e-Services and Applications	X		X	X	X	X		X		X		X		X					**9**
Service Delivery	X		X		X	X		X		X		X		X					**8**
Information Dissemination	X			X		X		X											**4**
Access/Usability	X			X		X													**3**
Citizen Participation	X																		**1**
e-Health												X							**1**
Political and Regulatory Environment		X		X		X	X	X			X			X	X				**8**
Legacy		X		X		X	X	X			X				X				**7**
Strategy		X		X							X			X	X				**5**
TOTAL	**12**	**12**	**2**	**18**	**2**	**14**	**14**	**15**	**8**	**16**	**15**	**14**	**6**	**12**	**13**	**8**	**9**	**5**	

The analysis reveals that first area of common agreement of surveys is technology infrastructure. All of the e-readiness frameworks investigated except those that mainly focus on existing e-services (e.g. CapGemini and Brown) comprises some kind of technology criteria. Although most of the tools give emphasize to technology infrastructure, their point of view concerning infrastructure of ICT is somewhat different. While some frameworks just consider physical infrastructure of ICT (e.g. main telephone lines, computers, mobile phones), others provide further ICT infrastructure related categorization such as quality (e.g. bandwidth, rate of packet loss), affordability/pricing (e.g. broadband, charge of Internet), sector of ICT (e.g. foreign investment in ICT), and information security (e.g. security breach, information security policy).

E-society is second area widely recognized as significant factor for e-readiness. Social and cultural transformation is put high importance for establishment of information society since e-transformation places people component at the center of transformation. People's use of ICT and integration of ICT into daily and professional lives are respected as noteworthy concerns within e-society category. Additionally, places of network, digital divide and e-participation issues are considered, yet these issues are not frequently observed. E-participation is considered in e-government survey of UN with the focus of online opportunities provided for citizens to state their views on decisions of government. Places of network are included in the some of the frameworks by which homes and businesses are considered as general potential places of access. However, CID's approach gives emphasis to additional places such as schools, government offices, universities and health institutions. As other unique issue of e-society, SIBIS has a digital divide category that aims to measure discrepancy of ICT access among citizens according to various factors such as gender, age, education, income.

Human capital factor is another concern received high attention from most of the e-readiness tools. Even though category names referring human capital vary, a large

amount of the frameworks decide on the need for a category that reveals the existing workforce potential in a nation. This category depends on three major criteria; education, ICT workforce and system of innovation. Issue of education in a nation is mainly measured by inspecting rate of schooling, quality of education, and degree of ICT integration into education system. Regarding ICT workforce the major concerns are rate of existing technical personnel, approach of businesses towards research and development activities. With innovation system issue, governments are observed mainly according to patents, scientific and technical journals developed per year.

Economy aspect is involved more than half of the e-readiness tools. Nations' climate of economy considers business environment, economy and market conditions, positioning for digital economy, and e-commerce. Business environment is comprehensively included in e-readiness study of EIU. In this study, mainly overall political environment and macroeconomic environment of a country are evaluated. Related to economy conditions, annual GDP growth and level of competition within the market are generally taken into consideration. Digital economy gives emphasizes on progress of e-commerce and investigates the actions of countries towards e-commerce.

Category of e-Services and online applications is another common consideration of e-government assessment tools. While some tools (e.g. CapGemini and Brown) focus solely on online public services, others involve as one of the component factors of their frameworks. E-government measurement tools attempt to examine online services delivered in national portals and governmental web sites. Online services are evaluated with regards to features based on four main aspects: information dissemination/outreach, access/usability, availability and sophistication. The dissemination of information reflects the level of accountability of government to its citizens and businesses. The presence of intermediaries (e.g. national portal, ministerial web sites), the degree of citizens' and businesses' being informed about government processes, laws, policy documents, priorities, etc. are the concerns

received high attention within information dissemination aspect. Access/usability deals with features easing use of web sites such as audio and video feature, multiple languages availability, features enabling access for people with disabilities. While availability aspect examines the presence of online services presented in governmental web sites, sophistication aspect tries to reveal the maturity level of these investigated services. In addition to those aspects, UN aims to assess how active involvement of citizens is satisfied by online services. For this purpose, presence of e-participation policy and supportive tools (e.g. polls, surveys, bulletin boards, chat room, blogs, web casting, and discussion forums, etc.) are evaluated. As other unique concern, e-health services are examined by the SIBIS framework.

Approximately half of the e-readiness tools rely on political and regulatory concern in their frameworks. This issue is related to strategies, laws and regulations developed by governments in order to integrate ICT into their processes. Strategies are examined to mainly observe how much governments invest on ICT, to what extent they see ICT as priority for country, and how effective of their implementation plan for utilization of ICT. The assessment of regulations related to ICT is respected in a broader manner. Indicators widely recognized are degree of laws and regulations framework regarding use of ICT, competition among ICT providers, intellectual property protection, and tariffs on trade of ICT equipment.

Additionally, comparison of the studies is conducted according to amount of metrics they involve. The results of the comparison are given in Table 3-6.

Table 3-6 Number of Metrics Included in Studies

Study	**# of metrics**
e-Readiness Rankings	100
e-Commerce Readiness Assessment	100
Statistical Indicators Benchmarking the Information Society	84
e-Government Survey	68
Network Readiness Index	68
STOPE Framework for e-Readiness Assessment	45
Readiness Guide for Living in the Networked World	44

Table 3-6 (cont.)

Online Public Service Availability	40
Measuring ICT	40
Seizing the Opportunity of Global E-Readiness	28
World e-Government Ranking	26
Global e-Government	22
Research of ICT Usage in Turkey	22
Readiness for the Networked World	19
Knowledge Assessment Methodology	14
Digital Opportunity Index	11
Digital Access Index	8
Technology Achievement Index	8

The results clearly show that e-Readiness Rankings developed by EIU and e-Commerce Readiness Assessment developed by APEC include maximum number of metrics. Second place goes to Statistical Indicators Benchmarking the Information Society study with its 84 metrics.

3.3. e-Transformation Performance of Turkey

Of the studies reviewed, nine of them involved Turkey as one of the target countries to be assessed. These studies are listed as follows:

1. UN e-Government Survey,
2. E-Readiness Rankings by Economic Intelligence Unit,
3. EU Online Public Service Availability by Cap Gemini,
4. Network Readiness Index by World Economic Forum,
5. Global e-Government Survey by Brown University,
6. Turkish Statistical Institute: Research of ICT Usage in Turkey,
7. Knowledge Assessment Methodology by World Bank,
8. Digital Access Index by International Telecommunications Union,
9. Digital Opportunity Index by International Telecommunications Union

Turkey's e-transformation performance in each of these measurement approaches is detailed in following sub sections.

3.3.1. Turkey's Performance According to e-Government Survey

UN e-Government Survey was conducted in years 2003, 2004, 2005 and 2008. The survey produces e-government readiness index, which ranges between values 0 and 1. Turkey was assessed in each of the survey series and obtained the corresponding values of e-government index given in Figure 3-5 [51-54].

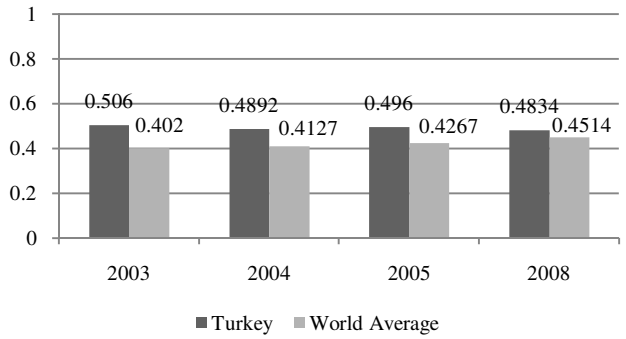


Figure 3-5 Turkey's e-Performance According to e-Government Survey

Although Turkey has achieved better than world average in each of four years, its e-government index has experienced decline between years from 0.506 (2003) to 0.4834 (2008). Yet, world has experienced increase in its overall e-readiness performance. That is, average e-readiness of world has risen from 0.402 (2003) to 0.4514 (2008). According to ranking results, Turkey's place among world countries is listed in Table 3-7 [51-54].

Table 3-7 Turkey's Rankings According to e-Government Survey

Year	Turkey's e-Government Readiness Index	Ranking	# of Countries
2003	0.506	49	191
2004	0.4892	57	191
2005	0.496	60	191
2008	0.4834	76	192

Turkey has achieved the best ranking result, 49, in first year (2003) of the survey. In accordance with its decreasing e-readiness score from 2003 to 2008, Turkey has moved into 76th position in 2008.

UN's e-government index comprises three sub indices, which are web measure, infrastructure and human capital. The survey also has released countries' performance in each sub index of e-government. Turkey's scores in three sub indexes of the study are shown in Figure 3-6 [51-54].

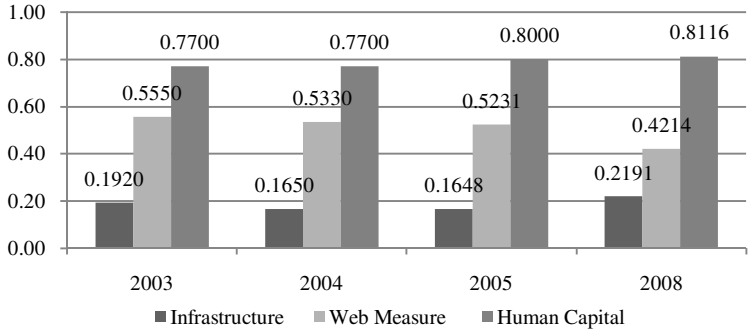


Figure 3-6 Turkey's Detailed Scores in UN e-Government Survey

In terms of recent scores of Turkey, some conclusions can be drawn. The highest achievement occurs in human capital index with the value 0.8116. This index measures adult literacy rate and gross enrollment ratios. Specifically, in Turkey 88.1% of people aged 15 and over are literate. From the perspective of schooling rates, primary enrollment ratio is 94%, secondary enrollment ratio is 79% and tertiary enrollment ratio is 35% [55].

Turkey's score in availability of online services presented in national portals and governmental web sites is below the world average. Indeed, Turkey's score is 0.4214 while world average is 0.4514 in web measurement index.

The lowest achievement of Turkey is detected in technological infrastructure aspect. In Turkey, Internet penetration is 16.56%; PC penetration is 5.56%; cellular

penetration is 71%; main telephone lines penetration is 25.39%; and broadband penetration is 3.74%.

3.3.2. Turkey's Performance According to e-Readiness Rankings

Since 2002, Economic Intelligence Unit (EIU) has been assessing e-readiness level of the biggest economies. Level for e-readiness is rated out of 10. Between years 2002 and 2008, e-readiness scores of Turkey, and average e-readiness of world are shown in Figure 3-7 [15-20].

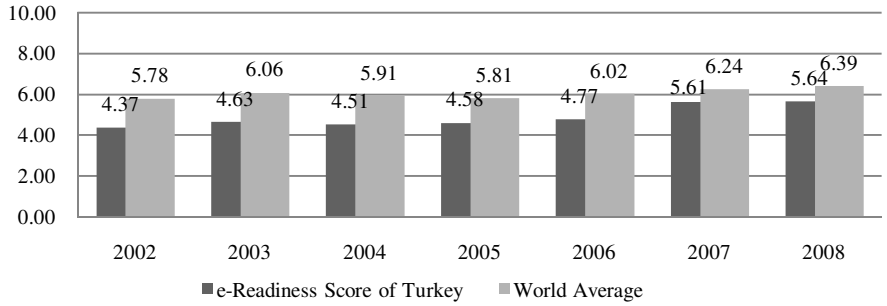


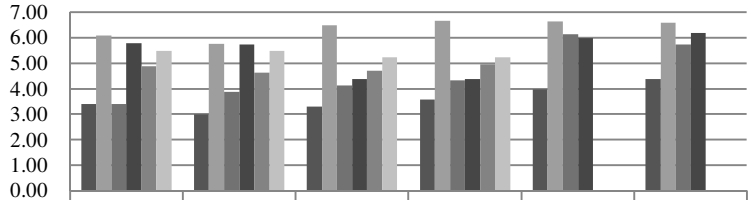
Figure 3-7 Turkey's Performance According to e-Readiness Rankings

From the general view of the scores, it can be interpreted that achievement of Turkey has increased from the value of 4.37 (2002) to 5.64 (2008). However, Turkey lagged far behind the world average in each year of the survey. According to the ranking results, places of Turkey have lied between 39 and 45. Rankings of Turkey from 2002 to 2008 are shown in Table 3-8 [15-20].

Table 3-8 Turkey's Rankings According to e-Readiness Rankings

Year	Turkey's e-Readiness Score	Ranking	# of Countries
2002	4.37	40	60
2003	4.63	39	60
2004	4.51	45	64
2005	4.58	43	65
2006	4.77	45	68
2007	5.61	42	69
2008	5.64	43	70

In the mean time, EIU has published country scores in six categories of e-readiness. The scores in Figure 3-8 [15-20] belong to Turkey between 2003 and 2008.



	2003	2004	2005	2006	2007	2008
Connectivity	3.40	3.00	3.30	3.60	4.00	4.40
Business Environment	6.10	5.76	6.49	6.68	6.66	6.60
Consumer and Business Adoption	3.40	3.88	4.15	4.35	6.15	5.75
Social and Cultural Environment	5.80	5.75	4.40	4.40	6.00	6.20
Legal and Policy Environment	4.90	4.65	4.71	4.97		
e-Services	5.50	5.50	5.25	5.25		

Figure 3-8 Turkey's Detailed Performance In e-Readiness Rankings

Of the measurement categories, Turkey has attained the highest score in business environment. On the other hand, connectivity is the lowest achievement of Turkey. Turkey's connectivity score is 4.40 in 2008. e-Services category has not been involved since 2007. After the year 2007, the category legacy and policy environment was divided into two sub groups: legal environment and government policy and vision. Turkey succeeded better in government policy and vision than in legal environment. According to legal environment, Turkey obtained 5.10 (2007) and 5.40 (2008). From the perspective of government policy and vision category, Turkey scored 5.75 in both years 2007 and 2008.

3.3.3. Turkey's Performance According to EU Online Public Service Availability

Turkey was newcomer of EU Online Public Service Availability survey in 2007. Through this survey, presence and maturity of online public services are measured. Performances of countries are released according to two major indicators: full online

availability and online sophistication. Turkey's achievement in full online availability is shown in the Figure 3-9 [4].

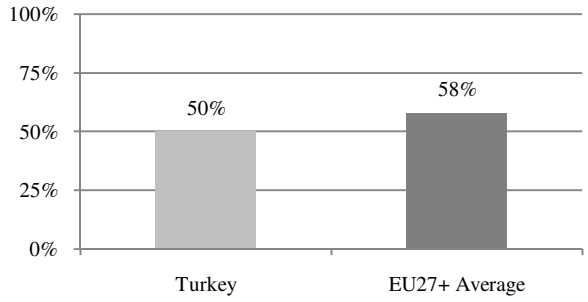


Figure 3-9 Turkey's Achievement in Full Online Availability

The survey demonstrates that 50% of the services in Turkey are fully available online. Turkey scores 8% below the EU27+ average of 58%. According to online sophistication, the scores of Turkey are depicted in the Figure 3-10 [4].

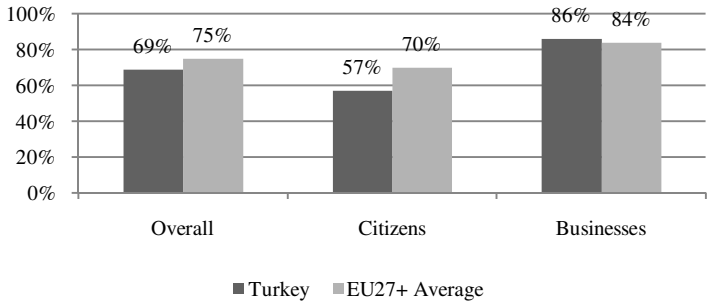


Figure 3-10 Turkey's Achievement in Online Sophistication

Turkey's overall score in online sophistication is 69%, which is below the EU27+ average, 75%. Concerning sophistication of online services for citizens, Turkey achieves 57%, far below the EU27+ average of 70%. Turkey performs better in sophistication of online services for businesses. That is, Turkey's score is 86%, which is above the EU27+ average of 84%.

In order to provide a detailed performance of countries, the survey has published scores for each of 20 public services individually. Turkey's performance in service delivery is presented in Figure 3-11 [4].

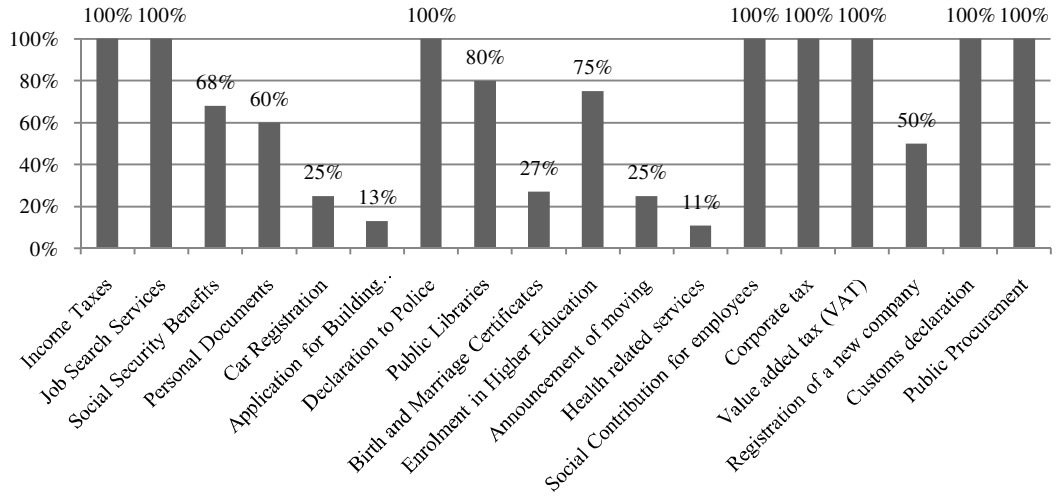


Figure 3-11 Turkey's Performance in Service Delivery

The survey indicates that Turkey has achieved full online availability in 8 public services: income taxes, job search services, declaration to police, social contribution for employees, corporate tax, value added tax (VAT), customs declaration and public procurement. Turkey has experienced the lowest performance with the score of 11% in health related services.

3.3.4. Turkey's Performance According to Network Readiness Index

World Economic Forum (WEF) has provided NRI for countries since 2001. Except the years 2004 and 2005, the value of NRI is computed between 1 and 7. A change in computation methodology has occurred in 2004 and 2005. NRI scores have been standardized with a mean of 0 in these years. Hence, scores are distributed above and below the mean of 0. While positive scores represent that countries achieve better than average, negative scores indicate that countries attain worse compared to

average of whole countries. Table 3-9 [57-63] demonstrates Turkey's NRI scores and rankings, as well as total number of countries evaluated.

Table 3-9 Turkey's NRI Scores and Rankings

Year	Turkey's NRI Score	Ranking	# of Countries
2001	3.67	41	75
2002	3.57	50	82
2003	3.32	56	102
2004	-0.14	52	104
2005	0	48	115
2006	3.86	52	122
2007	3.96	55	127

To draw general picture of Turkey between 2001 and 2007, NRI values shall be in the same range. For this reason, Turkey's scores in 2004 and 2005 are standardized to their representative scores. In range of 1 to 7, the value of -0.14 was normalized to 3.68 and the value of 0 was normalized to 4. After this standardization process, the statistical results in Figure 3-12 [57-63] have been obtained.

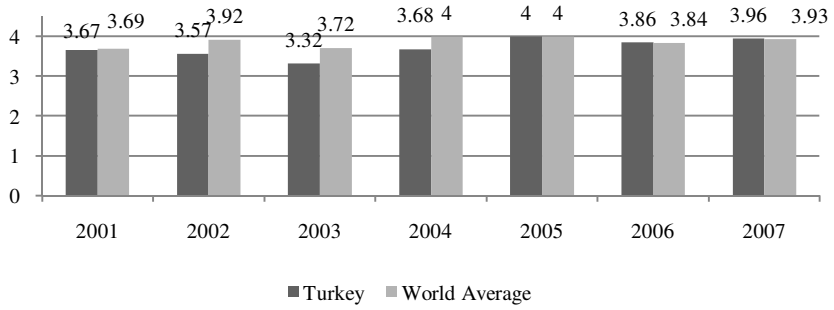
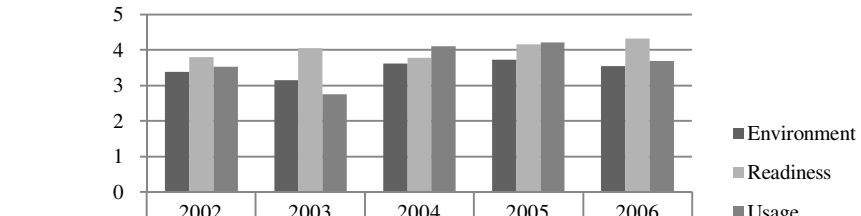


Figure 3-12 Turkey's Performance According to Network Readiness Index

Turkey has experienced fall in its NRI scores from 3.67 (2001) to 3.32 (2003). Then, a significant jump was detected in 2004. Following this progress, Turkey has evolved from a networked readiness of 3.68 (2004) to 3.96 (2007).

NRI is composed of three component indexes: environment, readiness and use. For the component indexes, between 2002 and 2007 Turkey has obtained the set of scores demonstrated in Figure 3-13 [57-63].



	2002	2003	2004	2005	2006
Environment	3.38	3.14	3.62	3.73	3.55
Readiness	3.79	4.05	3.79	4.16	4.32
Usage	3.53	2.76	4.10	4.21	3.69

Figure 3-13 Turkey's Detailed Performance in Network Readiness Index

Turkey's progress in environment has nearly flattened over recent years after significant advancement in 2004. Turkey's recent score was 3.55 in environment in 2006. For the sub indexes of environment, the scores 3.88, 4.22 and 2.65 go to market, political/regularity and infrastructure environment respectively.

In readiness, Turkey has shown the highest achievement with score 4.32 in 2006. In same year, Turkey has obtained scores 5.03, 4.19 and 3.75 in individual, business and government readiness respectively.

Turkey's usage has shown very marked jump from 2.76 (2003) to 4.10 (2004). Yet, after this progress, Turkey's usage score has dropped from 4.21 (2005) to 3.69 (2006). As the sub indexes of usage, individual, business and government readiness are 1.94, 4.96, and 4.18 respectively in 2006.

3.3.5. Turkey's Performance According to Global e-Government

Brown University has assessed countries according to availability of 22 distinct features in national government web sites. Assessment through the method of Brown University reveals the scores for Turkey given in Figure 3-14 [9-13].

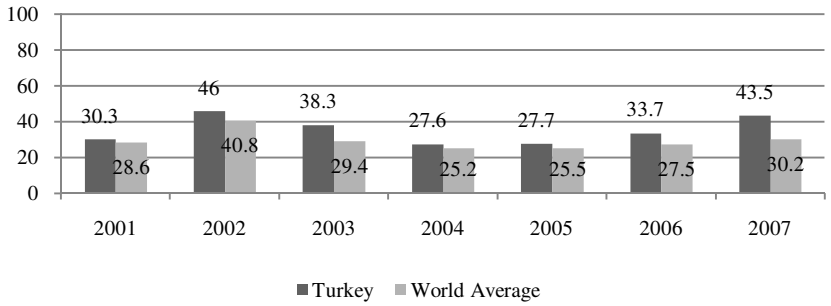


Figure 3-14 Turkey's Performance According to Global e-Government

Turkey has achieved the maximum performance with the score 46% in the first year of the survey. However, after that year Turkey has experienced fall in its overall score. Then, Turkey's score has experienced a marked increase from 27.6% (2004) to 43.50% (2007). According to ranking results of the study, Turkey's place among world countries is listed in Table 3-10[9-13].

Table 3-10 Turkey's Rankings According to Global e-Government

Year	Turkey's Score According to Global e-Government Study	Ranking	# of Countries
2002	46	54	198
2003	38.3	6	198
2004	27.6	62	198
2006	33.7	27	198
2007	43.5	9	198

The study revealed inconsistent rankings for Turkey. In 2003 and 2007, Turkey experienced the best rankings as 6 and 9 respectively.

3.3.6. Turkey's Performance According to Turkish Statistical Institute (TSI)

Research of ICT Usage in Turkey study has been conducted by Turkish Statistical Institute (TSI). The study intends to monitor level of ICT use of two groups: citizens, and enterprises of Turkey. Performed in 2005, 2007, and 2008, the survey has

released ICT usage rates of those mentioned groups. Major findings of the survey focusing on citizens are demonstrated in Figure 3-15 [44] [46] [48].

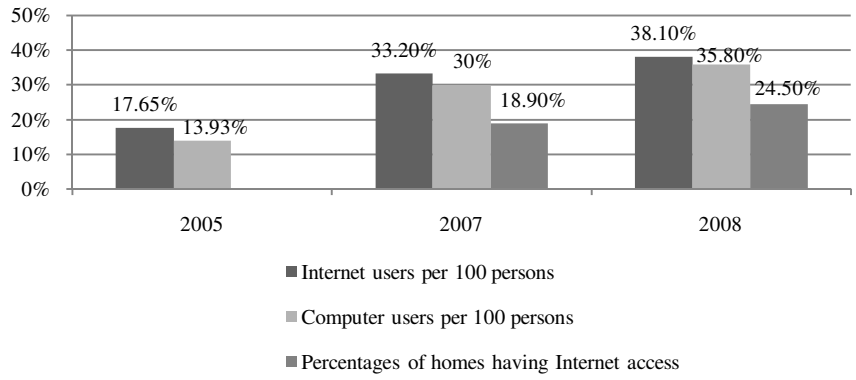


Figure 3-15 ICT Use of Turkish Citizens

In first year of the survey, TSI found out that 17.65% of Turkish citizens were using Internet, and 13.93% of Turkish citizens were using computer. With its rates in 2008, Turkey has gained a significant step compared to rates in 2005. In Turkey, percentage of individuals using the Internet in the population is 38.1, using the computer in the population is 35.8, and the proportion of households with Internet access is 24.5%.

Meanwhile, the survey publishes the scores for ICT use of enterprises, which are given in Figure 3-16 [45] [47] [49].

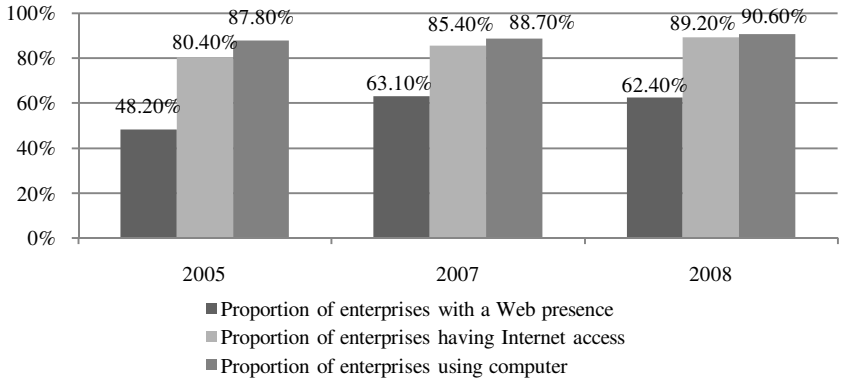


Figure 3-16 ICT Use of Turkish Enterprises

In 2008, the rates for Internet and computer use of enterprises are 89.2% and 90.6% respectively. These values are recognized as high scores in ICT use. On the other hand, in Turkey 62.4% of the enterprises own web site.

3.3.7. Turkey's Performance According to Knowledge Assessment Methodology

World Bank's Knowledge Assessment Methodology (KAM) provides two major indexes: Knowledge Economy Index (KEI) and Knowledge Index (KI). For Turkey, the study has released KEI in years 2007 and 2008, and KI in 2008. Figure 3-17 [64] shows KEI and KI scores of Turkey and world average in 2008.

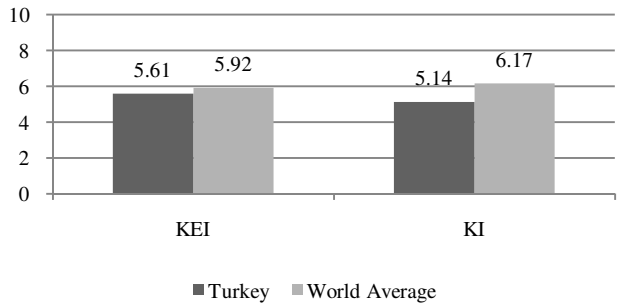


Figure 3-17 Turkey's Performance According to KAM

The scores of KEI and KI range between 0 and 10. Turkey has obtained 5.61 and 5.14, for KEI and KI respectively in 2008. Among 140 countries, the ranking of Turkey is 53 according to KEI, and is 66 according to KI.

Performance of Turkey in four knowledge economy pillars is demonstrated in Figure 3-18 [64].

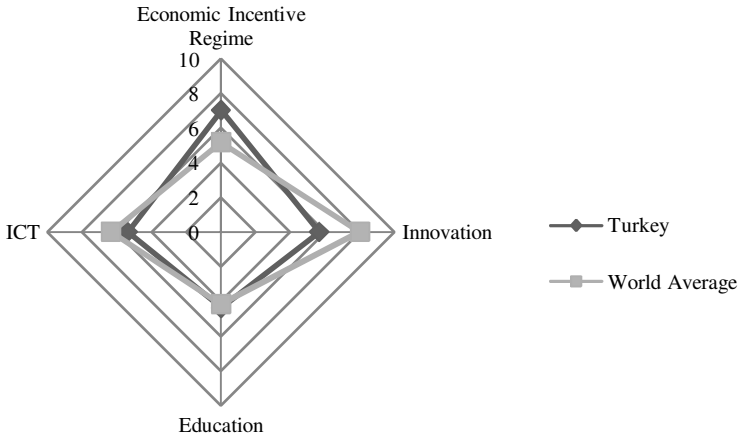


Figure 3-18 Turkey's Performance in Four Knowledge Economy Pillars

Turkey has achieved maximum score, which is 7.02, in economic incentive and institutional regime. Economic incentive regime pillar includes three key variables: tariff and nontariff barriers, regulatory quality, and rule of law. Turkey has scored 9.56, 5.57, and 5.93 in these three key variables respectively. Innovation score of Turkey is 5.67. Turkey has achieved the minimum score, which is 4.38, in education pillar. For key variables of education, 3.52, 3.97, and 5.66 go to adult literacy rate, gross secondary enrollment, and gross tertiary enrollment respectively. For ICT score, Turkey has obtained 5.38, which is average of the penetrations of telephone, computer and internet. The normalized scores of Turkey are 6.21, 4.64, and 5.29 for telephone, computer, and internet penetrations respectively.

3.3.8. Turkey's Performance According to Digital Access Index

Using eight indicators spread over five categories, DAI attempts to investigate ICT access capabilities of countries. According to data from 2002, Turkey obtained 0.48 as overall DAI score. Owing to its achievement, Turkey took place in medium region of success in view of its 70^{th} rank of position. Figure 3-19 [28] shows Turkey's performance in five main measures of DAI.

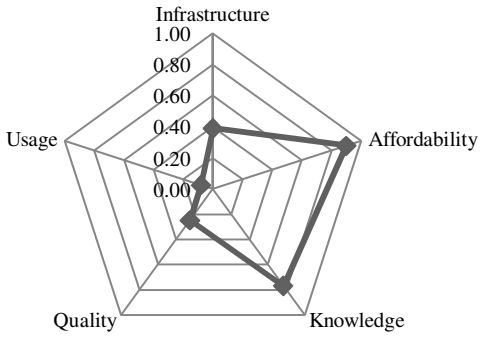


Figure 3-19 Turkey's Performance According to DAI

As can be concluded from the figure, the DAI found Turkey best with regards to affordability and knowledge, and worst in infrastructure, usage, and quality. Deeply analysis on DAI measures and indicators reveals the following scores for Turkey. The highest achievement of Turkey is detected in affordability with the value 0.90. As indicator, affordability involves just Internet tariff as % of GNI (Gross National Income), for which Turkey has obtained the score 9.5. Turkey's score in knowledge measure is revealed as 0.77. The component indicators of knowledge show that in Turkey adult literacy rate is 85.5%, and school enrollment is 60%. Investigation of infrastructure indicates the insufficiency of Turkey with score 0.39. It was estimated that there were 26.9 subscribers lines per 100 inhabitants, and 33.6 mobile subscribers per 100 inhabitants. According to DAI, Turkey fared poorly in quality of information infrastructure; the corresponding score is calculated as 0.25. Concerning indicators of quality, it was found out that international bandwidth per 100 inhabitants was 10.6, broadband subscribers per 100 inhabitants were 0.00 and Internet users per 100 inhabitants were 7.0.

3.3.9. Turkey's Performance According to Digital Opportunity Index

ITU publishes a DOI that measures degree of digital opportunities of a nation in Information Society. The assessment in 2005/2006 provides a DOI score of 0.52, and

ranking 52 out of 181 nations for Turkey. DOI scores of Turkey between 2001 and 2006 are given in Figure 3-20 [29].

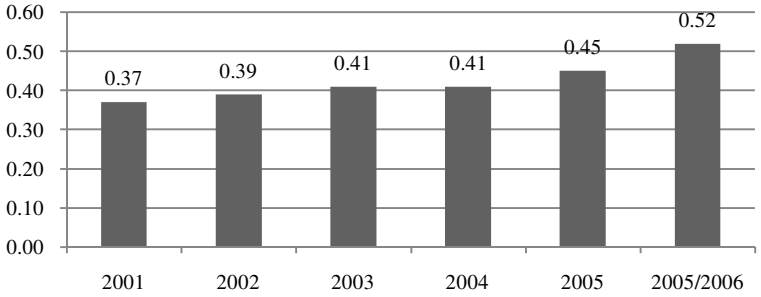


Figure 3-20 Turkey's Performance According to DOI

The DOI consists of 11 indicators across three categories: opportunity, infrastructure, and utilization. Table 3-11 [29] presents achievement of Turkey in these three measures.

Table 3-11 Turkey's Detailed Performance According to DOI

Opportunity	Infrastructure	Utilization
0,97	0,31	0,27

Turkey scores highest in the opportunity sub-index within the DOI. However, DOI has judged Turkey to be performing poorly in infrastructure and utilization.

3.4. Comparative e-Performance of Turkey

Turkey's e-performance is revealed according to eight international studies developed for assessment of e-transformation. In order to compare e-performance of Turkey with regard to eight international studies, initially, Turkey's scores are obtained from each study. Discrepancy observed between measurement scales of

scores prevents performing direct comparison between studies. Thus, raw scores are standardized to their representative scores out of 10.

Following the standardization process, distinct performance scores of Turkey between years 2001 and 2008 are included in one common chart, which is available in the Figure 3-21.

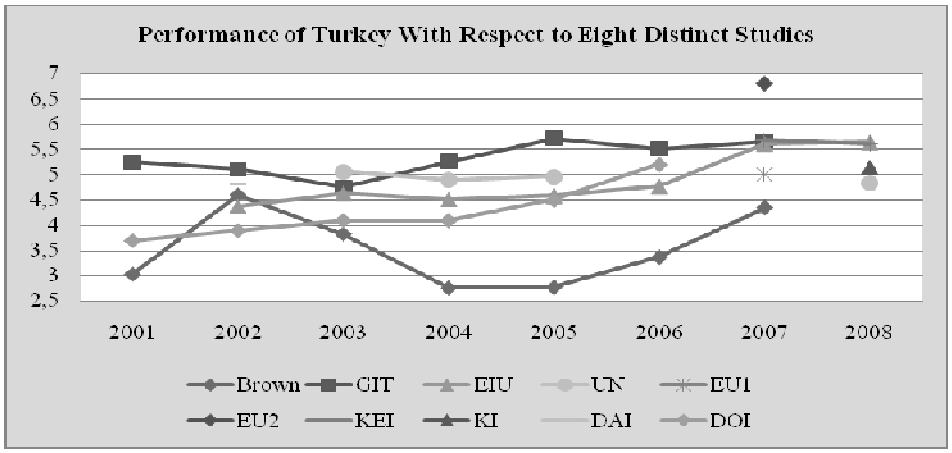


Figure 3-21 Turkey's Comparative e-Performance

The figure above includes Turkey's individual scores with respect to eight e-government evaluation tools. Averaging the individual scores, one aggregate score is obtained. Figure 3-22 demonstrates average e-government performance of Turkey from 2001 to 2008.

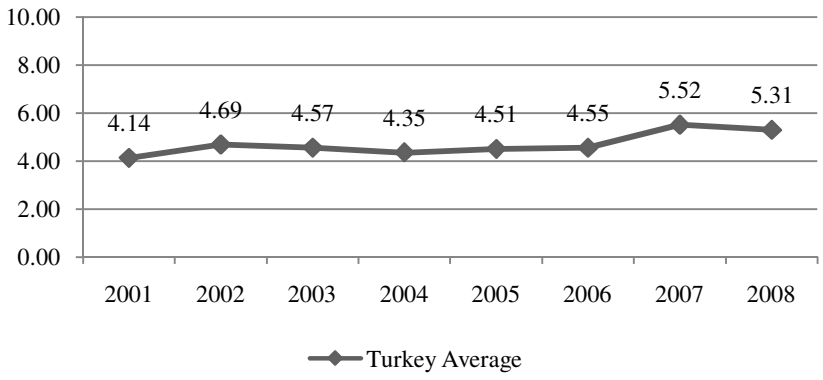


Figure 3-22 Turkey's Overall e-Performance

The procedure applied to calculate aggregate e-government score for Turkey is repeated for six world regions: Africa, North America, Latin America, Western Europe, Central & Eastern Europe, and Asia Pacific. Regional scores are compared with Turkey's e-government score. As an illustration of comparison, Figure 3-23 depicts e-government performance of Turkey versus e-government performance of Africa.

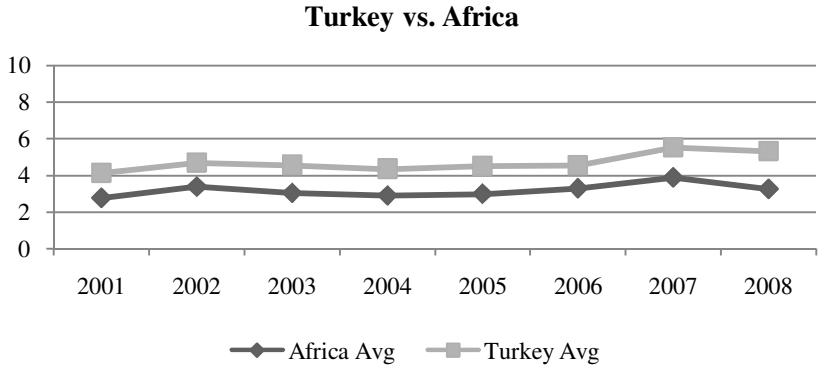


Figure 3-23 Turkey vs. Africa With Regard to e-Transformation

Comparative analysis of Turkey with remaining five regions is given in Appendix-B.

CHAPTER – 4

A NEW METRIC SYSTEM: METHODOLOGY

4.1. Purpose and Scope

In their continuous journey of e-transformation, governments are encouraged to regularly check where they are. This kind of assessment provides opportunity for governments to move their e-transformation to an advanced level [30] [39].

In order to assist governments in their assessment of e-transformation, we aim to develop an evaluation method derived from e-government evaluation studies investigated. Our method is built around six main measurement categories that are agreed as essential factors for measurement of e-transformation by the studies reviewed. Technological infrastructure, e-society, human capital, political and regulatory environment, economy environment, and online services and applications are six measurement categories decided to be included in our method. As building blocks, specific set of metrics are embedded into each category. Based on metrics and measurement categories, the system generates e-transformation index to define e-transformation maturity level of the countries.

The purpose of this chapter is to describe our method. This is offered as a new metric system to measure governments' maturity level of e-transformation. In this chapter, first of all, the system is briefly introduced. Afterwards, in-depth

descriptions of measurement categories and metrics are provided. Ultimately, methodology applied for the calculation of e-transformation index is described. That is, methodology of combining partial results into one single e-transformation index is described.

4.2. General Description of the Metric System

The system is designed with the purpose of determining how nations proceeded with their attempts to participate in networked world. In this regard, this metric system is proposed for governments that are concerned with evaluating their maturity level of e-transformation. Therefore, governments will be able to measure their progress, and learn their strengths and weaknesses towards digital transformation. With the help of information obtained, governments will be able to take actions to overcome their weak points. Additionally, ranking of the governments is provided considering capabilities of governments in e-transformation. In this way, governments will be informed about their positions in global competitive world.

While developing e-transformation metric system, related measurement tools, guides, and surveys investigated and described in the literature section of the thesis are taken into account. Actually, considering previous tools, proposed system attempts to include measures widely recognized as significant factors to gauge maturity level of e-transformation. More specifically, this system is based on category of measures widely utilized as well as metrics frequently applied by the assessment tools investigated.

In order to explore governments' overall maturity, the system produces an e-transformation index. A mathematical formula has been developed for the calculation of the index. The aggregate e-transformation index is based on a

model comprising six major measurement categories and set of metrics of the system.

Throughout the implementation of the system, 30 countries from five world regions are analyzed and related findings are revealed in Chapter-5.

4.3. Structure of the Metric System

The metric system is shaped by involving two types of measurement factors in a hierarchical order. As more generic type of factor, measurement categories (i.e. technology infrastructure, e-society, human capital, political and regulatory environment, economy environment, and online services and applications) are established. The measurement categories within metric system are shown in the Figure 4-1.

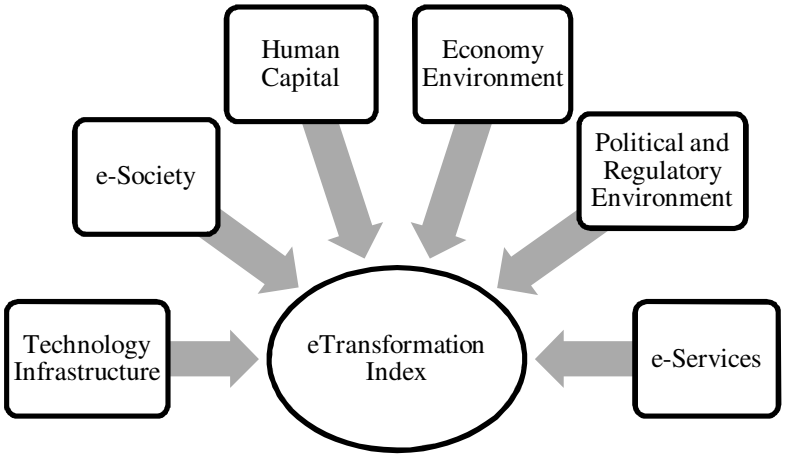


Figure 4-1 Measurement Categories of the Metric System

The hierarchy continues with division of each category into specific metrics. That is, a measurement category is established as a superset of its own set of metrics. This relation is demonstrated in Figure 4-2.

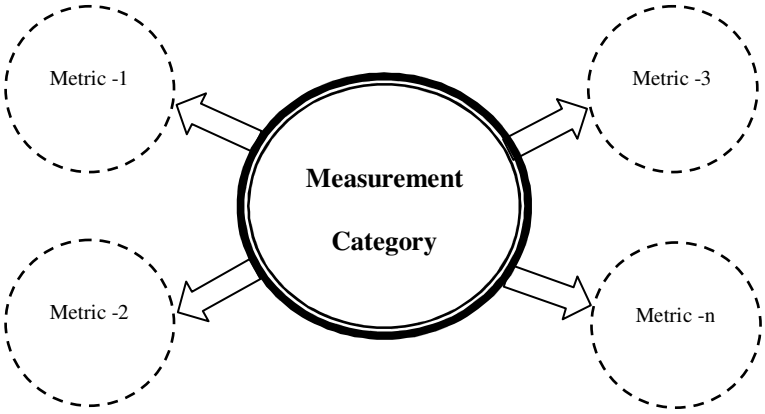


Figure 4-2 Relation between Measurement Category and Metrics

This section elaborates each of the measurement factors. In other words, measurement categories of the system are detailed and the set of metrics involved within each category are introduced.

4.3.1. Technology Infrastructure

Technology implies IT and communication facilities consisting of "hardware, software, networks, and media for collection, storage, processing transmission, and presentation of information in the form of voice, data, text, and images." [7]

Constructing underlying ICT infrastructure throughout country is recognized as fundamental condition for knowledge economy. It is impossible for nations to participate in networked world without adequate opportunity of access to network of global communications [6]. Meanwhile, ICTs are realized as considerable tools supporting economic growth and sustainable development. [7]

With integration of technology category into structure of the system, it is aimed to capture the state of technology infrastructure for e-transformation. The category includes metrics distributed into three major ICT related aspects, which are availability, speed, and affordability. The metrics selected to measure a country's technology infrastructure are listed in Table 4-1. These 9 metrics are chosen out of

78 technology metrics detected in the studies. Criterion for selection is identifying metrics included in majority of the studies investigated.

Table 4-1 Metrics of Technology Infrastructure

Metrics of Technology Infrastructure
Proportion of households with computer
Proportion of households with Internet
Mobile cellular subscriptions per 100 inhabitants
Fixed telephone lines per 100 inhabitants
Broadband per 100 inhabitants
Secure Internet servers per 1 million inhabitants
International Internet bandwidth per Internet user (bit/s)
Mobile cellular prices (% of GNI per capita)
Broadband Internet prices (% of GNI per capita)

In the beginning, technology infrastructure category seeks to find out presence of major IT and communication facilities in a country. For this purpose, metrics to gauge availability of key information technologies (i.e. computer, Internet, mobile phone, fixed phone lines, broadband and server) are included. Statistical data essential for evaluation are taken from databases of ITU [27] and World Bank [64]. Findings are revealed as diffusion of these technologies per households or per inhabitants.

- ***Proportion of households with computer:*** In digital era, computers are both popular and useful tools providing communication and information for their users. This metric investigates number of houses in which desktop computer or notebook is available for use (2007).

- ***Proportion of households with Internet:*** Being constructed as a worldwide network, Internet principally enables citizens to access information and online

services. Percentage of households that own Internet connection is examined through this metric (2007).

- ***Mobile cellular subscriptions per 100 inhabitants:*** The purpose is to inspect number of subscriptions to a mobile phone service. This kind of service supports cellular technology that provides access to the Public Switched Telephone Network (PSTN) (2007).

- ***Fixed telephone lines per 100 inhabitants:*** Although recent trend of telephone use has moved to mobile phones, fixed phones are already utilized as vital infrastructure for transfer of voice. Meanwhile, fixed phones exist as base for progress of broadband technologies. The purpose is to explore number of fixed phone lines per 100 inhabitants (2007).

- ***Broadband per 100 inhabitants:*** Broadband accelerates data transmission. Fast transfer of data allows users to access online applications requiring high Internet speed. This metric intends to find out penetration of broadband Internet per 100 inhabitants (2007).

- ***Secure Internet servers per 1 million inhabitants:*** Internet server can be described as a special computer that provides room for web site to make it permanently available. The penetration of secure Internet services reflects the extent to which reliable transactions can be conducted. [20] This metric aims to reach data of number of servers per 1 million inhabitants in a country (2007).

The metric related to Internet bandwidth attempts to identify speed of the country wide network. Actually, average Internet bandwidth within borders of the country is investigated. The available bandwidth determines network capability to support amount of users and types of web based activities. For instance, transfer of files with large size and video streaming may not be supported by a network with low bandwidth [20]. High value of bandwidth is significant evidence of strength of the communication. It is emphasized that lack of adequate bandwidth is a

considerable barrier for developing countries to connect worldwide network. This kind of problem occurs while people are attempting to visit foreign web sites to access information through slow Internet connection. The other challenge is related to increasing dominance of IP networks over PSTN network. It is difficult to access IP-based services with slow and expensive Internet connection (2007). [27]

Ultimately, affordability level of broadband and mobile phones is took place. Level of affordability is measured by estimating prices of broadband and mobile telephones in proportion to average income of country citizens. (2008) More affordable fees will undeniably raise the rate of use. Presence of competition in telecommunication sector will contribute to reduce the costs of access.

4.3.2. e-Society

Digital divide, which originates from inequality in Internet access, decelerates the process of building Information Society. Digitally developed nations gain competitiveness in global world. In order to achieve e-society, governments shall shape their strategies providing equal access opportunities to whole society. Such an attempt is recognized as authorities' valuable commitment to accelerate digital transformation of society.

Achievement of information society ensures intended rate of ICT use and adoption of the stakeholders. Actual utilization of digital channels by citizens and businesses is an indicator for successful implementation of e-government [20]. In e-societies, individuals have gained awareness about benefits of technology. They know how to use technology and how to integrate ICT effectively into their professional and daily lives. In organizational level, companies have utilized ICT to improve business processes and to maintain their competitiveness in the business world.

e-Society category of measure gives emphasis on demand side of e-transformation. Major focus is on utilization level of IT infrastructure. To achieve the intended rate of use, society awareness about advantages of technology is accepted as precondition. On the other hand, lack of awareness is recognized as tight barrier to satisfy high penetration rates.

Table 4-2 Metrics of e-Society

Metrics of e-Society
PC users per 100 inhabitants
Internet users per 100 inhabitants
Mobile phone users per 100 inhabitants
Fixed phone users per 100 inhabitants
Broadband users per 100 inhabitants
Firm level Technology Absorption
Extent of Business Internet Use
Government Success in ICT Promotion
ICT Use and Government Efficiency
Presence of ICT in Government Offices

A country's movement along e-society domain is shaped by a set of determining metrics constructed in accordance with e-transformation's three major stakeholders: citizens, businesses and governments. To measure maturity of society transformation, considered metrics are tabulated in Table 4-2. 10 e-society metrics are selected out of total 72 metrics. Selected metrics are widely recognized measures to investigate e-society. Data essential for assessment are gathered from database of ITU [27] and WEF [63].

With the use of first five metrics, digital transformation level of individuals is measured. Specifically, percentage of people using major facilities of IT and communication is investigated. In this regard, proportion of country citizens using

PC, Internet, mobile phone, fixed phone, and broadband technologies are monitored and corresponding findings are revealed.

Firm level Technology Absorption: Businesses are assessed according to their level of uptake of recent technological infrastructure. In other words, degree of openness of businesses related to technology absorption is put into consideration (2007).

Extent of Business Internet Use: The purpose is to examine to what extent companies use Internet. Companies' extensive uses of Internet for business purposes such as buying and selling goods, and interacting with customers and suppliers are desired observations (2007).

Government Success in ICT Promotion: Government's taking the leading role to raise Information Society is one of the encouraging factors. The more ICT promotion the government performs, the more rapid revolution of information society can be accomplished. There exists variety of promotional activities a government can apply, such as establishing network of Public Internet Access Centers (PIACs), offering sources of advice to users and consumers, and taking initiatives to raise ICT awareness among businesses. This metric aims to examine success of government programs promoting the use of ICT (2007).

ICT Use and Government Efficiency: This metric focuses on government's level of ICT use to improve efficiency of government services, and to facilitate interaction with businesses and individuals. In the mean time, utilization of ICT to create online services improves the processes of government (2007).

Presence of ICT in Government Offices: To provide effective functioning, governmental agencies shall be equipped with essential ICT. Availability of ICT in government offices is investigated through this metric (2007).

4.3.3. Human Capital

Human capital category deals with people factor on progress of e-transformation. Country's existing workforce equipped with ICT skills can play role in planning, developing, and maintaining ICT, and also effectively leverage these technologies in the offices.

Education with its different stages supports development of ICT related skills. Basic education provides people with gaining basic computer skills. Secondary-level education and higher education support raising professional and technical workers to accomplish technological innovation.

Productivity of a country on innovation is a significant factor for achievement in research and development activities. "An innovation system refers to the network of institutions, rules and procedures that influences the way by which a country acquires, creates, disseminates and uses knowledge." [7] Proportion of patents, royalty payments and receipts, scientific and technical journals developed are considered as major outputs of research and development activities.

Table 4-3 Metrics of Human Capital

Metrics of Human Capital
Professional and Technical Workers as % of the Labor Force
Adult Literacy Rate
Digital Literacy Rate
Tertiary enrollment ratio
Secondary enrollment ratio
Schools having Internet access
Quality of Educational System
Patents granted by USPTO per million people
Total royalty payments and receipts (US$/pop.)
University-Company Research Collaboration

10 metrics out of 46 metrics are chosen to investigate human capital of a country. Selection is based on existence of metrics in majority of the studies examined. The metrics of Human Capital category are tabulated in Table 4-3. Databases of WB [64], WEF [63] and ITU [27] are consulted to gather data for the assessment.

Professional and Technical Workers as % of the Labor Force: Competitiveness in knowledge economy is vastly related to high proportion of white collar workers. To observe distribution of technical and scientific workforce, number of professional and technical workers as percentage of the labor force is estimated (2006-2007).

Adult Literacy Rate: Literacy is fundamental condition to establish Information Society. Proportion of literate people aged between 16 and 74 within society is evaluated through this metric (2007).

Digital Literacy Rate: Digital literacy has gained importance with increasing developments in ICT. Consequently, a society need arises to gain basic skills of ICT use. Proportion of ICT literate people within society is estimated with this metric (2007).

Tertiary Enrollment Ratio: Tertiary education refers the stage as university level. Rate of enrollment to universities is attempted to be estimated with this metric (2006).

Secondary Enrollment Ratio: Secondary level education is the stage in education following the primary level education. The schooling rate in secondary level is estimated with this metric (2006).

Schools having Internet access: The proportion of schools having Internet access is measured to find out degree of key ICT integration into education (2007-2008).

Quality of Educational System: The educational system is evaluated with regards to abilities of education to meet the needs of competitive economy (2007-2008).

Patents granted by USPTO per million people: This value demonstrates the number of U.S. patent documents (i.e. utility patents, design patents, plant patents, reissue patents, defensive publications, and statutory invention registrations) granted. This metric is weighted by million population (2002-2006).

Total royalty payments and receipts (US$/pop.): This metric intends to assess total "receipts between residents and nonresidents for the authorized use of intangible, non-produced, non-financial assets and proprietary rights (such as patents, copyrights, trademarks, industrial processes, and franchises) and for the use, through licensing agreements, of produced originals of prototypes (such as manuscripts and films)." (2006)

University-Company Research Collaboration: Collaboration of university and company to conduct researches contributes to production of academic and scientific outputs. This metric aims to measure density of collaboration (2007).

4.3.4. Political and Regulatory Environment

The nations understood the role of ICT for economic development and global competitiveness. Hence, governments have developed their national strategies considering impacts of ICT. Vision of authorities for e-government transformation is also crucial since leaders are setting the strategies of a country. An effective ICT strategy creates an environment promoting use of digital technology. In this way, citizens and organizations are encouraged to invest in and use ICT [6].

e-Transformation related rules and regulations are enablers for implementation phase of transformation. At the same time, progress of e-transformation depends on country's legal framework and laws governing Internet use [20]. Strength of the law making bodies, and regulations supporting ICT use (i.e. Laws relating to ICT, intellectual property protection, and property rights) are mainly investigated within this category.

This measurement category concentrates on two major issues: ICT strategy, and legal framework of the country. The metrics covered in political and regulatory environment are listed in Table 4-4. 9 out of 24 metrics are selected for evaluation of political and regulatory environment. These metrics are detected in majority of the studies investigated. Database of WEF [63] provides necessary data for assessment of these metrics.

Table 4-4 Metrics of Political and Regulatory Environment

Metrics of Political and Regulatory Environment
Government prioritization of ICT
Importance of ICT to government vision of the future
Laws relating to ICT
Quality of competition in the ISP sector
Effectiveness of law-making bodies
Judicial independence
Intellectual property protection
Efficiency of legal framework for disputes
Property rights

Government prioritization of ICT: e-Transformation strategy of a government is examined with this metric. The purpose is to observe to what extent governments prioritize ICT in their country strategies (2007).

Importance of ICT to government vision of the future: Implementation plans of governments related to utilization of ICT are investigated through this metric (2007). Strength of such a plan will improve the position of country in global competition.

Laws relating to ICT: This metric intends to assess both presence and sophistication level of laws developed to use electronic commerce, digital signatures, and consumer protection (2007).

Quality of competition in the ISP sector: High level competition between Internet Server Provides is reflected as decrease in costs of Internet access. More affordable Internet costs will increase the usage. With this metric, level of competition is intended to be measured (2007).

Effectiveness of law-making bodies: This metric aims to observe effectiveness level of national parliament/congress as a law making institution (2007).

Judicial Independence: The purpose of this metric is to inspect whether judiciary is taking decisions without political influences of members of government, citizens or firms (2007).

Intellectual property protection: Rights of inventors of various works (i.e. musical, literary, and artistic works; ideas, discoveries, inventions, words, phrases, symbols, and designs) are considered. With this metric, effectiveness of the laws which were set to protect rights of inventors is investigated. (2007)

Efficiency of legal framework for disputes: This metric intends to assess efficiency of legal framework to resolve conflict and to challenge the validity of government actions and/or regulations (2007).

Property rights: How property rights, including over financial assets are defined and protected by law is investigated. Success lies behind the clear definition and well protection of property rights (2007).

4.3.5. Economy Environment

Economy environment is recognized as supporting factor for e-transformation. General climate of the economy is examined through six metrics listed in Table 4-5. 6 economy metrics are chosen out of total 61 metrics detected in the studies.

These metrics are seen in majority of the studies investigated. For the assessment, data are gathered from WEF [63] and WB [64].

Table 4-5 Metrics of Economic Environment

Metrics of Economic Environment
Annual GDP Growth (%)
GDP (current US$ bill)
The level of taxes
Financial market sophistication
Intensity of local competition
Time required to start a business

Annual GDP Growth (%): With this metric, overall economic development of a country between years 2002 and 2006 is assessed. This is considered as a significant indicator in monitoring the progress of economy.

GDP (current US$ bill): This indicator provides total value of all services and goods produced by a country in a year. The GDP value is stated in US$ and considers the current values of the time measurement being conducted (2006).

The level of taxes: This index deals with extent and effect of taxes on incentives to work or investment (2007-2008). If the level rises to higher scores, impact of the taxes decreases to lower values.

Financial market sophistication: This metric intends to measure sophistication level of financial market in a country. The level is compared with and determined according to international norms (2007-2008).

Intensity of local competition: This metric aims to investigate level of competition in local market (2007-2008).

Time required to start a business: With this metric, number of days countries expect from businesses to start is estimated (2009).

4.3.6. Online Services and Applications

Online services and applications are developed as web based means to convey government services to citizens and businesses. Considering their business processes and related user duties, governmental agencies and ministries provide their services in online environment. Functionality and sustainability of each service is ensured by responsible agency or ministry itself. Generally a national portal is created to present online services from one single point. Communication between services is available through such a single source. In other words, this structure makes data sharing available among service databases previously separated and not communicating with each other.

Assessment of online services and applications is based on Web Measure category of UN's e-Government Study [50] [54]. This study is chosen because among the studies examining e-services UN's e-Government study both investigates the countries we selected and addresses the widely recognized aspects to evaluate services. Additionally, the reason to base the assessment in one study is that studies have provided integrated result for the assessment of online services and applications. Results of the indicators are not released separately. To evaluate functionality of online public services and applications of a nation, the measures listed in Table 4-6 are decided to be used.

Table 4-6 Measures of Online Services and Applications

Measures of Online Services and Applications
Information Dissemination/Outreach
Service Delivery Capability
Access/Usability
Citizen participation / Interconnectedness

Information Dissemination/Outreach: This measure concentrates on delivery of governmental information to public. Specifically, this measure intends to find out:

- Existence of a national website and ministerial websites including: education, finance, health, labor and/or social services
- Existence of a one-stop-shop national portal
- Existence of a Head of State website
- Existence of an e-government section
- Sources of archived information (laws, policy documents, priorities, etc.)
- News and/or updates on government policies
- Access to back office applications
- Chief Information Officer (CIO), or similar officer with a leadership role, to manage national cross-agency e-government programmes/projects
- Information concerning government officials responsible for the provision of specific online services/queries
- Personal account/profile of citizens, with the objective of enhancing dialogue between government and citizens
- Information for citizens on the usage of the website

Service Delivery Capability: With the use of this measure, it is intended to investigate web features to deliver services in a more functional manner. Following features are involved to assess service delivery capability:

- One-stop-shop for online services
- Downloadable/printable forms
- Online forms
- Job opportunities
- Online transactions
- E-mail alerts for e-participation
- Really Simple Syndication (RSS) use for e-participation
- Set turnaround time for government to respond to submitted forms/e-mails

Access/Usability: This measure analyses public services with respect to their level of access and usability. This measure mainly examines services to find out if they are involving:

- Search feature
- "Contact us" feature
- Audio and video features
- Multiple languages availability
- Use of wireless technology to send messages to mobile phones or devices
- Security (secure link) feature available/indicated
- Electronic signature feature
- Online payment by credit, debit, or other card methods
- E-mail sign-up option, either as a formal list-serv or simply for news items
- Existence of features to enable access for people with disabilities

Citizen participation/interconnectedness: This measure examines services with respect to their features for citizen participation. Assessment is based on following metrics:

- E-participation policy or mission statement
- Calendar listings of upcoming e-participation activities
- Archived information about e-participation activities
- E-participation tools to obtain public opinion (polls, surveys, bulletin boards, chat room, blogs, web casting, and discussion forums, etc.)
- Citizen feedback on the national strategy, policies and e-services
- Provision for publishing the results of citizen feedback
- Archive on responses by government to citizen's questions, queries and inputs

4.4. Calculation of e-Transformation Index

e-Transformation index reflects countries' level of e-transformation maturity. A mathematical formula is applied to produce the index. This index is calculated based on country performance over six measurement categories and set of metrics embedded into categories. The procedure of the calculation starts with data collection and ends with production of e-transformation index. Calculation procedure is composed of following steps:

1. At the beginning, all country data essential for metrics are collected from major research institutions. ITU, UN, WEF, and WB are four major institutions from which we obtained data during assessment. If there are more than one institution providing data for the same metric, more recent data is preferred.

2. Based on values in Step-1, countries are sorted from top scorer to least scorer. Regarding each individual metric, distinct rankings are obtained.

3. Since each metric has its own range of scores, calculation for measurement categories can be performed after normalization procedure. To be more specific, in order to place all data in identical scale of measurement, normalization procedure is applied. The normalization procedure is based on Knowledge Assessment Methodology of World Bank. The formula in WB's methodology is widely used formula for the normalization. The formula applied is detailed as follows [64]:

Normalized score=10*(1-Highers/All)
Highers: Number of countries scoring higher than country being assessed
All: Total number of countries assessed

Normalized scores range between 0 and 10. The lowest score is 0. Rising to higher scores indicates the country progress. Top scorer country is graded with 10.

4. Following the normalization procedure, scores for the measurement categories are calculated. Calculation of a category score is performed by averaging the normalized scores of the set of metrics included in that category. This step will produce 6 groups of data.

5. Calculation of e-transformation index is the final step. Averaging measurement category scores produced in Step-4 will create e-transformation index for each country investigated. e-Transformation index ranges between 0 and 10 as the scores of measurement categories do.

To summarize, while developing e-transformation index, inductive approach is followed. The procedure of the calculation initiates with scoring each metric individually. Country's scores in metrics are converted to normalized scores. Averaging the scores of the set of metrics produces the performance for the associated measurement category. Ultimately, e-transformation index is calculated by averaging the scores for six measurement categories the government has obtained.

CHAPTER – 5

ANALYSIS

e-Transformation metric system systematically described in Chapter-4 has been applied for a number of countries located in different regions of the world. Countries are assessed through measurement factors of the system. The analysis is initiated with scoring all metrics for each country individually. Data essential for the metrics are obtained from secondary sources issued by major research institutes. Based on scores of the metrics, performances of countries according to measurement categories are calculated. As the overall output, the system produces e-transformation index for each country evaluated.

5.1. Countries Assessed

In order to apply e-transformation metric system, totally 30 countries from five world regions are selected to be analyzed. Selection is based on two major criteria. The first concern is availability of country data within majority of the international e-government evaluation studies. The other concern is related to investigation of countries from majority of the regions in the world. Number of countries to be included from one region is determined in accordance with total number of countries taking place in that region. Table 5-1 demonstrates distribution of assessed countries into five regions – Africa, America, Asia, Europe and Oceania.

Table 5-1 Countries Assessed

Region	Countries Assessed	Total # of Countries
Africa	Algeria, Botswana, Egypt, Ethiopia, Kenya, Mauritius, Mozambique, Nigeria	53
America	Argentina, Brazil, Canada, Mexico, United States, Venezuela	35
Asia	China, India, Indonesia, Japan, Malaysia, Singapore, Sri Lanka, Turkey	47
Europe	Austria, Finland, Italy, Spain, Sweden, Russia	43
Oceania	Australia, New Zealand	14

5.2. Findings

This section is dedicated to explore findings of the analysis of selected countries. The findings are explained in two sub sections. Firstly, analysis of one country is revealed to illustrate the calculation methodology of e-transformation index. The second part explains the overall performance of 30 countries concentrating on six measurement categories of e-transformation metric system.

Throughout the analysis, essential data are obtained from major research institutions such as International Telecommunications Union (ITU), United Nations (UN), World Economic Forum (WEF), and World Bank (WB).

5.2.1. An Example

In order to illustrate the methodology developed to calculate e-transformation index, analysis of Turkey is given as an example. Firstly, we concentrate of "technology

infrastructure" measurement category. According to our system, there are nine metrics included in this category. Turkey's actual scores in metrics of technology infrastructure are tabulated in Table 5-2. Data for assessment of the metrics are obtained from ITU and WB.

Table 5-2 Turkey's Actual Scores in Technology Infrastructure

Metric	**Actual Score**
Proportion of households with computer (% of households)	28.5
Proportion of households with Internet (% of households)	18.9
Mobile cellular subscriptions per 100 inhabitants	82.8
Fixed telephone lines per 100 inhabitants	24.3
Broadband per 100 inhabitants	6.08
Secure Internet servers per 1 million inhabitants	25
International Internet bandwidth per Internet user (bit/s)	8390
Mobile cellular prices (% of GNI per capita)	N.A.
Broadband Internet prices (% of GNI per capita)	N.A.

The scale of measurement for the actual scores is changing among metrics. For instance, while number of fixed lines is estimated per 100 inhabitants, number of secure Internet servers is estimated per 1 million inhabitants. The diversification between scales encourages the normalization procedure. In order to conduct normalization, initially scores of the countries are sorted from highest to lowest. Then, place of the country is detected, and normalization procedure is applied. To illustrate, countries' sorted scores in "proportion of households with computer" metric are given in Table 5-3.

Table 5-3 Countries' Scores in "proportion of households with computer" Metric

Rank	Country	Actual Scores	Normalized Scores
1	Japan	85	10.00
2	Sweden	83	9.67
3	Canada	79.1	9.33
4	New Zealand	75.7	9.00
5	Finland	74	8.67
6	Australia	73	8.33
7	Austria	71	8.00
8	United States	70.2	7.67
9	Singapore	60.4	7.33
10	Italy	53	7.00
11	Spain	52	6.67
12	China	39.1	6.33
13	Argentina	36.4	6.00
14	Malaysia	35.9	5.67
15	Turkey	28.5	5.33
16	Mauritius	27.8	5.00
17	Mexico	22.1	4.67
18	Brazil	20.8	4.33
19	Russia	16.2	4.00
20	Egypt	16.1	3.67
21	Venezuela	11.9	3.33
22	Algeria	8.3	3.00
23	Indonesia	8.1	2.67
24	Sri Lanka	7.8	2.33
25	Kenya	5.5	2.00
26	Nigeria	5.1	1.67
27	Botswana	4.5	1.33
28	Mozambique	3.8	1.00
29	India	3.7	0.67
30	Ethiopia	0.2	0.33

According to metric- proportion of households with computer-, Turkey stands in the 15th position with its 28.5% of households having computer. Total number of countries assessed is 30, and there are 14 countries scored higher than Turkey. When we apply the formula of normalization, we found that Turkey has obtained 5.33

within the 0-10 scale. In other words, Turkey's score 28.5 is converted to 5.33 when we consider performance of the countries within the sample and applying the normalization procedure. Scores of all countries are converted in a similar way and corresponding normalized values are obtained. Same procedure is followed for other metrics within technology infrastructure category. For metrics of technology infrastructure category, normalized scores of Turkey are given in Table 5-4.

Table 5-4 Turkey's Normalized Scores in Technology Infrastructure

Metric	**Normalized Score**
Proportion of households with computer (% of households)	5.33
Proportion of households with Internet (% of households)	5.33
Mobile cellular subscriptions per 100 inhabitants	5.33
Fixed telephone lines per 100 inhabitants	5.67
Broadband per 100 inhabitants	6.00
Secure Internet servers per 1 million inhabitants	6.33
International Internet bandwidth per Internet user (bit/s)	7.00
Mobile cellular prices (% of GNI per capita)	N.A.
Broadband Internet prices (% of GNI per capita)	N.A.

Scoring the set of metrics is followed with calculation of the country performance regarding measurement category. By averaging the scores in Table 5-4, Turkey's score in "Technology Infrastructure" measurement category is calculated. Same steps are repeated for other five measurement categories, and finally, Turkey's performances in six categories are obtained. Scores of Turkey in six measurement categories of the system are presented in Figure 5-1.

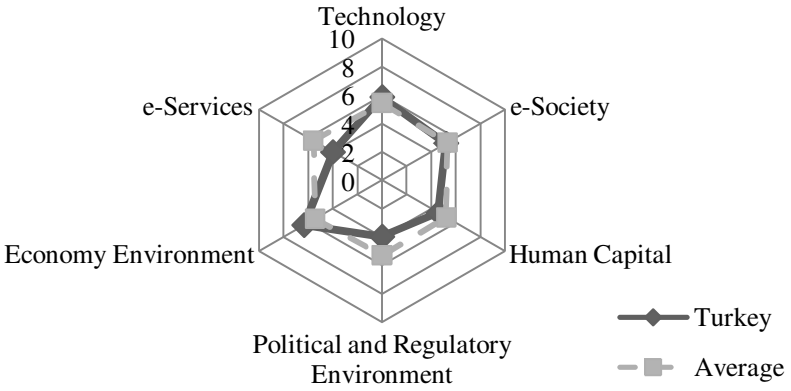


Figure 5-1 Turkey's Performance in Measurement Categories

The overall outcome of the system is e-transformation index. In order to calculate e-transformation index, normalized scores of countries in six measurement categories are averaged. When the scores of Turkey in Figure 5-1 are averaged, 5.13 is obtained as e-transformation index. Countries' scores in measurement categories, e-transformation index, and rankings are presented in Appendix-C.

5.3. e-Transformation Maturity of the Countries

The countries assessed are ranked with regard to their value of e-transformation index. Figure 5-2 demonstrates e-transformation performance of the countries.

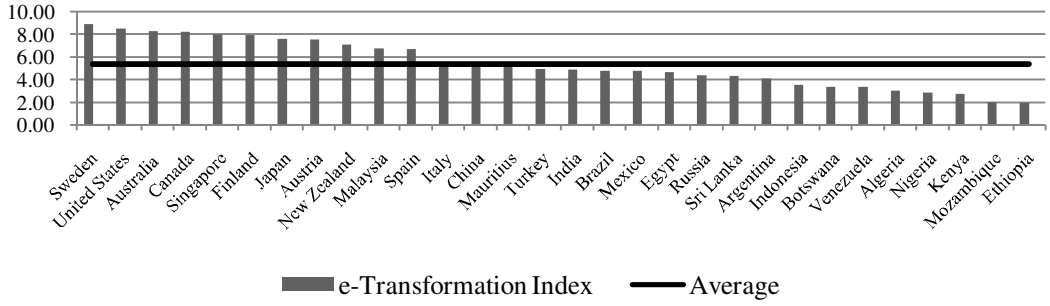


Figure 5-2 e-Transformation Performance of the Countries

Countries' average on e-transformation index is calculated as 5.40. Results of the ranking clearly shows that Sweden takes the number one spot with its score 8.91. The United Stated scoring 8.55 attains the second place. Turkey scores 4.99 and stands slightly below the average. The least scorer country is Ethiopia with its 1.98 e-transformation index value.

5.3.1. Technology Infrastructure

The major measurement factors considered in technology infrastructure are availability of key ICT infrastructure, bandwidth of network, and affordability of broadband Internet and mobile phones. The countries are evaluated in the light of metrics within these three factors. Ranking of the countries with regard to technology infrastructure is demonstrated in Figure 5-3.

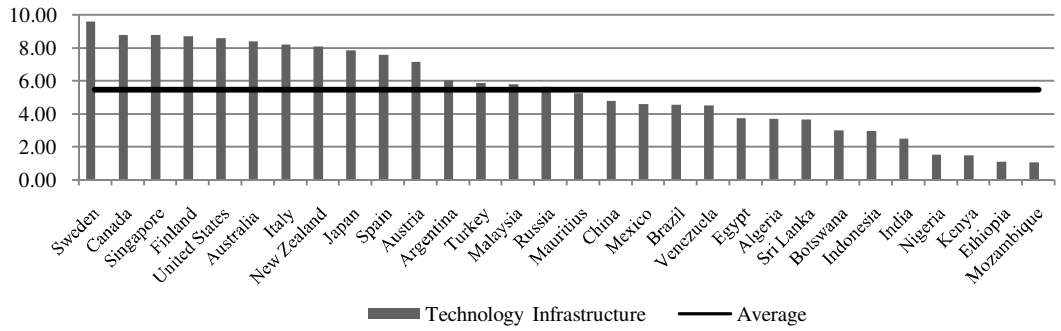


Figure 5-3 Countries' Performance in Technology Infrastructure

The overall 5.45 score achieved on technology infrastructure is the average of all the assessed countries. With its overall 9.59 score, Sweden keeps the leadership of the country ranking. The second place goes to Canada and Singapore with an equal score of 8.78. Turkey obtains 5.86 and stands in 13th in the ranking. The lowest scorer country is Mozambique with its technology score, 1.07.

5.3.2. e-Society

e-Society category attempts to measure level of ICT use and adoption by three e-transformation stakeholders: citizens, businesses and governments. Ranking of the countries assessed according to e-society category is given in Figure 5-4.

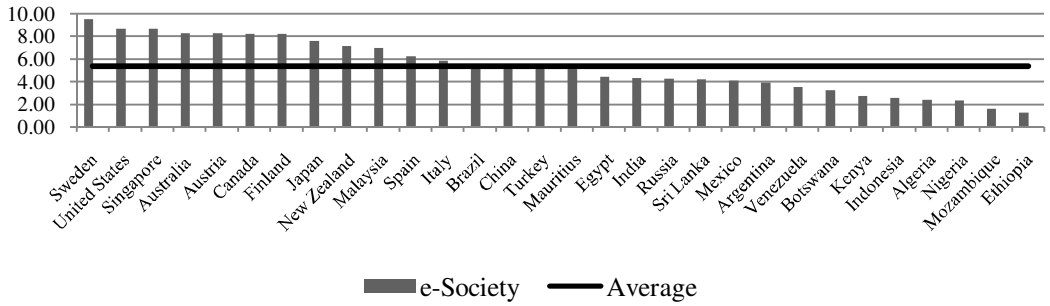


Figure 5-4 Countries' Performance in e-Society

The average score of all the assessed countries on e-society category is 5.34. With its 9.57 score, Sweden attains the leadership of the country ranking. In the second place The second place goes to United States and Singapore with an equal score of 8.70. From the perspective of e-society, Turkey scores 0.14 below the average of 5.34. The worst scorer country is Ethiopia with its overall score 1.23.

5.3.3. Human Capital

Through human capital measurement category, countries are assessed with respect to three aspects: technical workforce, system of education, and innovation system. Ranking of the countries in human capital category is given in Figure 5-5.

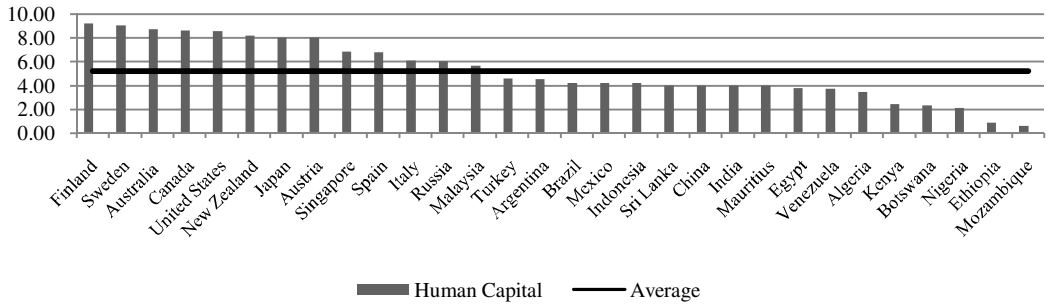


Figure 5-5 Countries' Performance in Human Capital

The average score calculated for human capital is 5.24. Finland achieved the highest score on human capital. Finland's score is 9.24, far above the average. Sweden keeps the second place with its score 9.10. Turkey stands in 14th position with its overall 4.57 score below the average. The lowest scorer country is Mozambique with its overall score 0.62.

5.3.4. Political and Regulatory Environment

The political and regulatory environment of a country is evaluated according to two dimensions: ICT strategy and legal framework. Ranking of the countries with regards to political and regulatory category is demonstrated in Figure 5-6.

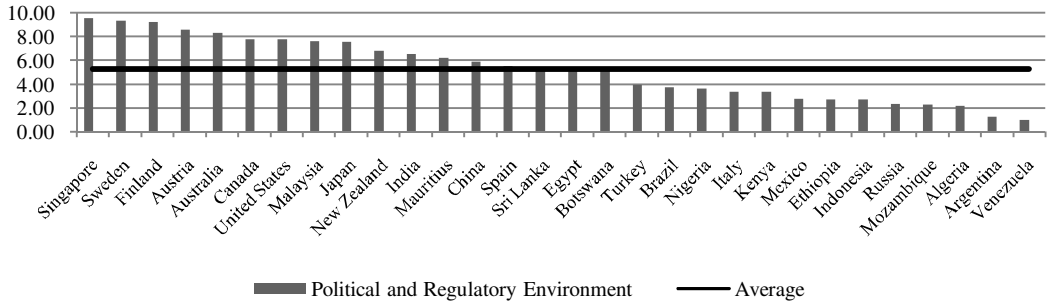


Figure 5-6 Countries' Performance in Political and Regulatory Environment

The overall 5.29 score achieved on political and regulatory environment is the average of all the assessed countries. Singapore is the leading country with its score 9.59. Sweden is taking place in the second position with its 9.33 score. Turkey scores 3.96 and stands in the 18th position. The worst scorer country is Venezuela with its score 1.04.

5.3.5. Economy Environment

Countries' economy climate promoting the e-transformation and national development are intended to be assessed. Ranking of the countries with regards to economy environment category is demonstrated in Figure 5-7.

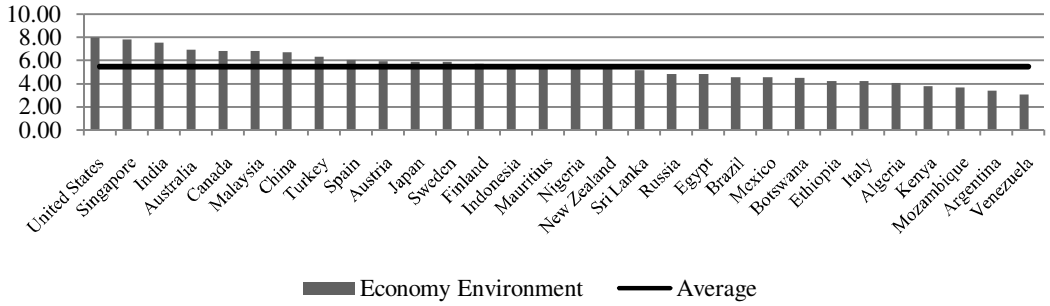


Figure 5-7 Countries' Performance in Economy Environment

The average performance of the countries according to economy conditions is 5.46. With its overall 8.00 score, United States achieves the leadership of the country ranking. The second place goes to Singapore with score 7.83. Turkey scores 6.33 and takes place in 8th in the ranking. Venezuela is the lowest scorer country with its overall score 3.11.

5.3.6. Online Services and Applications

e-Government services with respect to features- information dissemination, service delivery, access/usability, and citizen participation/interconnectedness are intended to be evaluated through this category. Ranking of the countries with regards to online services and applications category is demonstrated in Figure 5-8.

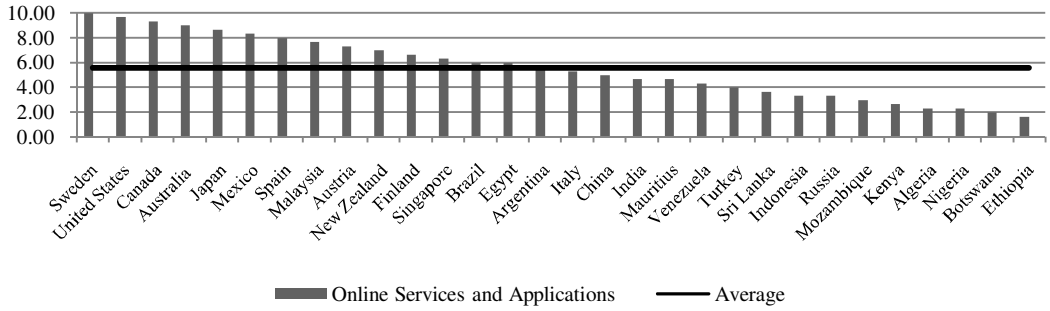


Figure 5-8 Countries' Performance in Online Services

Average performance is calculated as 5.6. Results of the ranking obviously reveals that Sweden takes the number one spot with its score 10.00. The second place is achieved by United States with its score as 9.67. Turkey scores 4.00 and stands in the 21st place. The least scorer country is Ethiopia with its 1.67 score related to online services and applications.

CHAPTER – 6

JUSTIFICATION

Previous chapter presented the findings of the implementation of e-transformation metric system. This chapter discusses justification of the e-transformation metric system proposed.

e-Government evaluation studies of the major research institutions are considered to conduct justification. To justify the system, countries' scores in each measurement category are compared with the scores in same aspect of the previously constructed methods. Additionally, e-transformation index produced is compared with indices of the methods investigated. By applying the statistical method, namely, Pearson product-moment correlation, it is found out that there is large correlation between the scores produced by the system proposed and the scores of the methods developed by major research institutes. This finding is accepted as strong evidence to confirm an approach adopted.

6.1. Current e-Government Evaluation Models

In Chapter-3, eighteen e-government evaluation methods are introduced. Of the methods, UN's e-Government Survey, EIU's e-Readiness Rankings, WEF's Network

Readiness Index, Brown University's Global e-Government, WB's Knowledge Assessment Methodology, and ITU's Digital Access Index have published their findings. Hence findings of these six studies are considered to conduct comparison between findings of our system.

6.2. Relationship between Countries' e-Transformation Performance in e-Transformation Metric System and in e-Government Evaluation Models

To allow the comparison between findings, initially, we applied the normalization process for the scores produced by seven studies. To be more specific, we standardized the scores published by the studies to their representative scores in range of 0 to 10.

In order to perform validation of our system, we compared our grading with the studies' grading for the same countries. Countries' scores are compared with regard to system's measurement categories; namely, technology infrastructure, e-society, human capital, political and regulatory environment, economy environment, and online services. We assured that country scores in each measurement category of our system are compared with scores in same category included in e-government evaluation methods previously constructed. Countries' e-transformation index with indices of major research institutions is also compared.

The countries' scores in e-transformation are entered on the SPSS 15.0 program. The scores range between 0 and 10. While 0 indicates the lowest score, 10 indicates the highest score. The data are analyzed by using both descriptive and inferential statistical tools of SPSS.

To examine whether there is a relationship between countries' performances with regard to our system and their performances according to studies reviewed, Pearson

product-moment correlations are performed regarding the scores in our system and the scores in the studies.

6.2.1. Relationship between Countries' Technology Infrastructure Performance in e-Transformation Metric System and in e-Government Evaluation Models

Technology related scores are published by five e-government evaluation studies which are UN's e-Government Survey, EIU's e-Readiness Rankings, WEF's Network Readiness Index, WB's Knowledge Assessment Methodology, and ITU's Digital Access Index.

The relationship between countries' technology infrastructure scores in our system and in five e-government evaluation studies is investigated by applying Pearson product-moment correlation coefficient. The procedure is illustrated with description of the steps in UN's e-Government Survey. For other studies, same procedure is applied to find out correlation between scores generated by e-Transformation Metric System and by the studies examined.

UN's e-Government Survey

Before calculating Pearson product-moment correlation, preliminary analyses are conducted to ensure that there is no violation of the assumptions of normality, linearity and homoscedasticity.

To check the normality of the distribution of countries' scores on technology infrastructure, results of the Kolmogorov-Smirnov statistic are considered. A non-significant result ($p > .05$) is obtained; hence normal distribution is satisfied with regard to technology infrastructure both in our system and UN's e-Government Survey. Table 6-1 presents the results of Kolmogorov-Smirnov statistic of countries' scores on technology infrastructure of our system.

Table 6-1 Kolmogorov-Smirnov Results for Technology Infrastructure of e-Transformation Metric System

	Kolmogorov-Smirnov(a)			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
e-Transformation Metric System	.124	30	.200(*)	.943	30	.112

Table 6-2 presents the results of Kolmogorov-Smirnov statistic of countries' scores on infrastructure of UN's e-Government Survey.

Table 6-2 Kolmogorov-Smirnov Results for Infrastructure of UN's e-Government Survey

	Kolmogorov-Smirnov(a)			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
UN	.103	30	.200(*)	.975	30	.688

In order to perform calculation of correlation coefficients correctly, the relationship between the two variables needs to be linear [41]. The scatter plot shown in Figure 6-1 is used to investigate the relationship between the technology scores in our system and UN's survey.

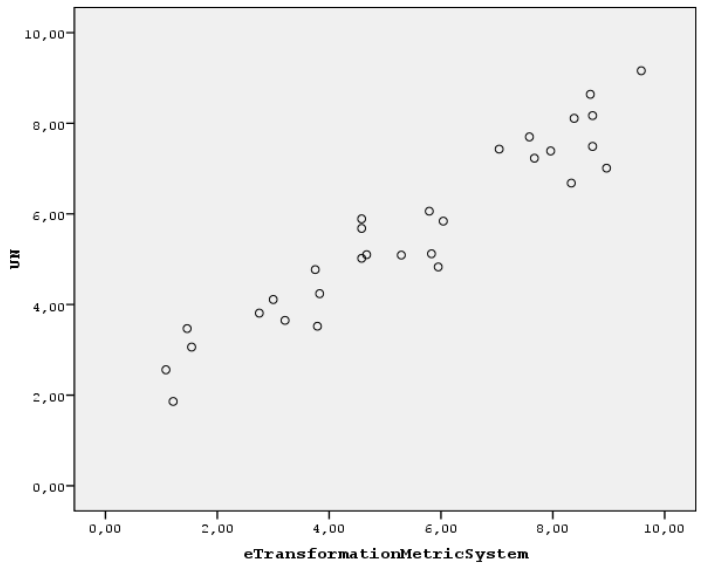


Figure 6-1 Scatterplot of e-Transformation Metric System and e-Government Survey in Technology

The figure clearly shows that variables tend to move in the same direction. Hence, linearity is satisfied according to the scatterplot generated to examine the relationship between the technology scores in our system and UN's survey. The scores in the scatterplot are approximately spread in a cigar shape, and homoscedasticity is also confirmed. The results of Pearson product-moment correlation are presented in Table 6-3.

Table 6-3 Results of the Bivariate Correlations of e-Transformation Metric System and e-Government Survey in Technology

		UN	e-Transformation Metric System
UN	Pearson Correlation	1	.952(**)
	Sig. (2-tailed)		.000
	N	30	30
e-Transformation Metric System	Pearson Correlation	.952(**)	1
	Sig. (2-tailed)	.000	
	N	30	30

The results revealed that there is a significant large positive correlation between the two variables, [r = .95, n = 30, p < .05], with countries' technology infrastructure scores in e-Transformation Metric System with countries' technology scores in UN's survey.

The relationship between technology infrastructure (as measured by e-Transformation Metric System) and technology (as measured by studies) is investigated using Pearson product-moment correlation coefficient. Preliminary analyses are performed to ensure no violation of the assumptions of normality, linearity and homoscedasticity. The results of Pearson product-moment correlation for technology infrastructure are presented in Table 6-4.

Table 6-4 Correlations Regarding Technology Infrastructure

Survey Pairs		Correlation
Technology Infrastructure (e-Transformation Metric System)	Technology (UN's e-Government Survey)	0.95
Technology Infrastructure (e-Transformation Metric System)	Connectivity and Technology Infrastructure (EIU's e-Readiness Rankings)	0.95
Technology Infrastructure (e-Transformation Metric System)	Infrastructure Environment (WEF's Network Readiness Index)	0.91
Technology Infrastructure (e-Transformation Metric System)	ICT (WB's Knowledge Assessment Methodology)	0.96
Technology Infrastructure (e-Transformation Metric System)	Infrastructure (ITU's Digital Access Index)	0.95

The results revealed that there is a significant large positive correlation between the two variables with countries' technology infrastructure scores in e-Transformation Metric System with countries' technology scores in each of five e-government evaluation studies.

6.2.2. Relationship between Countries' e-Society Performance in e-Transformation Metric System and in e-Government Evaluation Models

From the perspective of e-society, three e-government evaluation studies (i.e. EIU's e-Readiness Rankings, WEF's Network Readiness Index, and ITU's Digital Access Index) have performed the assessment. The relationship between countries' e-society scores in our system and in three e-government evaluation studies is investigated by applying Pearson product-moment correlation coefficient. Preliminary analyses are performed to ensure no violation of the assumptions of normality, linearity and homoscedasticity. The results of Pearson product-moment correlation are presented in Table 6-5.

Table 6-5 Correlations Regarding e-Society

Survey Pairs		Correlation
e-Society (e-Transformation Metric System)	Consumer and Business Adoption (EIU's e-Readiness Rankings)	0.92
e-Society (e-Transformation Metric System)	Use (WEF's Network Readiness Index)	0.92
e-Society (e-Transformation Metric System)	Usage (ITU's Digital Access Index)	0.89

The results indicated that there is a significant large positive correlation between the two variables with countries' e-society scores in e-Transformation Metric System with countries' e-society related scores in each of three e-government evaluation studies.

6.2.3. Relationship between Countries' Human Capital Performance in e-Transformation Metric System and in e-Government Evaluation Models

Human capital related scores are published by three e-government evaluation studies which are UN's e-Government Survey, EIU's e-Readiness Rankings, and WB's Knowledge Assessment Methodology. The relationship between countries' human capital scores in our system and in three e-government evaluation studies is investigated by applying Pearson product-moment correlation coefficient. Preliminary analyses are performed to ensure no violation of the assumptions of normality, linearity and homoscedasticity. The results of Pearson product-moment correlation are presented in Table 6-6.

Table 6-6 Correlations Regarding Human Capital

Survey Pairs		Correlation
Human Capital (e-Transformation Metric System)	Human Capital (UN's e-Government Survey)	0.95
Human Capital (e-Transformation Metric System)	Social and Cultural Environment (EIU's e-Readiness Rankings)	0.90
Human Capital (e-Transformation Metric System)	Education (WB's Knowledge Assessment Methodology)	0.94

The results revealed that there is a significant large positive correlation between the two variables with countries' human capital scores in e-Transformation Metric System with countries' human capital related scores in each of three e-government evaluation studies.

6.2.4. Relationship between Countries' Political and Regulatory Environment Performance in e-Transformation Metric System and in e-Government Evaluation Models

Scores related to political and regulatory environment are published by two e-government evaluation studies which are EIU's e-Readiness Rankings and WEF's Network Readiness Index. The relationship between countries' scores with regard to political and regulatory environment in our system and in two e-government evaluation studies is investigated by applying Pearson product-moment correlation coefficient. Preliminary analyses are conducted to ensure no violation of the assumptions of normality, linearity and homoscedasticity. The results of Pearson product-moment correlation are presented in Table 6-7.

Table 6-7 Correlations Regarding Political and Regulatory Environment

Survey Pairs		Correlation
Political and Regulatory Environment (e-Transformation Metric System)	Legal Environment (EIU's e-Readiness Rankings)	0.58
Political and Regulatory Environment (e-Transformation Metric System)	Government Policy and Vision (EIU's e-Readiness Rankings)	0.73
Political and Regulatory Environment (e-Transformation Metric System)	Political and Regulatory Environment (WEF's Network Readiness Index)	0.95

The results indicated that there is a significant normal positive correlation between the two variables with countries' political and regulatory environment scores in e-Transformation Metric System with countries' related scores in EIU's e-Readiness Rankings. And, there is a significant large positive correlation between the two variables with countries' political and regulatory environment scores in e-

Transformation Metric System with countries' political and regulatory environment related scores in WEF's Network Readiness Index.

6.2.5. Relationship between Countries' Economy Environment Performance in e-Transformation Metric System and in e-Government Evaluation Models

Scores regarding economy environment are published by three e-government evaluation studies which are EIU's e-Readiness Rankings, WEF's Network Readiness Index and WB's Knowledge Assessment Methodology. The relationship between countries' scores with regard to economy environment in our system and in three e-government evaluation studies is investigated by applying Pearson product-moment correlation coefficient. Preliminary analyses are conducted to ensure no violation of the assumptions of normality, linearity and homoscedasticity. The results of Pearson product-moment correlation are presented in Table 6-8.

Table 6-8 Correlations Regarding Economy Environment

Survey Pairs		Correlation
Economy Environment (e-Transformation Metric System)	Business Environment (EIU's e-Readiness Rankings)	0.53
Economy Environment (e-Transformation Metric System)	Market Environment (WEF's Network Readiness Index)	0.79
Economy Environment (e-Transformation Metric System)	Economic Intensive Regime (WB's Knowledge Assessment Methodology)	0.63

The results indicated that there is a significant normal positive correlation between the two variables with countries' economy environment scores in e-Transformation Metric System with countries' related scores in EIU's e-Readiness Rankings and WB's Knowledge Assessment Methodology. And, there is a significant large positive correlation between the two variables with countries' economy environment scores in e-Transformation Metric System with countries' economy environment related scores in WEF's Network Readiness Index.

6.2.6. Relationship between Countries' Online Services Performance in e-Transformation Metric System and in e-Government Evaluation Models

Scores related to online services are published by Brown University's Global e-Government. The relationship between countries' scores with regard to online services in our system and in Brown University's study is investigated by applying Pearson product-moment correlation coefficient. Preliminary analyses are conducted to ensure no violation of the assumptions of normality, linearity and homoscedasticity. The results of Pearson product-moment correlation are presented in Table 6-9.

Table 6-9 Correlations Regarding Online Services and Applications

Survey Pairs		Correlation
Online Services and Applications (e-Transformation Metric System)	Global e-Government (Brown University)	0.56

The results indicated that there is a significant normal positive correlation between the two variables with countries' online services and applications scores in e-Transformation Metric System with countries' related scores in Brown University's Global e-Government study.

6.2.7. Relationship between Countries' e-Transformation Performance in e-Transformation Metric System and in e-Government Evaluation Models

Five studies - UN's e-Government Survey, EIU's e-Readiness Rankings, WEF's Network Readiness Index, WB's Knowledge Assessment Methodology, and ITU's Digital Access Index- have produced e-transformation indices for the countries.

The relationship between countries' e-transformation scores in our system and in five studies is investigated by applying Pearson product-moment correlation coefficient. Preliminary analyses are conducted to ensure no violation of the assumptions of normality, linearity and homoscedasticity. The results of Pearson product-moment correlation are presented in Table 6-10.

Table 6-10 Correlations Regarding e-Transformation

Survey Pairs		Correlation
e-Transformation Index (e-Transformation Metric System)	e-Government Readiness Index (UN's e-Government Survey)	0.95
e-Transformation Index (e-Transformation Metric System)	e-Readiness (EIU's e-Readiness Rankings)	0.94
e-Transformation Index (e-Transformation Metric System)	Network Readiness Index (WEF's Network Readiness Index)	0.99
e-Transformation Index (e-Transformation Metric System)	Knowledge Economy Index (WB's Knowledge Assessment Methodology)	0.95
e-Transformation Index (e-Transformation Metric System)	Digital Access Index (ITU)	0.92

The results revealed that there is a significant large positive correlation between the two variables with countries' e-transformation scores in e-Transformation Metric System with countries' e-transformation scores in each of five e-government evaluation studies.

CHAPTER – 7

CONCLUSION AND LIMITATIONS

Assessment of e-government plays a crucial role to define success and shortcomings of government's e-transformation process. In this thesis, we intend to answer two major questions:

1) What is the maturity level of e-transformation of Turkey in government level?
2) Which measures are appropriate to measure maturity level of e-transformation?

In order to respond to these questions, initially, we investigated analysis of Turkey's e-performance in terms of findings of international e-government evaluation studies. And, we offered an e-transformation metric system to be used for assessment of e-transformation of governments.

This chapter provides summary of our actions to conduct the thesis, contribution and limitations of the study, and presentation of some further study.

7.1. Summary

In this study, we investigated eighteen e-government evaluation studies developed by major research institutions. The investigation provides us to identify mutual measurement factors of the studies. In the light of this information, we established an e-transformation metric system derived from the studies reviewed. Specifically, our system is built to include core metrics distributed over measurement factors widely recognized as significant aspects to assess e-transformation. To experiment the system, we examined 30 countries located in five regions of the world. Essential data regarding the countries are gathered from database of major research institutions (i.e. UN, WEF, WB, and ITU). Results of the analysis reveal the overall performance of the countries. Besides, country scorecards are developed to publish the individual e-performance of the countries. For the justification of the system, we compared our findings with findings of the some e-government evaluation studies reviewed. Use of Pearson-product moment correlation shows the strong correlation across the findings. Hence, this proves the reliability of our evaluation method.

Additionally, we found reasonable to examine Turkey's e-performance in terms of e-government evaluation methods. In this regard, we included Turkey's e-transformation scores and ranking results compared to other countries.

7.2. Contribution

Review of the literature indicates that there are some methods offered for evaluation of e-transformation. However, there is not such a model including both essential and reasonable number of measures. Main contribution of our study is to propose an e-transformation evaluation method including key measurement factors.

7.3. Limitations

1. The sample size of the study is 30 out of the population size with 192 countries. But in fact, system needs to be applied to more sample countries.

2. The study can be considered as pilot study to test the system. Hence, system can be improved to be more mature.

3. The system gives identical weights for its each measure. However, with assigning weights in parallel with significance of the measure for e-transformation, more distinguishing analysis can be performed.

7.4. Future Work

1. e-Transformation metric system needs to be experimented with more sample countries. The system has not been applied to some regions because of the lack of data.

2. An automated supporting tool for the system can be developed to facilitate the assessment.

3. e-Transformation metric system can be repeated in the next few years.

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APPENDICES

APPENDIX-A E-TRANSFORMATION METRICS

POLITICAL AND REGULATORY ENVIRONMENT	
Strategy	
Government prioritization of ICT	ICT Managers / Responsibilities
Importance of ICT to government vision of the future	Familiarity level of policy makers related to connectedness policy issues
Base of government's purchase decisions	
e-Government Readiness assessment	Quality of partnerships between industry leaders and government to improve e-Readiness
Government spend on ICT as a proportion of GDP	
Online procurement	
Legacy	
Laws relating to the use of ICT	Independency of judiciary from political influences
Level of competition among Internet Service Providers	Legal framework for private businesses
Intellectual property protection	Number of procedures from the moment the plaintiff files a lawsuit in court until the moment of payment
Level of tariffs on trade of ICT equipment	
Property rights	Number of days required to resolve a dispute
Existence of regulatory framework that encourages multiple carriers to operate competitively in telecommunications sector	Level of effort to promote access for all citizens
	Level of censorship
	Ease of registering a new business
Effectiveness of national Parliament/Congress as a law-making institution	Level of allowance for foreign direct investment

TECHNOLOGY	
Infrastructure	
PCs per 100 inhabitants	Presence of Public Internet Access Points (PIAPs)
Internet per 100 inhabitants	Internet servers per 100 inhabitants
Mobile phone per 100 inhabitants	Availability of electricity in homes
Fixed phone per 100 inhabitants	Per capita electricity production
Broadband per 100 inhabitants	Mobile Wireless Data service
TV per 100 inhabitants	Wifi hotspot per 100 inhabitants
Radio per 100 inhabitants	Existence of advertising for online companies
ISP per 100 inhabitants	Existence of local website
Number of private providers leased lines to businesses	Number of registered domains per 1000 people
Quality	
Internet connection type of businesses /homes (Dialup, DSL, ISDN, Wireless)	Number of high-speed data wired provider
	Number of voice/data wireless provider
Percentage of pocket loss by the network	Duration of wired /fixed wireless installation
International Internet bandwidth per 10000 inhabitants	Mobile wireless data flat rate
Degree of opportunities for public Internet access	Presence of radio spectrum for voice/data/video
Percentage of successful phone calls	Frequency of local websites inaccessible
Internet backbone capacity	Percent of additional (non-primary) lines
Presence of hardware, software solutions to local needs	Existence of network upgrades
Duration for mainline installation	Reliability of electricity supply
Duration to resolve mainline problems	Standards for interconnection and interoperability
Existence of technical personnel	Availability of latest technologies
Affordability/Pricing	
Pricing structure for dialup telecommunication services	Monthly phone charge per capita income
Internet access tariffs per capita income	Broadband charge per capita income
Mobile access tariffs per capita income	Affordability of hardware/software solutions
Broadband affordability	Affordability of phone charges
Base of buyers' purchasing decision	Affordability of internet charges
ICT sector	
Way of regulation in market for ICT infrastructure	Presence of foreign providers for wireless services
Extent of government adoption to international principles	Presence of foreign investment
	Ease of importing and exporting goods
Economy's accede to WTO Information Technology Agreement	Royalties and fees received
	High-technology and medium-technology exports
Information Security	
Existence of information security breach	Effects of security concerns on online shopping behavior
Percent of connections with firewall	
Encryption frequency of sensitive business and personal e-mail	Type of information security breaches
	Major cause of security breaches in organizations
Update frequency of virus software	Existence of information security policy
Percent of digital signature use	Type of tools used for information security
Legal protection for intellectual property rights	Importance of high costs for security measures as
Electronic privacy protection	Importance of lack of staff training as barrier
Legal framework for information security	Importance of lack of staff time as barrier
Level of concern about data security	Importance of complexity of technology as barrier
Level of concern about privacy and confidentiality	Importance of lack of employee co-operation as barrier
Online shopping rate	

E-SOCIETY	
ICT Use by Citizens	
Internet users per 100 inhabitants	Mobile usage rate
Cellular phone users per 100 inhabitants	Frequency of e-mail use
PC users per 100 inhabitants	Age distribution in Internet use
Broadband users per 100 inhabitants	Educational background of Internet users
Fixed telephone users per 100 inhabitants	Occupation of Internet users
Purpose of Internet use	PC/Internet usage of urban/rural
Usage degree of online bulletin-board systems, Usenet groups, newsletters, and/or listservs	Ratio of (Fixed) Broadband Internet subscribers to total Internet subscribers
Frequency of Internet use	Ratio of (Mobile) Broadband Internet subscribers to mobile Internet subscribers
Time spent on using Internet in a week	
ICT Use by Businesses	
Proportion of businesses using Internet	Diffusiveness of licensing of foreign technology
Proportion of businesses using computer	Level of new technology absorption
Proportion of employees using Internet	Availability/Reliability of new phone lines
Proportion of businesses with a Web presence	e-Mail Accounts per 100 business employees
Proportion of businesses receiving orders over the Internet	Proportion of employees using computers
	Proportion of businesses with an intranet
Proportion of businesses placing orders over the Internet	Services provided by enterprises from their webs
	Percent of enterprises using web for communication between public organizations
Purpose of businesses' Internet use	
Proportion of employees having access to telephone	Percent of enterprises employ information expert
Proportion of businesses with LAN	
e-Participation	
Availability of e-participation policy	Availability of non-formal online consultation
Availability of e-mail alerts	Government's commitment to incorporating results of e-participation
Availability of RSS	
Availability of calendar	Availability of explicit acknowledgement of received e-opinions, e-deliberations and e-interactions
Government's use of polls to solicit citizen opinion	
Government's use of chat/instant messaging	Presence of 'sent receipt' sent to citizens after receiving input
Government's use of weblogs(blogs)	
Availability of open web forum	Officials' moderation of e-deliberations online
Availability of the content of past discussions	Government's publish of findings/results of citizen opinions, including e-opinions, on website
Availability of formal online consultation	
Networked Places	
Percent of Internet access from businesses	Percent of Internet access from universities
Percent of Internet access from government	Percent of Internet access from health institutions
Percent of Internet access from schools	Percent of Internet access from homes
Digital Divides	
Digital divide index for gender	"It requires advanced computer skills" as a barrier to Internet usage
Digital divide index for age	
Digital divide index for education	"Is not something for me" as a barrier to Internet usage
Digital divide index for income	
Internet usage drop-outs (%of population)	Priority of making website user-friendly for people with limited literacy
Internet use of disabled persons	
Promotion and Facilitation Activities	
Existence of initiatives to raise awareness and disseminate best e-commerce practice among SMEs	Availability of support for the development of adaptive technologies
Existence of studies gauging the effects of e-commerce on employment	The extent of independent sources of advice to users and consumers
Policy with regard to standards	Current year to year growth rate in number of Internet users
Presence of targeted public budget that helps needy pay for local phone calls	

HUMAN CAPITAL	
Workforce	
Professional and Technical Workers as % of the Labor Force	Digital literacy: index value of total population
Existence of regulatory barriers that restrict free movement of workers	Level of confidence in communicating via Internet
Existence of regulatory barriers that restrict free provision of services	Degree of entrepreneurship
Digital literacy in age groups	Degree of awareness of Internet use
Digital literacy gender gap	General approach of companies to human resources
	Money spent on research and development
	Level of business and university collaboration in R&D activities
Education	
Adult Literacy Rate	Percentage of schools with radio
Internet Literacy Rate	Percentage of schools with TV
Primary gross enrollment ratio	Student to computer ratio
Secondary gross enrollment ratio	Percentage of students enrolled by gender at the tertiary level in an ICT-related field
Tertiary gross enrollment ratio	Percentage of ICT-qualified teachers in primary and secondary schools
Proportion of schools having Internet	Existence of initiatives to increase schools' Internet access
Types of computers in schools	Integration of Internet and e-commerce in education and training policy
Existence some computer/IT education as part of the curriculum	Existence of latest technologies in schools
Presence of specialized research and training services	Cooperation between educational institutions and businesses to develop up-to-date curricula
Quality of management schools	Average years of schooling
Quality of math and science education	Existence of training opportunities for programming, maintenance, support, web design and other ICT professions
Quality of educational system	Availability of opportunities for Web-related training
Rate of school enrollment	
Number of computers in schools	
Educational levels in which computers are available	
Access level of students and teachers to the technology	
Speed of Internet connection in schools	
Percentage of schools with electricity	
Innovation System	
Patents granted by USPTO(US Patent and Trademark Office) per million people	Degree of innovation
Total royalty payments and receipts (US$/pop.)	Scientific and technical journal articles per million people

ECONOMY ENVIRONMENT	
Business Environment	
Rule of law	Level of competition among ICT providers
Overall political environment	Transparency and predictability of regular implementation
Macroeconomic environment	
Market opportunities	General business risk
Policy toward private enterprise	Ability of the financial system to support e- business transactions
Foreign investment policy	
Foreign trade and exchange regimes	Average Annual Gross Domestic Product (GDP) Growth
Tax regime	
Financing	Longevity
The labor market	Standard of living (real GDP per capita in purchasing power parity)
Quality of local technology suppliers	
Presence of computer communications and other services	Level of ICT employment opportunities
Economy and Market Conditions	
Venture capital availability	Freedom of the press
Sophistication level of financial markets	Accessibility of digital content
Availability of clusters throughout the economy	Percentage of existing businesses that have transformed their internal and external practices
High-technology exports as a percentage of total export	Percentage of workforce participates in training/education programs
Complying with administrative requirements	
Level of taxes	Percentage of employers that post job openings on online job listing services
Total tax rate	
Number of procedures required to start a business	Percent of households that purchase goods or use services online
Level of competition in local markets	
Positioning for Digital Economy	
Industry's self-regulation to address e-commerce policy issues	The status of your economy's intellectual property rights legislation and record of IP protection
Policy regarding the fiscal treatment of ecommerce	Economy's approach to liability
Level of consistency between taxation principles and internationally agreed principles	Economy's approach to e-commerce content control
	Level of awareness of businesses and consumers regarding data privacy issues
Level of government support for the WTO standstill agreement	Availability of rules or standards for privacy protection
Existence of internationally agreed principles to secure e-commerce	Availability of an independent agency dedicated to the oversight and redress of consumer protection complaints
Level of government control on the use and trade of encryption products	
Existence of a general code of conduct for electronic commerce transactions	
e-Commerce	
Regular and occasional purchases over the Internet	Types of online e-Commerce activities used
e-Commerce users differentiated by age groups	Existence of Web integration into systems of businesses
Year of online experience of e-Commerce users	
Types of establishments selling online	Efficiency and transparency level of B2B interactions
Share of establishments that sell online to businesses	Overall level of electronic B2B transactions over B2B commerce
Share of establishments that sell online to consumers	
Share of establishments that sell online to public sector	Development of B2C e-Commerce
Share of establishments according to e-Commerce typology	

ONLINE SERVICES AND APPLICATIONS	
Information Dissemination/Outreach	
Existence of a national website and ministerial websites	Access to back office applications
Sources of archived information	CIO, or similar officer with a leadership role, to manage national cross-agency e-government programmes/projects
Existence of a one-stop-shop national portal	Information concerning government officials
Existence of a Head of State website	Personal account/profile of citizens
Existence of an e-government section	Information for citizens on the usage of the website
News and/or updates on government policies	
Access/Usability	
Search feature	Security (secure link) feature available/indicated
"Contact us" feature	Electronic signature feature
Audio and video features	Online payment by credit, debit, or other card methods
Multiple languages availability	E-mail sign-up option, either as a formal list-serv or simply for news items
Use of wireless technology to send messages to mobile phones or devices	Existence of features to enable access for people with disabilities
Service Delivery	
Availability of job search services online	Availability of certificates online
Availability of personal documents (passports / driver's license) online	Availability of announcement of moving online
Availability of corporate tax online	Availability of health-related services online
Availability of car registration online	Availability of social contributions for employees online
Availability of declaration to police online	Availability of VAT online
Availability of public libraries line	Availability of registration of a new company online
Availability of enrolment in higher education	Availability of submission of data to statistical offices online
Sophistication level of enrolment in higher education service	Availability of customs declaration online
Type of online services offered	Availability of environment-related permits online
Percentage of Government Websites Offering e-mail	Availability of public procurement online
Percentage of Government Websites Offering website personalization	Percentage of Websites Offering Publications
Percentage of Government Websites Offering PDA access	Number of services offered
One-stop-shop for online services	Use of cookies or individual profiles of visitors
Downloadable/printable forms	Prohibition of sharing visitor information with law enforcement agents
Online forms	Percent of government websites are accessible to the disabled
Job opportunities	Percent of government websites rely on advertisements
Online transactions	Percent of government websites rely on user fees
E-mail alerts for e-participation	Percent of government websites rely on primary fees
Really Simple Syndication (RSS) use for e-participation	Percentage of Government Websites Offering comments
Set turnaround time for government to respond to submitted forms/e-mails	Percentage of Government Websites Offering e-mail updates
Availability of income taxes online	e-Tender System
Availability of social security benefits online	e-Voting System
Availability of application for building permission online	
Citizen Participation	
E-participation policy or mission statement	Citizen feedback on the national strategy, policies and e-services
Calendar listings of upcoming e-participation activities	Provision for publishing the results of citizen feedback
Archived information about e-participation activities	Archive on responses by government to citizen's questions, queries and inputs
E-participation tools to obtain public opinion (polls, surveys, bulletin boards, chat room, blogs, web casting, and discussion forums, etc.)	

APPENDIX-B TURKEY'S E-PERFORMANCE IN COMPARISON TO REGIONS' E-PERFORMANCE

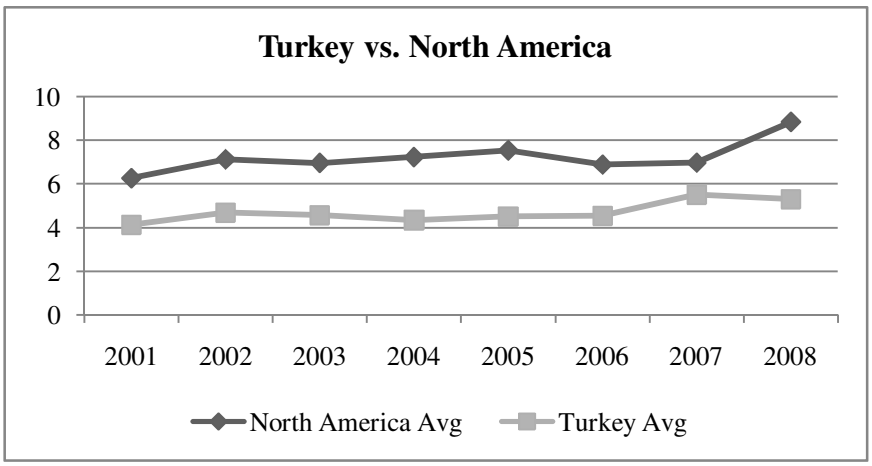


Figure B-1 Turkey vs. North America With Regard to e-Transformation

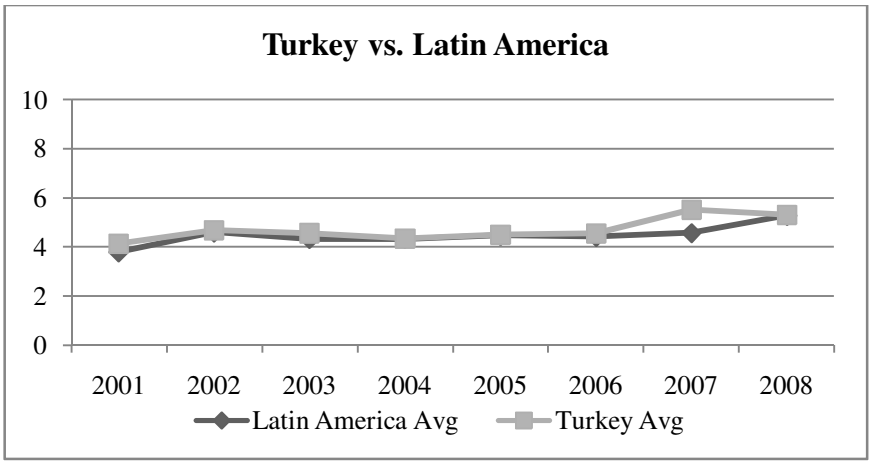


Figure B-2 Turkey vs. Latin America With Regard to e-Transformation

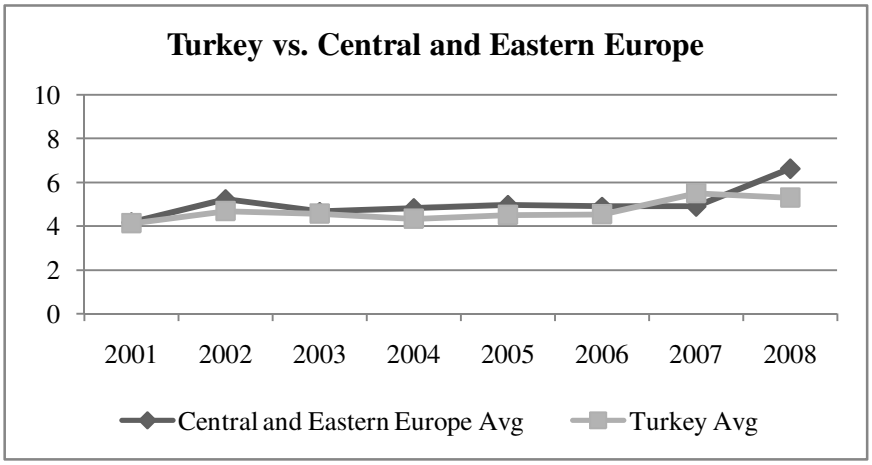


Figure B-3 Turkey vs. Central and Eastern Europe With Regard to e-Transformation

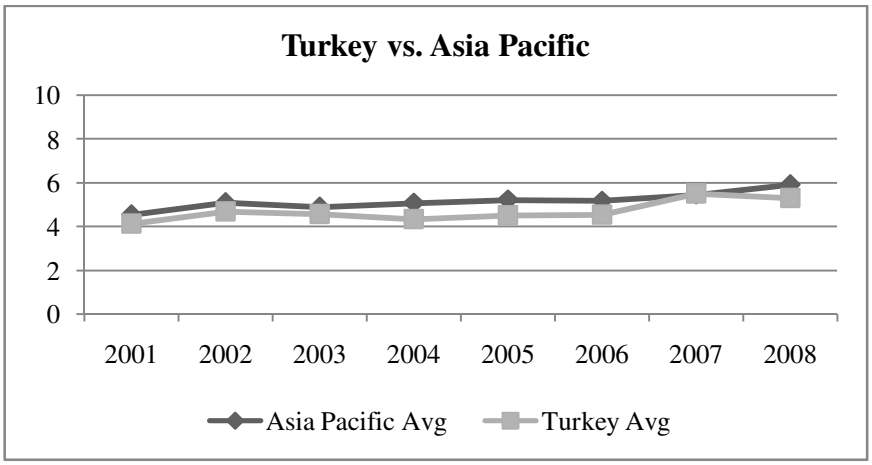


Figure B-4 Turkey vs. Asia Pacific With Regard to e-Transformation

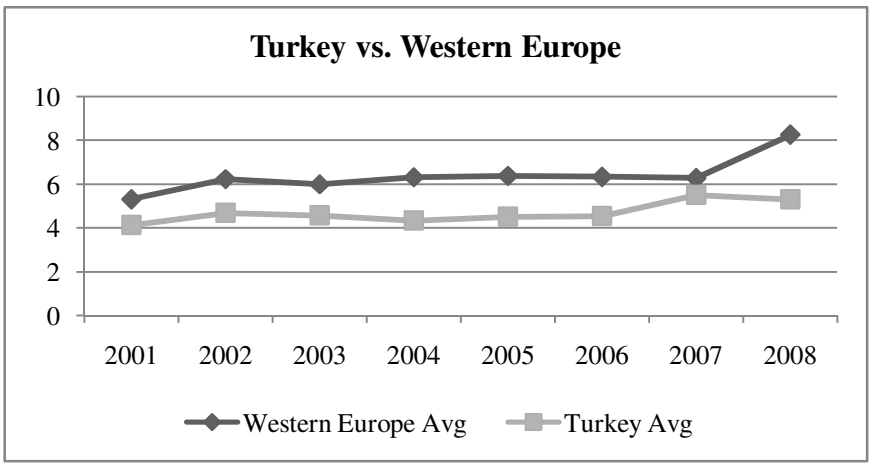
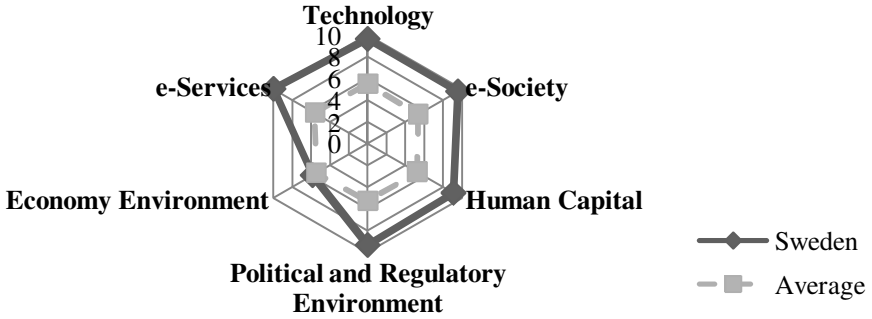


Figure B-5 Turkey vs. Western Europe With Regard to e-Transformation

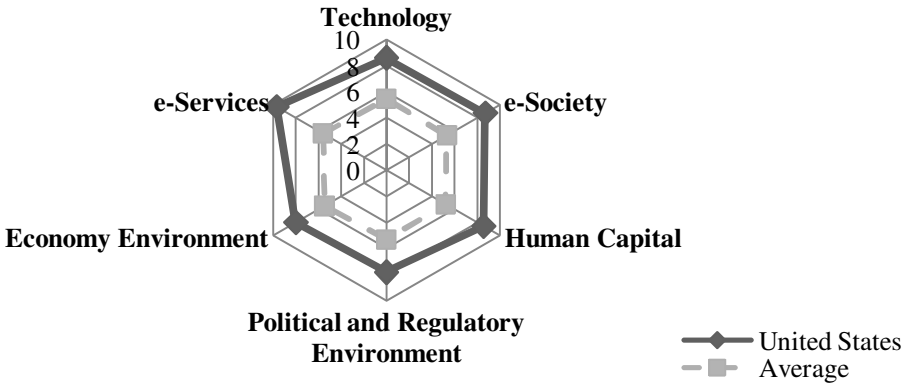
APPENDIX-C COUNTRY SCORECARDS

Country Scorecard- Sweden



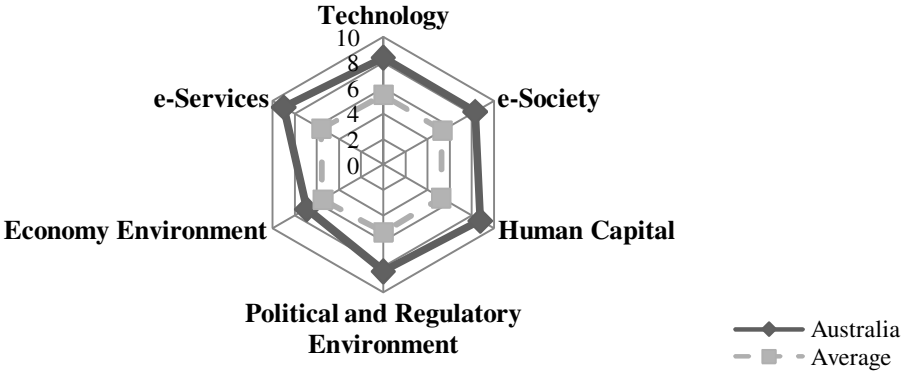
e-Transformation Index	8.91	Ranking	1
Technology Infrastructure	**9.59**	**e-Society**	**9.57**
Proportion of households with computer	9.67	PC users per 100 inhabitants	9.67
Proportion of households with Internet	10	Internet users per 100 inhabitants	10
Mobile cellular subscriptions per 100 inhabitants	8.67	Mobile phone users per 100 inhabitants	8.33
Fixed telephone lines per 100 inhabitants	10	Fixed phone users per 100 inhabitants	9.67
Broadband per 100 inhabitants	10	Broadband users per 100 inhabitants	10
Secure Internet servers per 1 million inhabitants	8.67	Firm level technology absorption	9.33
International Internet bandwidth per Internet user (bit/s)	10	Extent of business Internet use	9.67
Mobile cellular prices (% of GNI per capita)	10	Government success in ICT promotion	9.67
Broadband Internet prices (% of GNI per capita)	9.33	ICT use and government efficiency	9.67
		Presence of ICT in government offices	9.67
Human Capital	**9.10**	**Political and Regulatory Environment**	**9.33**
Professional and technical workers as % of the labor force	9.00	Government prioritization of ICT	9.67
Adult literacy rate	10	Importance of ICT to government vision of the future	9.33
Digital literacy rate	10	Laws relating to ICT	9.67
Tertiary enrollment ratio	9.00	Quality of competition in the ISP sector	9.00
Secondary enrollment ratio	8.00	Effectiveness of law-making bodies	9.33
Schools having Internet access	9.67	Judicial independence	9.67
Quality of educational system	8.00	Intellectual property protection	9.00
Patents granted by USPTO per million people	9.33	Efficiency of legal framework for disputes	9.33
Total royalty payments and receipts (US$/pop.)	9.67	Level of property rights protection	9.00
University-Company research collaboration	10		
Economy Environment	**5.89**	**e-Services**	**10**
Annual GDP Growth (%)	2.33	Web measure index	10
GDP (current US$ bill)	6.00		
The level of taxes	1.67		
Financial market sophistication	9.67		
Intensity of local competition	8.67		
Time required to start a business	7.00		

Country Scorecard- United States



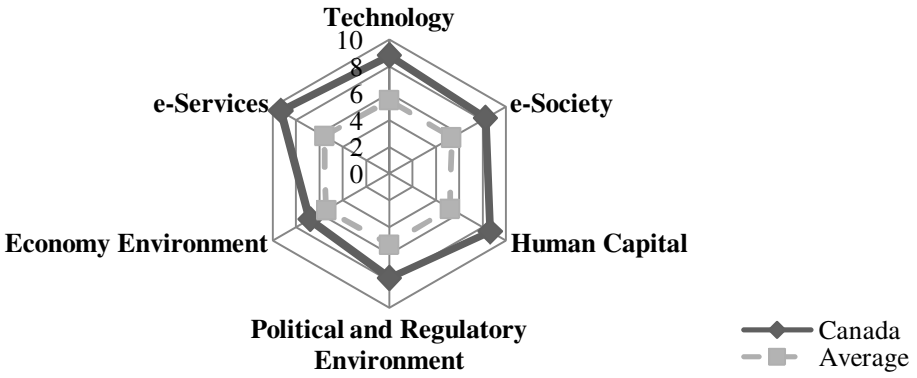
e-Transformation Index	8.55	Ranking	2
Technology Infrastructure	**8.56**	**e-Society**	**8.70**
Proportion of households with computer	7.67	PC users per 100 inhabitants	9.00
Proportion of households with Internet	7.67	Internet users per 100 inhabitants	9.33
Mobile cellular subscriptions per 100 inhabitants	6.00	Mobile phone users per 100 inhabitants	5.67
Fixed telephone lines per 100 inhabitants	9.33	Fixed phone users per 100 inhabitants	9.00
Broadband per 100 inhabitants	9.00	Broadband users per 100 inhabitants	9.00
Secure Internet servers per 1 million inhabitants	10	Firm level technology absorption	9.67
International Internet bandwidth per Internet user (bit/s)	7.67	Extent of business Internet use	10
Mobile cellular prices (% of GNI per capita)	9.67	Government success in ICT promotion	8.67
Broadband Internet prices (% of GNI per capita)	10	ICT use and government efficiency	8.33
		Presence of ICT in government offices	8.33
Human Capital	**8.57**	**Political and Regulatory Environment**	**7.78**
Professional and technical workers as % of the labor force	8.33	Government prioritization of ICT	8.67
Adult literacy rate	10	Importance of ICT to government vision of the future	8.00
Digital literacy rate	9.00	Laws relating to ICT	8.67
Tertiary enrollment ratio	9.67	Quality of competition in the ISP sector	9.33
Secondary enrollment ratio	6.67	Effectiveness of law-making bodies	5.67
Schools having Internet access	8.67	Judicial independence	8.00
Quality of educational system	7.67	Intellectual property protection	7.67
Patents granted by USPTO per million people	10	Efficiency of legal framework for disputes	7.00
Total royalty payments and receipts (US$/pop.)	8.67	Level of property rights protection	7.00
University-Company research collaboration	10		
Economy Environment	**8.00**	**e-Services**	**9.67**
Annual GDP Growth (%)	3.00	Web measure index	9.67
GDP (current US$ bill)	10		
The level of taxes	6.67		
Financial market sophistication	10		
Intensity of local competition	9.67		
Time required to start a business	8.67		

Country Scorecard- Australia



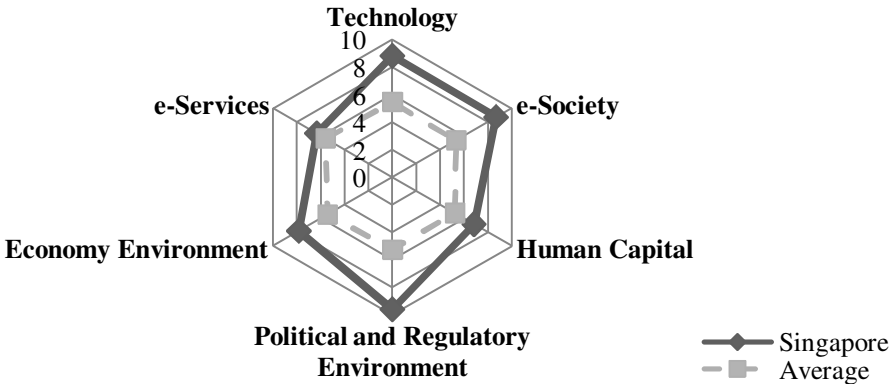
e-Transformation Index	8.29	Ranking	3
Technology Infrastructure	**8.37**	**e-Society**	**8.30**
Proportion of households with computer	8.33	PC users per 100 inhabitants	9.33
Proportion of households with Internet	8.33	Internet users per 100 inhabitants	8.67
Mobile cellular subscriptions per 100 inhabitants	8.00	Mobile phone users per 100 inhabitants	7.67
Fixed telephone lines per 100 inhabitants	8.67	Fixed phone users per 100 inhabitants	8.67
Broadband per 100 inhabitants	8.67	Broadband users per 100 inhabitants	8.67
Secure Internet servers per 1 million inhabitants	9.00	Firm level technology absorption	8.00
International Internet bandwidth per Internet user (bit/s)	6.67	Extent of business Internet use	8.00
Mobile cellular prices (% of GNI per capita)	8.67	Government success in ICT promotion	7.33
Broadband Internet prices (% of GNI per capita)	9.00	ICT use and government efficiency	7.67
		Presence of ICT in government offices	9.00
Human Capital	**8.76**	**Political and Regulatory Environment**	**8.33**
Professional and technical workers as % of the labor force	6.00	Government prioritization of ICT	7.67
Adult literacy rate	10	Importance of ICT to government vision of the future	8.33
Digital literacy rate	9.33	Laws relating to ICT	8.00
Tertiary enrollment ratio	8.67	Quality of competition in the ISP sector	6.33
Secondary enrollment ratio	10	Effectiveness of law-making bodies	9.67
Schools having Internet access	8.00	Judicial independence	9.33
Quality of educational system	9.33	Intellectual property protection	8.67
Patents granted by USPTO per million people	7.67	Efficiency of legal framework for disputes	8.67
Total royalty payments and receipts (US$/pop.)	7.33	Level of property rights protection	8.33
University-Company research collaboration	7.33		
Economy Environment	**6.94**	**e-Services**	**9.00**
Annual GDP Growth (%)	2.67	Web measure index	9.00
GDP (current US$ bill)	6.67		
The level of taxes	10		
Financial market sophistication	8.00		
Intensity of local competition	1.33		
Time required to start a business	9.67		

Country Scorecard- Canada



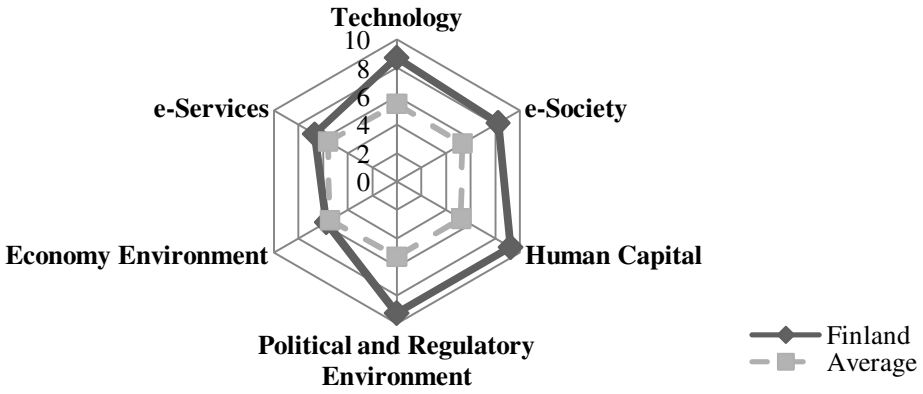
e-Transformation Index	8.28	Ranking	4
Technology Infrastructure	**8.78**	**e-Society**	**8.24**
Proportion of households with computer	9.33	PC users per 100 inhabitants	10
Proportion of households with Internet	9.33	Internet users per 100 inhabitants	9.67
Mobile cellular subscriptions per 100 inhabitants	4.00	Mobile phone users per 100 inhabitants	3.67
Fixed telephone lines per 100 inhabitants	9.67	Fixed phone users per 100 inhabitants	9.33
Broadband per 100 inhabitants	9.33	Broadband users per 100 inhabitants	9.33
Secure Internet servers per 1 million inhabitants	9.67	Firm level technology absorption	7.67
International Internet bandwidth per Internet user (bit/s)	8.67	Extent of business Internet use	9.33
Mobile cellular prices (% of GNI per capita)	9.33	Government success in ICT promotion	7.00
Broadband Internet prices (% of GNI per capita)	9.67	ICT use and government efficiency	8.00
		Presence of ICT in government offices	8.67
Human Capital	**8.46**	**Political and Regulatory Environment**	**7.78**
Professional and technical workers as % of the labor force	8.67	Government prioritization of ICT	6.33
Adult literacy rate	10	Importance of ICT to government vision of the future	6.67
Digital literacy rate	8.67	Laws relating to ICT	8.33
Tertiary enrollment ratio	7.00	Quality of competition in the ISP sector	7.33
Secondary enrollment ratio	9.00	Effectiveness of law-making bodies	8.33
Schools having Internet access	8.33	Judicial independence	9.00
Quality of educational system	9.00	Intellectual property protection	7.33
Patents granted by USPTO per million people	8.67	Efficiency of legal framework for disputes	8.00
Total royalty payments and receipts (US$/pop.)	9.00	Level of property rights protection	8.67
University-Company research collaboration	8.67		
Economy Environment	**6.83**	**e-Services**	**9.33**
Annual GDP Growth (%)	1.67	Web measure index	9.33
GDP (current US$ bill)	8.67		
The level of taxes	4.67		
Financial market sophistication	9.33		
Intensity of local competition	7.67		
Time required to start a business	9.00		

Country Scorecard- Singapore



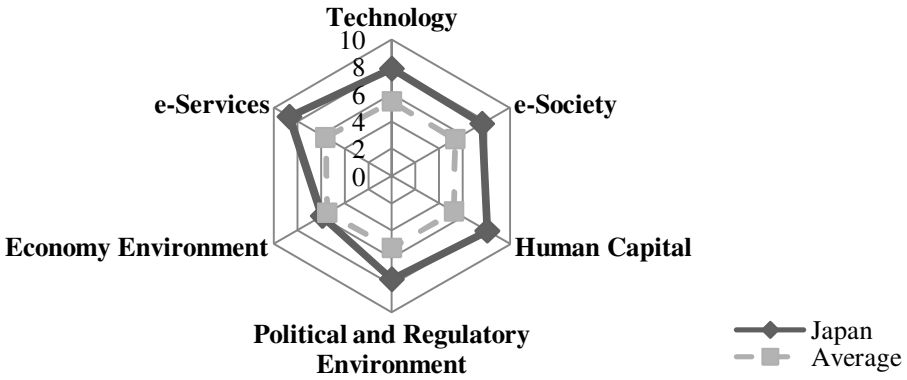
e-Transformation Index	**8.02**	**Ranking**	**5**
Technology Infrastructure	**8.78**	**e-Society**	**8.70**
Proportion of households with computer	7.33	PC users per 100 inhabitants	8.67
Proportion of households with Internet	9.67	Internet users per 100 inhabitants	6.67
Mobile cellular subscriptions per 100 inhabitants	9.67	Mobile phone users per 100 inhabitants	9.67
Fixed telephone lines per 100 inhabitants	8.00	Fixed phone users per 100 inhabitants	7.67
Broadband per 100 inhabitants	7.67	Broadband users per 100 inhabitants	7.67
Secure Internet servers per 1 million inhabitants	7.67	Firm level technology absorption	8.33
International Internet bandwidth per Internet user (bit/s)	9.67	Extent of business Internet use	8.33
Mobile cellular prices (% of GNI per capita)	10	Government success in ICT promotion	10
Broadband Internet prices (% of GNI per capita)	9.33	ICT use and government efficiency	10
		Presence of ICT in government offices	10
Human Capital	**6.86**	**Political and Regulatory Environment**	**9.59**
Professional and technical workers as % of the labor force	8.00	Government prioritization of ICT	10
Adult literacy rate	6.00	Importance of ICT to government vision of the future	10
Digital literacy rate	6.67	Laws relating to ICT	10
Tertiary enrollment ratio	6.33	Quality of competition in the ISP sector	8.33
Secondary enrollment ratio	2.00	Effectiveness of law-making bodies	10
Schools having Internet access	9.00	Judicial independence	8.33
Quality of educational system	10	Intellectual property protection	10
Patents granted by USPTO per million people	8.33	Efficiency of legal framework for disputes	10
Total royalty payments and receipts (US$/pop.)	10	Level of property rights protection	9.67
University-Company research collaboration	9.00		
Economy Environment	**7.83**	**e-Services**	**6.33**
Annual GDP Growth (%)	8.33	Web measure index	6.33
GDP (current US$ bill)	3.67		
The level of taxes	10		
Financial market sophistication	8.67		
Intensity of local competition	7.00		
Time required to start a business	9.33		

Country Scorecard- Finland



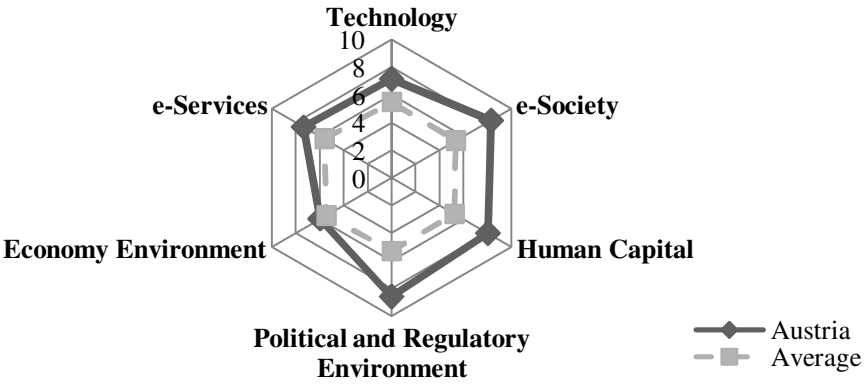
e-Transformation Index	7.97	Ranking	6
Technology Infrastructure	**8.70**	**e-Society**	**8.23**
Proportion of households with computer	8.67	PC users per 100 inhabitants	7.33
Proportion of households with Internet	9.00	Internet users per 100 inhabitants	5.33
Mobile cellular subscriptions per 100 inhabitants	9.33	Mobile phone users per 100 inhabitants	9.00
Fixed telephone lines per 100 inhabitants	6.67	Fixed phone users per 100 inhabitants	6.67
Broadband per 100 inhabitants	9.67	Broadband users per 100 inhabitants	9.67
Secure Internet servers per 1 million inhabitants	8.33	Firm level technology absorption	8.67
International Internet bandwidth per Internet user (bit/s)	8.33	Extent of business Internet use	9.00
Mobile cellular prices (% of GNI per capita)	9.67	Government success in ICT promotion	9.00
Broadband Internet prices (% of GNI per capita)	8.67	ICT use and government efficiency	9.00
		Presence of ICT in government offices	8.67
Human Capital	**9.24**	**Political and Regulatory Environment**	**9.26**
Professional and technical workers as % of the labor force	10	Government prioritization of ICT	9.00
Adult literacy rate	10	Importance of ICT to government vision of the future	9.00
Digital literacy rate	6.33	Laws relating to ICT	9.00
Tertiary enrollment ratio	10	Quality of competition in the ISP sector	8.67
Secondary enrollment ratio	8.67	Effectiveness of law-making bodies	9.00
Schools having Internet access	10	Judicial independence	10
Quality of educational system	9.67	Intellectual property protection	9.67
Patents granted by USPTO per million people	9.00	Efficiency of legal framework for disputes	9.67
Total royalty payments and receipts (US$/pop.)	9.33	Level of property rights protection	9.33
University-Company research collaboration	9.33		
Economy Environment	**5.72**	**e-Services**	**6.67**
Annual GDP Growth (%)	3.67	Web measure index	6.67
GDP (current US$ bill)	4.67		
The level of taxes	2.33		
Financial market sophistication	8.00		
Intensity of local competition	8.33		
Time required to start a business	7.33		

Country Scorecard- Japan



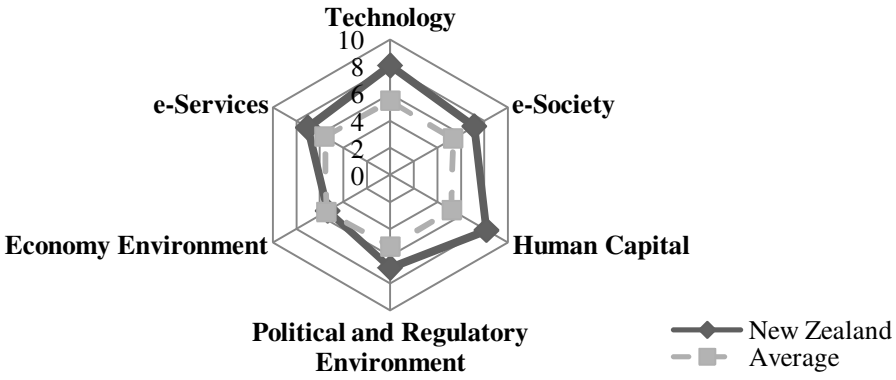
e-Transformation Index	**7.61**	**Ranking**	**7**
Technology Infrastructure	**7.85**	**e-Society**	**7.63**
Proportion of households with computer	10	PC users per 100 inhabitants	8.33
Proportion of households with Internet	8.00	Internet users per 100 inhabitants	8.33
Mobile cellular subscriptions per 100 inhabitants	6.33	Mobile phone users per 100 inhabitants	6.00
Fixed telephone lines per 100 inhabitants	7.00	Fixed phone users per 100 inhabitants	10
Broadband per 100 inhabitants	8.33	Broadband users per 100 inhabitants	8.33
Secure Internet servers per 1 million inhabitants	8.00	Firm level technology absorption	10
International Internet bandwidth per Internet user (bit/s)	6.00	Extent of business Internet use	9.00
Mobile cellular prices (% of GNI per capita)	8.33	Government success in ICT promotion	5.67
Broadband Internet prices (% of GNI per capita)	8.67	ICT use and government efficiency	3.67
		Presence of ICT in government offices	7.00
Human Capital	**8.05**	**Political and Regulatory Environment**	**7.56**
Professional and technical workers as % of the labor force	9.67	Government prioritization of ICT	5.67
Adult literacy rate	10	Importance of ICT to government vision of the future	7.33
Digital literacy rate	8.33	Laws relating to ICT	7.00
Tertiary enrollment ratio	6.67	Quality of competition in the ISP sector	9.67
Secondary enrollment ratio	7.33	Effectiveness of law-making bodies	7.00
Schools having Internet access	7.33	Judicial independence	7.67
Quality of educational system	7.00	Intellectual property protection	8.00
Patents granted by USPTO per million people	9.67	Efficiency of legal framework for disputes	7.67
Total royalty payments and receipts (US$/pop.)	8.33	Level of property rights protection	8.00
University-Company research collaboration	8.67		
Economy Environment	**5.89**	**e-Services**	**8.67**
Annual GDP Growth (%)	1.00	Web measure index	8.67
GDP (current US$ bill)	9.67		
The level of taxes	3.67		
Financial market sophistication	5.33		
Intensity of local competition	9.33		
Time required to start a business	6.33		

Country Scorecard- Austria



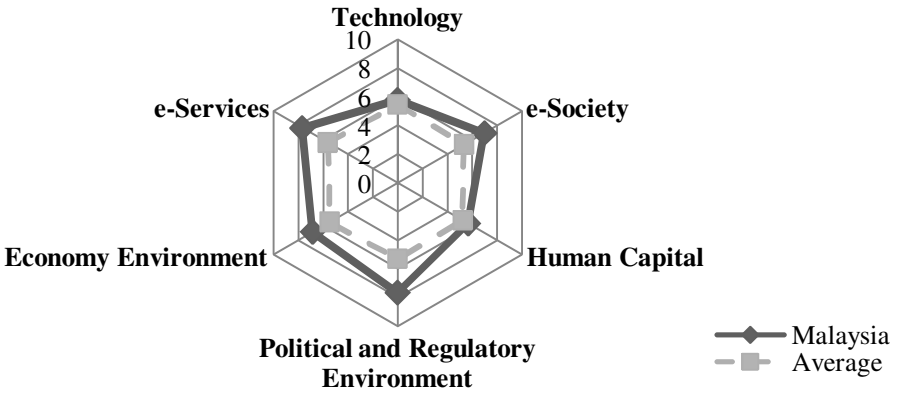
e-Transformation Index	**7.56**	**Ranking**	**8**
Technology Infrastructure	**7.15**	**e-Society**	**8.30**
Proportion of households with computer	8.00	PC users per 100 inhabitants	8.00
Proportion of households with Internet	7.33	Internet users per 100 inhabitants	8.00
Mobile cellular subscriptions per 100 inhabitants	1.00	Mobile phone users per 100 inhabitants	9.33
Fixed telephone lines per 100 inhabitants	7.33	Fixed phone users per 100 inhabitants	7.00
Broadband per 100 inhabitants	7.33	Broadband users per 100 inhabitants	7.33
Secure Internet servers per 1 million inhabitants	7.33	Firm level technology absorption	9.00
International Internet bandwidth per Internet user (bit/s)	9.33	Extent of business Internet use	8.67
Mobile cellular prices (% of GNI per capita)	9.00	Government success in ICT promotion	7.67
Broadband Internet prices (% of GNI per capita)	7.67	ICT use and government efficiency	8.67
		Presence of ICT in government offices	9.33
Human Capital	**8.05**	**Political and Regulatory Environment**	**8.59**
Professional and technical workers as % of the labor force	7.00	Government prioritization of ICT	7.33
Adult literacy rate	10	Importance of ICT to government vision of the future	7.67
Digital literacy rate	8.00	Laws relating to ICT	9.33
Tertiary enrollment ratio	5.67	Quality of competition in the ISP sector	10.
Secondary enrollment ratio	7.67	Effectiveness of law-making bodies	6.00
Schools having Internet access	9.33	Judicial independence	8.67
Quality of educational system	8.67	Intellectual property protection	9.33
Patents granted by USPTO per million people	8.00	Efficiency of legal framework for disputes	9.00
Total royalty payments and receipts (US$/pop.)	8.00	Level of property rights protection	10
University-Company research collaboration	7.67		
Economy Environment	**5.94**	**e-Services**	**7.33**
Annual GDP Growth (%)	2.67	Web measure index	7.33
GDP (current US$ bill)	6.67		
The level of taxes	5.33		
Financial market sophistication	8.33		
Intensity of local competition	10		
Time required to start a business	5.33		

Country Scorecard- New Zealand



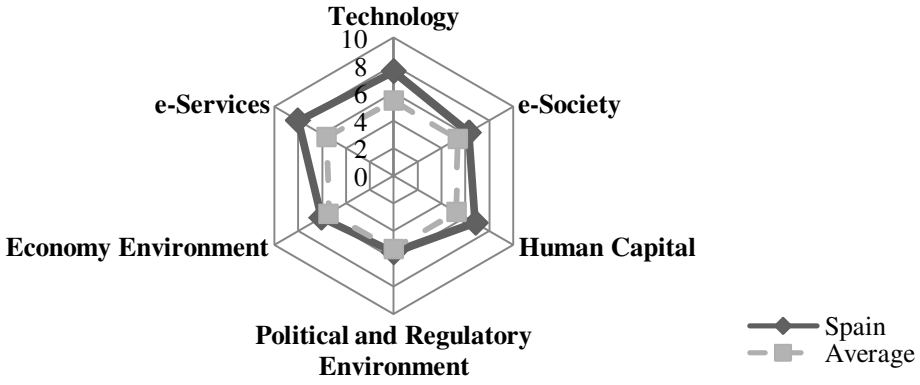
e-Transformation Index	7.10	Ranking	9
Technology Infrastructure	**8.07**	**e-Society**	**7.17**
Proportion of households with computer	9.00	PC users per 100 inhabitants	7.67
Proportion of households with Internet	8.67	Internet users per 100 inhabitants	9.00
Mobile cellular subscriptions per 100 inhabitants	7.33	Mobile phone users per 100 inhabitants	7.00
Fixed telephone lines per 100 inhabitants	7.67	Fixed phone users per 100 inhabitants	7.33
Broadband per 100 inhabitants	8.00	Broadband users per 100 inhabitants	8.00
Secure Internet servers per 1 million inhabitants	9.33	Firm level technology absorption	7.00
International Internet bandwidth per Internet user (bit/s)	6.33	Extent of business Internet use	7.67
Mobile cellular prices (% of GNI per capita)	8.33	Government success in ICT promotion	3.67
Broadband Internet prices (% of GNI per capita)	8.00	ICT use and government efficiency	6.33
		Presence of ICT in government offices	8.00
Human Capital	**8.19**	**Political and Regulatory Environment**	**6.85**
Professional and technical workers as % of the labor force	3.67	Government prioritization of ICT	5.00
Adult literacy rate	10	Importance of ICT to government vision of the future	5.00
Digital literacy rate	9.67	Laws relating to ICT	7.67
Tertiary enrollment ratio	9.33	Quality of competition in the ISP sector	2.00
Secondary enrollment ratio	9.67	Effectiveness of law-making bodies	7.67
Schools having Internet access	7.67	Judicial independence	10
Quality of educational system	7.33	Intellectual property protection	8.33
Patents granted by USPTO per million people	7.33	Efficiency of legal framework for disputes	8.33
Total royalty payments and receipts (US$/pop.)	7.67	Level of property rights protection	7.67
University-Company research collaboration	7.33		
Economy Environment	**5.33**	**e-Services**	**7.00**
Annual GDP Growth (%)	3.33	Web measure index	7.00
GDP (current US$ bill)	2.67		
The level of taxes	4.00		
Financial market sophistication	7.00		
Intensity of local competition	5.00		
Time required to start a business	10		

Country Scorecard- Malaysia



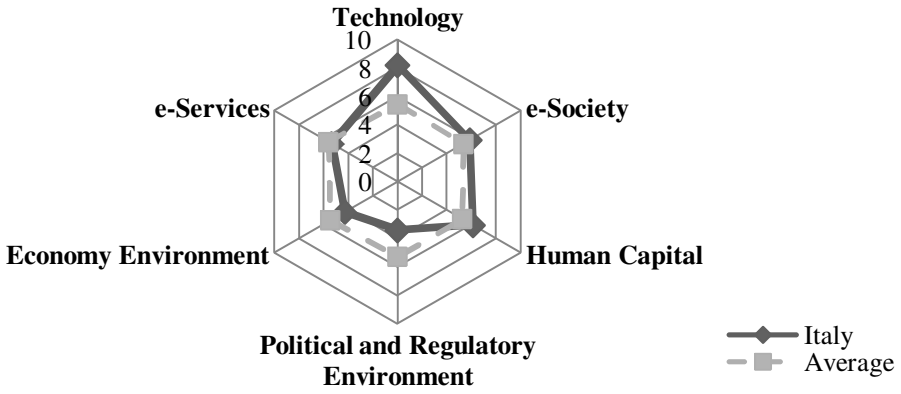
e-Transformation Index	**6.76**	**Ranking**	**10**
Technology Infrastructure	**5.78**	**e-Society**	**6.97**
Proportion of households with computer	5.67	PC users per 100 inhabitants	6.33
Proportion of households with Internet	6.00	Internet users per 100 inhabitants	7.67
Mobile cellular subscriptions per 100 inhabitants	7.00	Mobile phone users per 100 inhabitants	6.67
Fixed telephone lines per 100 inhabitants	3.67	Fixed phone users per 100 inhabitants	3.67
Broadband per 100 inhabitants	4.67	Broadband users per 100 inhabitants	4.67
Secure Internet servers per 1 million inhabitants	5.67	Firm level technology absorption	7.33
International Internet bandwidth per Internet user (bit/s)	4.33	Extent of business Internet use	7.00
Mobile cellular prices (% of GNI per capita)	8.00	Government success in ICT promotion	9.33
Broadband Internet prices (% of GNI per capita)	7.00	ICT use and government efficiency	9.33
		Presence of ICT in government offices	7.67
Human Capital	**5.67**	**Political and Regulatory Environment**	**7.63**
Professional and technical workers as % of the labor force	8.00	Government prioritization of ICT	9.33
Adult literacy rate	4.67	Importance of ICT to government vision of the future	9.67
Digital literacy rate	7.33	Laws relating to ICT	7.33
Tertiary enrollment ratio	4.67	Quality of competition in the ISP sector	6.67
Secondary enrollment ratio	2.67	Effectiveness of law-making bodies	8.67
Schools having Internet access	4.00	Judicial independence	6.00
Quality of educational system	8.33	Intellectual property protection	7.00
Patents granted by USPTO per million people	6.00	Efficiency of legal framework for disputes	7.33
Total royalty payments and receipts (US$/pop.)	6.67	Level of property rights protection	6.67
University-Company research collaboration	8.67		
Economy Environment	**6.83**	**e-Services**	**7.67**
Annual GDP Growth (%)	7.00	Web measure index	7.67
GDP (current US$ bill)	4.00		
The level of taxes	8.67		
Financial market sophistication	6.67		
Intensity of local competition	7.00		
Time required to start a business	7.67		

Country Scorecard- Spain



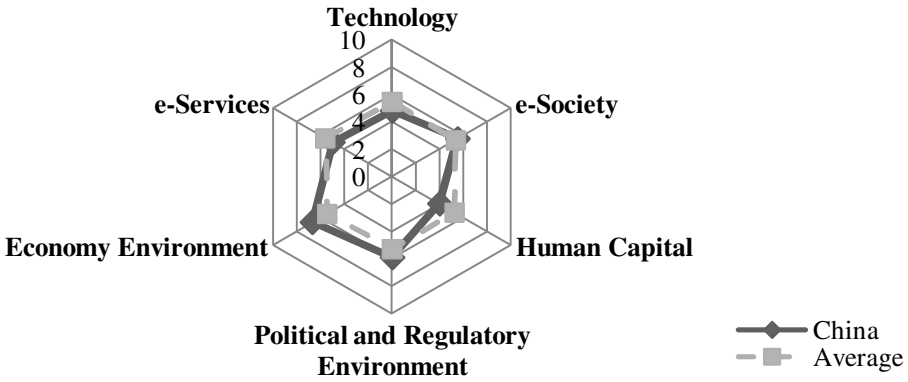
e-Transformation Index	6.70	Ranking	11
Technology Infrastructure	**7.56**	**e-Society**	**6.27**
Proportion of households with computer	6.67	PC users per 100 inhabitants	6.67
Proportion of households with Internet	7.00	Internet users per 100 inhabitants	7.00
Mobile cellular subscriptions per 100 inhabitants	8.33	Mobile phone users per 100 inhabitants	8.00
Fixed telephone lines per 100 inhabitants	8.33	Fixed phone users per 100 inhabitants	8.00
Broadband per 100 inhabitants	6.67	Broadband users per 100 inhabitants	6.67
Secure Internet servers per 1 million inhabitants	7.00	Firm level technology absorption	5.33
International Internet bandwidth per Internet user (bit/s)	8.00	Extent of business Internet use	4.67
Mobile cellular prices (% of GNI per capita)	7.67	Government success in ICT promotion	3.33
Broadband Internet prices (% of GNI per capita)	8.33	ICT use and government efficiency	6.33
		Presence of ICT in government offices	6.67
Human Capital	**6.81**	**Political and Regulatory Environment**	**5.52**
Professional and technical workers as % of the labor force	4.67	Government prioritization of ICT	4.67
Adult literacy rate	6.33	Importance of ICT to government vision of the future	5.33
Digital literacy rate	7.00	Laws relating to ICT	6.67
Tertiary enrollment ratio	8.00	Quality of competition in the ISP sector	3.67
Secondary enrollment ratio	9.33	Effectiveness of law-making bodies	5.00
Schools having Internet access	7.00	Judicial independence	5.67
Quality of educational system	5.33	Intellectual property protection	6.67
Patents granted by USPTO per million people	6.33	Efficiency of legal framework for disputes	5.67
Total royalty payments and receipts (US$/pop.)	7.00	Level of property rights protection	6.33
University-Company research collaboration	5.67		
Economy Environment	**6.06**	**e-Services**	**8.00**
Annual GDP Growth (%)	4.00	Web measure index	8.00
GDP (current US$ bill)	8.33		
The level of taxes	5.00		
Financial market sophistication	7.33		
Intensity of local competition	8.67		
Time required to start a business	3.00		

Country Scorecard- Italy



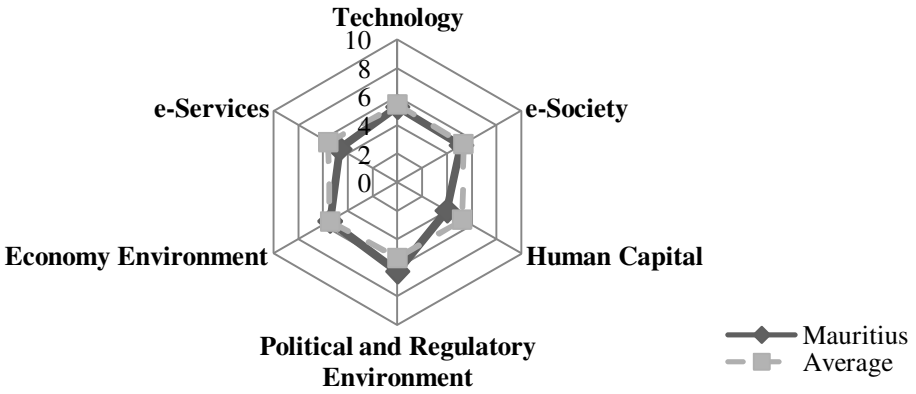
e-Transformation Index	5.52	Ranking	12
Technology Infrastructure	**8.18**	**e-Society**	**5.83**
Proportion of households with computer	7.00	PC users per 100 inhabitants	7.00
Proportion of households with Internet	6.67	Internet users per 100 inhabitants	7.33
Mobile cellular subscriptions per 100 inhabitants	10	Mobile phone users per 100 inhabitants	10
Fixed telephone lines per 100 inhabitants	9.00	Fixed phone users per 100 inhabitants	8.33
Broadband per 100 inhabitants	7.00	Broadband users per 100 inhabitants	7.00
Secure Internet servers per 1 million inhabitants	6.67	Firm level technology absorption	3.67
International Internet bandwidth per Internet user (bit/s)	9.00	Extent of business Internet use	2.33
Mobile cellular prices (% of GNI per capita)	9.33	Government success in ICT promotion	1.33
Broadband Internet prices (% of GNI per capita)	9.00	ICT use and government efficiency	7.33
		Presence of ICT in government offices	4.00
Human Capital	**6.10**	**Political and Regulatory Environment**	**3.41**
Professional and technical workers as % of the labor force	4.33	Government prioritization of ICT	1.00
Adult literacy rate	7.00	Importance of ICT to government vision of the future	2.00
Digital literacy rate	7.67	Laws relating to ICT	5.00
Tertiary enrollment ratio	7.67	Quality of competition in the ISP sector	4.33
Secondary enrollment ratio	7.00	Effectiveness of law-making bodies	1.67
Schools having Internet access	6.00	Judicial independence	4.33
Quality of educational system	3.00	Intellectual property protection	6.33
Patents granted by USPTO per million people	7.00	Efficiency of legal framework for disputes	1.00
Total royalty payments and receipts (US$/pop.)	6.33	Level of property rights protection	5.00
University-Company research collaboration	3.00		
Economy Environment	**4.28**	**e-Services**	**5.33**
Annual GDP Growth (%)	0.67	Web measure index	5.33
GDP (current US$ bill)	9.00		
The level of taxes	1.00		
Financial market sophistication	4.00		
Intensity of local competition	3.00		
Time required to start a business	8.00		

Country Scorecard- China



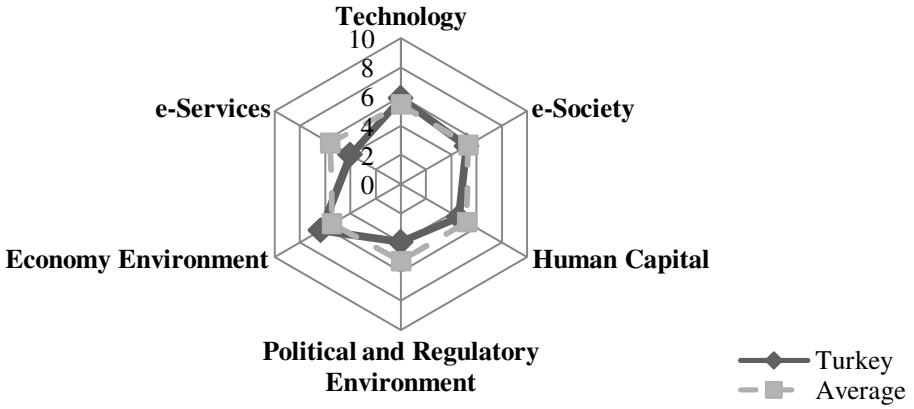
e-Transformation Index	5.32	Ranking	13
Technology Infrastructure	**4.78**	**e-Society**	**5.50**
Proportion of households with computer	6.33	PC users per 100 inhabitants	3.33
Proportion of households with Internet	5.00	Internet users per 100 inhabitants	4.00
Mobile cellular subscriptions per 100 inhabitants	3.00	Mobile phone users per 100 inhabitants	2.67
Fixed telephone lines per 100 inhabitants	5.67	Fixed phone users per 100 inhabitants	5.67
Broadband per 100 inhabitants	5.67	Broadband users per 100 inhabitants	5.67
Secure Internet servers per 1 million inhabitants	2.00	Firm level technology absorption	6.00
International Internet bandwidth per Internet user (bit/s)	4.00	Extent of business Internet use	5.00
Mobile cellular prices (% of GNI per capita)	7.00	Government success in ICT promotion	8.33
Broadband Internet prices (% of GNI per capita)	4.33	ICT use and government efficiency	7.00
		Presence of ICT in government offices	7.33
Human Capital	**4.00**	**Political and Regulatory Environment**	**5.93**
Professional and technical workers as % of the labor force	2.33	Government prioritization of ICT	6.00
Adult literacy rate	5.67	Importance of ICT to government vision of the future	8.67
Digital literacy rate	3.67	Laws relating to ICT	6.00
Tertiary enrollment ratio	3.33	Quality of competition in the ISP sector	5.33
Secondary enrollment ratio	3.00	Effectiveness of law-making bodies	6.33
Schools having Internet access	6.67	Judicial independence	4.67
Quality of educational system	3.33	Intellectual property protection	5.67
Patents granted by USPTO per million people	4.67	Efficiency of legal framework for disputes	5.33
Total royalty payments and receipts (US$/pop.)	3.67	Level of property rights protection	5.33
University-Company research collaboration	6.67		
Economy Environment	**6.72**	**e-Services**	**5.00**
Annual GDP Growth (%)	10	Web measure index	5.00
GDP (current US$ bill)	9.33		
The level of taxes	7.67		
Financial market sophistication	2.67		
Intensity of local competition	7.33		
Time required to start a business	3.33		

Country Scorecard- Mauritius



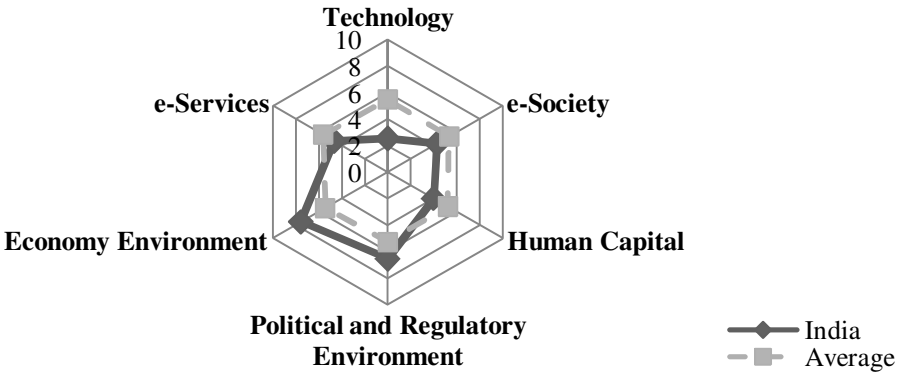
e-Transformation Index	5.12	Ranking	14
Technology Infrastructure	**5.26**	**e-Society**	**5.13**
Proportion of households with computer	5.00	PC users per 100 inhabitants	6.00
Proportion of households with Internet	5.67	Internet users per 100 inhabitants	3.33
Mobile cellular subscriptions per 100 inhabitants	5.00	Mobile phone users per 100 inhabitants	4.67
Fixed telephone lines per 100 inhabitants	6.00	Fixed phone users per 100 inhabitants	6.00
Broadband per 100 inhabitants	5.33	Broadband users per 100 inhabitants	5.33
Secure Internet servers per 1 million inhabitants	6.00	Firm level technology absorption	5.00
International Internet bandwidth per Internet user (bit/s)	2.33	Extent of business Internet use	4.00
Mobile cellular prices (% of GNI per capita)	8.33	Government success in ICT promotion	6.67
Broadband Internet prices (% of GNI per capita)	3.67	ICT use and government efficiency	4.67
		Presence of ICT in government offices	5.67
Human Capital	**4.00**	**Political and Regulatory Environment**	**6.22**
Professional and technical workers as % of the labor force	1.33	Government prioritization of ICT	8.00
Adult literacy rate	3.00	Importance of ICT to government vision of the future	6.00
Digital literacy rate	4.67	Laws relating to ICT	5.67
Tertiary enrollment ratio	3.00	Quality of competition in the ISP sector	2.33
Secondary enrollment ratio	6.33	Effectiveness of law-making bodies	7.33
Schools having Internet access	4.67	Judicial independence	7.00
Quality of educational system	5.00	Intellectual property protection	6.00
Patents granted by USPTO per million people	0.00	Efficiency of legal framework for disputes	6.33
Total royalty payments and receipts (US$/pop.)	3.33	Level of property rights protection	7.33
University-Company research collaboration	2.67		
Economy Environment	**5.45**	**e-Services**	**4.67**
Annual GDP Growth (%)	4.33	Web measure index	4.67
GDP (current US$ bill)	0.67		
The level of taxes	9.67		
Financial market sophistication	5.67		
Intensity of local competition	3.67		
Time required to start a business	8.67		

Country Scorecard- Turkey



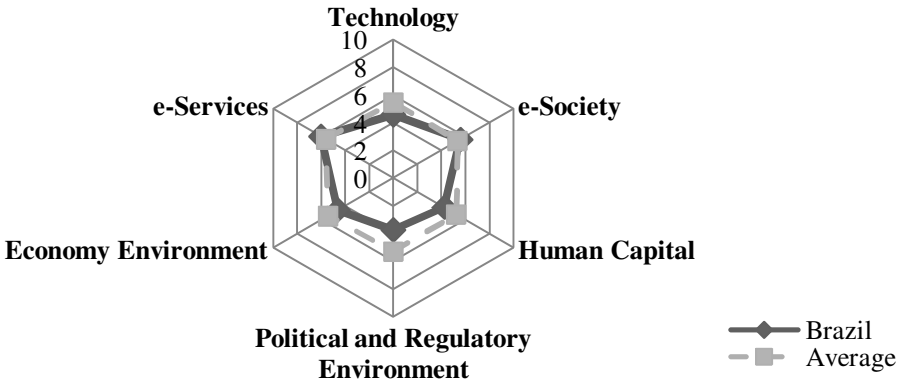
e-Transformation Index	4.99	Ranking	15
Technology Infrastructure	**5.86**	**e-Society**	**5.20**
Proportion of households with computer	5.33	PC users per 100 inhabitants	4.00
Proportion of households with Internet	5.33	Internet users per 100 inhabitants	4.33
Mobile cellular subscriptions per 100 inhabitants	5.67	Mobile phone users per 100 inhabitants	5.33
Fixed telephone lines per 100 inhabitants	5.33	Fixed phone users per 100 inhabitants	5.33
Broadband per 100 inhabitants	6.00	Broadband users per 100 inhabitants	6.00
Secure Internet servers per 1 million inhabitants	6.33	Firm level technology absorption	5.67
International Internet bandwidth per Internet user (bit/s)	7.00	Extent of business Internet use	6.00
Mobile cellular prices (% of GNI per capita)	N.A.	Government success in ICT promotion	4.00
Broadband Internet prices (% of GNI per capita)	N.A.	ICT use and government efficiency	6.00
		Presence of ICT in government offices	5.33
Human Capital	**4.57**	**Political and Regulatory Environment**	**3.96**
Professional and technical workers as % of the labor force	5.33	Government prioritization of ICT	3.33
Adult literacy rate	3.33	Importance of ICT to government vision of the future	3.33
Digital literacy rate	4.00	Laws relating to ICT	4.67
Tertiary enrollment ratio	5.00	Quality of competition in the ISP sector	5.00
Secondary enrollment ratio	4.00	Effectiveness of law-making bodies	5.33
Schools having Internet access	6.33	Judicial independence	5.00
Quality of educational system	4.00	Intellectual property protection	2.67
Patents granted by USPTO per million people	3.67	Efficiency of legal framework for disputes	3.33
Total royalty payments and receipts (US$/pop.)	4.33	Level of property rights protection	3.00
University-Company research collaboration	4.67		
Economy Environment	**6.33**	**e-Services**	**4.00**
Annual GDP Growth (%)	9.00	Web measure index	4.00
GDP (current US$ bill)	6.33		
The level of taxes	2.00		
Financial market sophistication	6.00		
Intensity of local competition	6.00		
Time required to start a business	8.67		

Country Scorecard- India



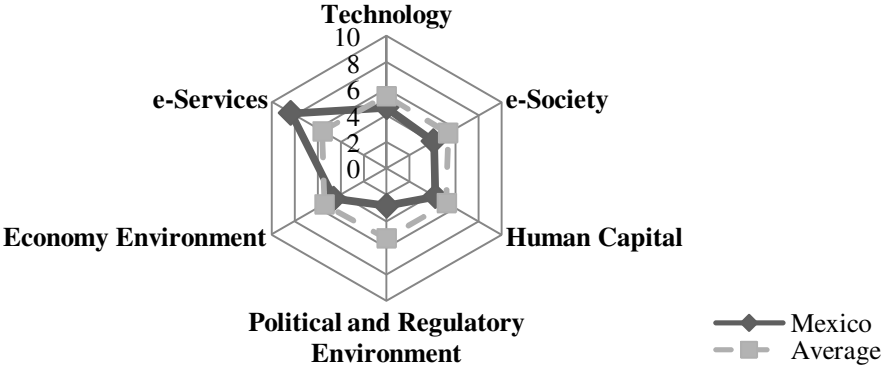
e-Transformation Index	4.93	Ranking	16
Technology Infrastructure	**2.52**	**e-Society**	**4.30**
Proportion of households with computer	0.67	PC users per 100 inhabitants	2.33
Proportion of households with Internet	1.67	Internet users per 100 inhabitants	2.33
Mobile cellular subscriptions per 100 inhabitants	1.33	Mobile phone users per 100 inhabitants	1.00
Fixed telephone lines per 100 inhabitants	1.67	Fixed phone users per 100 inhabitants	1.67
Broadband per 100 inhabitants	2.33	Broadband users per 100 inhabitants	2.67
Secure Internet servers per 1 million inhabitants	2.67	Firm level technology absorption	6.67
International Internet bandwidth per Internet user (bit/s)	1.33	Extent of business Internet use	6.33
Mobile cellular prices (% of GNI per capita)	6.33	Government success in ICT promotion	8.33
Broadband Internet prices (% of GNI per capita)	4.67	ICT use and government efficiency	6.67
		Presence of ICT in government offices	5.00
Human Capital	**4.00**	**Political and Regulatory Environment**	**6.56**
Professional and technical workers as % of the labor force	9.33	Government prioritization of ICT	8.33
Adult literacy rate	1.33	Importance of ICT to government vision of the future	7.00
Digital literacy rate	1.67	Laws relating to ICT	6.33
Tertiary enrollment ratio	2.33	Quality of competition in the ISP sector	7.67
Secondary enrollment ratio	1.67	Effectiveness of law-making bodies	6.67
Schools having Internet access	5.33	Judicial independence	6.33
Quality of educational system	6.33	Intellectual property protection	5.00
Patents granted by USPTO per million people	4.33	Efficiency of legal framework for disputes	6.00
Total royalty payments and receipts (US$/pop.)	2.33	Level of property rights protection	5.67
University-Company research collaboration	6.00		
Economy Environment	**7.56**	**e-Services**	**4.67**
Annual GDP Growth (%)	9.67	Web measure index	4.67
GDP (current US$ bill)	7.33		
The level of taxes	8.33		
Financial market sophistication	6.33		
Intensity of local competition	9.00		
Time required to start a business	4.67		

Country Scorecard- Brazil



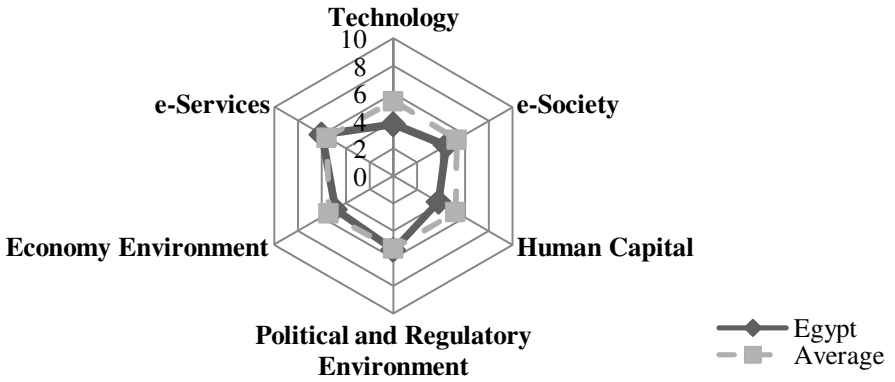
e-Transformation Index	**4.79**	**Ranking**	**17**
Technology Infrastructure	**4.56**	**e-Society**	**5.57**
Proportion of households with computer	4.33	PC users per 100 inhabitants	5.67
Proportion of households with Internet	4.67	Internet users per 100 inhabitants	6.33
Mobile cellular subscriptions per 100 inhabitants	4.67	Mobile phone users per 100 inhabitants	4.33
Fixed telephone lines per 100 inhabitants	4.67	Fixed phone users per 100 inhabitants	4.67
Broadband per 100 inhabitants	4.33	Broadband users per 100 inhabitants	4.33
Secure Internet servers per 1 million inhabitants	5.33	Firm level technology absorption	6.33
International Internet bandwidth per Internet user (bit/s)	5.00	Extent of business Internet use	7.33
Mobile cellular prices (% of GNI per capita)	4.00	Government success in ICT promotion	4.67
Broadband Internet prices (% of GNI per capita)	4.00	ICT use and government efficiency	5.67
		Presence of ICT in government offices	6.33
Human Capital	**4.24**	**Political and Regulatory Environment**	**3.74**
Professional and technical workers as % of the labor force	3.33	Government prioritization of ICT	2.33
Adult literacy rate	3.67	Importance of ICT to government vision of the future	4.00
Digital literacy rate	6.00	Laws relating to ICT	5.33
Tertiary enrollment ratio	4.00	Quality of competition in the ISP sector	6.00
Secondary enrollment ratio	8.33	Effectiveness of law-making bodies	1.00
Schools having Internet access	4.00	Judicial independence	4.67
Quality of educational system	0.33	Intellectual property protection	4.00
Patents granted by USPTO per million people	5.00	Efficiency of legal framework for disputes	2.33
Total royalty payments and receipts (US$/pop.)	5.67	Level of property rights protection	4.00
University-Company research collaboration	5.67		
Economy Environment	**4.61**	**e-Services**	**6.00**
Annual GDP Growth (%)	4.00	Web measure index	6.00
GDP (current US$ bill)	8.00		
The level of taxes	0.67		
Financial market sophistication	7.67		
Intensity of local competition	5.67		
Time required to start a business	1.67		

Country Scorecard- Mexico



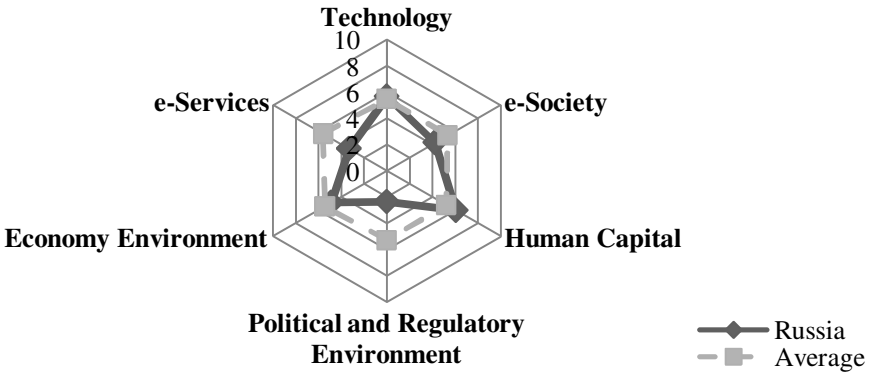
e-Transformation Index	4.78	Ranking	18
Technology Infrastructure	**4.59**	**e-Society**	**4.10**
Proportion of households with computer	4.67	PC users per 100 inhabitants	5.33
Proportion of households with Internet	4.33	Internet users per 100 inhabitants	5.67
Mobile cellular subscriptions per 100 inhabitants	4.33	Mobile phone users per 100 inhabitants	4.00
Fixed telephone lines per 100 inhabitants	4.33	Fixed phone users per 100 inhabitants	4.33
Broadband per 100 inhabitants	5.00	Broadband users per 100 inhabitants	5.00
Secure Internet servers per 1 million inhabitants	4.67	Firm level technology absorption	3.00
International Internet bandwidth per Internet user (bit/s)	1.67	Extent of business Internet use	2.67
Mobile cellular prices (% of GNI per capita)	6.00	Government success in ICT promotion	2.33
Broadband Internet prices (% of GNI per capita)	6.33	ICT use and government efficiency	5.00
		Presence of ICT in government offices	3.67
Human Capital	**4.24**	**Political and Regulatory Environment**	**2.81**
Professional and technical workers as % of the labor force	1.67	Government prioritization of ICT	3.67
Adult literacy rate	5.00	Importance of ICT to government vision of the future	3.33
Digital literacy rate	5.33	Laws relating to ICT	3.67
Tertiary enrollment ratio	4.33	Quality of competition in the ISP sector	2.67
Secondary enrollment ratio	5.67	Effectiveness of law-making bodies	1.33
Schools having Internet access	5.00	Judicial independence	3.67
Quality of educational system	2.67	Intellectual property protection	3.33
Patents granted by USPTO per million people	5.33	Efficiency of legal framework for disputes	2.33
Total royalty payments and receipts (US$/pop.)	5.00	Level of property rights protection	1.33
University-Company research collaboration	4.33		
Economy Environment	**4.61**	**e-Services**	**8.33**
Annual GDP Growth (%)	2.00	Web measure index	8.33
GDP (current US$ bill)	7.00		
The level of taxes	4.33		
Financial market sophistication	4.67		
Intensity of local competition	4.33		
Time required to start a business	5.33		

Country Scorecard- Egypt



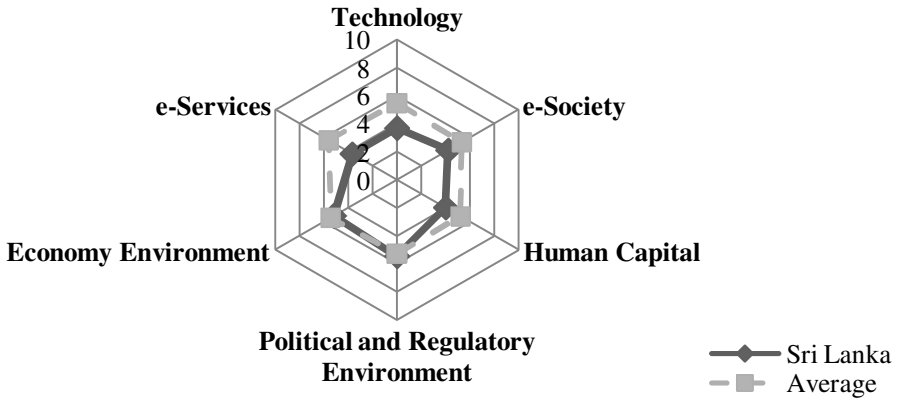
e-Transformation Index	4.71	Ranking	19
Technology Infrastructure	**3.74**	**e-Society**	**4.43**
Proportion of households with computer	3.67	PC users per 100 inhabitants	3.00
Proportion of households with Internet	3.67	Internet users per 100 inhabitants	3.67
Mobile cellular subscriptions per 100 inhabitants	2.67	Mobile phone users per 100 inhabitants	2.33
Fixed telephone lines per 100 inhabitants	3.33	Fixed phone users per 100 inhabitants	3.33
Broadband per 100 inhabitants	3.00	Broadband users per 100 inhabitants	3.33
Secure Internet servers per 1 million inhabitants	3.33	Firm level technology absorption	5.00
International Internet bandwidth per Internet user (bit/s)	3.67	Extent of business Internet use	6.67
Mobile cellular prices (% of GNI per capita)	5.00	Government success in ICT promotion	8.00
Broadband Internet prices (% of GNI per capita)	5.33	ICT use and government efficiency	4.67
		Presence of ICT in government offices	4.33
Human Capital	**3.81**	**Political and Regulatory Environment**	**5.37**
Professional and technical workers as % of the labor force	6.33	Government prioritization of ICT	7.00
Adult literacy rate	2.00	Importance of ICT to government vision of the future	5.67
Digital literacy rate	3.33	Laws relating to ICT	4.00
Tertiary enrollment ratio	5.33	Quality of competition in the ISP sector	8.00
Secondary enrollment ratio	6.00	Effectiveness of law-making bodies	3.00
Schools having Internet access	3.00	Judicial independence	6.67
Quality of educational system	0.67	Intellectual property protection	4.67
Patents granted by USPTO per million people	3.00	Efficiency of legal framework for disputes	5.00
Total royalty payments and receipts (US$/pop.)	4.00	Level of property rights protection	4.33
University-Company research collaboration	1.67		
Economy Environment	**4.89**	**e-Services**	**6.00**
Annual GDP Growth (%)	5.00	Web measure index	6.00
GDP (current US$ bill)	3.00		
The level of taxes	8.00		
Financial market sophistication	1.67		
Intensity of local competition	3.33		
Time required to start a business	8.33		

Country Scorecard- Russia



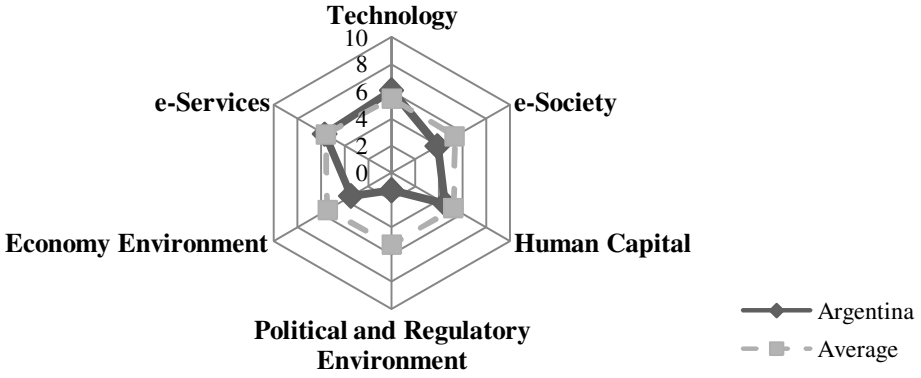
e-Transformation Index	4.42	Ranking	20
Technology Infrastructure	**5.63**	**e-Society**	**4.23**
Proportion of households with computer	4.00	PC users per 100 inhabitants	5.00
Proportion of households with Internet	4.00	Internet users per 100 inhabitants	5.00
Mobile cellular subscriptions per 100 inhabitants	9.00	Mobile phone users per 100 inhabitants	8.67
Fixed telephone lines per 100 inhabitants	6.33	Fixed phone users per 100 inhabitants	6.33
Broadband per 100 inhabitants	3.67	Broadband users per 100 inhabitants	4.00
Secure Internet servers per 1 million inhabitants	4.00	Firm level technology absorption	2.00
International Internet bandwidth per Internet user (bit/s)	4.67	Extent of business Internet use	5.33
Mobile cellular prices (% of GNI per capita)	7.67	Government success in ICT promotion	1.67
Broadband Internet prices (% of GNI per capita)	7.33	ICT use and government efficiency	2.33
		Presence of ICT in government offices	2.00
Human Capital	**6.05**	**Political and Regulatory Environment**	**2.37**
Professional and technical workers as % of the labor force	5.67	Government prioritization of ICT	2.00
Adult literacy rate	7.33	Importance of ICT to government vision of the future	2.33
Digital literacy rate	5.00	Laws relating to ICT	3.00
Tertiary enrollment ratio	8.33	Quality of competition in the ISP sector	4.67
Secondary enrollment ratio	4.67	Effectiveness of law-making bodies	2.67
Schools having Internet access	5.67	Judicial independence	2.00
Quality of educational system	5.67	Intellectual property protection	2.00
Patents granted by USPTO per million people	N.A.	Efficiency of legal framework for disputes	1.67
Total royalty payments and receipts (US$/pop.)	N.A.	Level of property rights protection	1.00
University-Company research collaboration	4.33		
Economy Environment	**4.89**	**e-Services**	**3.33**
Annual GDP Growth (%)	8.67	Web measure index	3.33
GDP (current US$ bill)	7.67		
The level of taxes	3.33		
Financial market sophistication	2.00		
Intensity of local competition	2.67		
Time required to start a business	5.00		

Country Scorecard- Sri Lanka



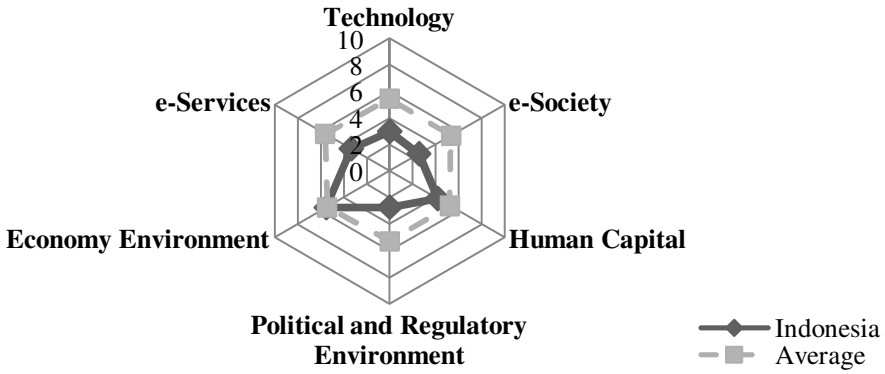
e-Transformation Index	**4.36**	**Ranking**	**21**
Technology Infrastructure	**3.67**	**e-Society**	**4.20**
Proportion of households with computer	2.33	PC users per 100 inhabitants	2.67
Proportion of households with Internet	2.67	Internet users per 100 inhabitants	1.00
Mobile cellular subscriptions per 100 inhabitants	3.33	Mobile phone users per 100 inhabitants	3.00
Fixed telephone lines per 100 inhabitants	3.00	Fixed phone users per 100 inhabitants	3.00
Broadband per 100 inhabitants	2.67	Broadband users per 100 inhabitants	3.00
Secure Internet servers per 1 million inhabitants	3.67	Firm level technology absorption	6.00
International Internet bandwidth per Internet user (bit/s)	5.67	Extent of business Internet use	5.67
Mobile cellular prices (% of GNI per capita)	6.67	Government success in ICT promotion	6.33
Broadband Internet prices (% of GNI per capita)	3.00	ICT use and government efficiency	5.33
		Presence of ICT in government offices	6.00
Human Capital	**4.00**	**Political and Regulatory Environment**	**5.44**
Professional and technical workers as % of the labor force	5.00	Government prioritization of ICT	6.67
Adult literacy rate	4.33	Importance of ICT to government vision of the future	6.33
Digital literacy rate	1.00	Laws relating to ICT	4.33
Tertiary enrollment ratio	N.A.	Quality of competition in the ISP sector	7.00
Secondary enrollment ratio	5.67	Effectiveness of law-making bodies	4.67
Schools having Internet access	3.33	Judicial independence	5.33
Quality of educational system	4.67	Intellectual property protection	5.33
Patents granted by USPTO per million people	4.00	Efficiency of legal framework for disputes	4.67
Total royalty payments and receipts (US$/pop.)	N.A.	Level of property rights protection	4.67
University-Company research collaboration	6.33		
Economy Environment	**5.17**	**e-Services**	**3.67**
Annual GDP Growth (%)	7.33	Web measure index	3.67
GDP (current US$ bill)	2.33		
The level of taxes	6.00		
Financial market sophistication	5.00		
Intensity of local competition	6.67		
Time required to start a business	3.67		

Country Scorecard- Argentina



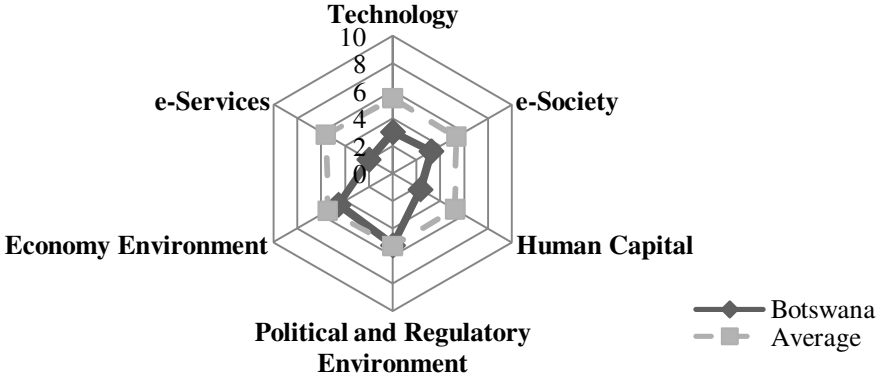
e-Transformation Index	4.14	Ranking	22
Technology Infrastructure	**6.04**	**e-Society**	**3.90**
Proportion of households with computer	6.00	PC users per 100 inhabitants	4.33
Proportion of households with Internet	6.33	Internet users per 100 inhabitants	6.00
Mobile cellular subscriptions per 100 inhabitants	7.67	Mobile phone users per 100 inhabitants	7.33
Fixed telephone lines per 100 inhabitants	5.00	Fixed phone users per 100 inhabitants	5.00
Broadband per 100 inhabitants	6.33	Broadband users per 100 inhabitants	6.33
Secure Internet servers per 1 million inhabitants	5.00	Firm level technology absorption	3.33
International Internet bandwidth per Internet user (bit/s)	7.33	Extent of business Internet use	3.67
Mobile cellular prices (% of GNI per capita)	5.67	Government success in ICT promotion	0.67
Broadband Internet prices (% of GNI per capita)	5.00	ICT use and government efficiency	1.67
		Presence of ICT in government offices	0.67
Human Capital	**4.52**	**Political and Regulatory Environment**	**1.30**
Professional and technical workers as % of the labor force	3.00	Government prioritization of ICT	0.67
Adult literacy rate	6.67	Importance of ICT to government vision of the future	1.33
Digital literacy rate	5.67	Laws relating to ICT	1.67
Tertiary enrollment ratio	7.33	Quality of competition in the ISP sector	3.00
Secondary enrollment ratio	5.00	Effectiveness of law-making bodies	0.67
Schools having Internet access	2.33	Judicial independence	1.67
Quality of educational system	1.67	Intellectual property protection	1.33
Patents granted by USPTO per million people	5.67	Efficiency of legal framework for disputes	0.67
Total royalty payments and receipts (US$/pop.)	6.00	Level of property rights protection	0.67
University-Company research collaboration	2.67		
Economy Environment	**3.44**	**e-Services**	**5.67**
Annual GDP Growth (%)	5.67	Web measure index	5.67
GDP (current US$ bill)	5.00		
The level of taxes	1.33		
Financial market sophistication	2.33		
Intensity of local competition	2.33		
Time required to start a business	4.00		

Country Scorecard- Indonesia



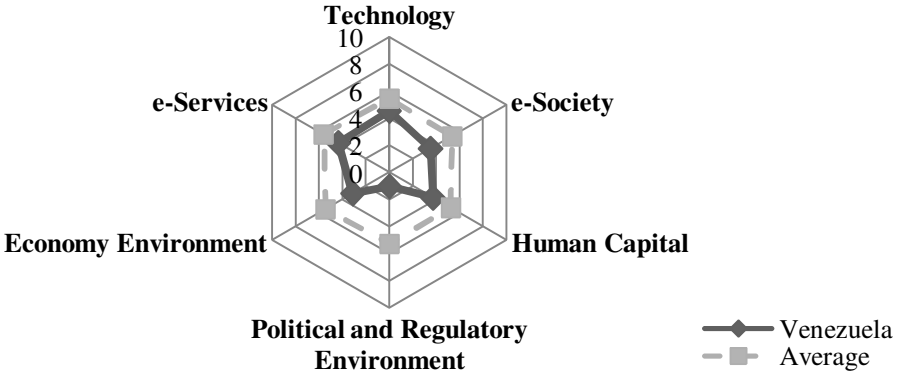
e-Transformation Index	3.55	Ranking	23
Technology Infrastructure	**2.96**	**e-Society**	**2.57**
Proportion of households with computer	2.67	PC users per 100 inhabitants	2.00
Proportion of households with Internet	3.33	Internet users per 100 inhabitants	1.67
Mobile cellular subscriptions per 100 inhabitants	2.33	Mobile phone users per 100 inhabitants	2.00
Fixed telephone lines per 100 inhabitants	2.33	Fixed phone users per 100 inhabitants	2.33
Broadband per 100 inhabitants	1.67	Broadband users per 100 inhabitants	2.00
Secure Internet servers per 1 million inhabitants	3.00	Firm level technology absorption	4.67
International Internet bandwidth per Internet user (bit/s)	3.33	Extent of business Internet use	3.33
Mobile cellular prices (% of GNI per capita)	4.67	Government success in ICT promotion	3.00
Broadband Internet prices (% of GNI per capita)	3.33	ICT use and government efficiency	2.00
		Presence of ICT in government offices	2.67
Human Capital	**4.19**	**Political and Regulatory Environment**	**2.74**
Professional and technical workers as % of the labor force	6.67	Government prioritization of ICT	1.00
Adult literacy rate	4.00	Importance of ICT to government vision of the future	2.33
Digital literacy rate	2.33	Laws relating to ICT	3.33
Tertiary enrollment ratio	2.67	Quality of competition in the ISP sector	3.33
Secondary enrollment ratio	2.33	Effectiveness of law-making bodies	3.33
Schools having Internet access	4.67	Judicial independence	4.00
Quality of educational system	6.67	Intellectual property protection	1.67
Patents granted by USPTO per million people	2.67	Efficiency of legal framework for disputes	4.33
Total royalty payments and receipts (US$/pop.)	4.67	Level of property rights protection	1.33
University-Company research collaboration	3.67		
Economy Environment	**5.50**	**e-Services**	**3.33**
Annual GDP Growth (%)	6.33	Web measure index	3.33
GDP (current US$ bill)	5.67		
The level of taxes	6.33		
Financial market sophistication	4.33		
Intensity of local competition	4.33		
Time required to start a business	2.67		

Country Scorecard- Botswana



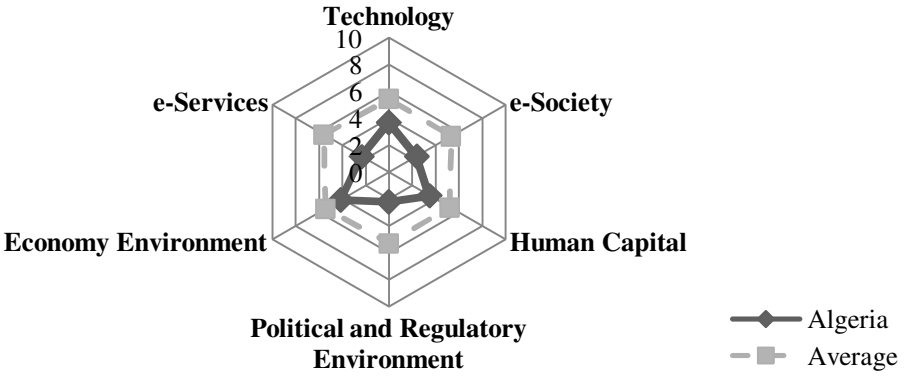
e-Transformation Index	3.39	Ranking	24
Technology Infrastructure	**3.00**	**e-Society**	**3.23**
Proportion of households with computer	1.33	PC users per 100 inhabitants	3.67
Proportion of households with Internet	0.67	Internet users per 100 inhabitants	1.33
Mobile cellular subscriptions per 100 inhabitants	3.67	Mobile phone users per 100 inhabitants	3.33
Fixed telephone lines per 100 inhabitants	2.00	Fixed phone users per 100 inhabitants	2.00
Broadband per 100 inhabitants	2.00	Broadband users per 100 inhabitants	2.33
Secure Internet servers per 1 million inhabitants	2.33	Firm level technology absorption	4.00
International Internet bandwidth per Internet user (bit/s)	2.00	Extent of business Internet use	1.67
Mobile cellular prices (% of GNI per capita)	7.33	Government success in ICT promotion	6.00
Broadband Internet prices (% of GNI per capita)	5.67	ICT use and government efficiency	3.33
		Presence of ICT in government offices	4.67
Human Capital	**2.33**	**Political and Regulatory Environment**	**5.22**
Professional and technical workers as % of the labor force	1.00	Government prioritization of ICT	5.33
Adult literacy rate	2.67	Importance of ICT to government vision of the future	4.67
Digital literacy rate	1.33	Laws relating to ICT	2.33
Tertiary enrollment ratio	1.67	Quality of competition in the ISP sector	2.33
Secondary enrollment ratio	3.33	Effectiveness of law-making bodies	8.00
Schools having Internet access	2.00	Judicial independence	7.33
Quality of educational system	4.33	Intellectual property protection	4.33
Patents granted by USPTO per million people	0	Efficiency of legal framework for disputes	6.67
Total royalty payments and receipts (US$/pop.)	5.33	Level of property rights protection	6.00
University-Company research collaboration	1.67		
Economy Environment	**5.94**	**e-Services**	**2.00**
Annual GDP Growth (%)	6.67	Web measure index	2.00
GDP (current US$ bill)	1.33		
The level of taxes	9.00		
Financial market sophistication	4.00		
Intensity of local competition	4.00		
Time required to start a business	2.33		

Country Scorecard- Venezuela



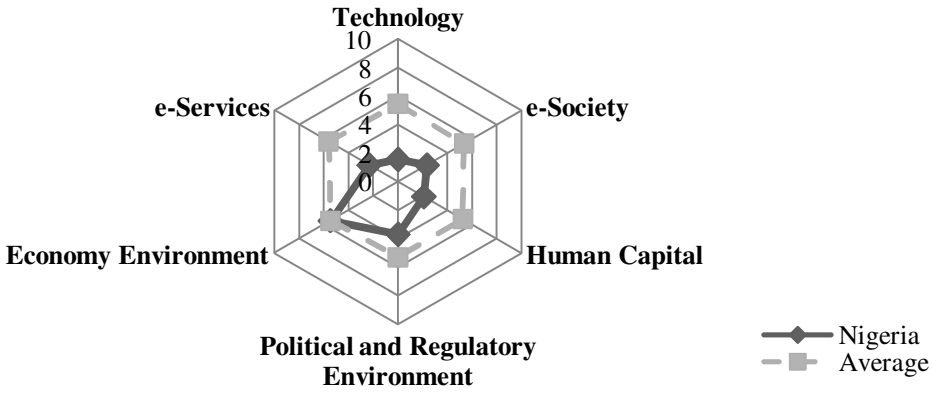
e-Transformation Index	**3.37**	**Ranking**	**25**
Technology Infrastructure	**4.52**	**e-Society**	**3.50**
Proportion of households with computer	3.33	PC users per 100 inhabitants	4.67
Proportion of households with Internet	2.00	Internet users per 100 inhabitants	4.67
Mobile cellular subscriptions per 100 inhabitants	6.67	Mobile phone users per 100 inhabitants	6.33
Fixed telephone lines per 100 inhabitants	4.00	Fixed phone users per 100 inhabitants	4.00
Broadband per 100 inhabitants	4.00	Broadband users per 100 inhabitants	4.33
Secure Internet servers per 1 million inhabitants	4.33	Firm level technology absorption	2.67
International Internet bandwidth per Internet user (bit/s)	5.33	Extent of business Internet use	3.00
Mobile cellular prices (% of GNI per capita)	4.33	Government success in ICT promotion	1.00
Broadband Internet prices (% of GNI per capita)	6.67	ICT use and government efficiency	2.67
		Presence of ICT in government offices	1.67
Human Capital	**3.71**	**Political and Regulatory Environment**	**1.04**
Professional and technical workers as % of the labor force	2.33	Government prioritization of ICT	1.67
Adult literacy rate	5.33	Importance of ICT to government vision of the future	1.67
Digital literacy rate	4.33	Laws relating to ICT	2.00
Tertiary enrollment ratio	6.00	Quality of competition in the ISP sector	1.00
Secondary enrollment ratio	3.67	Effectiveness of law-making bodies	0.33
Schools having Internet access	3.00	Judicial independence	1.33
Quality of educational system	1.33	Intellectual property protection	0.67
Patents granted by USPTO per million people	6.67	Efficiency of legal framework for disputes	0.33
Total royalty payments and receipts (US$/pop.)	2.67	Level of property rights protection	0.33
University-Company research collaboration	2.67		
Economy Environment	**3.11**	**e-Services**	**4.33**
Annual GDP Growth (%)	5.33	Web measure index	4.33
GDP (current US$ bill)	4.33		
The level of taxes	3.00		
Financial market sophistication	3.00		
Intensity of local competition	1.00		
Time required to start a business	2.00		

Country Scorecard- Algeria



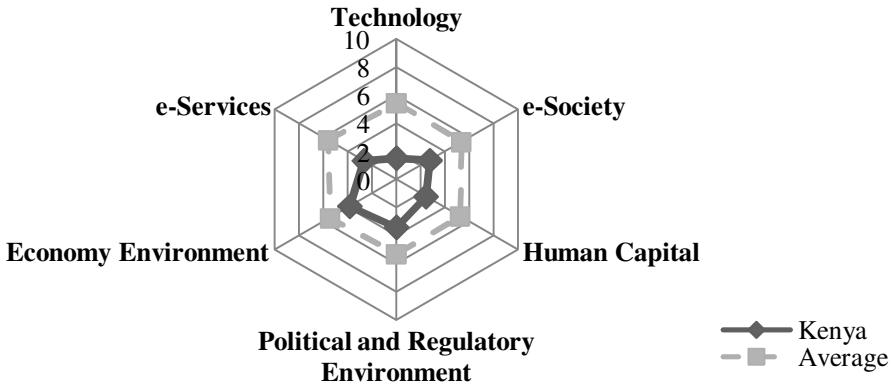
e-Transformation Index	3.03	Ranking	26
Technology Infrastructure	**3.70**	**e-Society**	**2.40**
Proportion of households with computer	3.00	PC users per 100 inhabitants	1.00
Proportion of households with Internet	3.00	Internet users per 100 inhabitants	3.00
Mobile cellular subscriptions per 100 inhabitants	5.33	Mobile phone users per 100 inhabitants	5.00
Fixed telephone lines per 100 inhabitants	2.67	Fixed phone users per 100 inhabitants	2.67
Broadband per 100 inhabitants	3.33	Broadband users per 100 inhabitants	3.67
Secure Internet servers per 1 million inhabitants	1.67	Firm level technology absorption	1.33
International Internet bandwidth per Internet user (bit/s)	3.00	Extent of business Internet use	0.67
Mobile cellular prices (% of GNI per capita)	5.33	Government success in ICT promotion	4.33
Broadband Internet prices (% of GNI per capita)	6.00	ICT use and government efficiency	1.33
		Presence of ICT in government offices	1.00
Human Capital	**3.48**	**Political and Regulatory Environment**	**2.19**
Professional and technical workers as % of the labor force	7.33	Government prioritization of ICT	4.33
Adult literacy rate	2.33	Importance of ICT to government vision of the future	2.67
Digital literacy rate	3.00	Laws relating to ICT	0.67
Tertiary enrollment ratio	3.67	Quality of competition in the ISP sector	1.33
Secondary enrollment ratio	4.33	Effectiveness of law-making bodies	2.00
Schools having Internet access	1.67	Judicial independence	3.00
Quality of educational system	2.00	Intellectual property protection	1.00
Patents granted by USPTO per million people	2.00	Efficiency of legal framework for disputes	2.67
Total royalty payments and receipts (US$/pop.)	N.A.	Level of property rights protection	2.00
University-Company research collaboration	0.33		
Economy Environment	**4.11**	**e-Services**	**2.33**
Annual GDP Growth (%)	6.00	Web measure index	2.33
GDP (current US$ bill)	3.67		
The level of taxes	6.33		
Financial market sophistication	0.67		
Intensity of local competition	2.00		
Time required to start a business	6.00		

Country Scorecard- Nigeria



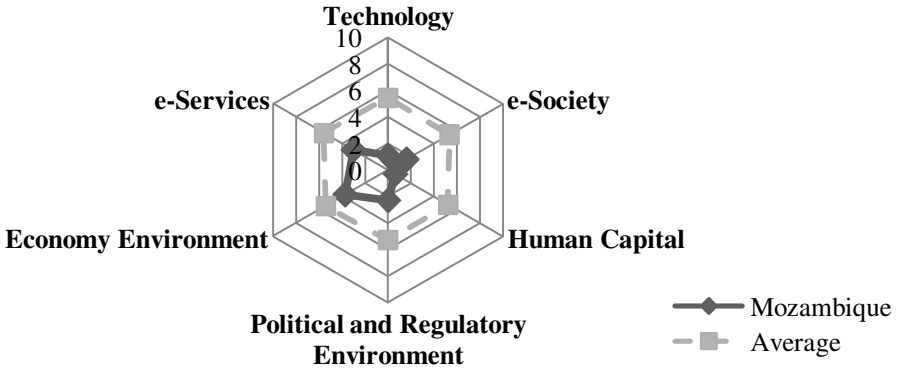
e-Transformation Index	2.90	Ranking	27
Technology Infrastructure	**1.56**	**e-Society**	**2.33**
Proportion of households with computer	1.67	PC users per 100 inhabitants	0.67
Proportion of households with Internet	2.33	Internet users per 100 inhabitants	2.00
Mobile cellular subscriptions per 100 inhabitants	1.67	Mobile phone users per 100 inhabitants	1.33
Fixed telephone lines per 100 inhabitants	1.33	Fixed phone users per 100 inhabitants	1.33
Broadband per 100 inhabitants	0.00	Broadband users per 100 inhabitants	0.00
Secure Internet servers per 1 million inhabitants	1.00	Firm level technology absorption	3.67
International Internet bandwidth per Internet user (bit/s)	0.33	Extent of business Internet use	4.33
Mobile cellular prices (% of GNI per capita)	3.67	Government success in ICT promotion	2.67
Broadband Internet prices (% of GNI per capita)	2.00	ICT use and government efficiency	4.00
		Presence of ICT in government offices	3.33
Human Capital	**2.10**	**Political and Regulatory Environment**	**3.67**
Professional and technical workers as % of the labor force	2.67	Government prioritization of ICT	1.33
Adult literacy rate	2.00	Importance of ICT to government vision of the future	3.00
Digital literacy rate	2.00	Laws relating to ICT	4.00
Tertiary enrollment ratio	2.00	Quality of competition in the ISP sector	5.67
Secondary enrollment ratio	1.00	Effectiveness of law-making bodies	4.33
Schools having Internet access	1.33	Judicial independence	5.67
Quality of educational system	3.67	Intellectual property protection	2.33
Patents granted by USPTO per million people	2.33	Efficiency of legal framework for disputes	4.00
Total royalty payments and receipts (US$/pop.)	N.A.	Level of property rights protection	2.67
University-Company research collaboration	3.67		
Economy Environment	**5.44**	**e-Services**	**2.33**
Annual GDP Growth (%)	8.00	Web measure index	2.33
GDP (current US$ bill)	3.33		
The level of taxes	7.33		
Financial market sophistication	3.33		
Intensity of local competition	6.33		
Time required to start a business	4.33		

Country Scorecard- Kenya



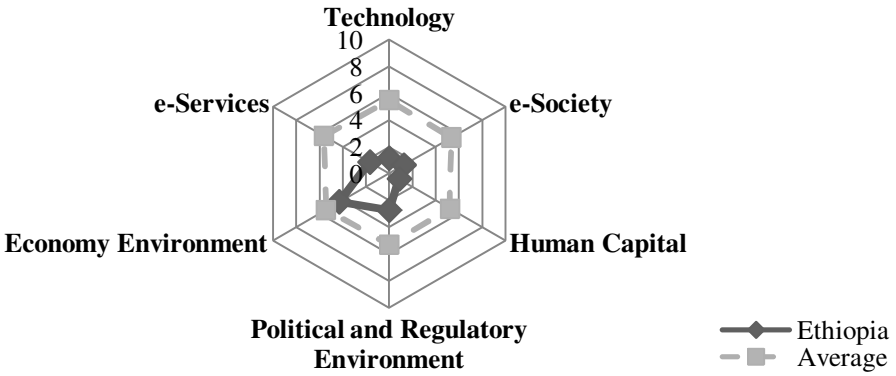
e-Transformation Index	2.76	Ranking	28
Technology Infrastructure	**1.52**	**e-Society**	**2.73**
Proportion of households with computer	2.00	PC users per 100 inhabitants	1.67
Proportion of households with Internet	1.33	Internet users per 100 inhabitants	2.67
Mobile cellular subscriptions per 100 inhabitants	2.00	Mobile phone users per 100 inhabitants	1.67
Fixed telephone lines per 100 inhabitants	0.67	Fixed phone users per 100 inhabitants	0.67
Broadband per 100 inhabitants	0.00	Broadband users per 100 inhabitants	1.67
Secure Internet servers per 1 million inhabitants	1.33	Firm level technology absorption	4.33
International Internet bandwidth per Internet user (bit/s)	0.67	Extent of business Internet use	2.00
Mobile cellular prices (% of GNI per capita)	3.00	Government success in ICT promotion	5.33
Broadband Internet prices (% of GNI per capita)	2.67	ICT use and government efficiency	4.33
		Presence of ICT in government offices	3.00
Human Capital	**2.43**	**Political and Regulatory Environment**	**3.41**
Professional and technical workers as % of the labor force	4.00	Government prioritization of ICT	4.00
Adult literacy rate	1.00	Importance of ICT to government vision of the future	4.33
Digital literacy rate	2.67	Laws relating to ICT	2.67
Tertiary enrollment ratio	1.00	Quality of competition in the ISP sector	4.00
Secondary enrollment ratio	1.33	Effectiveness of law-making bodies	4.00
Schools having Internet access	1.00	Judicial independence	2.33
Quality of educational system	6.00	Intellectual property protection	3.00
Patents granted by USPTO per million people	3.33	Efficiency of legal framework for disputes	3.00
Total royalty payments and receipts (US$/pop.)	3.00	Level of property rights protection	3.33
University-Company research collaboration	5.67		
Economy Environment	**3.83**	**e-Services**	**2.67**
Annual GDP Growth (%)	4.67	Web measure index	2.67
GDP (current US$ bill)	2.00		
The level of taxes	2.67		
Financial market sophistication	4.33		
Intensity of local competition	4.67		
Time required to start a business	4.67		

Country Scorecard- Mozambique



e-Transformation Index	2.05	Ranking	29
Technology Infrastructure	**1.07**	**e-Society**	**1.57**
Proportion of households with computer	1.00	PC users per 100 inhabitants	1.33
Proportion of households with Internet	1.00	Internet users per 100 inhabitants	0.67
Mobile cellular subscriptions per 100 inhabitants	0.67	Mobile phone users per 100 inhabitants	0.67
Fixed telephone lines per 100 inhabitants	0.33	Fixed phone users per 100 inhabitants	0.33
Broadband per 100 inhabitants	0.00	Broadband users per 100 inhabitants	0.00
Secure Internet servers per 1 million inhabitants	0.67	Firm level technology absorption	2.33
International Internet bandwidth per Internet user (bit/s)	1.00	Extent of business Internet use	1.00
Mobile cellular prices (% of GNI per capita)	2.67	Government success in ICT promotion	5.00
Broadband Internet prices (% of GNI per capita)	2.33	ICT use and government efficiency	3.00
		Presence of ICT in government offices	1.33
Human Capital	**0.62**	**Political and Regulatory Environment**	**2.30**
Professional and technical workers as % of the labor force	0.33	Government prioritization of ICT	3.00
Adult literacy rate	0.67	Importance of ICT to government vision of the future	3.67
Digital literacy rate	0.67	Laws relating to ICT	1.33
Tertiary enrollment ratio	0.67	Quality of competition in the ISP sector	1.67
Secondary enrollment ratio	0.33	Effectiveness of law-making bodies	3.67
Schools having Internet access	0.67	Judicial independence	2.67
Quality of educational system	1.00	Intellectual property protection	1.00
Patents granted by USPTO per million people	0.00	Efficiency of legal framework for disputes	2.00
Total royalty payments and receipts (US$/pop.)	2.00	Level of property rights protection	1.67
University-Company research collaboration	1.00		
Economy Environment	**3.72**	**e-Services**	**3.00**
Annual GDP Growth (%)	9.33	Web measure index	3.00
GDP (current US$ bill)	1.00		
The level of taxes	3.67		
Financial market sophistication	1.33		
Intensity of local competition	1.33		
Time required to start a business	5.67		

Country Scorecard- Ethiopia



e-Transformation Index	1.98	Ranking	30
Technology Infrastructure	**1.11**	**e-Society**	**1.23**
Proportion of households with computer	0.33	PC users per 100 inhabitants	0.33
Proportion of households with Internet	0.33	Internet users per 100 inhabitants	0.33
Mobile cellular subscriptions per 100 inhabitants	0.33	Mobile phone users per 100 inhabitants	0.33
Fixed telephone lines per 100 inhabitants	1.00	Fixed phone users per 100 inhabitants	1.00
Broadband per 100 inhabitants	0	Broadband users per 100 inhabitants	0
Secure Internet servers per 1 million inhabitants	0.33	Firm level technology absorption	1.67
International Internet bandwidth per Internet user (bit/s)	2.67	Extent of business Internet use	1.33
Mobile cellular prices (% of GNI per capita)	3.33	Government success in ICT promotion	2.00
Broadband Internet prices (% of GNI per capita)	1.67	ICT use and government efficiency	3.00
		Presence of ICT in government offices	2.33
Human Capital	**0.86**	**Political and Regulatory Environment**	**2.74**
Professional and technical workers as % of the labor force	0.67	Government prioritization of ICT	2.67
Adult literacy rate	0.33	Importance of ICT to government vision of the future	3.67
Digital literacy rate	0.33	Laws relating to ICT	1.00
Tertiary enrollment ratio	1.33	Quality of competition in the ISP sector	0.67
Secondary enrollment ratio	0.67	Effectiveness of law-making bodies	2.33
Schools having Internet access	0.33	Judicial independence	3.33
Quality of educational system	2.33	Intellectual property protection	3.67
Patents granted by USPTO per million people	0	Efficiency of legal framework for disputes	3.67
Total royalty payments and receipts (US$/pop.)	1.67	Level of property rights protection	3.67
University-Company research collaboration	0.67		
Economy Environment	**4.28**	**e-Services**	**1.67**
Annual GDP Growth (%)	7.67	Web measure index	1.67
GDP (current US$ bill)	1.67		
The level of taxes	7.00		
Financial market sophistication	1.00		
Intensity of local competition	1.67		
Time required to start a business	6.67		