IMPACT OF ICT ON COMMUNITY DEVELOPMENT

in ESCWA Member Countries

ESCWA

United Nations Economic and Social commission for Western Asia

ECONOMIC AND SOCIAL COMMISSION FOR WESTERN ASIA (ESCWA)

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United Nations

Distr.
GENERAL
E/ESCWA/ICTD/2009/15
26 November 2009
ORIGINAL: ENGLISH

ECONOMIC AND SOCIAL COMMISSION FOR WESTERN ASIA (ESCWA)

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United Nations
New York, 2009

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09-0506

Preface

This study describes the efforts and progress made by the international community, in particular the World Summit on the Information Society (WSIS), the International Telecommunication Union (ITU) and the Partnership on Measuring ICT for Development. Particular attention is drawn to the endeavour to develop a unified model able to address the many aspects of the information society, including the impact of information and communication technology (ICT) on society and community development. Despite the challenges and limitations, a useful and practical framework can be developed using available measurement models and tools. Based on this, the study proposes a set of indicators for measuring the impact of ICT on community development while focusing on the context in which ICT is applied.

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ABBREVIATIONS

3G	Third Generation of mobile phone technology standards and technology
AFPU	Agro-Food Processing Unit
ANRT	Agence Nationale de Réglementation des Télécommunications
BSNL	Bharat Sanchar Nigam Ltd.
CDIE	Center for Development Information and Evaluation
CEPES	Peruvian Centre for Social Studies
CPU	Central Processing Unit
DAI	Digital Access Index
DOI	Digital Opportunity Index
ECA	Economic Commission for Africa
ECLAC	Economic Commission for Latin America and the Caribbean
ESCAP	Economic and Social Commission for Asia and the Pacific
ESCWA	Economic and Social Commission for Western Asia
Eurostat	European Statistics
FIRDOS	Fund for Integrated Rural Development of Syria
GDP	Gross Domestic Product
GHz	Gigahertz
GIS	Geographic information system
GSM	Global System for Mobile communications
HIV	Human Immunodeficiency Virus
ICDL	International Computer Driving Licence
ICT	Information and communication technology
ICT4D	Information and communication technology for development
ICT-OI	ICT Opportunity Index
IDI	ICT Development Index
IDRC	International Development Research Centre
IEEE	Institute of Electrical and Electronics Engineers
IFAD	International Fund for Agricultural Development
ITU	International Telecommunication Union
KSI	Knowledge Stations Initiative
MCIT	Ministry of Communications and Information Technology
MTCC	Multipurpose Technology Community Centre
NGOs	Non-governmental organizations
NITC	National Information Technology Center
NSOs	National Statistical Offices
OECD	Organisation for Economic Co-operation and Development
PACTE	Programme of Access generalized to Telecommunications
PC	Personal Computer
Reefnet	Rural Knowledge Network
SCP	Smart Community Project
SME	Small and Medium Enterprises
SMS	Short Message Service
TACC	Technology Access Community Centres
TPI	Telecentre Performance Indicator
UIS	UNESCO Institute for Statistics
UN	United Nations
UNCTAD	United Nations Conference on Trade and Development
UNDESA	United Nations Department of Economic and Social Affairs
UNDP	United Nations Development Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNIFIL	United Nations Interim Force in Lebanon
VERCON	Virtual Extension and Research Communication Network
WiMAX	Worldwide Interoperability for Microwave Access
WPIIS	Working Party on Indicators for the Information Society
WSIS	World Summit on the Information Society

Introduction

As economies in the world develop, transitioning from commodity-based approaches to value added manufacturing and information economies is vital for sustainable development. Appropriate use of high technology products is a gateway for successful economic transition. Developing countries must properly utilize information and communication technologies (ICTs) in their socio-economic development because these tools can function as significant productive and economic forces. Unfortunately, the obstacles faced by developing countries often hinder their progress in these areas.

Further, as communication facilitates greater global integration, countries which do not have a self-sustaining electronic presence will find their cultural and linguistic identities threatened. As the Internet grows and develops, a clear trend of homogenization places these cultures at risk. Consequently, citizens of these countries and communities will experience greater barriers to the participation in the global economy, further exacerbating the situation. This effect can be clearly seen in the Economic and Social Commission for Western Asia (ESCWA) region, where the number of web pages per capita seriously lags behind other linguistically and culturally self-sufficient areas. Unless this trend is reversed, the Arabic linguistic presence will fade, limiting the ability of Arabic speakers to utilize ICT for socio-economic advancement.

In addition to content, delivery mechanisms are vital for successful global integration. Many ESCWA member countries struggle with developing communication infrastructures, making it difficult to exchange information. While significant progress has been seen in voice communication, especially mobile phones, Internet subscriptions per capita, computer adoption and, particularly, broadband services remain sub-optimal. Generally speaking, the comparatively prosperous and geographically smaller Gulf-coast countries have been quite successful in rolling out modern telecommunication networks, while larger, less well-capitalized nations in the Levant are not as advanced.

ICT development projects that function in this environment must incorporate these macroscopic realities into their project designs. Adapting the famous adage of “Think global, act local” project implementers must be aware of the significant importance of participation in the global information economy as they construct ICT projects at the local level. In order to obtain maximum impact and sustainability, these interventions must focus on the broad-scale integration of community services. By integrating many different aspects of community life into a project, the activities are better anchored and have enhanced opportunities for absorption and sustainability.

In order to achieve this synergy, it is necessary to carefully track the impact of information and communication technology for development (ICT4D) projects and adjust them accordingly to achieve optimal efficiency. Funding agencies, community stakeholders and beneficiaries alike are all keenly interested in understanding how well the specific project performs in terms of converting the financial inputs into meaningful impact outputs. In order to determine this, monitoring and evaluative challenges must be overcome.

As with ICT investments in the private sector, it is difficult to quantify the full impact of ICT4D investments in a target group. Fundamentally, it is impossible to create a monitoring model that can accurately represent the entire impact of a project. Meaningful data can, however, be obtained and acted upon from well implemented projects. Obstacles include the difficulty of quantifying the economic impact in developing economies where baseline economic data is almost never sufficiently robust. Further, such investments as training and education are typically long-term undertakings, so accurately assessing the impact of training on the participants is typically quite difficult within the comparatively short evaluation periods used in most project timelines.

Properly constructing evaluative indicators depends on the prior establishment of an evaluative framework. Should the project be judged by economic impact, social change, or value chain generation? These broader areas must be addressed before indicators are ever contemplated. For example, recent

developments have shown nations codifying a government-guaranteed right to broadband services.[1] Comparatively, a nation pursuing an ICT4D investment strategy might use classical return on investment and cost recovery metrics to judge the success of its initiative. It is imperative that the target of the project is understood before any indicators can be constructed.

A partnership of organizations has been formed in order to address these complexities and provide international standardization. This group consists of a broad array of international and United Nations organizations and is working to harmonize data collection and analytical standards. By using a multinational approach, this partnership has been able to bring together national and regional perspectives on defining appropriate indicators. These data and measurement methodologies are referred to as the core ICT indicators and help provide the necessary insight for making informed decisions at the macroscopic level. To date, work has focused on such measurements which provide a clear picture of input resources as telephone lines, computer adoption and so forth. This study focuses on the need for output metrics to illustrate what change was achieved at the national level as a result of these core indicators.

This approach provides a useful starting point for comparing data at the national level. In order to make best use of the data, the full context is necessary. For example, the definition of households in a Western context is usually clear. In the ESCWA region, the definition of a household can vary significantly. In some cases, migratory workers or the realities of communities in transition make it difficult to define what the total count of a household should be. In addition, such metrics as international bandwidth per inhabitant can encourage misleading conclusions. While low levels of international bandwidth are considered undesirable, countries with highly advanced infrastructures and information economies often fall into this category. South Korea is a key example: As most Korean-language websites are located within the country, the highly wired and Internet savvy population does not have a great need for international connectivity. Reliance on this metric without understanding the context could create a misleading analysis of the state of the ICT infrastructure in such countries.

These examples illustrate that while international standardization is vital for informed decision-making, reducing national complexities to quantifiable metrics is inherently difficult, even in developed countries. Understanding qualitative circumstances, and information not easily represented in metrics, is needed to put the information in context. Unfortunately, this often puts decision makers in a grey area. Actionable insight can only be obtained by combining high-level numeric indicators at the national level with detailed measurements of success at the project level.

In addition to measuring the success or failure of the determined metrics, projects must also dedicate resources to evaluating the intended side effects of the intervention. By definition, it is impossible to establish metrics in advance for unintended consequences, thus making agility in monitoring necessary. Further, while there are limits to the feasibility of measuring these issues, the importance of doing so is significant. When undertaking this research, a variety of measurement techniques must be used and direct data collection must be supplemented by interviews with participants, focus group research and questionnaires. This broad combination of qualitative and quantitative data is less subject to bias in data analysis and allows project evaluators to more fully understand the impact picture.

As an example of measurement difficulties, the Smart Community Project (SCP) in Iraq is a clear case in point. This project combined efficiency enhancements for agro-food production with an IT centre to provide technical training and telecommunication access. By definition, ICT4D projects are occurring in places needing development, yet, as these areas do not have baseline performance metrics available, before-and-after analysis is difficult. Furthermore, while usage can be directly observed by staff employees (total number of customers, gender, usage, etc.), it is more difficult to assess what effects are caused by that usage.

[1] Reuters, Tue Nov 17, 2009, Spain govt to guarantee legal right to broadband, at: http://www.reuters.com/article/rbssTechMediaTelecomNews/idUSLH61554320091117.

For example, 100 people may have been trained, but what happened afterwards? Did the average household income increase for graduates of the training? Has the economic picture of the targeted community changed?

It is unfortunate that the realities of implementing projects in developing areas typically require significant investments of time and money in order to robustly collect this type of data, and this level of analysis is generally more than donor agencies are interested in paying for. All too often, the costs of robust measurement are de-emphasized in favour of what are considered the core implementation activities of the initiative. Thus, outcomes are achieved, but the true picture of the impact is not obtained. In the case of SCP, participants were asked to self-assess the economic impact of the training. While this is clearly desirable data, self-assessments of this type are not able to adequately illustrate the results of the project.

An additional project which highlights the issues associated with sustainability planning and long-term impact assessments is the Jordanian Knowledge Stations Initiative (KSI). This network of telecentres was originally incepted as a mechanism for bridging the digital divide, providing e-services to rural areas and improving the economic picture of rural areas. The networks were impressively implemented with a clearly articulated strategy. Follow-up research has shown, however, that these centres have not achieved financial self-sufficiency. Long-term analysis has led the government to reconsider the future trajectory of this initiative in order to fully achieve the desired impact.

In this case, the target metrics for the performance of the telecentres were within the parameters desired for social change, for example use by women. The centres were operating well and distributing the knowledge they were intended to promote although their financial performance has not met expectations. The business side of the equation has performed more like a government-supported social programme than a self-sustaining economic model. The Jordanian government realizes that creating a sector of employment dependent on government money (taxed from other productive sectors of the economy) is difficult to justify, particularly on a long-term basis. Like most project donors, the Jordanian government is not aiming to create a government-supported social programme in perpetuity. In addition to these financial concerns, the full impact of telecentres on communities is less than compelling.

For example, early telecentre projects intended to address rural depopulation sought to teach local citizens computer skills. As a consequence, the best and brightest members of these rural communities gained skills which the local areas were unable to absorb. Due to this, the graduates of these programmes were able to locate much better paying opportunities in urban areas and these projects ultimately incentivized exactly the behaviour they sought to prevent – the migration of skilled workers from rural to urban areas. A proper evaluative structure must be able to detect these types of unintended effects so that decision makers can take appropriate action.

This study reviews the evaluative frameworks, available indicators and candidate indicators to provide insight into the optimal methods of assessing the impact of ICT4D initiatives. Illustrative case studies are included to guide the reader through ICT projects which highlight the unique difficulties of assessing ICT projects and what alternatives need to be considered to address these issues. Ultimately, recommendations are provided for new indicators which will allow enhanced monitoring and evaluation of the project impact.

I. MEASURING THE INFORMATION SOCIETY

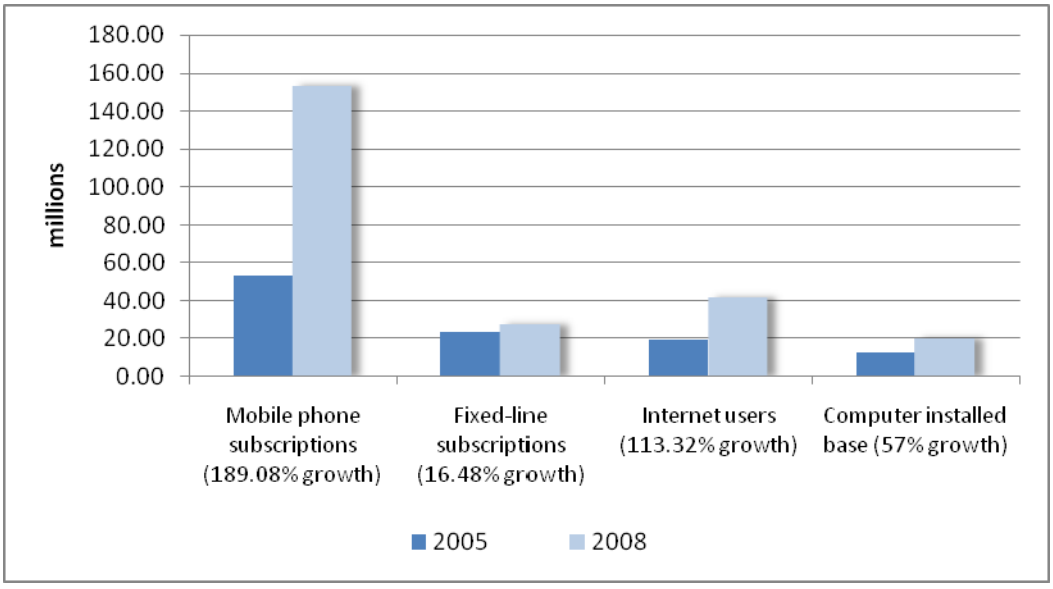
A. OVERVIEW

The spread and adoption of information and communication technologies (ICTs) throughout the world have been phenomenal during the past decade. More people than ever are using fixed and mobile phones and accessing the Internet with the wealth of information and applications it provides.

Mobile phone technology has revolutionized the global communication landscape and is by far the fastest growing ICT today. From penetration rates close to zero in the mid-nineties to an estimated penetration rate of over 50 per cent by the end of 2008, over 4 billion mobile users worldwide are communicating everyday and some even have access to the Internet via advanced mobile services made possible by the availability of 3G networks. At the end of 2008, almost a quarter of the world's population was using the Internet; out of these 1.4 billion Internet users, 400 million were using fixed broadband technologies.[2]

The ESCWA region has taken significant steps towards bridging the digital divide and building the information society. The prominence of ICTs throughout the region has grown significantly; mobile penetration rates have drastically increased and the number of Internet users is on the rise. Figure I depicts the ESCWA region's growth in ICTs between 2005 and 2008.

Figure I. ESCWA region's growth in ICTs (2005-2008)



Source: Madar Research, World Bank, World Development Indicators (WDI) database.

In view of such remarkable developments, it is perhaps no surprise that one of the targets set by the World Summit on the Information Society (WSIS) namely "to ensure that more than half of the world's inhabitants have access to ICTs within their reach" has been reached seven years ahead of its 2015 schedule.[3]

The past decade has established that ICTs are long-term drivers for economic growth and have positive impacts on the socio-economic development of communities and countries alike. As such, governments have been investing heavily in ICT-based development projects and initiatives with the aim of achieving ubiquitous access to ICTs and reaping their promised benefits.

[2] ITU estimates.

[3] WSIS Plan of Action, paragraph 6. j. http://www.itu.int/wsis/docs/geneva/official/poa.html.

The links between ICTs and development are not always clear and well-established, thus international calls for benchmarking and monitoring progress have increased, driven by governments, international organizations, donors, non-governmental organizations (NGOs) and the private sector, all of which wish to assess the impact of their investments.

Despite the high penetration and increased growth rates of ICTs, major differences are seen between developed and developing countries; the global digital divide remains significant, and the question of how to best assess and measure the impact of ICTs on socio-economic development remains to be answered.

B. Review of ICT measurement efforts

Significant differences exist in the capacity of countries to adapt to changes in technology and knowledge. Consequently, the move towards the information society constitutes a real challenge to developing countries, particularly in view of the expanding digital divide with developed countries, thus rendering them increasingly vulnerable to reduction in productivity and economic capacity.

In this context, WSIS was incepted under the patronage of the Secretary-General of the United Nations. The Summit aimed at reducing the digital divide by increasing awareness regarding the benefits of the information society, and by presenting mechanisms to help developing countries advance towards such a society within the context of the global knowledge-based economy.

The WSIS was divided into two phases. Phase I was held in Geneva in December 2003 and resulted in a Declaration of Principles and a Plan of Action which specifically called for a realistic international performance evaluation and benchmarking methodology for measuring the "Information Society" through comparable statistical indicators and research results.[4] The second phase was held in Tunis in November 2005 and focused on the implementation of the Plan of Action, recognized that the development of ICT indicators is important for measuring the digital divide, called for periodic evaluation, stressed that indicators must take into account different levels of development and national circumstances, and must be developed in a collaborative, cost-effective and non-duplicative fashion.

In line with the commitments of the first phase of WSIS, serious work, spearheaded by international and regional organizations,[5] was carried out to develop a methodology for measuring the digital divide, ICT and the information society. In this regard, a global Partnership on Measuring ICT for Development was launched in Geneva in 2004 which proposed a common set of core ICT indicators. During the second phase of WSIS, two composite indices were launched: the ICT Opportunity Index (ICT-OI) and the Digital Opportunity Index (DOI), both were based on the common set of core ICT indicators proposed earlier by the Partnership. Continuous work on information society measurement during the past five years has led to the development and adoption of additional measurement models and indices, most notably is the ICT Development Index (IDI) developed by the International Telecommunication Union (ITU).

1. *ITU - Digital Access Index (DAI)*

Developed by ITU in 2003, DAI[6] was presented at the first phase of WSIS. Its main objective was to measure the overall ability of individuals in a country to access and use ICTs. The index is built around five categories which impact a country's ability to access ICTs: infrastructure, affordability, knowledge, quality and actual usage of ICTs. The DAI included eight indicators and was calculated for 178 economies in 2002 which allowed them to see how they compare to other countries. The DAI also provided a transparent and globally measurable way of tracking progress towards improving access to ICTs.

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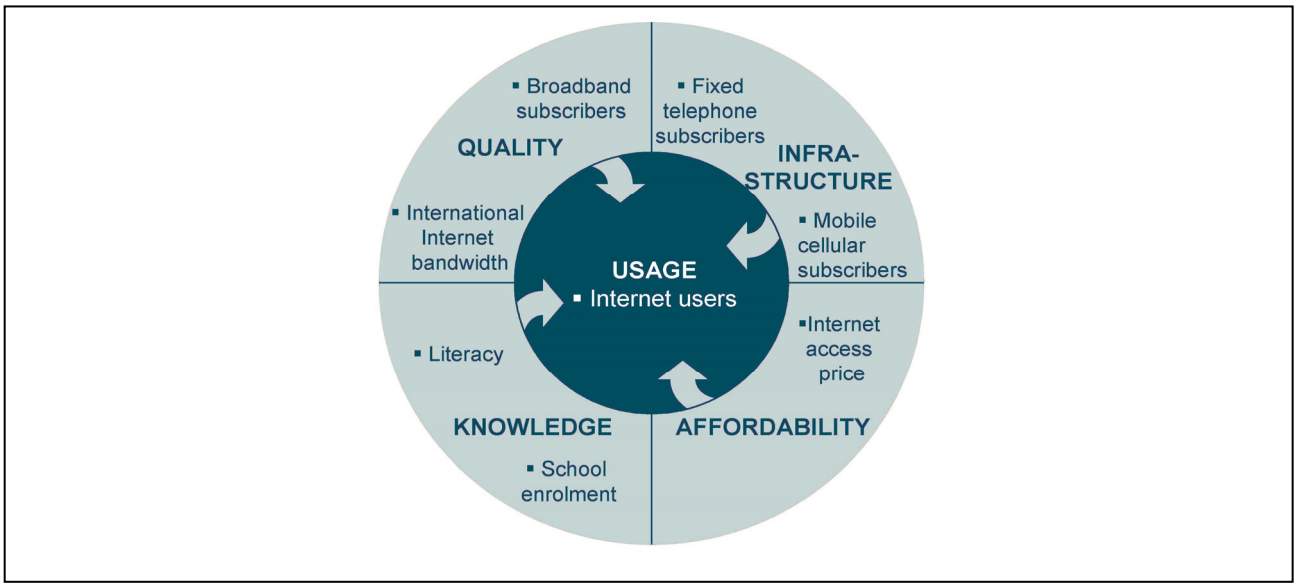
[4] WSIS Plan of Action, Paragraph 28, http://www.itu.int/wsis/docs/geneva/official/poa.html.

[5] Most notable are the efforts of ITU, UNCTAD and OECD.

[6] http://www.itu.int/ITU-D/ict/dai/index.html.

Figure II. Structure of the digital access index (DAI)



Source: International Telecommunication Union (ITU), *Digital Access Index (DAI)*, (2003).

2. *The Partnership on Measuring ICT for Development*

The Partnership on Measuring ICT for Development is one of the most comprehensive initiatives dedicated to developing, collecting and disseminating globally relevant indicators to measure the information society. Launched in June 2004 following the first phase of WSIS, it exemplifies the success of international and multi-stakeholder partnerships by providing an open framework for coordinating ongoing and future activities, and for developing a coherent and structured approach to the development of ICT indicators. It includes a number of such international and United Nations organizations as ITU, United Nations Conference on Trade and Development (UNCTAD), the Organisation for Economic Co-operation and Development (OECD), United Nations Educational, Scientific and Cultural Organization (UNESCO) Institute for Statistics (UIS), United Nations Department of Economic and Social Affairs (UNDESA), the World Bank, Eurostat, and four United Nations Regional Commissions (including ESCWA). The Partnership serves as an indispensable channel for exchanging expertise and advice between National Statistical Offices (NSOs) from developed and developing countries. Box 1 provides more information on the Partnership, including its objectives.

Box 1. Partnership on Measuring ICT for Development

Launched:
June 2004 at UNCTAD XI (São Paulo, Brazil).

Current members:
UNESCO, UNCTAD, ITU, OECD, UIS, UNDESA, World Bank, ECLAC, ESCWA, ESCAP, ECA and Eurostat.

Objectives:
To achieve a common set of core ICT indicators, to be harmonized and agreed upon internationally, which will constitute the basis for a database on ICT statistics; to enhance the capacities of national statistical offices in developing economies and to build competence to develop statistical compilation programmes on the information society based on internationally agreed indicators; and to develop a global database of ICT indicators and to make it available via the Internet.

Structure:
A steering committee (consisting of ITU, UNCTAD and ECLAC) plus five task groups (on ICT in education, e-government, measuring impact, capacity-building and database development).

Through continuous work over the past five years, the most notable achievement of the Partnership was the development, adoption and revision of a common list of core ICT indicators covering five main aspects of the information society: ICT infrastructure and access; access to, and use of, ICT by households and individuals; use of ICT by businesses; the ICT sector and trade in ICT goods; and ICT in education. Table 1 provides additional details on the set of core ICT indicators.

TABLE 1. THE PARTNERSHIP'S LIST OF CORE ICT INDICATORS

Core ICT indicators	Number of indicators	Description
ICT infrastructure and access	9	Data have been collected by ITU (official regulatory agencies and ministries) for many years and are largely available for the majority of countries. Indicators include fixed telephone lines, mobile cellular subscribers, Internet and broadband subscribers (fixed and mobile), international Internet bandwidth, and tariff indicators.
Access to and use of ICTs by households and individuals	13	Data have been collected by ITU (from NGOs) since 2005 but they are scarce. While the majority of countries has information on basic ICT equipment in households (televisions and fixed lines), data on such new technologies as use of and access to mobile phones, Internet and computers are lacking. Indicators include households with a radio, a TV, a fixed telephone line, a mobile cellular telephone and a personal computer (PC). Indicators on location, type, and purpose of Internet use are also included.
Use of ICT by businesses	12	Data are collected by UNCTAD and include indicators on businesses and employees using PCs, the Internet and e-commerce activities. Indicators on location, type, and purpose of Internet use are also included.
ICT sector and trade in ICT goods	4	Data have been collected by UNCTAD since 2004 and include indicators on ICT goods' imports and exports, and the ICT sector's value-added.
ICT in education	9	Data are collected by UIS and include indicators on ICT infrastructure, usage and skills in schools.

Source: Partnership on Measuring ICT for Development (2008 revision).

A closer look at the core ICT indicators reveals that the Partnership-clearly distinguished between measuring readiness (indicators related to ICT infrastructure) and intensity (indicators related to the use of ICT by households, individuals and businesses). No specific indicators, however, were dedicated to measuring impact. The revised set of core ICT indicators did measure ICT skills through some of its indicators on the ICT sector and ICT in education.

Measuring ICT impact can usually be performed once the measurement of ICT infrastructure, ICT access and ICT use have been achieved. Impact indicators are generally difficult to compare since they often rely on an opinion-based questionnaire for collection. Currently, the list of core ICT indicators has no specific indicators for measuring the impact of ICT; however, a recent task group was formed[7] for that purpose. In addition, the Partnership has recently been discussing, including a number of new indicators addressing e-government, barriers to ICT use and ICT security and trust. Such an addition to the core list will only be possible after ample statistical work has been achieved by the international community.

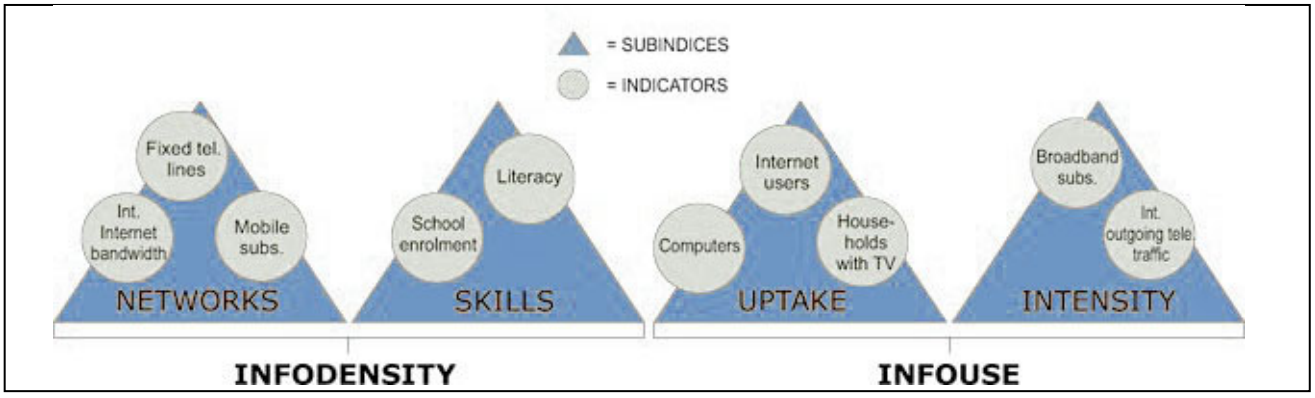
Notable aspects of the Partnership's work are its global approach to identifying ICT indicators, establishing clear definitions, and devising uniform processes for collecting data. This has been a consistent and continuous process and is expected to be carried out way beyond the developmental targets set by WSIS for 2015.

[7] This task group is headed by OECD with the membership of ESCWA.

3. *ITU-ICT Opportunity Index (ICT-OI)*

The ICT ICT-OI[8] was developed by ITU in 2005 as a merger of DAI and Orbicom's Monitoring the Digital Divide/Info-state conceptual framework.[9] The index benefited from the expertise of several international and research organizations, and was based on a selected methodology and list of indicators. It was an excellent example of successful international cooperation and partnership work, as called for in the WSIS Plan of Action in 2003.[10]

Figure III. Structure of the ICT opportunity index



Source: International Telecommunication Union (ITU), *Measuring the Information Society*, (2007).

The ICT-OI is an important tool for tracking the digital divide by measuring the relative difference in ICT opportunity levels among economies and over time. It provides measurement across 183 economies, and relies on 10 qualitative and quantitative indicators grouped into four sub-indices that help measure ICT infrastructure, ICT skills, ICT uptake and ICT intensity. The different sub-indices allow countries to further identify their specific weaknesses and strengths and estimate their degree of info-density and info-use.

4. *The ITU Digital Opportunity Index (DOI)*

The DOI[11] was also developed in 2005 by the ITU and other international and national agencies; it measures the potential of countries to benefit from access to ICTs.

The index is based on 11 indicators which are based on the set of core ICT indicators prepared by the Partnership and agreed upon by the international community. These indicators are grouped into three clusters denoting opportunity, infrastructure and utilization. As opposed to ICT-OI, DOI includes tariffs and covers such advanced services as mobile broadband.

The preliminary version of the index was launched at the second phase of WSIS in November 2005 and the two full releases (covering 180 and 181 countries) were published in 2006 and 2007 in the World Information Society Report.[12]

[8] http://www.itu.int/ITU-D/ict/publications/ict-oi/2007/index.html.

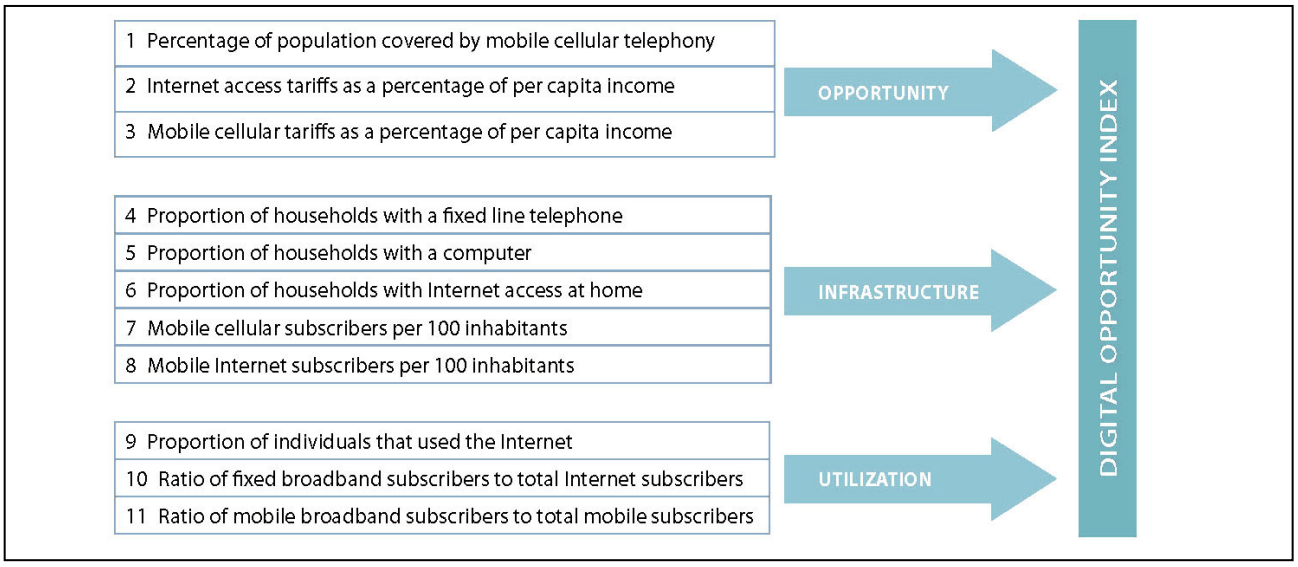
[9] Also called Digital Divide Index, http://www.orbicom.uqam.ca/projects/ddi2002.

[10] WSIS Plan of Action, Paragraph 28, http://www.itu.int/wsis/docs/geneva/official/poa.html.

[11] http://www.itu.int/ITU-D/ict/doi/index.html.

[12] http://www.itu.int/osg/spu/publications/worldinformationsociety/2007/.

Figure IV. Structure of the digital opportunity index



Source: ITU/UNCTAD/KADO Digital Opportunity Platform.

5. *ITU-ICT Development Index (IDI)*

Following the development of these two indices by ITU, the stakeholders called on ITU to further develop and improve its benchmarking efforts and move towards a single index. The IDI[13] was then developed in 2009 as a merger of the Digital Opportunity Index and the ICT Opportunity Index.

The IDI is a global index which measures the digital divide, tracks ICT progress over time, and captures ICT development potential. From DOI it takes indicators related to households and broadband as well as its simple methodology and presentation, whilst from ICT-OI it adopts the indicators related to skills, its normalization method, and its digital divide analysis and methodology.

In addition, a new conceptual framework was adopted, which, for the first time, veered away from the basic assumption that ICTs are potential development enablers. Instead, the framework considers ICTs as critical for countries that are moving towards establishing knowledge-based societies; consequently, it assesses and tracks the extent of development reached by countries in their transformation towards information and knowledge-based societies.

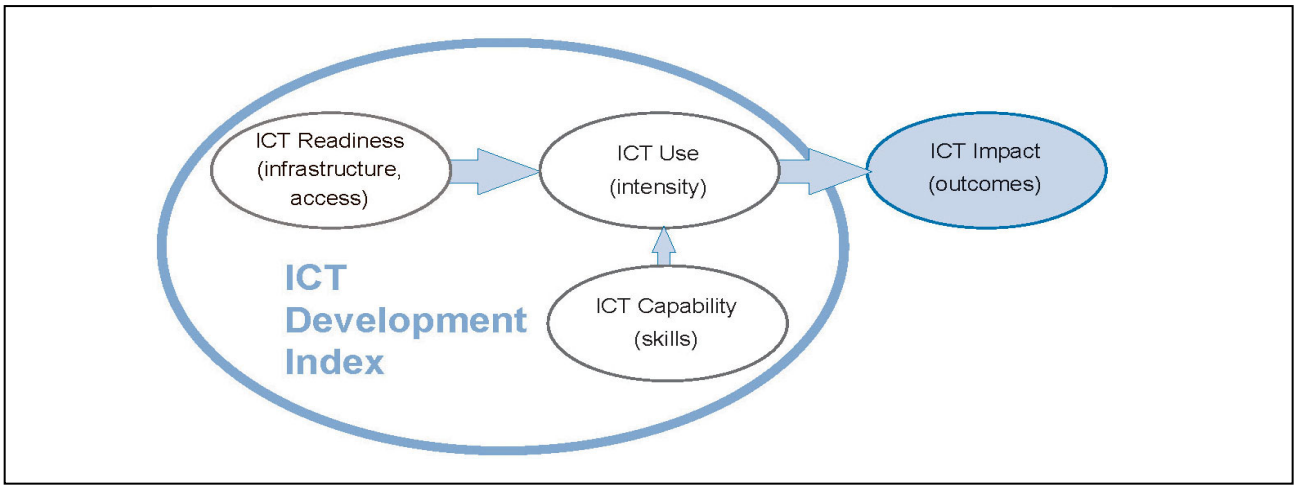
The conceptual framework is based on a basic three-stage information society model:

- Stage 1: ICT readiness, reflecting the level of networked infrastructure and access to ICT;
- Stage 2: ICT intensity, reflecting the level of use of ICTs in the society;
- Stage 3: ICT impact, reflecting the result of efficient and effective ICT use.

This three-stage model has been adopted by several stakeholders involved with measuring the information society. The OECD Working Party on Indicators for the Information Society (WPIIS) has used it for measuring the level of development of e-commerce activities in a given country. It was later expanded to describe the level of development of ICT-related activities, and is frequently used by such other organizations as the Partnership on Measuring ICT for Development.

[13] http://www.itu.int/newsroom/press_releases/2009/07.html.

Figure V. The three-stage information society model adopted by IDI



Source: International Telecommunication Union (ITU), *Measuring the Information Society: The ICT Development Index*, (2009).

The IDI was developed as a composite index reflecting the sequence described by the three-stage model (readiness, intensity, impact). Each stage was denoted by a sub-index composed of several related indicators. The indicators dedicated to stage three do not, however, measure impact per se, but assess the evolution towards the final stages of the information society (impact stage) by capturing ICT skills. An important consequence of this index is its ability to raise awareness among policy and decision-makers on specific areas requiring attention or further development.

The index covered 154 economies and was first published in March 2009 in Measuring the Information Society: The ICT Development Index, 2009.[14]

Table 2 summarizes the three previously discussed measurement frameworks, namely, DOI, ICT-OI and IDI.

TABLE 2. COMPARISON OF THE INDICATORS INCLUDED IN DOI, ICT-OI, AND IDI

Digital Opportunity Index (DOI)	ICT Opportunity Index (ICT-OI)	ICT Development Index (IDI)
Opportunity	**Info-density: Networks**	**ICT access**
1. Percentage of population covered by mobile telephony (A7)	1. Main telephone lines per 100 inhabitants (A1)	1. Fixed telephone lines per 100 inhabitants (A1)
2. Internet access tariffs as a percentage of per capita income (A8)	2. Mobile cellular subscribers per 100 inhabitants (A2)	2. Mobile cellular telephone subscribers per 100 inhabitants (A2)
3. Mobile cellular tariffs as a percentage of per capita income (A9)	3. International Internet bandwidth (kbit/s per inhabitant) (A6)	3. International Internet bandwidth (bit/s) per Internet user
Infrastructure	**Info-density: Skills**	4. Proportion of households with a computer (HH4)
4. Proportion of households with a fixed-line telephone	4. Adult literacy rates	5. Proportion of households with Internet access at home (HH6)
5. Proportion of households with a computer	5. Gross enrolment rates (primary, secondary and tertiary)	**ICT use**
6. Proportion of households with Internet access at home	**Info-use: Uptake**	6. Internet users per 100 inhabitants
7. Mobile cellular subscribers per 100 inhabitants (A2)	6. Internet users per 100 inhabitants	7. Fixed broadband Internet subscribers per 100 inhabitants (A4)
8. Mobile Internet subscribers per 100 inhabitants	7. Proportion of households with a TV (A11)	8. Mobile broadband subscribers per 100 inhabitants (A5)

[14] http://www.itu.int/ITU-D/ict/publications/idi/2009/index.html.

TABLE 2 (*continued*)

Digital Opportunity Index (DOI)	ICT Opportunity Index (ICT-OI)	ICT Development Index (IDI)
Utilization	8. Computers per 100 inhabitants (A3)	**ICT skills**
9. Proportion of individuals that have used the Internet	**Info-use: Intensity**	9. Adult literacy rate
10. Ratio of fixed broadband subscribers to total Internet subscribers (A5:A4)	9. Total broadband Internet subscribers per 100 inhabitants (A5)	10. Secondary gross enrolment ratio
11. Ratio of mobile broadband subscribers to total mobile subscribers	10. International outgoing international traffic (minutes) per capita	11. Tertiary gross enrolment ratio

Source: International Telecommunication Union (ITU).

Note: Indicators A1-A9, HH4 and HH6 are part of the Partnership's core list of ICT indicators.

C. BENEFITS AND LIMITATIONS OF CURRENT ASSESSMENT FRAMEWORKS

The information society is a concept designed to enable and further drive the socio-economic development of both developed and developing countries. At the core of this society, the implementation of ICT initiatives has been the focus of government strategies. As the formulation of effective strategies and policies requires sound assessment, special efforts were directed towards developing measurement and evaluation tools. These tools provide decision-makers with valuable information in order to update and fine tune their ICT strategies and implementation plans.

While using measurement as a basis for evaluating and modifying strategies and policies is a sound approach, the relevance and accuracy of the selected tools remain questionable. The challenges of measuring such a multidimensional concept as the information society render this task very complex. Such a task requires a tested framework, statistical methods, surveys, data collection, monitoring and evaluation.

As opposed to measuring economic activities, the complexity of measuring the information society stems from the inability to assess and measure intangible activities and outputs. Cause and effect relationships are not clearly visible in the information society; for instance, high ICT penetration rates do not directly translate into improved economic benefits for a given society.

Earlier approaches to measuring ICT and the information society were confined to simply aggregating a variety of data on selected indicators, adjusting the weight of some factors, and applying statistical tools. These approaches lacked theory and validation.

While measuring the ever-changing ICT landscape might seem to be enough, some studies have shown that societies are not exclusively driven by technology; thus, measuring the number of connected computers tells us very little about the actual state of society. In fact, assessing the information society must go beyond measuring ICT diffusion and investigate the social context within which these developments are taking place.[15]

D. ALTERNATIVE MEASUREMENT FRAMEWORKS

Early international efforts for measuring the information society concentrated on the development of sets of indicators recognized as key indicators. These efforts mainly focused on infrastructure and information increase, but later involved other economic, social and environmental indicators. For instance, such international organizations as ITU, OECD, UNESCO and UNCTAD have long been collecting various

[15] Exploring Social Theory as a Framework for Social and Cultural Measurements of the Information Society, Pille Pruulmann-Vengerfeldt, The Information Society, 22: 303-310, 2006.

sets of indicators covering telecommunication, economy, education and trade. It became obvious that any effort must focus on available indicators rather than try to come up with new ones. One of the fundamental drawbacks to this approach is that these indicators were based on objective and quantitative statistics rather than on the subjective perception of individuals about their social environment.[16]

Apart from the efforts led by the international community on issues relating to measuring the information society, several empirical and theoretical studies have attempted to provide statistical models for constructing indices and selecting indicators to represent aspects of the information society and the role of ICT in building this society. However, selecting such indicators is a critical task that involves different types of indicators; composite indicators and subjective indicators are the most common ones.

Most of the present measurement models rely on composite indicators which are used to summarize the complex and multidimensional aspects of the information society. By aggregating several indicators using weights, composite indicators are able to represent the big picture, are easier to interpret, and can facilitate the task of ranking countries. If they are poorly interpreted, however, they are prone to sending misleading and ineffective messages to policy and decision-makers, pushing them to draw rather simplistic conclusions. Statisticians may also tend to resent composite indicators, whereby a lot of work in data collection and editing is "wasted" or "hidden" behind a single number of dubious significance.[17]

Alternatively, subjective indicators have been gaining in significance for capturing the progress of information societies through the perception of citizens on a number of related attributes. These indicators tend to measure what is relatively intangible and directly experienced. Without subjective indicators, measurement efforts are bound to being inadequate.

A number of scholars have suggested using such indicators for measuring the impact of ICT by means of participatory assessment approaches that include open-ended questions, whereas some have stressed that evaluating the impact of ICT must be determined and interpreted contextually.[18]

Regardless of the choice of indicators, such a critical task potentially involves statistics that are subject to measurement errors and interpretation. In many cases, once an indicator has been chosen and used, it is likely that policy-makers will pay particular attention to it and focus their efforts on improving the indicator, rather than addressing the situation this indicator is supposed to measure.

The previously reviewed measurement frameworks show that there is still neither an explicit model nor a single overarching theory for measuring the information society. Regardless of the choice of a model, the process of selecting indicators must be governed by the goals of the task at hand. Even the most comprehensive theoretical models used for representing the information society could not be validated and tested as they do not solely rely on empirical data, but involve qualitative assessment as well. In updating its measurement model, ITU notes these limitations and suggests that future attempts include consideration of cause and effect relationships in the information society.[19]

[16] Statistics and Politics in a "Knowledge Society", Enrico Giovannini, OECD, STD/DOC(2007)2, 2007.

[17] Statement by Andrea Saltelli, European Union Joint Research Centre.

[18] Article on "Assessing NGO Performance: Difficulties, Dilemmas and a Way Ahead", from Non-governmental organisations: performance and accountability beyond the magic bullet, 2002, Earthscan Publications Limited.

[19] Dan M. Grigorovici, Jorge R. Schement and Richard D. Taylor, "Weighing the intangible: towards a theory-based framework for Information Society Indices," from Global economy and digital society, International Telecommunications Society, 2004, Elsevier.

II. CASE STUDIES OF COMMUNITY DEVELOPMENT PROJECTS

Studying the impact of ICTs comes through a close look at implemented projects, initiatives and activities that have addressed the integration of ICT for community development. The sections below describe a selection of case studies, including the results and impact achieved whenever documented. Most of the following case studies have been selected from the ESCWA region. Many other similar projects and initiatives are available worldwide and have shown a level of success.

A. TELECENTRES

The concept of telecentres emerged in the 1990s offering ICT access to the public at large. They were devised as a practical tool to deliver ICT and connectivity to all social groups, particularly middle and low-income families or those in rural areas with no access to such facilities. As time passed, telecentres became more of a worldwide phenomenon that varies in outlook, design and outcomes. Numerous models with a variety of names have emerged based on the design of the telecentre, its target beneficiaries, and list of services or activities: Internet café, cyber café, multipurpose centre, and mobile Internet unit are all names describing a similar basic model of a telecentre.

The central design of a telecentre encompasses a set of personal computers, printing and scanning equipment, a set of software applications, and an Internet connection. Other services offered by multipurpose community centres require such additional equipment as that for telemedicine.

1. *Egypt: IT Clubs*

IT Clubs are part of a government-led initiative that was launched throughout Egypt in 2001 by the Ministry of Communications and Information Technology (MCIT).[20] In addition to the United Nations Development Programme (UNDP) and Egypt's ICT Trust Fund, partnerships play an important role in launching and sustaining IT Clubs which include NGOs and such civil society organizations as libraries, youth centres, community centres and professional syndicates. The different partners, particularly local ones, reflect the needs of the surrounding community onto the services and activities offered by the IT-club.

IT Clubs aim to deliver ICT awareness, capacity-building and other services in order to foster economic growth in rural and poor areas in particular by means of the following:

- training programmes in ICT skills, including basic computer literacy;
- specialized software applications;
- outsourcing of ICT services to other institutions;
- maintenance of hardware and software.

IT Clubs are usually made up of around 10 networked PCs, one or more printer, a software library and a leased-line Internet connection. Such auxiliary services as printing and photocopying are also offered. The minimal staff composition of the IT Clubs includes one manager and two technical staff. Trainers are brought in on a part-time basis as needs arise.

A number of IT Clubs were designed to be mobile. Set up in vehicles, the Mobile IT-club covers larger geographical regions in remote areas. In addition to Internet access through satellite and computer use, the Mobile IT-club has a set programme for training on ICT and business skills.[21]

[20] http://www.mcit.gov.eg.

[21] http://www.mcit.gov.eg/ict_access.aspx#Mobile.

The concept of IT Clubs is not new to Egypt. Precedents include the 21st Century Kids Clubs and the Technology Access Community Centres (TACCs), both established in the late 1990s. The TACC project was launched in 1998 as the first telecentre in Egypt by UNDP in partnership with local Egyptian actors. The TACCs main goal is to provide disadvantaged communities with access to ICT and build their capacities for this purpose. There is evidence that the TACC project has had a positive impact on the local community in terms of increasing employment opportunities, raising awareness and building capacities. Farmers, for example, have used TACC services to invest in fertilizers and better production methods. It was, in fact, the success of TACCs that encouraged MCIT to launch its IT Clubs programme.[22] Box 2 describes the national initiative launched by MCIT to promote ICT use for development.

Box 2. The ICT for Development Initiative

IT Clubs, including their mobile version, are only one part of a far-reaching ICT for Development Initiative currently being undertaken by MCIT on a national basis. The initiative includes a number of projects developed and implemented in collaboration with other government agencies, funds, the private sector and NGOs addressing areas of access, education, health, culture and government.

The ICT for All component of the initiative includes the following projects/programmes: (a) Egypt PC 2010 – Nation Online which offers locally assembled and internationally branded PCs for every home at nominal monthly payments with particular attention to disadvantaged areas; (b) PC for Every Top Student offering advanced computers or laptops to top students nationwide; (c) Internet and broadband connectivity offering reduced-cost broadband connectivity and a zero value cost of accessing dial-up which requires payment of the telephone call only; (d) National competitions, including the Olympiad in Informatics which is an annual competition in information technology and programming, and the Imagine Cup by Microsoft which aims to encourage the imaginations of young people towards innovations in technology.

Source: MCIT Egypt. Yearbook 2008.

Although the 21st Century Kids Clubs have been phased out, TACCs continue their operations at a slow rate. In contrast, the IT Clubs maintain a high momentum with slightly less than 2,000 units established throughout Egypt[23] (see the table below for the most recent statistics). By the end of the first quarter of 2009, around 91 per cent of the total number of IT Clubs had Internet access.[24]

TABLE 3. TOTAL NUMBER OF EGYPT'S IT CLUBS

Item	Number	From	To
IT Clubs with Internet access	1 715	31 December 2001	30 September 2009
Total number of IT Clubs	1 931	31 July 2005	30 September 2009

Source: http://www.mcit.gov.eg/club_tech.aspx.

Additionally, the average number of IT-club users on a weekly basis reached 180 in rural areas in 2009, a 27 per cent increase since 2008.[25] A survey conducted by MCIT in June 2009 revealed that 19 per cent of those using IT Clubs have reportedly obtained improved employment opportunities and 22 per cent have utilized e-government services or accessed government information online.

[22] El Tokali, S. and Wanas N. The role of community telecentres in helping citizens help themselves; the Egyptian experience. February 2007.

[23] Egypt's ICT Strategy 2007-2010.

[24] Egypt, Ministry of Communications and Information Technology. Information and Communications Technology Indicators Bulletin. June 2009.

[25] Egypt, Ministry of Communications and Information Technology. Information and Communications Technology Indicators Bulletin. June 2009.

Additionally, a reported 70 per cent of users benefiting from IT-club services have acquired advanced skills in using the PC and the Internet, whereas 35 per cent of those surveyed indicated that participating in the IT-club training helped them obtain International Computer Driving Licence (ICDL) certificates. Table 4 includes more details on urban and rural beneficiaries and how the IT Clubs led to positive impact in their skills and jobs.

TABLE 4. POSITIVE IMPACT OF EGYPT'S IT CLUBS
(*% of users*)

	Urban	Rural	Total
Getting information about governmental services	13.63	6.98	12.02
Accomplishing governmental transactions through the Internet	11.90	4.18	10.03
Acquiring ICDL certificate	35.37	33.92	35.02
Acquiring advanced skills in using computers and Internet	71.70	65.50	70.22
Having better job opportunities	19.70	17.60	19.22
Other benefits	7	3.92	7.37

Source: Ministry of communications and information technology ICT usage in IT clubs survey – June 2009.

Multiple answers were allowed.

A positive correlation is noticed between the number of IT Clubs established in Egypt and the number of professional training graduates. The statistics for professional training graduates are not limited to those graduating from IT Clubs but rather from other national institutes and academies. See figure VI.

Figure VI. Professional training graduates and IT Clubs

Source: http://www.mcit.gov.eg/Indicators.aspx at 24 Nov. 2009

2. *Jordan: Knowledge Stations Initiative*

The KSI was launched in Jordan through a partnership between the King Abdullah Fund for Development, UNDP and the National Information Technology Centre (NITC). The partnership was extended to include other international and national players, including NGOs and local authorities. These partnerships have helped in raising a sense of ownership in the KSI.

The KSI came in fulfilment of a vision to fill the digital gap between different Jordanian regions and social groups. In 2007, the cumulative number of trainees reached a value of 91,282 of which 55 per cent were females. By 2009, 172 stations had been established across Jordan.[26]

The Knowledge Stations provide capacity-building courses on ICT skills certified by ICDL, computer-based language learning, web development courses, and specialized Cisco certification courses. They also act as cultural centres where lectures and information sessions are arranged on the most recent health and environment topics.[27] Training workshops are organized on a variety of skills based on the needs of the location, including dairy processing, horticulture, solar heating, handcrafts and other business skills. Several KSI services, notably advanced and specialized training programmes, are offered for a fee which is used to sustain the operation of the stations.

Although similar in their physical set-up to other telecentres, the Knowledge Stations take a more innovative approach towards the delivery of value added services. Hence, in addition to training courses, the stations offer selected e-services, including e-employment, official high school exam results, financial information and e-loans.[28] The e-loans service has facilitated access to micro loans for citizens residing in rural and remote areas. For these citizens, access to loans was previously limited to resources in the capital, whereby they had to undertake several trips to the city to finalize their application, paper work and other formalities. Transportation requirements and costs have been significantly reduced for those using the e-loans service.

An upcoming addition to KSI services is e-government, which is currently being implemented. For e-government to be successful it has to be accessible to all citizens. The integration of e-government into KSI will require capacity-building and awareness-raising.

The KSI has been the subject of an evaluation study addressing its impact on community development. The study has shown the positive social impact resulting from the initiative, raising awareness of the benefits and uses of ICTs and including both genders in the process (see box 3). For instance, by the end of 2008, the percentage of females enrolling in training activities was 47 per cent.[29] The stations have also been valuable in providing direct employment opportunities, reaching a value of 250 for staff employed at the stations.

Box 3. Assessment of the Knowledge Stations Initiative in Jordan

In March 2007, NITC, in partnership with the Centre for Studies, Consultation and Community Service at the Hashemite University, conducted an evaluation study to assess the progress of KSI and plan ahead. In itself, the study indicates commitment to the initiative and interest in continued follow-up to achieve the highest impact on community development.

The study depended on several methodologies, including literature review and field surveys. The surveys addressed those working in or trained at the stations and the surrounding community in general. What follows are highlights of the study's results:

(a) Awareness of KSI: The survey has shown that 52 per cent of the local community is aware of KSI and the services it delivers. Only 17 per cent of those aware of KSI benefit from its services. For the remaining 83 per cent, reasons for refraining from utilizing KSI services mainly include involvement with other life priorities, availability of alternatives to the services provided by the stations, or other social obstacles. It was noteworthy that financial inability was not listed as a main obstacle by the surveyed sample, reflecting an appropriate pricing scheme offered by the stations;

[26] Report of the Expert Group Meeting Meeting on ICT Application and E-Services in the Public Sector (20-21 July 2009).

[27] Other topics may be addressed as well.

[28] Nasser Khalaf. The role of Knowledge Stations in disseminating electronic services in Jordan. Presentation at the Expert Group Meeting on ICT Application and E-Services in the Public Sector (20-21 July 2009).

[29] http://www.ks.jo/stats08_AR.htm.

Box 3 (*continued*)

(b) Knowledge Station users: The survey revealed that most of those using the stations' services were government employees at 34 per cent, 24 per cent were students and 26 per cent were unemployed. The media has not played its role in promoting KSI as only 10 per cent of the beneficiaries were introduced to the stations through the media;

(c) Economic impact: Other than direct employment for the stations' staff, KSI has provided indirect employment opportunities through facilitating access to micro loans. At the time of the survey, 150 new estimated jobs were made available following the funding of 484 projects;

(d) Social impact: The Knowledge Stations have manifested a positive social impact in the form of strengthening social ties, increasing awareness on family issues, improving individual self-confidence and facilitating community involvement;

(e) Main obstacles: One of the major obstacles facing KSI is limited financial resources. The income generated from training sessions and other services only covers around 23 per cent of required annual expenses. In certain cases, the improper location of the Knowledge Station has been an obstacle towards increased numbers of users. Some stations also face issues of acceptance by the local community, or mismanagement by the host institution.

The following are some of the items recommended by the survey:

- Promoting the role of the Knowledge Stations in providing micro loans and hiring staff to aid in the evaluation of projects requiring loans;
- Seeking contractual partnerships with institutions to train their staff in exchange for a set fee;
- Constantly responding to the needs of the local community;
- Diversifying offered training to include, for example, typing lessons, hardware maintenance workshops, agricultural sessions, etc.;
- Arranging women-only sessions;
- Improving job security for the stations' staff;
- Targeting school students as possible trainees;
- Improving marketing techniques and strategies;
- Improving monitoring mechanisms particularly related to the administration and staffing of the stations;
- Gradually reducing free courses;
- Arranging periodic competitions.

It is noteworthy that these recommendations have been valuable in taking KSI to the next level. They may also be enlightening to other similar telecentre projects in the region.

Source: National Information Technology Centre and the Hashemite University. Measuring and evaluating the impact of Knowledge Stations on local communities, *in Arabic*. (دراسة قياس وتقييم أثر محطات المعرفة على المجتمعات المحلية), March 2007.

3. *Lebanon: E-Caravan*

Having suffered complete destruction during the Israeli war on Lebanon in July 2006, the e-Caravan was revived as e-Caravan Phœnix, an idea worth replication. The e-Caravan aims to empower the local communities in south Lebanon through teaching computer and IT skills, especially for youth, women and persons with disabilities. It includes a network of 10 PCs, a laser printer, a liquid crystal display projector with screen, two satellite connection modems, and auxiliary items. It also comprises a ramp to facilitate access for physically disabled individuals and special software for the blind and visually impaired to learn basic ICT skills. Courses offered range from beginner to advanced levels, and are also available for small and medium enterprises (SMEs). The needs of the selected communities are taken into consideration when courses are designed.

The project is implemented through a partnership between the Saradar Foundation, ESCWA, Italian NGOs operating in south Lebanon, United Nations Interim Force in Lebanon (UNIFIL), and local municipalities.[30] The e-Caravan was networked with a Lebanese community development portal, www.baldati.com, through the training of moderators from selected villages.[31] Towards the beginning of 2009, the total number of beneficiaries had exceeded 1,500 with around 51 per cent being females.

4. *Syrian Arab Republic: Telecentres Project*

Initiated in 2002 as a partnership between the Ministry of Communications and Technology and UNDP, the telecentres project in the Syrian Arab Republic aims to promote the use of ICTs by all social and demographic groups, particularly in rural areas.[32] By 2009, 40 centres had been established – 35 fixed and five mobile – and equipped with between six and 40 computers as well as communication and printing equipment. The mobile units, called e-Bags[33], are equipped with laptop computers and cover selected rural areas.

The telecentres project took a novel approach towards the delivery of services. Telecentres have been promoted as cultural community centres undertaking a multitude of capacity-building and awareness-raising activities, not merely confined to ICT. For their ICDL certified training, the centres employ ICDL certified trainers. Three of the centres are also certified ICDL testing centres. Other specialized training courses include basic literacy, first aid health training, accounting, SME management and foreign language learning. Over 24,500 individuals have participated in all training activities in total, with 48 per cent being females – a considerable percentage given the conservative culture governing rural areas of the Syrian Arab Republic.

The telecentres also offer courses for individuals with special needs and by 2009 had trained over 900 in this domain. Different age groups have also been the focus of training sessions, for example those arranged on ICT skills for the elderly. Forums for children and "Scratch"[34] programming have also been arranged at selected telecentres. During planned annual periods, the telecentres participate in awareness campaigns on such different social, environmental and health-related subjects as the risks of smoking or the environmental hazards of plastic bags.

Apart from direct employment opportunities offered to full- and part-time trainers and social workers, which amount to around 250, the telecentres have been observed to have opened indirect employment opportunities. In some communities, the telecentre "trend" was adopted by entrepreneurs establishing their own private centres on the basis of a similar model.

5. *ESCWA – Smart Community Project*

The SCP was designed and launched by ESCWA in a number of the member countries with the aim of promoting the acquisition and utilization of integrated modern technology inputs to generate employment, initiate enterprises and reduce poverty. The SCP serves to build local capacities by utilizing technology-based constituents selected on the basis of the needs and priorities of the rural communities.

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[30] http://www.escwa.un.org/divisions/projects/ecaravan/index.asp.

[31] More on this portal below.

[32] Information in this section is based on a telephone conversation with Mr. Nour Eddine Sheikh Obeid, manager of the Telecentres project as well as a presentation "Rural Knowledge Network and Telecentres" (in Arabic).

[33] http://www.telecentre.org/profiles/blogs/2086278:BlogPost:6776.

[34] Scratch, developed by MIT, is a freeware drawing application that introduces children to the concepts of object-oriented programming. (http://scratch.mit.edu).

As part of its design, the SCP includes two core components: (a) the Multipurpose Technology Community Centre (MTCC) which aims to provide the local community with access to ICT services and vocational training; and (b) the Agro-Food Processing Unit (AFPU) which aims to process and market agro-food products utilizing modern hygienic and quality standards thus providing outlets for locally available raw materials. A number of auxiliary facilities to treat input process water, utilize solar heating and provide options for wastewater treatment support AFPU.

While ICT training is important, coupling it with technology-based facilities implementation like AFPU has more tangible results. The MTCC and AFPU are complementary components where sustainability is assured by interaction and collaboration with the local community and municipality. This design is intended to answer the long-standing question about the financial sustainability of community centres in general. Providing income from an already sustainable production unit is the answer adopted by SCP.

The SCP in each location is unique as it is based on community needs and locally available raw material, particularly for AFPU.

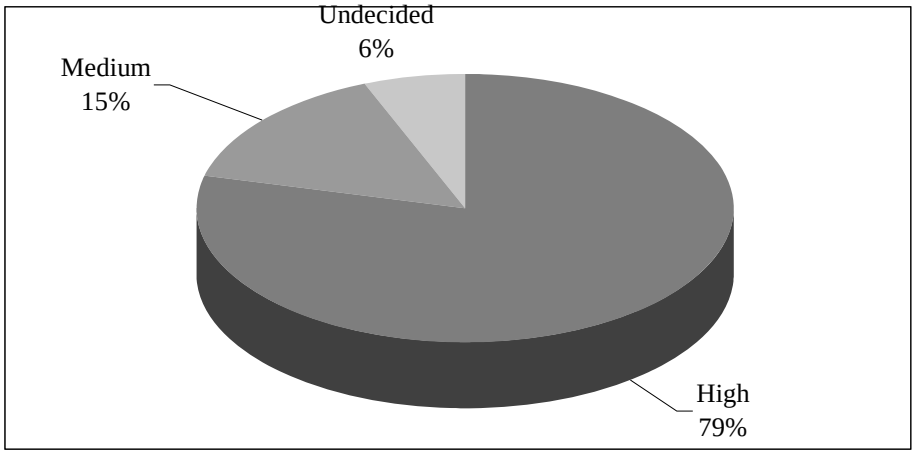
(a) *SCP Iraq*

SCP implementation in Iraq targeted two areas, one in the south and the other in the north.[35] The project relied heavily on partnerships with local municipalities and universities. Their role was key in view of the security situation prevailing in the country between 2005 and 2008.

Dairy production was selected for AFPU operations in both locations, the main reasons for this selection being excess milk and limited awareness of sanitary precautions and routines.

The MTCCs were first to be set-up, launched and operated. During 2007 and 2008 more than 500 trainees in both locations participated in training courses on ICT skills, namely MS Windows and MS Office. The trainees included government employees, students of both genders and of different educational levels. Of those trained, 40 per cent were employees seeking to improve their skills, and 2 per cent succeeded in establishing their own Internet centres or got a job at an Internet café. Female participation, however, remained low at only 9-12 per cent.[36]

Figure VII. Contribution of SCP Iraq to business development



[35] http://www.escwa.un.org/divisions/scp/iraq/L_alton_kopri.asp and http://www.escwa.un.org/divisions/scp/iraq/L_sayid_dikhil.asp.

[36] Numbers based on an evaluation conducted by ESCWA.

The project in Iraq faced numerous challenges, mostly resulting from the security situation. Ownership was also a major challenge, but was resolved by agreeing to privatize SCP facilities through a general call for expressions of interest to draw in interested investors.

(b) *SCP Syrian Arab Republic*

Qusaybeh village, an impoverished village in a rural area, was selected to host the pilot components of SCP in the Syrian Arab Republic. The MTCC and AFPU were established in cooperation with a number of partners, including a national NGO (FIRDOS, Fund for Integrated Rural Development of Syria) which has been instrumental to field operations related to project implementation. For the AFPU, dairy production was selected: milk, labneh (strained yogurt) and halloum cheese. Modern water treatment technologies and renewable energy generation (flat-bed solar water heating) were installed by the AFPU.

Implementing SCP in the Syrian Arab Republic involved a number of capacity-building train-the-trainers workshops. These helped raise awareness as to the value of coupling the operations of a community centre, MTCC, with income generating facilities, AFPU. The project stressed the participation of women and rested on the idea that empowering women and alleviating poverty can be intertwined. For instance, the AFPU employs eight workers, all female.

(c) *SCP Yemen*

The focus on women in Yemen proved to be much more challenging than for other SCPs. Whether as trainers, producers or trainees, the participation of women was quite timid, mainly due to cultural customs and values. One of the two trainers employed by MTCC is a female whereas all four AFPU workers are males.

The AFPU, established together with an MTCC in Hadran specializes in coffee bean processing. It was designed to meet the needs of the host community and utilize available natural resources. The SCP is unique in this way as each AFPU must be customized to its surroundings.

B. FROM TELECENTRES TO TELECENTRE NETWORKS

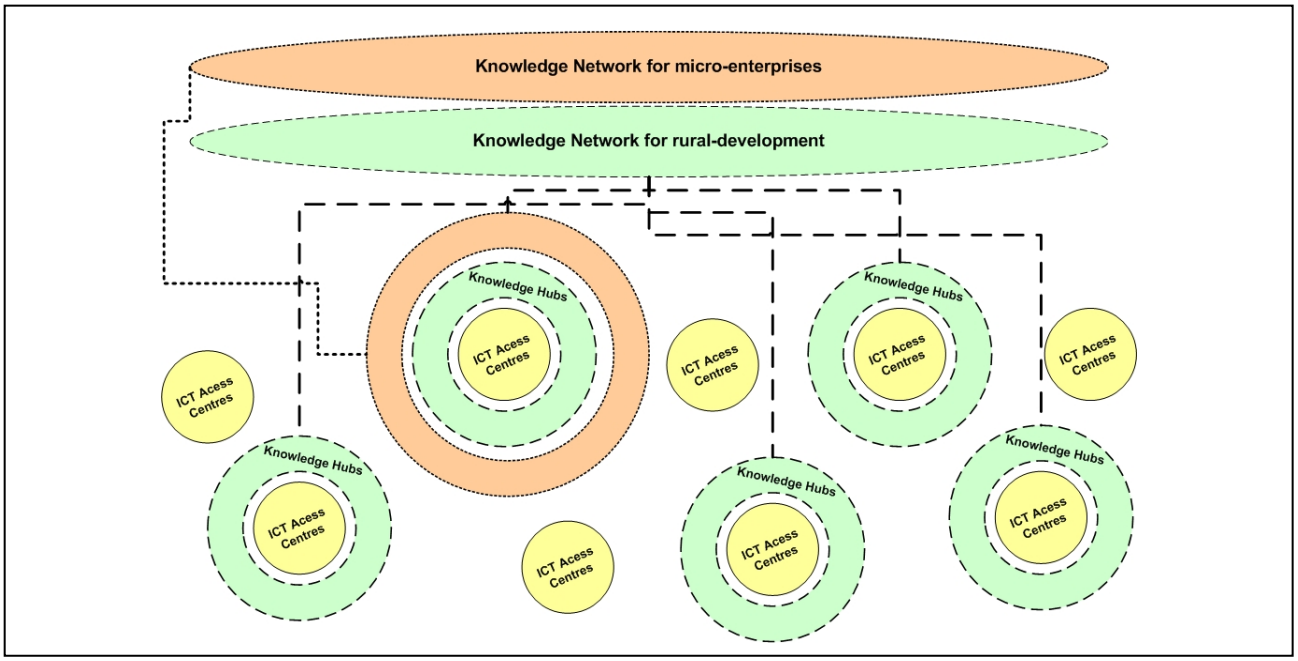
1. *ESCWA's Knowledge Networks Project*

The Knowledge Networks through ICT Access Points for Disadvantaged Communities is an ongoing global project spearheaded by ESCWA as the lead agency (see figure VIII). The main goal of this pilot project is to empower poor and disadvantaged communities through the transformation of selected existing ICT access points around the world into global knowledge network hubs.

The transformation of the selected ICT access points into knowledge hubs will increase the engagement of target beneficiaries in disadvantaged communities in these knowledge networks. For a global reach, ESCWA partnered with the other four United Nations regional commissions, thereby covering Africa, Asia and the Pacific, Europe and Latin America.[37] Each regional commission is in charge of implementing the project activities, including selection of the participating access points, transforming them into knowledge hubs and developing a regional network. Other crucial activities include awareness-raising and sharing of expertise. A global network will then connect the regional networks.

[37] Through the regional commissions: Economic Commission for Africa (ECA), Economic and Social Commission for Asia and the Pacific (ESCAP), Economic Commission for Europe (ECE), and the Economic Commission for Latin America and the Caribbean (ECLAC).

Figure VIII. Framework of the regional knowledge networks



Source: ESCWA, 2007.

A few of the value-added services proposed for integration into the ICT access points to transform them into knowledge hubs were as follows: kids' clubs, ICT for kids based on the Scratch application, libraries for adolescents, web pages for participating communities, an e-library, educational trips, seminars on health and social awareness, workshops on handcrafts, computer courses, language courses, e-services, translation services, leasing the locale of the knowledge hub for miscellaneous events, services for special needs individuals, art courses, and access to the Internet and ICT equipment. Some activities have been unique to certain regional commissions but may well be replicated elsewhere, like the Economic Commission for Africa's (ECA) quarterly "e-mpower-africa Newsletter" which had its first online edition debut in October 2009.

In the ESCWA region, the participating countries are: Lebanon, the Syrian Arab Republic, Jordan, Egypt, Yemen and the Sudan. A regional network portal has already been launched.[38] Although the project is not yet finalized, indications of a positive impact are perceptible. All involved telecentres have become aware of the difference between an ICT access point and a knowledge hub and they understand the importance of transforming into a knowledge hub as part of a knowledge network. Benefits are also reflected in new requests from other countries, namely, Palestine and Oman, to join the regional knowledge network.

Impact is also perceived at the telecentre level. Involved African telecentres have adapted the knowledge hubs concept and are restructuring their centres to integrate new services. Some are devising special programmes to give this transformation the attention it needs.

2. *Global: Telecentre.org*

Telecentre.org is a network of telecentres, a global community of organizations, collaborating to supply telecentres with "locally relevant content and services, support and learning opportunities, and networks that help telecentre activists connect with each other". Telecentre.org builds bridges to share knowledge, experiences and skills allowing thousands of telecentres worldwide to flourish and improve their

[38] http://www.knowledgenets.net and http://www.shabakaTmaarifa.net.

capabilities. Telecentre.org was founded by the International Development Research Centre in Canada, Microsoft and the Swiss Agency for Development and Cooperation, and currently collaborates with more than 60 organizations and telecentre networks.[39]

Telecentre.org runs a social investment programme that provides technical assistance to telecentres worldwide through content development, knowledge-sharing, networking, research and the Telecentre.org Academy. The latter is a global initiative launched to provide telecentre managers with training, capacity-building, and professional development opportunities. On the basis of set accreditation and certification standards, the Academy consists of a consortium of national academies and partners coordinating through a global support unit.

Through its Internet portal, telecentre.org publishes a quarterly Telecentre Magazine and provides online tools and resources, including software packages for running and managing telecentres. Community facilitators reach out to community members, enrich online content and promote participation through the portal.

Box 4. Highlights of telecentre.org activities: the Curriculum Commons Grant

Further to the launch of telecentre.org Academy, the Curriculum Commons Grant was announced offering a grant of US$125,000. The objective of the grant was to support the development of a continuous learning programme at telecentre.org Academy to meet the growing needs of telecentre managers worldwide. Once standardized, the curricula will be developed into an e-learning system to be adopted by open universities around the world, particularly in countries where the Academy has been established.

The Curriculum Commons Grant drew in 30 contributions from different countries where winning institutions have shown immense enthusiasm for developing these curricula. These are essentially based on the needs of telecentre managers and cater to build their capacities in order to find solutions to their problems.

A repository and library of training material for use, translation, and adaptation across the world is available online at http://www.telecentreacademy.org.

Source: Telecentre Magazine, Volume II, Issue 6, April-June 2009.

3. *Syrian Arab Republic: Reefnet*

The Rural Knowledge Network (Reefnet) is an online portal launched as part of an ICT4D project by the Ministry of Communications and Technology in the Syrian Arab Republic and UNDP. The portal provides a networking platform for communities in the rural Syrian Arab Republic to learn, share information, and build knowledge repositories. It essentially aims at giving the communities tools for flexible and active contributions to building their capacities and improving their livelihoods. With its considerable Arabic content, the portal is an example project towards building digital Arabic content in the region. Box 5 includes a list of online services and applications provided by Reefnet.

Through the portal, each village or community is supplied with a template to build a specialized website. Through online forums, the website then draws together the contributions of all interested community members, including municipality heads. Some of these municipality heads have even started to consider the community portal as a source of feedback on the needs and requirements of the village. The portal currently accommodates the webpages of 45 communities.

Reefnet also provides educational services. For example, audio lessons are available for download for use by students or those with visual disabilities. Digitized Arabic grammar books register an average of 17,000 visits on a monthly basis, indicating the need for and scarcity of such content online.

[39] http://www.telecentre.org/.

Box 5. Overview of Reefnet Services

The following subjects are addressed by the portal in which experts write specialized and technical articles in Arabic. The postings now constitute a valuable repository of information for the local community:

- Agriculture: information on sustaining agricultural lands, use of fertilizers and pesticides, tips and guidelines on planting selected crops, rural engineering, agro-food production industry, local and national strategies, and gardening;
- Health: addressing such different health issues as diabetes, child health, dangers of smoking, cancer detection and nutrition;
- Education: providing a forum for consulting with volunteer teachers, audio lessons for high school classes on selected subjects (history, French, Arabic and philosophy), final results of the national high school exams and e-books on the Arabic language and grammar;
- Heritage: a variety of information on the rural heritage of the Syrian Arab Republic, including proverbs, handcrafts, traditional cuisine and customs;
- Law: information on Syrian law and legislation;
- Maps: visual maps of selected locations.

The portal also provides the following other services:

- Local community webpages reporting on the latest social news, for example, births, deaths, weather, upcoming events, forums discussing village needs, advertising and photo galleries. The webpages are customizable to the particularities of each village;
- The Reefnet online library which includes a selection of electronic books, research studies, articles, and novels;
- A general directory on universities, hospitals, international agencies, government agencies, NGOs and other institutions;
- Other such general information as currency exchange, weather forecasts and national and international dialling codes.

Source: http://www.reefnet.gov.sy/.

Medical consultations are also available online supported by a pool of around 60 volunteer doctors to answer the questions of citizens. It is notable that the medical forum registers a daily average of 2,200 visits and 35 consultations. The main advantage of this information is the fact that it is in Arabic, thus contributing to enriching online Arabic content and making knowledge easily and readily available for Arab citizens, not only in the Syrian Arab Republic, but worldwide.

As the portal undergoes management, ownership and operational changes, it faces questions of sustainability, particularly as the portal has so far been non-profit. The focal points in the participating communities are volunteers as all costs incurred for maintaining and developing the portal are currently sustained by the donors. Models for reformulating the governance of the portal are currently being debated.

C. WEB PORTALS AND APPLICATIONS

Portals emerged as online platforms to facilitate networking, information sharing and knowledge build-up between dispersed communities worldwide. A portal usually specializes in a certain subject and addresses a selected community or area. Community development portals are numerous and the examples below are given for illustration.

1. *Baldati (www.baldati.com)*

Baldati.com is a national Lebanese development portal that addresses environmental and cultural issues. Lebanese villages are the main beneficiaries of this portal through which each village can display its information and participate in national activities. The portal acts as a platform to reunite communities, facilitate dialogue and support local institutions through forums and news updates. As an association, Baldati promotes rural development projects in partnership with local municipalities and NGOs, organizes events and develops capacity-building. For example, the Baldati Hiking Club has arranged 160 different hiking trips all over Lebanon. Baldati also celebrates special events with the aim of raising awareness, like World Environment Day.

2. *Kenana (*www.kenanaonline.com)

Kenana online is a selection of portals developed by the Egyptian government to address subjects and issues most relevant to community development. As an interactive portal, Kenana allows the participation of local community members in discussions and developing specialized and personal webpages. The portal also provides a few e-services related to employment, commerce and advertisement. Kenana specialty portal areas are: (a) agriculture; (b) family, women's and children's issues; (c) small- and medium-sized businesses; and (d) culture and youth.

3. *KariaNet (www.karianet.org)*

KariaNet is a multi-stakeholder partnership between the International Fund for Agricultural Development (IFAD) and the International Development Research Centre (IDRC) aiming to enhance networking among IFAD-funded rural and agricultural development projects. It is based on ICT and networking to help improve knowledge-sharing and the exchange of information and experiences in the region, thus bridging the digital divide between rural and urban areas. The portal also nurtures communities of practice and practitioners. Target beneficiary countries are Egypt, Jordan, Morocco, the Sudan and Tunisia.

D. MOBILE SERVICES FOR COMMUNITY DEVELOPMENT

When the subject of ICT4D is brought up, telecentres are usually at the forefront of deliberations and analysis as one of the most proliferating means for delivering ICTs to communities. The case studies above are only a minuscule fraction of worldwide efforts in telecentres and similar models. Other ICT applications and innovative services have emerged, however, and are in use to deliver benefits to needy communities in poor and rural areas.

Mobile phones have been the subject of study regarding their effect on economic growth in developing and underdeveloped countries, and whether their spread has an impact on reducing poverty or increasing gross domestic product (GDP) per person. One study has found,[40] for example, that an increase of 10 mobile phones per 100 individuals adds 0.6 per cent in GDP growth per person. Another study[41] found that a 10 per cent increase in mobile phone adoption results in a 0.8 per cent GDP growth per person.[42]

The individual stories of how mobile phones have improved or even transformed the lives of entrepreneurs or micro businesses are numerous. Stories have been reported of plumbers or barbers using mobile phones to schedule appointments and reduce transportation costs. Where market information is

[40] The Impact of Telecoms on Economic Growth in Developing Counties, Waverman, Meschi, and Fuss.

[41] Study carried out by Christine Zhen-Wei Qiang, the World Bank.

[42] The Economist, Mobile Marvels, Sept. 2009, at: http://www.economist.com/specialreports/displayStory.cfm?story_id=14483896.

available via mobile, farmers and fishermen have been able to access information on prices and weather conditions and base their seasonal decisions on the latest available updates.

The cases below are a panorama of initiatives and projects on the use of the mobile phone for community development.

1. *India: WiMAX by BSNL*

Bharat Sanchar Nigam Ltd. (BSNL) is India's public telecommunications company offering an array of telecommunication services. As part of its activities, BSNL has a vision for bridging the rural-urban digital divide in India.[43] By means of ICT, access to a number of basic services will be possible in marginalized areas with limited or no access to such services as health and education.

Phase 1 of BSNL's rural project aims to deliver Worldwide Interoperability for Microwave Access (WiMAX) to 250,000 subscribers from 80,000 villages. WiMAX, a wireless broadband technology, promises to deliver a wide range of such services as e-government services, telemedicine and e-education, as well as access to media, travel and legal information to rural areas in an efficient and cost-effective manner.

BSNL has already initiated its WiMAX experience in selected cities and has activities underway to build a nationwide WiMAX network. For that purpose, BSNL has partnered with Intel and HCL Infosystems Ltd. to accelerate WiMAX proliferation, particularly in rural India, based on IEEE 802.16e specifications in the 2.5 GHz frequency. The partnership also extends to offering affordable, low-cost notebooks and WiMAX portable devices to rural populations.[44]

2. *Bangladesh and Uganda: Grameen Foundation Projects*

Grameenphone, a joint venture between the Grameen Bank and Telenor, started the Village Phone model. Through a loan, women in rural villages are able to purchase a mobile handset, an antenna and a large battery in order to sell phone calls to local villagers. Profits they make from this micro business allow them to repay the loan and sustain their families. The model has not only extended to thousands of villages in Bangladesh, but was also replicated by the Grameen Foundation in Cameroon, Indonesia, Rwanda and Uganda, not to mention similar models by other parties worldwide.[45]

In Uganda, the project was set up through a partnership between Grameen Foundation and MTN in 2003. Around 7,000 villages have set up a Village Phone operation.[46]

Business for such Village Phones has been dropping though, the main reason being lower-priced mobile handsets and prepaid phone card options. Call costs and handset prices were the major causes of limited proliferation of mobile use in rural and poor areas, making the mobile phone a luxury when it first came into service. With handset prices as low as US$ 20, mobile phones are now in reach.

[43] Intel and WiMAX Forum. WiMAX: Success Stories from Around the World (0909/DJ/MESH/HOP/2.5k), 2009.

[44] http://www.intel.com/pressroom/archive/releases/20091027corp.htm.

[45] The Economist, Mobile Marvels, Sept. 2009, at: http://www.economist.com/specialreports/displayStory.cfm?story_id=14483896.

[46] http://www.thecommonwealth.org/news/180671/240608ict.htm.

Box 6. Mobile applications for agro-food activities

The Makuleke Project in South Africa

The Makuleke Project was launched by Alcatel in partnership with Manobi and Vodacom. The project aims to supply rural farmers with real-time market information from major cities located hundreds of kilometres away. Through a GSM mobile phone, producers, intermediaries and wholesalers have access to real-time market information on agricultural produce. The SMS service is used for promoting their produce in the local market. In its pilot phase, the project trained 200 farmers on the use of this service.

ICT for Agriculture in Peru

The Peruvian Centre for Social Studies (CEPES) has implemented a project for the collection of agricultural and irrigation information. The data was compiled in a database shared by the Ministry of Agriculture and farming communities. Six thousand farmers have been target beneficiaries of the project.

The Virtual Extension and Research Communication Network in Egypt

The Virtual Extension and Research Communication Network (VERCON) is a pilot project launched in four centres in 2001-2002 by the Egyptian government and the Food and Agriculture Organization of the United Nations. It aims at addressing the needs of small scale Egyptian farmers through the exchange of information between agricultural research and extension on the one hand, and farmers on the other. The system allows users to access extension information, decision support systems and databases as well as participate in online discussions, forums and news. Small scale farmers can ask questions through an online service called "Farmers' Problems" which archives all the questions and answers for use by others. Now that the pilot phase is completed, VERCON is planned for roll out in other countries worldwide.

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Sources: http://www1.alcatel-lucent.com, http://www.cepes.org.pe, and The Forum for Agricultural Research in Africa, Inventory of Innovative Farmer Advisory Services using ICTs (Feb. 2009).

3. *Reaching full mobile coverage: Morocco*

The Moroccan GSM network serves around 95 per cent of the population, is one of the goals of the Morocco e-Government strategy. A global information system (GIS) system was utilized to identify over 9,200 villages, two million citizens, as lacking in mobile coverage and the Programme of Access generalized to Telecommunications (PACTE) was formulated to supply these villages with mobile coverage by 2011. The main aim is to bridge the digital divide that still exists in Morocco through the following priorities: development of rural public telephony, promotion of public centres for ICT, and extension of broadband networks.[47]

4. *M-Pesa: Kenya*

Apart from agricultural and health information, the mobile phone has been a platform for financial services in some of the least developed countries where banking services are still underdeveloped or limited. Money transfer via a mobile phone is made simple by means of transferring credit through SMS.

One example is the M-Pesa service in Kenya which was originally developed to allow the transfer of money. The service has expanded to facilitate the payment of school fees and taxi fares. It has also been recently used for saving money, although it does not pay interest.

The most obvious social and economic impact of such a service is the reduced transportation costs and requirements to and from city centres and banks. It also helps avoid the costs required for commissions and interest payments by other transfer methods through middlemen. Studies have also shown that households adopting the M-Pesa mobile financial services have increased their income by 5-30 per cent.

[47] ANRT, E-Morocco and ITU, Report on the World Summit on the Information Society Stocktaking, 2008.

M-Pesa was launched in 2007 by Kenya's largest mobile operator (Sfaricom). Its quick widespread has gradually encouraged local banks to partner with the mobile operator.[48]

E. CONCLUSIONS ON PERCEIVED IMPACT

Case studies in the region and worldwide give an insight into the means to measure and assess the impact that ICTs have on community development, particularly communities in impoverished or rural areas. Recorded success stories, although they may be on the individual level, add up to a wide-scale impact on the social and economic levels, as described below.

(a) Social: ICTs improve communications, especially for communities previously isolated from the rest of the world or even the rest of the country they reside in. ICTs facilitate the sharing of knowledge on specialized and general subjects, thus allowing the build-up of knowledge repositories accessible anytime and anywhere. In this way, they allow the sharing of experiences and networking within one community or between communities. According to the type of project, ICTs have also allowed and/or improved the delivery of awareness-raising activities and supplied innovative techniques to reach all citizens;

(b) Economic: The economic impact resulting from the introduction of ICTs into community development is as important as the social one where employment comes to the forefront. ICTs have been useful in improving employment opportunities either through training or facilitating access to microloans. By introducing new and novel ideas, ICTs have also succeeded in encouraging entrepreneurship.

Overlap of course exists between the social and economic impact. Improved access to services implies reduced transportation costs, thus, economic benefits. Communicating and networking for social purposes may bring about new business opportunities and the advertising of a village heritage may well attract investment.

[48] The Economist, Mobile Marvels, Sept 2009, at: http://www.economist.com/specialreports/displayStory.cfm?story_id=14483896.

III. MEASURING THE IMPACT

A. ICT IMPACT ASSESSMENT

1. *Focus on telecentres*

Because of the dearth of empirical studies and substantiated cases measuring the impact of ICT on community development, this study investigates evaluation mechanisms to assess the pivotal role telecentres play in developing communities in the ESCWA region.

A telecentre is a rather loosely used term for describing a community centre which offers the public computer and network connectivity.[49] Telecentres differ from the more narrowly focused cybercafés or Internet kiosks, but the latter are also important for community development because of their potential to become telecentres as they mature. According to IDRC in Canada, hundreds of rural telecentre projects are carried out worldwide with the explicit aim of developing the social and economic landscape of the targeted communities; these projects are based on the premise that access to information will lead to empowerment which will eventually lead to development.

Telecentres enable citizens to join the information society by providing them with essential access to ICTs upon which such concrete ICT applications could be used as ICT in education (ICT literacy and training), e-commerce (selling or purchasing products online), and healthcare (access to indirect medical services and health related information) to name a few.

The importance of evaluating telecentres stems from the fact that these centres provide a digital window to the information society and an opportunity to get first-hand information from the individuals of that society. Answers on if and how access to ICT produces benefits to individuals and communities can be sought more easily through telecentre impact assessments.

As billions of United States dollars are spent each year on such ICT4D projects as telecentres, the donors, international organizations and NGOs that fund these projects need to validate the assumption that ICT can bridge the digital divide and drive the social and economic development of the targeted communities. They simply need to coordinate their capital investments, optimize their returns and assess the extent to which a telecentre can contribute to sustainable development.

In spite of all this investment, very little is actually understood about its effect, as few impact assessments of telecentres and ICT4D projects are being carried out. This is in part due to the absence of agreed upon impact evaluation frameworks and methodologies given the variety of telecentre experiences and the type of communities being served.

Impact assessment plays a leading role in answering if and how access to ICTs produces benefits to individuals and communities they serve. Like most development projects, however, measuring the impact of telecentres is highly contextual and not easily quantifiable. The main focus of most current and previous telecentre projects has been the implementation of the ICT side of the project, rather than understanding the impact of ICTs on the targeted communities. A number of development projects have failed to achieve their set objectives due to the lack of this key understanding; thus, understanding the impact of telecentre projects must be done in the local context, by considering the perspectives of participants at the micro (community) level.

2. *Multilevels of implementation of telecentre projects*

Most impact research on ICT based development projects is conducted at the macro and meso levels rather than the micro level, whereby little attention has been paid to the perspective of the participants in or recipients of these community projects.

[49] This definition is aligned with the multi-purpose community telecentre approach suggested by ITU and others.

Community members are better positioned to describe or decide what constitutes development than anyone else as they are conscious of their own well-being. So, if their viewpoints are taken into account the impact of a telecentre project can be better understood.

Some researchers[50] contend that the full potential of ICTs can better be achieved if their benefits focus on user-oriented and cost-effective applications rather than on technology-driven applications. ICT impact assessment will thus be better understood if it considers the perspectives of the participants.

There are several levels to be considered when studying the impact of ICTs; results vary depending on which of these levels is taken into consideration. Table 5 shows the macro, meso and micro levels.

As the implementation of ICT4D telecentre projects comprises many organizations, representing different interests, the need arises to conduct impact assessment at different levels.

TABLE 5. ADOPTION AND IMPLEMENTATION OF ICT4D TELECENTRE PROJECTS

Macro level	Typically, government institutions and donors provide funding programmes, financial and other support for ICT4D projects which meet programme-specific guidelines.
Meso level	Projects may be implemented by teams drawn from a range of organization types (NGOs, implementation agencies, multinational groups). The meso level refers to aspects related to the intermediate level whereby a tension is potentially observable between the specifications of the project (the guidelines of the various potential funding programmes) and the needs of the end-users.
Micro level	Community or group which is impacted directly by the project – the "participants" and their socio-organizational context.

Source: "An extended framework to investigate ICT impact on development at the micro (community) level", Ashraf, Swatman, and Hanisch, University of South Australia.

3. *Focusing on indicators*

Indicators are measuring devices which define the type of data to collect and the time intervals at which data must be collected. They are central to any telecentre assessment as they tend to focus on performance, sustainability, content and overall impact. If well chosen, indicators can help provide answers to some basic questions on such telecentre projects as:

- Is the telecentre a positive force for community development?
- Does the telecentre benefit some members of the community more than others?
- Does the telecentre act as a catalyst for other positive initiatives and innovations at the local level?
- Does the telecentre enable people to help themselves?
- Is the telecentre more beneficial for some economic sectors than others?
- For every telecentre user, how many other users are indirect beneficiaries?
- Are there any drawbacks to the telecentre?
- What features of the telecentre are responsible for the greatest number of benefits?

Although the measurement of telecentre impact is hard to quantify, the adoption and use of internationally agreed upon and uniform indicators is increasingly important, especially for evaluating more

[50] Mansell, R. and Wehn, U., (Eds), "Knowledge Societies: Information Technology for Sustainable Development", Oxford University Press, NY, 1998.

than one telecentre project. Comparisons thus become possible and more meaningful, and cause and effect relationships can be identified. Indicators used without context are, however, simply impractical to measure; it then becomes equally important that a contextual framework to assess telecentre projects is created and adopted.

For instance, nowadays, any telecentre project involves multiple stakeholders and has numerous developmental targets. As each of the stakeholders has a specific interest to measure and assess, a wide range of chosen indicators are being used in any given project. Telecommunication policy-makers may be easily satisfied with standard infrastructure indicators for measuring penetration, while users of a particular service will be chiefly interested in its price and quality, and NGOs involved in education may need to assess the cost savings of using e-learning applications. In short, whether developed or adapted, a measurement framework must be able to capture this complexity.

It has become evident that assessing community development through telecentres depends on much more than measuring infrastructure and access to ICT services. Even focusing on the adoption and usage of ICT does not yield a comprehensive assessment of the potential of ICTs as enablers of community development. A successful approach is the one which goes beyond the stages of ICT readiness and intensity, includes the benefits of usage at the community level, and thoroughly examines the impact of ICT on the quality of life of the participants. The indicators for measuring ICT impact on community development must, therefore, only be developed or adapted within their local contexts.

B. Problems with ICT impact assessment

Accurately assessing the impact of ICT investment in developmental targets is difficult for many reasons. In traditional industrial applications, measurable investments in factory equipment enable an organization to produce measurably more or better goods, thus the relationship between investment and resulting output is clearly understandable. In dealing with ICT investments, measuring outputs is more difficult and determining impact is complex because ICT investments can add value to a broad range of business practices.

A recent study of manufacturing enterprises in Thailand[51] found a correlation between the use of computers in the company and significantly higher sales per employee. Quantification is, however, extremely problematic: How were the computers used? What training was necessary to effectively utilize the new capabilities? Blindly encouraging the increased use of computers in a developing country is very likely to be inefficient.

Even in mature economies, determining the cost justification of new ICT expenditures is extremely problematic. The continual marketing and upgrade cycle assures business customers that the latest software and central processing unit (CPU) upgrades will increase their productivity. The reality is less clear. For example, over the last 10 years, customers have spent significant sums on word processing software applications with negligible differences in the ease of correspondence.

Fundamentally, the problem of assessing the impact of ICT spending is closely related to the difficulty of applying the scientific process. There are simply so many variables to consider, and it is nearly impossible to establish a control group, identify indicators and collect sufficient data to show repeatable causation. At the micro level, individual enterprises, employees, business practices and operating conditions are so different it is difficult to determine the correct mix of operating conditions to control for in conducting research. At the macro level, important detail is lost, making the extrapolation of conclusions more prone to error.

[51] UNCTAD, Information Economy Report 2009 - Trends and Outlook in Turbulent Times, October 2009.

Based on the difficulty of robustly proving causation, most ICT investment decisions are driven by correlation. In these cases, high-level best practices can be more easily assessed. At the most intuitive and basic level, markets respond to price/value trade-offs. As communications costs drop, usage increases. In turn, increased usage has been correlated with increased economic efficiency. Competition in the telecommunication sector has been shown to decrease price and increase quality. Given these observations, the decision to liberalize telecommunication markets is well-supported by existing correlations. As countries have opened their markets, costs have fallen, usage increased and GDP risen.

Even in these simple examples, however, clarity is difficult. Fundamentally, there is very little data to suggest that increased use of telecommunications causes increases in economic productivity. It may well be that economies which are already growing tend to spend more in telecommunications as the funds become available. In this case, it would be very unwise for a government to commit large sums of money to invest in these areas in an effort to jump-start economic growth. Unfortunately, solid data to inform decision-making is not available.

While telecommunication liberalization and GDP growth association tend to be the areas with strongest support with correlated data, other infrastructure investments are more difficult to assess. Experience with developed countries and economies in transition has clearly shown that in order to support a credible knowledge economy, the infrastructure must eventually transcend basic first-generation mobile telephony. Broadband and WiMAX applications are commonly used by economies which have successfully transitioned to knowledge economies and information societies.

Less clear is the degree to which broadband applications are used by businesses in these economies, and what elements must be promoted to enable growth to reach disadvantaged segments of society. Basic assessment is difficult because most available metrics do not specify whether the broadband application is used for business purposes or home use. Typically, available data focuses on the quantity of subscriptions and available bandwidth.

Ideally, data would be available to determine the key enabling factors in broadband for economic growth: What broadband functions are necessary to best facilitate growth in the targeted economic areas and communities? How much infrastructure is necessary to enable this growth? What pitfalls and proved practices are available? Simply deploying high-capacity bandwidth is insufficient to effectively promote growth. Policy-makers who blindly follow such paths are likely to find themselves in a situation similar to the massive investment in roads, bridges and infrastructure in the former East Germany, much of which has gone unused.

Further complicating the difficulty of assessing impact is the timeline in question. While a few economic changes can occur with startling speed, most take significant amounts of time. Liberalizing markets, investing in infrastructure and promoting sectoral growth may take years to ignite industrial development at the national level. Corresponding growth in ICT sectors in developed nations has typically moved in multi-year cycles as economic growth creates demand, which is in turn filled by changes in the labour market. Assessing the impact of ICT investment in these circumstances is challenging because of the amount of time, and the probability that an intervening cause will arise during the observation period, further clouding the reliability of results.

Nevertheless, available data can support inferences. A recent study[52] showed that an increase in the total number of websites in a country correlated to an increase in GDP the following year. This relationship can be inferred to show that increasing communication facilitates the growth of trade. The available data suggests that a growth of 10 per cent in the number of country level domain registrations correlates to an increase of approximately 0.2 per cent growth in exports the following year. Because the creation of web

[52] UNCTAD, Information Economy Report 2009 - Trends and Outlook in Turbulent Times, October 2009.

sites is facilitated by the availability of infrastructure and an enabling environment, these areas can be targeted by policy-makers and project initiatives to create measureable growth.

One particularly popular tool for promoting rural development is the telecentre. In an effort to address the digital divide, utilize technology for educational purposes and address the needs of disadvantaged communities, a wide variety of stakeholders have supported the deployment of telecentres. The popularity of this mechanism has resulted in such varying deployment methodologies as knowledge hubs, IT clubs, and technology centres. Typically, these installations involve a small number of computers provided at low or no cost to the public, often supplemented by training programmes and Internet connectivity.

Assessing the impact of these projects is complicated. Generally speaking, project implementers focus on such metrics as usage of the centre, customers served, and place within the IT value chain. More recent strategies attempt to quantify the degree to which the centre is used by the customers to create value, as opposed to a purely consumptive model. Often sustainability of the centre is a key indicator of success. If benchmarks are achieved, or improvements shown, the project is deemed a success.

The true impact of telecentre projects serves as a clear example of the principles of evaluation discussed in this section. Of particular note are the long-term effects. By definition, telecentres are needed in disadvantaged areas because they are not economically viable for a private sector approach. In these cases, long-term sustainability is very challenging, leading to problems after the project implementation. Unless the funding agencies are interested in committing long-term financial support to these types of projects, these sustainability issues must be carefully examined. Typically, for a telecentre to be sustainable there would be private sector competition. If the project is not viable for the private sector, short-term project funding from a governmental source is unlikely to be sustainable.

In addition, telecentres can have unintended side effects. For example, the graduates of telecentre training programmes are more suited to obtaining better careers in urban areas. This can contribute to the best and brightest relocating from rural areas for better paying opportunities in urban areas. This urban/rural brain drain effect has the counterproductive impact of making the rural areas even less able to support themselves than they otherwise would be. It is comparatively rare to locate communities for which a telecentre is not viable for the private sector or sustainable without governmental funding and communities which can locally absorb and employ the graduates at levels competitive with urban areas. Lack of measurement in these key areas leads decision makers to ineffectively deploy projects.

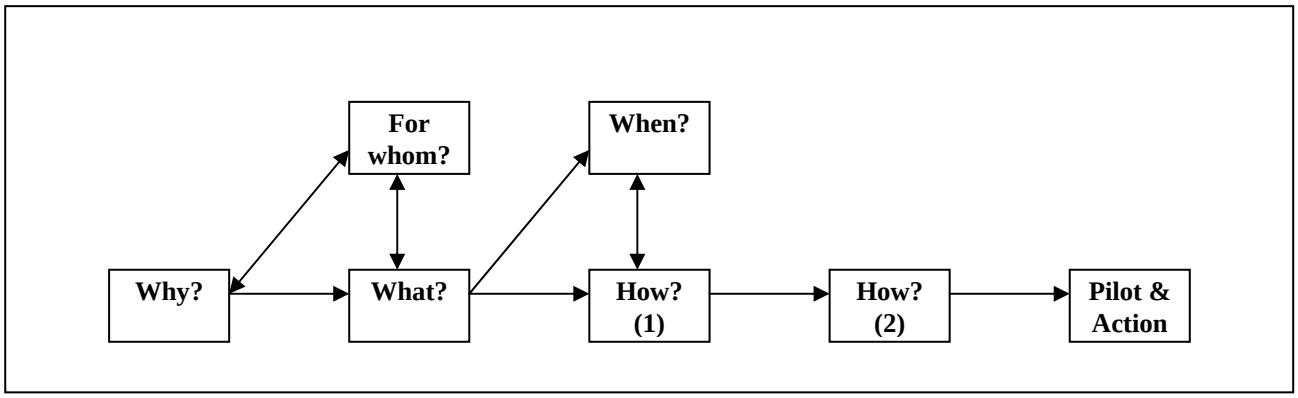
In contrast, successful telecentres tend to integrate many different aspects of community diversity. By hosting a wider variety of training courses and offering services which will appeal to even non-technical users, the project is more likely to be successful. Telecentres which work best offer a fusion of technical and non-technical contents. Keeping these best practices in mind, it is important to carefully select indicators which will be able to address this diversity of functions.

C. ICT IMPACT ASSESSMENT FRAMEWORK

The general aims of any efforts to measure the impact of ICT on development are to see, for instance, how far a telecentre has reached its desired audience, and to identify its effects or changes. In other words, these measurement efforts enable telecentre project stakeholders to understand the extent to which related activities/services have reached the community and the magnitude of their effects on people’s well-being.

A global impact study was carried out by IDRC for that purpose, whereby the impact assessment of any ICT4D project can be based on six major questions. Figure IX depicts the planning overview stage for impact assessment which is centred on answering six preliminary questions.

Figure IX. ICT4D project/telecentre impact assessment – planning overview



Source: Compendium on Impact Assessment of ICT-for-Development Projects, IDRC, 2009.

(a) *Why: What is the rationale for impact assessment?*

This is mainly driven by the internal purpose of the organization(s) implementing the impact assessment. It may also include retrospective achievements – post hoc assessment of what has been achieved from investments to date; prospective priorities – pre hoc assessment of future development project investments; and accountability – enabling agencies to be held to account for their ICT4D spending.

(b) *For whom: Who is the intended audience by the impact assessment?*

Typical audiences of the impact assessment can include investment funding decision makers, policy-makers, project decision makers, project/telecentre users/beneficiaries and other stakeholders.

(c) *What: What is to be measured?*

A set of indicators which is most feasible to measure and the indicators with which the assessment team is most familiar. This may also include identifying the conceptual framework guiding the impact assessment.

(d) *How 1: How are the selected indicators to be measured?*

This is mainly defined by the extent of participation of project/telecentre users/communities in the measurement process and the selection of indicators.

(e) *When: At what point in the project lifecycle will the indicators be measured?*

There is no single answer here; it really depends on each project/telecentre. Impact assessment must not, however, focus on assessing pilot projects instead of the fully implemented project/telecentre. In addition, evaluation of projects/telecentres is better conducted if broken into several stages; conducting measurements and assessment too early in the developmental stage of a project is to be avoided.

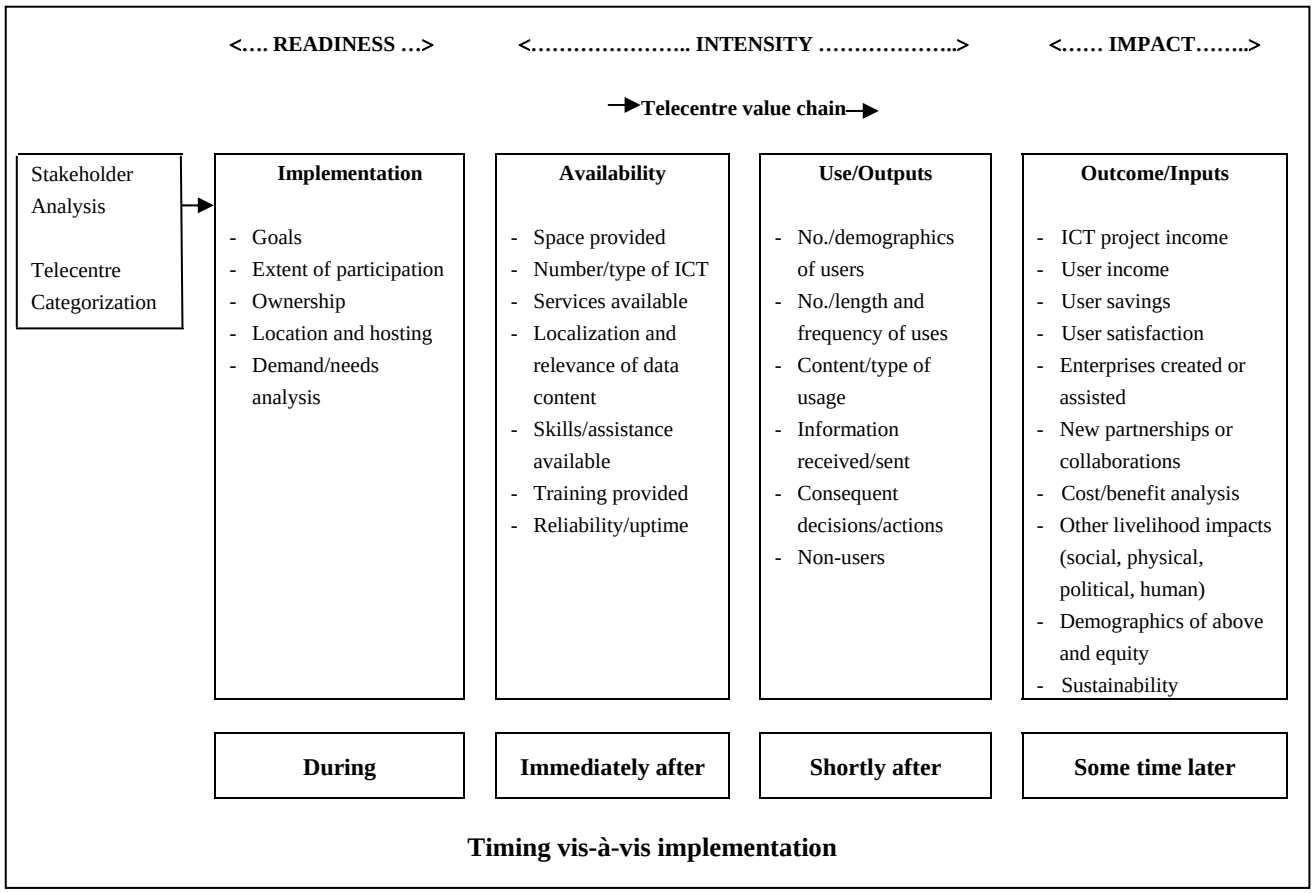
(f) *How 2: How are impact assessment results to be reported, disseminated and used?*

This is one of the most important and most overlooked elements in any assessment process. In order to better understand impact assessments, indicators must not only be reported "as is" but include the context in which they have been measured, for example causal models, case sketches, interviews, or focus groups.

According to the IDRC Global Impact study, there is no single agreed-upon impact assessment framework dedicated to telecentre assessment; however, a generic framework based on a telecentre performance indicator (TPI) is suggested (shown in figure X), and is worth exploring in the following sections.

This framework follows ICT4D value chain to define specific indicators for the evaluation of telecentres. The ICT4D value chain builds on a standard "input-process-output" model to create a sequence of linked ICT4D resources and processes. The value chain model is equally aligned with the three-stage model measurement framework previously discussed in Chapter 2 and is divided into four main targets for assessment as shown in figure X.

Figure X. A generic TPI impact assessment framework



Source: IDRC, Compendium on Impact Assessment of ICT-for-Development Projects, 2009.

For using this generic telecentre impact assessment framework, a number of related fundamental issues and influencing factors need to be further examined, as follows:

(a) *Stakeholder analysis*

This is an important requirement preceding impact assessment in order to ensure that key impacts are not missed. While stakeholders can sometimes have contradictory interests in a telecentre project, the need to identify their expectations of the evaluation study becomes essential. The process of identifying the various stakeholders' interests may include close consultation or larger multi-stakeholders meetings, both focusing on key stakeholders rather than all of them. The list of stakeholders for any given telecentre project includes users, targeted community, society, business community, government and donors.

(b) *Telecentre categorization*

Telecentre categorization is of particular importance as it helps in identifying the context in which the impact assessment will be undertaken, especially as telecentres exist in different forms and models. The different categories may include public, private, community owned, public-private, free of charge, minimal fee, profit-oriented, providing ICT access, providing access and ICT applications, to name a few.

(c) *Programme goals*

The main goals and objectives set for the implementation of any telecentre project play a significant role in shaping the focus of the indicator selection criteria. For instance, in a poverty alleviation/employment creation driven project, the focus indicators will be on the demographics of the users, income generation, job market and economic growth.

(d) *Stages of implementation*

Each stage in a telecentre implementation project is characterized by different issues which ought to be captured by specific indicators. For instance, readiness indicators (Implementation stage) tend to just provide a contextual background for assessment. Intensity indicators (Availability, Use/Outputs stages) are the most commonly used by most telecentre assessments due to their relative ease of collection. Impact assessment (Outcomes/Impacts stage) data, on the other hand, are harder to collect, require a longer time to be analysed to establish a cause and effect relationship.

(e) *Timescale*

Most of the challenges and even failures surrounding impact assessments have been attributed to conducting evaluations at inappropriate intervals. As telecentre projects are a form of human development projects, several months and years of operation must occur before an evaluation can capture any impact.

Finally, the success of the proposed impact assessment framework discussed above requires that regular and meaningful monitoring and evaluation efforts are addressed during the project planning overview stage. During this stage, the availability of all stakeholders allows for their consultation and engagement in brainstorming and close consultation meetings, enabling evaluation efforts to focus on their developmental objectives.

D. TELECENTRE IMPACT INDICATORS

Although standard sets of indicators for telecentre impact assessment are still at an early stage of development, we hope that a consensus on context specific impact indicators, that can be used to frame data collection for telecentres, will soon be adopted. The leading role played by the Partnership on Measuring ICT for Development appears promising, especially one of its dedicated task groups entrusted with impact measurement.

Good indicators able to measure impact require that a clear vision of what a telecentre is trying to achieve and what an evaluation is trying to measure be defined. Consequently, the first requirement in the development of indicators is to have identified the objectives, outputs, and projected results associated with the impact assessment framework of the project. The basic approach to creating indicators involves four steps as described in table 6.

Developing indicators is a carefully considered process requiring the collective efforts of all stakeholders especially because it is associated with costs. Having a lot of indicators does not necessary lead to better assessment as each indicator comes with an intrinsic cost in terms of data collection, monitoring and evaluation activities. In addition, issues related to reliability and availability of data must be carefully taken

into consideration at this stage. Finally, the frequency of collection associated with assessing the impact at various developmental stages of the project translates into additional costs and requires the availability of sufficient funds.

TABLE 6. STEPS IN DEVELOPING INDICATORS FOR EVALUATION

Step	Action
1. Identify all concepts to be measured, especially project objectives and outputs	• Review all concepts, objectives, results, and output statements to clarify them and reach an agreement • Be clear about what type of change is implied (a situation, state, condition, attitude, behaviour) • Clarify whether the outcome sought is an absolute change, a relative change, or no change • Specify where and when the change is expected (what target group, what location, and in what time frame – this identifies the appropriate unit of analysis) • Determine the relationship between project activities and their outputs or objectives (are these outputs or objectives direct or indirect?)
2. Develop a list of trial indicators	• Think of possible alternative indicators for each concept, objective, and output, without being too restrictive • Conduct internal brainstorming sessions • Consult stakeholders and other experts • Try to borrow from other projects and studies
3. Assess each trial indicator against criteria	• Establish an agreed set of criteria for indicators (see table 7) • Use a scoring scale (1-5) to determine the usefulness of each trial indicator (but be flexible and use your own judgment)
4. Select the best indicators for this project	• Consider each indicator on its merits against the criteria • Consider the mix of indicators to construct a robust set that is consistent and complementary in terms of data-collection methods and time frames • Avoid having too many indicators (it may indicate that the objectives and outputs are not clearly defined) • Be prepared to update your indicators — the best indicators may change as projects develop

Sources: Recommendations of the Center for Development Information and Evaluation (CDIE), USAID, 1996.

Whyte, A., Assessing Community Telecentres: Guidelines for Researchers, IDRC, 2000.

Another important dimension that informs the indicator development process is whether the expected impacts of the project will occur "during" implementation, "immediately after", "shortly after" or "some time later", as shown in figure X. As most impacts will not appear until after a project has been implemented, the majority of assessment intervals will stop short of measuring long-term impacts; consequently, these long-term impacts become hardly quantifiable.

The relevance of data on any proposed indicator is another limiting factor in impact assessment processes. Indicators are generally based on assumptions about what is relevant, and indicators are, therefore, expressions of value to some extent.[53] Accordingly, it is recommended that all proposed indicators be discussed with the various key stakeholders before they are adopted. The ultimate goal of such discussions and close coordination mechanisms with the various stakeholders is to make sure the proposed indicators are in line with their requirements and able to address the information they are trying to collect.

Table 7 summarizes the criteria recommended by the Center for Development Information and Evaluation (CDIE, a USAID institute) to assess potential indicators; these common-sense criteria are to be used flexibly. According to CDIE, direct measures are not always better than indirect ones, while quantitative measures are not always better than qualitative ones.

[53] Whyte A., "Assessing Community Telecentres - Guidelines for Researchers", IDRC, 2000.

In order to obtain impact indicators, telecentre evaluations require the development and collection of baseline data, or simply pre-telecentre data. Baseline data provides a benchmark against which impact can be measured, and relies on initial data collection which serves as a basis for future comparison with any subsequently acquired data.

TABLE 7. CRITERIA FOR ASSESSING INDICATORS

Criterion	Description
Direct measure	• Indicator is intuitively understood (high face validity) • Indicator is a direct measurement, rather than a proxy that depends on assumptions for its validity • Indicator is supported by a body of research
Objective	• Indicator is unambiguous about what is being measured • Different people will collect comparable data based on the indicator • Definition remains stable over time, so change can be measured • Indicator is unidimensional (measures only one thing at a time) • Indicator can be quantitative or qualitative, as long as it is clearly and consistently defined and interpreted
Adequate	• Either by itself or with a minimal companion set of indicators, the indicator provides reasonable confidence that it accurately measures the attribute • Object is to have as few indicators as possible per attribute (three or fewer) – more is not necessarily better • Number of indicators will depend on the complexity of the object, or what is being measured
Quantitative	• Quantitative indicators are more objective than qualitative ones • Qualitative indicators must be adequately specified to be objective and consistent
Disaggregated	• The more disaggregated the indicator, the more easily data can be manipulated to answer questions not anticipated at the outset
Practical	• Data can be collected at reasonable cost, given their utility • Data are available and can be collected at suitable time intervals • Data can be readily collected in various projects for comparison
Reliable	• Indicator is reliable within the context of the evaluation purpose and resources • Data-collection process is consistent across different time and space scales, using comparable methods and sampling procedures • Indicator is based on representative data

Sources: Recommendations of the Center for Development Information and Evaluation (CDIE), USAID, 1996.

Assessing Community Telecentres: Guidelines for Researchers, A. Whyte, IDRC, 2000.

Baseline data can be collected both qualitatively and quantitatively, especially through initial surveys undertaken before a telecentre is set up, and retrospective ones conducted after it has become operational. In this regard, data collected on individuals must be disaggregated as they are always easier to aggregate during analysis.

1. *Economic impact indicators*

Economic impact indicators of telecentres on community development depend largely on primary data that can be collected and surveyed by the evaluation team. As household level economic data are hard to obtain, a data-collection plan must be devised to include using the help of field researchers, using indirect measures of wealth accumulation (owning consumer goods), providing mechanisms (through household surveys) for evaluating household spending patterns, and, where possible, using already available data. Impact indicators measuring change (positive or negative) from a pre-telecentre baseline situation will then require studies which follow users over an extended period of time. In addition, the proposed economic impact indicators shown in table 8 assume that several measurements will be taken at different time intervals.

It should be noted, however, that several international statistical studies correlating access to ICTs with per capita GDP growth have only been possible through the use of longitudinal studies.

TABLE 8. POTENTIAL ECONOMIC IMPACT INDICATORS

Change	Potential indicators
Income, prices	• Change in household income • Percentage of household income from migrant worker remittances • Average daily wage for unskilled labour, agricultural worker • Prices obtained for sector-specific products • Ratio of cash to subsidence crop production • Value of exports (agricultural, non-agricultural) within, outside country • Availability of credit • Change in household budget
Work related	• Percentage (especially youth) employed and earning wages in community • Percentage of successful job searches using telecentre • Percentage of households engaged in enterprises • Percentage of households adopting improved technology, new products • Increase in hours of service through reduced downtime, travel time (e.g., shops, mechanics, pharmacy, clinic, ambulance) • Increased number of different markets for buying, selling •Changes in occupational patterns
Wealth, property accumulation	• Growth in number, size of community businesses • Percentage of households owning specified consumer goods • Percentage of households owning a vehicle • Growth in individual, business telephone subscriptions • Percentage of households with new construction, major improvements • Percentage of households with electricity
Information search	• Time to obtain information, communications • Monetary cost to obtain information, communications • Percentage of successful trips, attempts to obtain information, communications • Time to place, receive orders for spare parts, supplies

Source: A. Whyte, Assessing Community Telecentres: Guidelines for Researchers, IDRC, 2000.

2. *Social impact indicators*

Social impact indicators highlight another measurement issue; they need to be defined somewhere between indicators measuring "bottom-line" impacts (for example, mortality rates which, regardless of a possible impact due to the telecentre, will be impossible to separate from other contributing reasons) and those measuring direct impact on behaviour (for example, the number of fixed-line telephone calls made per household per month). While such an indicator measuring the number of telephone calls can be easily obtained, it does not have great significance at the level of social impact.

The proposed social impact indicators shown in table 9 were selected based on their relevance and the likelihood of data availability. Some of these indicators can be measured directly, while others are subjective indicators of attitudes and values. For that purpose, it is recommended that a panel made up of households or individuals be established to keep detailed logs of how they allocated their time during the day. Resorting to time-budget diaries[54] will, therefore, provide a wealth of information and tell much about the quality of life, social well-being and patterns of leisure and work of individuals.

[54] Time-budget analysis was pioneered by Sorokin and Berger in 1939.

TABLE 9. POTENTIAL SOCIAL IMPACT INDICATORS

Change	Potential indicators
Social structure, status	• Number of households • Percentage of households with migrant workers outside community • Occupation of heads of households • Percentage of professional workers residing in the community • Turnover of professionals (teachers, nurses, etc.) in the community • Ratio of employed to unemployed adults, youth
Health	• Percentage of households with improved water supply • Percentage of households with improved sanitation • Child mortality rate • Main childhood diseases • Major causes of morbidity, mortality • Percentage of children regularly visiting a health clinic • Percentage of households with a member treated via telemedicine
Education	• Adult literacy rate • Highest educational level attained by head of household • Children's enrolment in school • Youth, adult enrolment in training, skills upgrading • Participation in distance-learning courses • Competence in Arabic, English, French as second language • Competence in skills related to telecentre use (word processing, spreadsheets, simulation games)
Community action	• Number of community organizations • Active membership of community organizations • Community-action projects • Community newsletter, website, radio station • Response times for emergency services • Flyers, announcements
Behaviour	• Use of telecentre (purpose, frequency, success rate) • Use of alternatives to telecentre • Pattern of work, recreational activities • Patterns of travel to other communities, towns, capital • Domestic violence, violence towards women • Use of specialized professional services (veterinary, counselling, tax advice) • Purchases based on information from Internet, e-mail • Regular readers of newspapers, news sources online • Changes in time budgets
Knowledge, values, attitudes	• Self-assessed local pride • Awareness of events in the country, the world • Attitudes toward traditional culture, modernization • Reliance on telecentre services • Value placed on telecentre as a community facility

Source: A. Whyte, Assessing Community Telecentres: Guidelines for Researchers, IDRC, 2000.

3. *Organizational impact indicators*

Evaluation studies dedicated to measuring the impact of ICT on community development must not only measure economic and social impacts, but also accord special attention to measuring changes in formal organizations. These organizations are pivotal for community development and to the analysis of telecentres, they include schools, chambers of commerce, health clinics, SMEs and NGOs.

The increasing adoption and use of ICTs by formal organizations is becoming essential to their success. It not only improves their efficiency, transparency and accountability, but also provides citizens with faster and better services, all of which allow for considerable cost savings across these organizations.

In most cases, collecting impact data on organizations is quite achievable and can be directly obtained from formal records or by interviewing members of these organizations. This is especially true since telecentres are usually hosted and supported by a school, NGO or other host organizations.

As such, the proposed impact indicators on organizations, described in table 9, relate to their efficiency, the outcomes they achieve, their decision-making processes and the decisions made, as well as how effective their networking and information sources are for reaching their organizational goals.

TABLE 10. POTENTIAL ORGANIZATIONAL IMPACT INDICATORS

Change	Potential indicators
Operations	• Use of databases, spreadsheets for financial, other administrative tasks • Quality, timelines of formal reporting • Response time to fulfil requests, emergency response • Use of registries, online expertise to carry out functions • Use of off-site computer capacity to do work • Use of reference libraries, downloaded software to improve performance
Networks	• Networking within larger associations of member organizations • Sharing information with other similar organizations • Number of electronic networks of which the organization is a member • Time, number of interactive discussion groups
Organization	• Number, percentage of staff using telecentre, Internet • Number, percentage of staff trained to use ICTs • Implementation of the organization own information strategy • Growth in activities, membership • Ability to attract good leadership
Budget	• Cost savings for information, communication functions • Staff time savings for information, communication functions • Investment in purchasing, leasing ICT equipment • Change in revenue, expenditures
Perceived benefits, costs	• Change in performance indicators • Improved organizational structure, membership, leadership • Dependence on telecentre to perform tasks • Better networking • Reported success stories • Difficulties in keeping trained staff • Financial costs
Outreach	• Own website • Number of requests, hits on website • Production of electronic, print newsletters, bulletins • Number of subscribers to newsletters, bulletins • Percentage of outreach made available through fax, Internet, e-mail

Source: A. Whyte, Assessing Community Telecentres: Guidelines for Researchers, IDRC, 2000.

CONCLUSION

This study has reviewed existing frameworks, measurement mechanisms, and recommendations for new indicators. The principles underlying these areas have been illustrated with selected ICT4D initiatives from the ESCWA region and around the globe. From the available data and extrapolation from these experiences, a number of conclusions may be drawn.

At the macroeconomic level, breaking up telecommunication monopolies and promoting competition are closely correlated to increased economic growth. While governments may balk at the prospect of losing revenue by allowing private sector control of the telecommunication sector, the data supports the inference that the increased economic growth and higher consumption levels more than offset the initial drop in tax revenue. Governments which promote a low-tax private sector approach to providing ICTs are rewarded by faster economic growth.

Increased use of mobile telephones is also associated with GDP growth, particularly for the poorest citizens of developing nations. While it is unclear if this relationship is a cause of growth or an effect of pre-existent economic growth, governments are well-advised to ensure that they enact policies that will allow the growth of this sector. Allowing flexible pricing and the promotion of text messaging are specific decisions which have been shown to have pro-poor effects.

At the more local level, available data is difficult to extrapolate. Stakeholders must rely on the extrapolation of results from small-scale pilot projects because reliable statistical data is often not available. While highly susceptible to error, this approach makes the best use of available resources. In short, by drawing upon a wide range of experiences, consistent themes emerge.

ICT projects which involve the community in planning, implementation and follow-up tend to produce significantly better results than those which are developed far away and implemented on a franchise basis. By focusing on the community level, specific strengths, weaknesses and opportunities can be identified and appropriately addressed. While this approach requires greater inputs of time and resources to create a locally customized approach, the higher levels of success it creates makes it more worthwhile to pursue.

Project evaluation must include efforts to assess any unintended consequences of the initiative. Often, very valuable information can be obtained by looking beyond the predetermined measurements of success to attempt to understand what else may have occurred. Focusing exclusively on metrics established before implementation can place evaluative blinders on donors and project implementers. In the worst cases, these can create counterproductive effects, reduce sustainability, and leave the target communities disenfranchised and worse off than before. At best, giving careful attention to unintended consequences can provide additional enlightenment to refine projects so they will have greater impact in the future. Focusing on these issues is critical to knowledge management.

Choosing the proper indicator strategy is fundamental and starts at the high level, with a monitoring approach. As detailed in Chapter III of this document, a framework for evaluation is needed. When selecting a framework, project planners must identify the type of change they are interested in measuring. Value chain consumption and creation versus social change or policy enactment are all different approaches. Recent trends in measurement have tended towards evaluating ICT4D project stakeholders as part of the value generation process, not solely as product consumers.

Next, measurement ideas need to be refined by asking what metrics will best represent success or failure within the framework. Section C of Chapter III details specific steps to be taken in order to refine these ideas. The selection of indicators must consider what attributes are quantifiably measureable and be balanced with the needs of the funding agency to focus on creating change. Expenses associated with measuring the change are often seen as overheads to be reduced as much as possible. In addition to these issues, the project managers must devote time and resources to examining the unintended side effects of the project on the community. This undertaking illustrates the need to be agile in selecting and modifying the indicators of achievement for the initiatives.

In order to apply these principles, this study has recommended indicators in two major areas: economic and social. Within each sector, comparing the differences in the accomplishments in the baseline and beneficiary groups yields greater insight into measuring ICT impact than the currently available data. It must be emphasized that this higher level of information will typically be facilitated by the project implementers collecting the data. Most of this information will not already be publicly available.

In the economic realm, the first section of recommended indicators focuses on income and prices. While change in household income relative to prices is generally a good indicator of improving economic conditions, such other factors as export data, prices for sector-specific products and so forth are illuminating metrics. Indeed, some ICT4D projects are specifically designed to address these as their primary target. The use of mobile phones and SMS technology to aid in the distribution of food product marketing is a key example.[55]

Employment related data must also be considered in the selection of indicators. For example, direct data collection can illuminate how effective the project is in increasing employment. Care must be taken in collecting data in order to avoid bias in reporting. In some cases, telecentre questionnaires have been biased towards unusually positive numbers by asking participants how they feel the telecentre has impacted their employment prospects. While customer satisfaction is an important criterion, these data are not useful as quantifications of which telecentre beneficiaries actually obtained better jobs. In cases where employment is concerned it is usually better to avoid asking beneficiaries if they feel they were helped. Instead, focus must be placed on determining if they actually were.

Within the economic category, it is also beneficial to measure the increased access to information experienced by users in the community. By measuring what telecentre users are searching for, and whether their searches are successful, project evaluators are better equipped to show that the e-services component of their project is having a positive impact. Particularly for ICT4D projects which target rural areas, this type of information is highly valuable. While measurement must incorporate necessary confidentiality, e-health applications are often particularly well served by this type of approach.

Health applications are often found in the social category. While particular care is necessary in order to respect patient privilege, the delivery of e-health services is a key area of interest. E-health applications are ideally placed to make a significant positive contribution because such conditions with social stigma as tuberculosis and HIV are often underreported and badly treated. In this regard, such metrics as households accessing desired medical information and the use of ICTs to facilitate a treatment plan are useful indicators to examine.

Educational impact is also important to consider. ICT projects are often useful for addressing educational insufficiency, particularly in rural or disadvantaged areas. It is also important to measure the use of ICTs to promote literacy in these contexts. One such proposed indicator is movement in the adult literacy rate among telecentre beneficiaries. This type of information is an excellent example of the measurement issues we have outlined in this paper. Truly measuring this impact requires a broad selection of measurement tools over an extended period of time since the value of literacy is difficult to financially quantify and typically has no impact for a long period of time.

While these recommendations and conclusions are well supported by the available data and qualitative sources, additional research would be very illuminating. Further study must focus on specific indicator recommendations to allow project stakeholders to take advantage of the measurement efforts of other parties, making the community of practice more efficient. In addition, expending resources on effectively baselining the metrics of communities before project implementation will greatly empower analysts to understand the effectiveness of the project outcomes. With this additional research and data, ICT4D projects will be more effectively implemented and create greater impact.

[55] Manobi Development Foundation, case studies, available at: http://www.manobi.net/foundation/?M=2&SM=6.

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The challenges of measuring such a multifaceted concept as the information society render this task very complex. Although using measurements as a basis for evaluating and modifying strategies and policies is a sound approach, the relevance and accuracy of the selected tools remains questionable. In the past, measurement approaches were confined to simply aggregating a variety of data on selected ICT indicators, adjusting the weight of some factors, and applying statistical tools. These approaches, however, lacked theory and validation.

While measuring the ever-changing ICT landscape might seem to be enough, the study emphasizes that societies are not exclusively driven by technology. Consequently, assessment efforts should go beyond measuring ICT diffusion and investigate the social context within which these developments are taking place.

The study describes the efforts and progress made by the international community for measuring the information society. It draws particular attention to developing a unified model which is able to address the many aspects of the information society, including the impact of ICT on community development. Moreover, it investigates evaluation mechanisms that are able to assess the pivotal role telecentres play in developing communities in the ESCWA region, especially at the micro level.

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Printed at ESCWA, Beirut

E/ESCWA/ICTD/2009/15
United Nations Publication

09-0506 - December 2009 - 1275