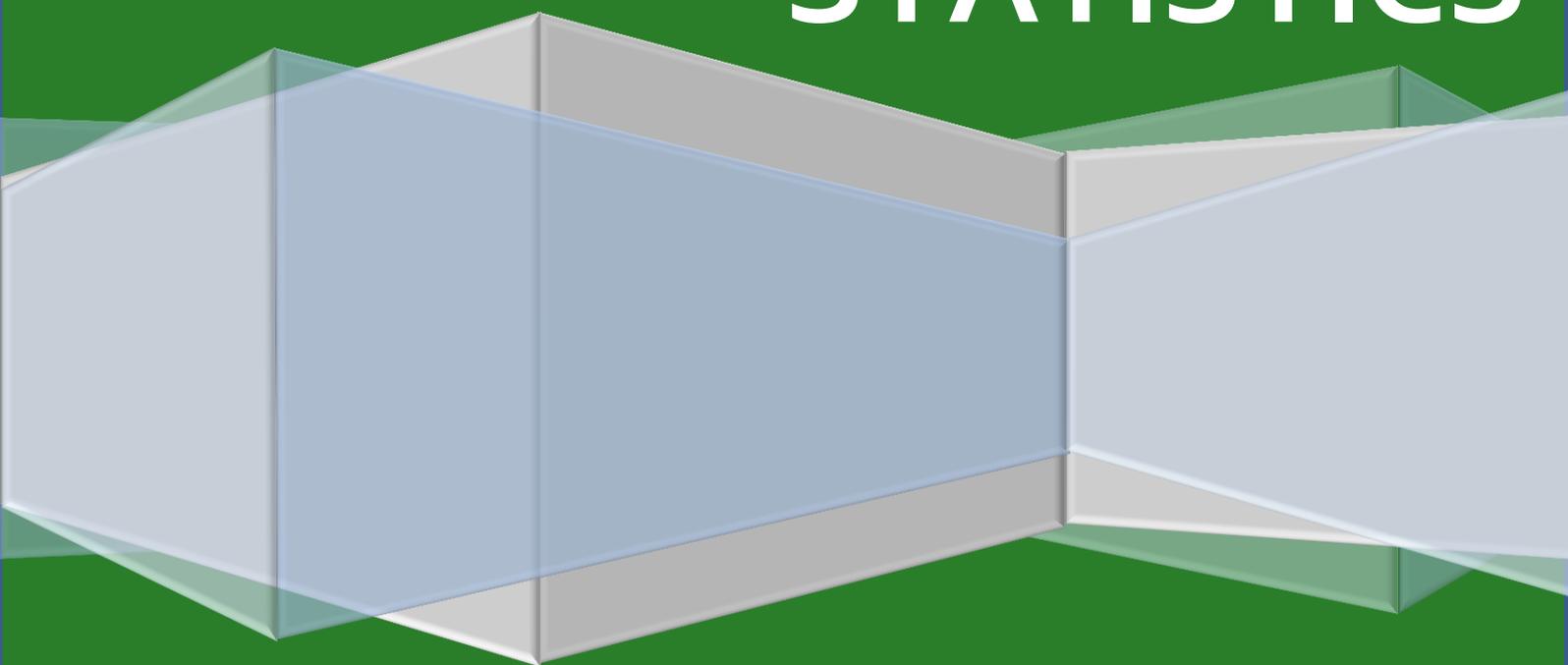


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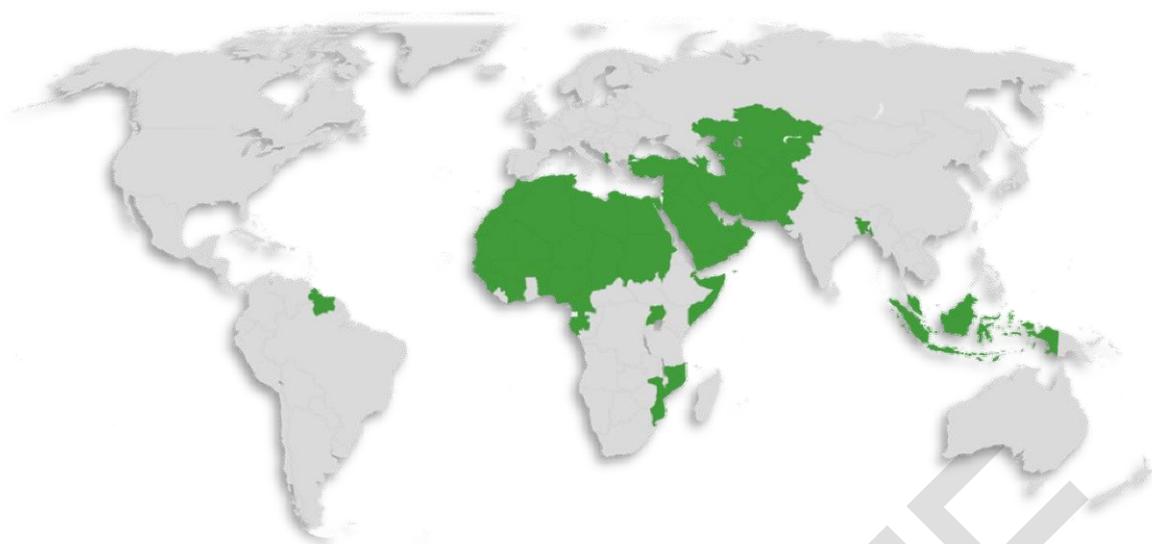
INTRODUCTION TO INFORMATION SOCIETY STATISTICS



ORGANISATION OF ISLAMIC COOPERATION

STATISTICAL ECONOMIC AND SOCIAL RESEARCH
AND TRAINING CENTRE FOR ISLAMIC COUNTRIES





INTRODUCTION TO INFORMATION SOCIETY STATISTICS

TEXTBOOK

{{AHMED UDDIN, KABIR}}



ORGANISATION OF ISLAMIC COOPERATION

STATISTICAL ECONOMIC AND SOCIAL RESEARCH AND
TRAINING CENTRE FOR ISLAMIC COUNTRIES

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Kudüs Cad. No: 9, Diplomatik Site, 06450 Oran, Ankara – Turkey

Telephone +90 – 312 – 468 6172

Internet www.sesric.org

E-mail statistics@sesric.org

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Acronyms

ASCII	American Standard Code for Information Interchange
CATV	Cable Television
CD	Compact Disk
CDMA	Code-Division Multiple Access
COICOP	Classification Of Individual Consumption by Purpose
CPC	Central Product Classification
DBMS	Database Management System
DTT	Digital Terrestrial Television
DVD	Digital Versatile Disc
EBCDIC	Extended Binary Coded Decimal Interchange Code
HS	Harmonized Commodity Description And Coding System
HTML	Hypertext Markup Language
HTTP	Hypertext Transfer Protocol
ICT	Information Communication Technology
IDI	ICT Development Index
IP	Internet Protocol
IPTV	Internet Protocol Television
ISDN	Integrated Services Digital Network
ISIC	International Standard Industrial Classification Of All Economic Activities
ISP	Internet Service Provider
ITU	International Telecommunication Union
LAN	Local Area Network
NSO	National Statistics Office
OS	Operating System
PC	Personal Computer
PDA	Personal Digital Assistance
PSTN	Public Switched Telephone Network
SIM	Subscriber Identification Module
SQL	Structured Query Language
UMTS	Universal Mobile Telecommunications System
UNIVAC	Universal Automatic Computer
URL	Universal Resource Locator
USB	Universal Serial Board
VoIP	Voice Over Internet Protocol
WAN	Wide Area Network
WiMAX	Worldwide Interoperability for Microwave Access
WPIIS	Working Party On Indicators for The Information Society <i>(Multi-Nation Organisation For Economic Co-Operation and Development)</i>
WSIS	World Summit On The Information Society
WWW	World Wide Web

Acknowledgements

This chapter presents the basic concepts and understandings on the Information society statistics and It is hoped that the information contained in this textbook will provide a basic picture of the aforementioned topic and will be useful to the professionals of National Statistics Offices of the OIC member countries.

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I must acknowledge the authors and agencies of the reference books that I have used in preparing the textbook. A list of the reference books is appended at the end of this chapter for reference and for further readings.

Suggestion and comments for further improvement of the report will be highly appreciated.

Kabir Uddin Ahmed

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UNIT-1

Information society

1.1 Introduction

The development of ICT (Information, Communication and Technology) has provided greater opportunities to improve the quality of life worldwide. Nowadays the term 'ICT' has been widely used in various contexts in daily life. The prevalence of cell phones and internet in the community has boosted the popularity of this term. The development of ICT and the global information infrastructure has brought significant changes in the way people live their life in many aspects.

There is little doubt that information and communication technology (ICT) has promoted profound economic and social change over the past decade or so. The need for statistics and analysis to support and inform policy-making has grown alongside the rapid emergence of new ways of communicating, processing and storing information. An information society is a society where the creation, distribution, use, integration and manipulation of information is a significant economic, political, and cultural activity. Its main driver are digital information and communication technologies, which have resulted in an information explosion and are profoundly changing all aspects of social organization, including the economy, education, health, warfare, government and democracy.

There is no universally accepted concept of what exactly can be termed information society and what shall rather not so be termed. Most theoreticians agree that a transformation can be seen that started somewhere between the 1970s and today and is changing the way societies work fundamentally. Information technology goes beyond the internet, and there are discussions about how big the influence of specific media or specific modes of production really is. Kelvin Kasiwulaya and Walter Gomo (Makerere University) allude that information societies are those that have intensified their use of IT for economic, social, cultural and political transformation.

The Information Society is an evolving concept that has reached different levels across the world, reflecting the different stages of development. Technological and other change is rapidly transforming the environment in which the Information Society is developed. The Plan of Action is thus an evolving platform to promote the Information Society at the national, regional and international levels. The unique two-phase structure of the World Summit on the Information Society (WSIS) provides an opportunity to take this evolution into account.

“Information society is a new form of living of human civilization, where universal services and equal access to information along with systems and developed infrastructure for electronic communication contribute to a sustainable socio-economic development, poverty alleviation and better living standards. International practices show positive impact of information communication technology in the development of modern society, through different ways of accessing information and public information resources in all social activities: e-democracy, e-government, e-business, e-economy, e-culture, e-health, e-learning etc.”

The EU Digital Agenda states that wider deployment and more effective use of digital technologies will thus enable Europe to address its key challenges and will provide citizens with a better quality of life through, for example, improved health care, safer and more efficient transport solutions, less polluted environment, new media opportunities and easier access to public services and cultural content.

The benefits for the society by implementing the information society as described in the EU digital agenda for the different target groups are:

- Consumers – a vibrant digital Single Market and high-speed internet access.
- Workers – right skills for the digital era.
- Patients and doctors - using ICT for sustainable healthcare.
- Manufacturing industry – the opportunities of an interoperable digital economy.
- The ICT industry – research and innovation for the digital economy.
- Small and medium-size enterprises (SMEs) – eGovernment to ease the functioning of SMEs
- Artists, authors, musicians – a unique platform for creation and distribution of cultural content by creating opportunities for authors.
- The environment – using ICT to reduce our environmental footprint.
- Researchers – increased and joined-up ICT research funding.
- Older and disabled people – new opportunities.
- People in rural and remote areas – connecting communities.

1.2 E-commerce, e-business, e-government

e-commerce

For individual members of households, e-commerce presents an alternative method of purchasing (and increasingly selling) goods and services for private use. According to the long-standing OECD statistical standard for measuring e-commerce, *it is the method by which an order is placed or received, rather than the payment or channel of delivery, which determines whether a transaction is an e-commerce transaction.*

The main interest in e-commerce measurement for the household sector is in use of the Internet for purchasing rather than selling transactions. This can provide useful information on, for example, business-to-consumer e-commerce, often not obtained through business surveys. While indicator HH9 includes the activities of purchasing and selling of goods or services, surveys of ICT use in households may collect additional information, including the nature of goods and services purchased or sold, the monetary value of those purchases or sales, the monetary value of online payments and/or barriers to purchasing or selling over the Internet.

There are both conceptual and data collection challenges associated with e-commerce measurement. For example, in respect of individuals reporting the value of Internet purchases, there are issues of understanding the definition of e-commerce (for instance, distinguishing purchases from payments) and the relatively small volume of e-commerce activity, which has implications for the size of sampling error. In addition, there are recall issues for respondents in relation to the value of e-commerce purchases (that is, they may not be able to report reliable information on the value of those purchases). Indeed, as such Internet transactions become more common, the recall problem is likely to worsen.

Example:

The survey on the use of ICT in households carried out by CETIC.br in Brazil in 2011 collected various items related to e-commerce. These enable the production of indicators including the following (response categories in brackets):

- the percentage of individuals who researched prices of products or services on the Internet;
- the percentage of individuals who had purchased products or services via the Internet;
- the types of products and services acquired through the Internet (electronic equipment, household products/appliances, clothing/footwear/sporting gear and accessories, computers and IT equipment,
- books/magazines or newspapers, travel (flight and hotel bookings), films/songs/ringtones, tickets for events, software, e-learning materials, computer games or videogames, medicines, food products, financial services/insurance, lottery and betting, flowers);

- the method of payment (credit card, bank payment slip, online debit/electronic transfer, payment on delivery, financing, not paid/free);
- the percentage of individuals who had problems purchasing through the Internet;
- the percentage of individuals who have advertised or sold goods or services via the Internet.

e-business

Electronic **business**, or **e-business**, is the application of information and communication technologies (ICT) in support of all the activities of **business**. E-business (electronic business) is the conduct of business processes on the Internet. These electronic business processes include buying and selling products, supplies and services; servicing customers; processing payments; managing production control; collaborating with business partners; sharing information; running automated employee services; recruiting; and more. Business (e-Business), or Electronic Business, is the administration of conducting business via the Internet. This would include the buying and selling of goods and services, along with providing technical or customer support through the Internet. e-Business is a term often used in conjunction with e-commerce, but includes services in addition to the sale of goods.

e-government

A prerequisite for developing a set of global e-government core indicators is to define what we mean by “e-government”. There are several definitions of e-government presently in use worldwide and they differ depending on the purpose of the definition.

E-government is about using the tools and systems made possible by information and communication technologies to provide better public services to citizens and businesses (European Commission - EC, 2011).

Use of new information and communication technologies (ICTs) by governments as applied to the full range of government functions. In particular, the networking potential offered by the internet and related technologies has the potential to transform the structures and operation of government. (OECD-2009b)

Collection of e-government statistical information faces several challenges, including statistical feasibility, data collection costs and the burden on respondents. There are particular challenges associated with comparability of e-government data between countries. In part, this has arisen through the currently diverse practices of countries that collect statistical information on e-government. However, a potentially larger problem arises from difficulties in identifying and comparing government units across countries.

1.3 ICT Product classification (goods and services)

ICT production takes place in many industries, either as a principal or secondary output. It is therefore not possible to use industry statistics to get a complete measure of ICT production. Nevertheless, the identification of industries whose principal production is ICT goods or services was thought to be an essential component of an information society statistical framework. It allows for international comparison of the relative importance of these industries and analysis of differences in the industrial structures of countries.

The list of ICT sector activities (industries) was originally decided on the basis of the following set of principles.

- For manufacturing industries, the products of a candidate industry: must be intended to fulfil the function of information processing and communication including transmission and display, or must use electronic processing to detect, measure and/or record physical phenomena or to control a physical process.
- For services industries, the products of a candidate industry: must be intended to enable the function of information processing and communication by electronic means.

The International Standard Industrial Classification (ISIC Rev 4) classifies the industry as follows:

A. ICT sector – Goods industries (ISIC Rev. 4)

ICT manufacturing industries

2610 Manufacture of electronic components

2620 Manufacture of computers and peripheral equipment

2630 Manufacture of communication equipment

2640 Manufacture of consumer electronics

2680 Manufacture of magnetic and optical media ICT trade industries

4651 Wholesale of computers, computer peripheral equipment and software

4652 Wholesale of electronic and telecommunication equipment and parts

B. ICT sector – Service industries (ISIC Rev. 4)

ICT services industries

5820 Software publishing

61 Telecommunications

6110 Wired telecommunications activities

6120 Wireless telecommunications activities

6130 Satellite telecommunications activities

6190 Other telecommunications activities

62 Computer programming, consultancy and related activities

6201 Computer programming activities

6202 Information technology consultancy activities and computer facilities management activities

6209 Other information technology and computer service activities

631 Data processing, hosting and related activities; web portals
6311 Data processing, hosting and related activities
6312 Web portals
951 Repair of computers and communication equipment
9511 Repair of computers and peripheral equipment
9512 Repair of communication equipment

C. Content and media sector (ISIC Rev. 4)

581 Publishing of books, periodicals and other publishing activities
5811 Book publishing
5812 Publishing of directories and mailing lists
5813 Publishing of newspapers, journals and periodicals
5819 Other publishing activities
591 Motion picture, video and television programme activities
5911 Motion picture, video and television programme production activities
5912 Motion picture, video and television programme post-production activities
5913 Motion picture, video and television programme distribution activities
5914 Motion picture projection activities
592 Sound recording and music publishing activities
60 Broadcasting and programming activities
601 Radio broadcasting
602 Television broadcasting and subscription programming
632 Other information service activities
6321 News agency activities
6329 Other information service activities n.e.c.

1.4 ICT infrastructure and access

The followings may be considered as the indicators for the ICT infrastructure and access:

Indicators on Access to ICT (Telecommunication)

- Fixed-telephone subscriptions per 100 inhabitants
- Mobile-cellular subscriptions per 100 inhabitants
- Fixed(wired)broadband subscriptions per 100 inhabitants
- Percentage of population covered by mobile cellular telephony

Indicators on Access to ICT (Internet)

- Proportion of households with internet access
- Proportion of individuals using the internet
- Computers per 100 inhabitants
- Broadband Internet subscribers per 100 inhabitants
- Percentage of localities with public Internet access centres (PIACs) by number of inhabitants (rural/urban)

1.5 Trade in telecommunications equipment

The first definition of ICT products was established by the WPIIS in 2003, based on a list of 6-digit items according to the HS 1996 and HS 2002. The second definition of ICT products was adopted in 2008, based on the then newly released second revision of the Central Product Classification (CPC rev. 2). The new definition includes ICT goods, ICT services and the first content and media product classification. The definition is published in the Guide to Measuring the Information Society 2009.

Composition of ICT trade in goods

One interesting feature of the ICT goods definition is that it can be split into five main groups of a different nature which allows analysis of the composition of the ICT goods in more detail and to test more precisely the correspondence between classifications. The five groups are: A-Computers and peripheral equipment, B-Communication equipment, C-Consumer electronic equipment, D- Electronic components, E- Miscellaneous. Figure 16 shows the evolution of these groups which all follow similar trends with one notable difference for Group A which shows a sharp decrease after 2006. Is it due to the correspondence or to the nature of the components of this group? When looking at the details of the series by country one can notice that Series number 5, which mainly includes computer peripheral equipment is the one which has decreased the most, but for some countries only: Japan, the Netherlands, United Kingdom, Germany and France. It is more likely due to the fact that these goods face more and more competition from China rather than due to a problem with the correspondence. The four other groups do not show any break in time series.

Global trends in ICT goods trade

The ICT goods trade of OECD countries was deeply affected by the burst of the Dot-com bubble in the 2000's leaving a very distinct shape to the exports and import curve: a very dynamic growth up to 2000, then a severe drop until 2003 followed by slow recovery until 2006 and another less pronounced slow down. In terms of total goods trade, Figure 5 shows a constant growth of the ratio of total exports to GDP for OECD countries. For the last 12 years, export values went from 15.5% to nearly 22% of GDP of OECD member countries. In contrast, the ICT trade to GDP ratio for OECD countries follows the pattern mentioned above: a rapid growth until the year 2000 followed by a severe turn down until 2003 and then a slower growth, never really recovering the importance it had in the GDP, even with the recovery of 2006

Trade in ICT services

Trade in ICT services is also available for two different indicators: Communication services and Computer and information services.

1.6 Core ICT indicators at household and individuals level

With the core ICT indicators at household and individuals level provided below, it would be possible to understand clearly the ICT situation in households in the country but also facilitates an assessment and monitoring of the extent to which the households have access to ICT and its related facilities.

HH1: Proportion of households with a radio

HH2: Proportion of households with a television

HH3: Proportion of households with telephone

HH4: Proportion of households with a computer

HH5: Proportion of individuals using a computer

HH6: Proportion of households with Internet

HH7: Proportion of individuals using the Internet

HH8: Proportion of individuals using the Internet, by location

HH9: Proportion of individuals using the Internet, by type of activity

HH10: Proportion of individuals using a mobile cellular telephone

HH11: Proportion of households with Internet, by type of service

HH12: Proportion of individuals using the Internet, by frequency

HH13: Proportion of households with multichannel television, by type

HH14: Barriers to household Internet access

HH15: Individuals with ICT skills, by type of skills

HH16: Household expenditure on ICT

1.7 Measurement of Core household and individual Indicators

Indicator HH1: Proportion of households with a radio

This is the proportion of households that have a radio.

A *radio* is defined as a device capable of receiving broadcast radio signals, using common frequencies, such as FM, AM, LW and SW. A radio may be a stand-alone device, or it may be integrated with another device, such as an alarm clock, an audio player, a mobile telephone or a computer.

Model question:

Does this household have a radio? Yes/No

Calculation:

The number of in-scope households with a radio is calculated by aggregating the weighted responses.

The proportion of households with a radio is expressed as a percentage and is calculated by dividing the number of in-scope households with a radio by the total number of in-scope households, and then multiplying the result by 100.

- $HH1\% = [(number\ of\ in\ scope\ households\ with\ a\ radio) / (total\ number\ of\ in\ scope\ households)] * 100$

Indicator HH2: Proportion of households with a television

This is the proportion of households that have a television (TV).

A *television (TV)* is a device capable of receiving broadcast television signals, using popular access means such as over-the-air, cable and satellite. A television set is typically a stand-alone device, but it may also be integrated with another device, such as a computer or a mobile telephone.

Model question:

Does this household have a television? Yes/No

Calculation:

The number of in-scope households with a TV is calculated by aggregating the weighted responses. The proportion of households with a TV is expressed as a percentage and is

calculated by dividing the number of in-scope households with a TV by the total number of in-scope households, and then multiplying the result by 100.

- $HH2\% = [(number\ of\ in\ scope\ households\ with\ a\ TV) / (total\ number\ of\ in\ scope\ households)] * 100$

Indicator HH3: Proportion of households with telephone

This is the proportion of households that have a telephone.

A *fixed telephone line* refers to a telephone line connecting a customer's terminal equipment (e.g. telephone set, facsimile machine) to the public switched telephone network (PSTN) and which has a dedicated port on a telephone exchange. This term is synonymous with the terms *main station* or *Direct Exchange Line (DEL)* that are commonly used in telecommunication documents. It may not be the same as an access line or a subscription.

A *mobile (cellular) telephone* refers to a portable telephone subscribing to a public mobile telephone service using cellular technology, which provides access to the PSTN. This includes analogue and digital cellular systems and technologies such as IMT-2000 (3G) and IMT-Advanced. Users of both postpaid subscriptions and prepaid accounts are included.

Model questions:

For fixed telephone: Does this household have a fixed telephone line? Yes/No

For mobile telephone: Does this household have a mobile telephone? Yes/No

Calculation:

The following sub indicators can be calculated:

- Proportion of households with a fixed telephone (regardless of whether they have a mobile telephone)
- Proportion of households with a mobile telephone (regardless of whether they have a fixed telephone)
- Proportion of households with any telephone (fixed and/or mobile)
- Proportion of households with a fixed telephone only
- Proportion of households with a mobile telephone only
- Proportion of households with both fixed and mobile telephone.

The number of in-scope households with a given type of telephone is calculated by aggregating the weighted responses for each case.

Indicator HH4: Proportion of households with a computer

This is the proportion of households that have a computer.

A *computer* refers to a desktop computer, a laptop (portable) computer or a tablet (or similar handheld computer).

- Desktop: a computer that usually remains fixed in one place; normally the user is placed in front of it, behind the keyboard.
- Laptop (portable) computer: a computer that is small enough to carry and usually enables the same tasks as a desktop computer; it includes notebooks and netbooks but does not include tablets and similar handheld computers.
- Tablet (or similar handheld computer): a tablet is a computer that is integrated into a flat touch screen, operated by touching the screen rather than (or as well as) using a physical keyboard.

It does not include equipment with some embedded computing abilities, such as smart TV sets, and devices with telephony as their primary function, such as smartphones.

Model question:

Does this household have a computer (desktop, laptop, tablet or similar)? Yes/No

Note that if the question is split by type of computer, respondents should select all that apply.

Calculation:

The number of in-scope households with a computer, or a given type of computer, is calculated by aggregating the weighted responses.

The proportion of households with a computer is expressed as a percentage and is calculated by dividing the number of in-scope households with a computer (or a given type of computer) by the total number of in-scope households and then multiplying the result by 100.

- $HH4\% = [(number\ of\ in\ scope\ households\ with\ a\ computer) / (total\ number\ of\ in\ scope\ households)] * 100$
- $HH4\%_{desktop} = [(number\ of\ in\ scope\ households\ with\ a\ desktop\ computer) / (total\ number\ of\ in\ scope\ households)] * 100$

- $HH4\%laptop = [(number\ of\ in\ scope\ households\ with\ a\ laptop\ computer) / (total\ number\ of\ in\ scope\ households)] * 100$
- $HH4\%tablet = [(number\ of\ in\ scope\ households\ with\ a\ tablet\ or\ similar) / (total\ number\ of\ in\ scope\ households)] * 100$

Alternatively, percentages can be also presented for each type of computer as the percentage of in-scope households with a computer by type of computer, that is, the denominator is the total number of households with a computer of any type.

Indicator HH5: Proportion of individuals using a computer

This is the proportion of individuals who used a computer from any location in the last three months. A *computer* refers to a desktop computer, a laptop (portable) computer or a tablet (or similar handheld computer).

- Desktop: a computer that usually remains fixed in one place; normally the user is placed in front of it, behind the keyboard.
- Laptop (portable) computer: a computer that is small enough to carry and usually enables the same tasks as a desktop computer; it includes notebooks and netbooks but does not include tablets and similar handheld computers.
- Tablet (or similar handheld computer): a tablet is a computer that is integrated into a flat touch screen, operated by touching the screen rather than (or as well as) using a physical keyboard.

It does not include equipment with some embedded computing abilities, such as smart TV sets, and devices with telephony as their primary function, such as smartphones.

Model question:

Have you used a computer (desktop, laptop, tablet or similar) from any location in the last three months?

Yes/No

Note that if the question is split by type of computer, respondents should select all that apply.

Calculation:

The number of in-scope individuals using a computer is calculated by aggregating the weighted responses.

The proportion of individuals using a computer is expressed as a percentage and is calculated by dividing the total number of in-scope individuals using a computer by the total number of in-scope individuals, and then multiplying the result by 100. The indicator can be split by type of computer, similarly to HH4.

- $HH5\% = [(number\ of\ in\ scope\ individuals\ using\ a\ computer) / (total\ number\ of\ in\ scope\ individuals)] * 100$

Indicator HH6: Proportion of households with Internet

This is the proportion of households with Internet access at home.

The *Internet* is a worldwide public computer network. It provides access to a number of communication services including the World Wide Web and carries e-mail, news, entertainment and data files, irrespective of the device used (not assumed to be only via a computer – it may also be by mobile telephone, tablet, PDA, games machine, digital TV etc.). Access can be via a fixed or mobile network.

Model question:

Does this household have Internet? Yes/No

Calculation:

The number of in-scope households with Internet is calculated by aggregating the weighted responses.

The proportion of households with Internet is expressed as a percentage and is calculated by dividing the number of in-scope households with Internet by the total number of in-scope households, and then multiplying the result by 100.

- $HH6\% = [(number\ of\ in\ scope\ households\ with\ Internet) / (total\ number\ of\ in\ scope\ households)] * 100$

Indicator HH7: Proportion of individuals using the Internet

This is the proportion of individuals who used the Internet from any location in the last three months.

The *Internet* is a worldwide public computer network. It provides access to a number of communication services including the World Wide Web and carries e-mail, news,

entertainment and data files, irrespective of the device used (not assumed to be only via a computer – it may also be by mobile telephone, tablet, PDA, games machine, digital TV etc.). Access can be via a fixed or mobile network.

Model questions:

Have you used the Internet from any location in the last three months? Yes/No

Calculation:

The number of in-scope individuals using the Internet is calculated by aggregating the weighted responses.

The proportion of individuals using the Internet is expressed as a percentage and is calculated by dividing the total number of in-scope individuals using the Internet by the total number of in-scope individuals, and then multiplying the result by 100.

- $HH7\% = [(\text{number of in-scope individuals using the Internet}) / (\text{total number of in-scope individuals})] * 100$

Indicator HH8: Proportion of individuals using the Internet, by location

This is the proportion of individuals who used the Internet from specified locations in the last three months.

The *Internet* is a worldwide public computer network. It provides access to a number of communication services including the World Wide Web and carries e-mail, news, entertainment and data files, irrespective of the device used (not assumed to be only via a computer – it may also be by mobile telephone, tablet, PDA, games machine, digital TV etc.). Access can be via a fixed or mobile network, including wireless access at a WiFi ‘hotspot’. Access via a mobile device should be classified to the appropriate location or to ‘in mobility’, that is while mobile.

Locations of Internet use are defined as follows:

- Home
- Work: where a person’s workplace is located at his/her home, then he/she would answer yes to the home category only
- Place of education: applies only to students – teachers and others who work at a place of education would report ‘work’ as the place of Internet use; where a place of education is also made available as a location for general community Internet use, such use should be reported in the Community Internet access facility category

- Another person's home: the home of a friend, relative or neighbor
- Community Internet access facility (typically free of charge): Internet use at community facilities such as public libraries, publicly provided Internet kiosks, non-commercial telecentres, digital community centres, post offices, other government agencies; access is typically free and available to the general public
- Commercial Internet access facility (typically not free of charge): Internet use at publicly available commercial facilities such as Internet or cybercafés, hotels, airports etc., where access is typically paid for
- In mobility: Use of the Internet while mobile, via a mobile cellular telephone (including devices with mobile telephone functionality) or other mobile access devices, for example, a laptop computer, tablet or other handheld device connected to a mobile phone network.

Model question:

Where did you use the Internet in the last three months? Respondents should select all locations that apply.

Countries may also ask about location of use as a series of yes/no questions, each referring to one location of use.

Calculation:

The number of in-scope individuals using the Internet from a specific location is calculated by aggregating the weighted responses for each location.

Proportions are expressed as percentages and are calculated by dividing the number of in-scope individuals using the Internet from a specific location by either the total number of in-scope individuals using the Internet (see HH7) or by the total number of in-scope individuals, and then multiplying the result by 100.

Examples:

The percentage of Internet users using the Internet at home is calculated as:

- $HH8\% \text{Internet users home} = \frac{\text{number of in-scope individuals using the Internet at home}}{\text{total number of inscope individuals using the Internet}} * 100$
- The percentage of in-scope individuals using the Internet at home is calculated as:
- $HH8\% \text{Individuals home} = \frac{\text{number of in-scope individuals using the Internet at home}}{\text{total number of inscope individuals}} * 100$

Indicator HH9: Proportion of individuals using the Internet, by type of activity

This is the proportion of individuals who undertook one or more activities using the Internet for private (defined as non-work) purposes from any location in the last three months. Internet activities are defined as follows:

- Getting information about goods or services
- Seeking health information (on injury, disease, nutrition etc.).
- Making an appointment with a health practitioner via a website
- Getting information from general government organizations
- Interacting with general government organizations (downloading/requesting forms, completing/lodging forms online, making online payments and purchasing from government organizations etc.) *General government organizations should be consistent with the SNA93 (2008 revision) concept of general government. According to the SNA "... the principal functions of government are to assume responsibility for the provision of goods and services to the community or to individual households and to finance their provision out of taxation or other incomes; to redistribute income and wealth by means of transfers; and to engage in non-market production." (General) government organizations include central, state and local government units.*
- Sending or receiving e-mail
- Telephoning over the Internet/VoIP (using Skype, iTalk, etc.; includes video calls via webcam)
- Participating in social networks (creating user profile, posting messages or other contributions to Facebook, Twitter etc.)
- Accessing chat sites, blogs, newsgroups or online discussions
- Purchasing or ordering goods or services (purchase orders placed via the Internet whether or not payment was made online; excludes orders that were cancelled or not completed; includes purchasing of products such as music, travel and accommodation via the Internet)
- Selling goods or services (via eBay, Mercado libre, Facebook etc.)
- Using services related to travel or travel-related accommodation
- Internet banking (includes electronic transactions with a bank for payment, transfers, etc. or for looking up account information; excludes electronic transactions via the Internet for other types of financial services such as share purchases, financial services and insurance)
- Doing a formal online course (in any subject)
- Consulting wikis (Wikipedia etc.), online encyclopedias or other websites for formal learning purposes
- Listening to web radio (either paid or free of charge)
- Watching web television (either paid or free of charge)
- Streaming or downloading images, movies, videos or music; playing or downloading games (either paid or free of charge)

- Downloading software or applications (includes patches and upgrades, either paid or free of charge)
- Reading or downloading online newspapers or magazines, electronic books (includes accessing news websites, either paid or free of charge; includes subscriptions to online news services)
- Looking for a job or sending/submitted a job application (includes searching specific web sites for a job; sending/submitted an application online)
- Participating in professional networks (professional networks are also seen in the broader context of social networking and have the same requirement of profile creation, contributing through messaging or chat, or uploading text or audio-visual content files; examples of professional or business networks are LinkedIn and Xing)
- Managing personal/own homepage
- Uploading self/user-created content to a website to be shared (text, images, photos, videos, music, software, etc.)
- Blogging: maintaining or adding contents to a blog
- Posting opinions on civic or political issues via websites (blogs, social networks, etc.) that may be created by any individual or organization
- Taking part in online consultations or voting to define civic or political issues (urban planning, signing a petition etc.)
- Using storage space on the Internet to save documents, pictures, music, video or other files (e.g. Google Drive, Dropbox, Windows SkyDrive, iCloud, Amazon Cloud Drive)
- Using software run over the Internet for editing text documents, spreadsheets or presentations

Model question:

For which of the following activities did you use the Internet for private purposes (from any location) in the last three months?’

Respondents should select all activities (see above) that apply.

Countries may ask about activities as a series of yes/no questions, each referring to one activity.

Calculation:

The number of in-scope individuals using the Internet for a specific activity is calculated by aggregating the weighted responses for each activity.

Proportions are expressed as percentages and are calculated by dividing the number of in-scope individuals using the Internet for a specific activity by either the total number of

in-scope individuals using the Internet (see HH7) or by the total number of in-scope individuals, and then multiplying the result by 100.

Examples:

The percentage of Internet users who undertook Internet banking is calculated as:

- $HH9\% \text{Internet users banking} = \left[\frac{\text{number of in-scope individuals who used the Internet for banking}}{\text{total number of in-scope individuals who used the Internet}} \right] * 100$
- The percentage of in-scope individuals using the Internet for Internet banking is calculated as:
- $HH9\% \text{Individuals banking} = \left[\frac{\text{number of in-scope individuals who used the Internet for banking}}{\text{total number of in-scope individuals}} \right] * 100$

Indicator HH10: Proportion of individuals using a mobile cellular telephone

This is the proportion of individuals who used a mobile telephone in the last three months.

A *mobile (cellular) telephone* refers to a portable telephone subscribing to a public mobile telephone service using cellular technology, which provides access to the PSTN. This includes analogue and digital cellular systems and technologies such as IMT-2000 (3G) and IMT-Advanced. Users of both postpaid subscriptions and prepaid accounts are included.

Model question:

Have you used a mobile telephone in the last three months? Yes/No

Calculation:

The number of in-scope individuals using a mobile cellular telephone is calculated by aggregating the weighted responses.

The proportion of individuals using a mobile telephone is expressed as a percentage and is calculated by dividing the total number of in-scope individuals using a mobile telephone by the total number of in-scope individuals, and then multiplying the result by 100.

- $HH10\% = \left[\frac{\text{number of in-scope individuals using a mobile cellular telephone}}{\text{total number of in-scope individuals}} \right] * 100$

Indicator HH11: Proportion of households with Internet, by type of service

This is the proportion of households with access to the Internet, by type of service.

The *Internet* is a worldwide public computer network. It provides access to a number of communication services including the World Wide Web and carries e-mail, news, entertainment and data files, irrespective of the device used (not assumed to be only via a computer – it may also be by mobile telephone, tablet, PDA, games machine, digital TV etc.). Access can be via a fixed or mobile network.

The broad types of Internet services to be identified are the following:

- Fixed (wired) narrowband network: includes analogue modem (dial-up via standard telephone line), ISDN (Integrated Services Digital Network), DSL (Digital Subscriber Line) at advertised download speeds below 256 kbit/s, and other forms of access with an advertised download speed of less than 256 kbit/s
- Fixed (wired) broadband network: refers to technologies at advertised download speeds of at least 256 kbit/s, such as DSL, cable modem, high speed leased lines, fibre-to-the-home/building, powerline and other fixed (wired) broadband
- Terrestrial fixed (wireless) broadband network: refers to technologies at advertised download speeds of at least 256 kbit/s, such as WiMAX, fixed CDMA
- Satellite broadband network (via a satellite connection), at advertised download speeds of at least 256 kbit/s
- Mobile broadband network (at least 3G, e.g. UMTS) via a handset
- Mobile broadband network (at least 3G, e.g. UMTS) via a card (e.g. integrated SIM card in a computer) or USB modem

Model question:

What type/s of Internet services are used for Internet access at home? Respondents should select all that apply (see above).

Countries may ask about services as a series of yes/no questions, each referring to one type of service. This question can present difficulties for both respondents and interviewers. The response options should be based on the commercial packages or plans offered in the country at the time of the interview – possibly using the brand names used by service providers, where these can be recoded to the different types of networks. Grouping into the above categories should be done by specialists during the coding phase of data processing.

Calculation:

The number of in-scope households with Internet access by a given type of access is calculated by aggregating the weighted responses for each type of access.

Proportions are expressed as percentages and are calculated by dividing the number of in-scope households with a given type of Internet access by either the total number of in-scope households with Internet access (HH6) or by the total number of in-scope households, and then multiplying the result by 100.

Examples:

The percentage of households with Internet access using a fixed (wired) broadband network should be calculated as:

- $HH11\% \text{households with access, fixed broadband} = \left[\frac{\text{number of in-scope households with fixed (wired) broadband Internet access}}{\text{total number of in-scope households with Internet access}} \right] * 100$

The percentage of in-scope households accessing the Internet via a fixed broadband network should be calculated as:

- $HH11\% \text{all households, fixed broadband} = \left[\frac{\text{number of in-scope households with fixed (wired) broadband Internet access}}{\text{total number of in-scope households}} \right] * 100$

Indicator HH12: Proportion of individuals using the Internet, by frequency

This is the frequency of Internet use by individuals who used the Internet from any location in the last three months.

The *Internet* is a worldwide public computer network. It provides access to a number of communication services including the World Wide Web and carries e-mail, news, entertainment and data files, irrespective of the device used (not assumed to be only via a computer – it may also be by mobile telephone, tablet, PDA, games machine, digital TV etc.). Access can be via a fixed or mobile network.

Frequency of use categories are as follows:

- At least once a day: once a working day for respondents who only (or most frequently) use the Internet from work or school etc.
- At least once a week but not every day
- Less than once a week.

Model question:

How often did you typically use the Internet during the last three months (from any location)?

Respondents can only respond to one category

Calculation:

The number of in-scope individuals using the Internet with a specific frequency is calculated by aggregating the weighted responses for each frequency.

Proportions are expressed as percentages and are calculated by dividing the number of in-scope individuals using the Internet with a specific frequency either by the total number of in-scope individuals using the Internet (see HH7) or by the total number of in-scope individuals, and then multiplying the result by 100.

Examples:

The percentage of Internet users who used the Internet at least once a day is calculated as:

- $HH12\% \text{Internet users at least once a day} = \left[\frac{\text{number of in-scope individuals using the Internet at least once a day}}{\text{total number of in-scope individuals who used the Internet}} \right] * 100$ The percentage of in-scope individuals using the Internet at least once a day is calculated as:
- $HH12\% \text{Individuals at least once a day} = \left[\frac{\text{number of in-scope individuals who used the Internet at least once a day}}{\text{total number of in-scope individuals}} \right] * 100$

Indicator HH13: Proportion of households with multichannel television, by type

This is the proportion of households with multichannel television (TV) and by type of multichannel service.

Multichannel TV services are as follows:

- Cable TV (CATV): multichannel programming delivered over a coaxial cable for viewing on television sets
- Direct-to-home (DTH) satellite services: TV services received via a satellite dish capable of receiving satellite television broadcasts
- Internet-protocol TV (IPTV): multimedia services such as television/video/audio/text/graphics/data delivered over an IP-based network managed to support the required level of quality of service, quality of experience, security, interactivity and reliability; it does not include video accessed over the public Internet, for example, by streaming. IPTV services are also generally aimed at viewing over a television

- set rather than a personal computer.
- Digital terrestrial TV (DTT): the technological evolution from analogue terrestrial television, providing capability for significantly more channels

Model question:

Does this household have any of the following television services?

Respondents should select all services (see above) that apply.

Countries may ask about multichannel services as a series of yes/no questions, each referring to one service.

Calculation:

The number of in-scope households with any type of multichannel TV service is calculated by aggregating the weighted responses for any multichannel TV service.

The proportion of households with any type of multichannel TV service is expressed as a percentage and is calculated by dividing the number of in-scope households with multichannel TV (of any type) by either the total number of in-scope households with TV (from HH2) or by the total number of in-scope households, and then multiplying the result by 100.

The number of in-scope households with a given type of multichannel service is calculated by aggregating the weighted responses for each multichannel TV service.

Proportions are expressed as percentages and are calculated by dividing the number of in-scope households with a given type of multichannel TV service by either the total number of in-scope households with TV (from HH2) or by the total number of in-scope households, and then multiplying the result by 100.

Examples:

Percentage of households with a TV having cable TV:

- $HH13\% \text{households with TV, cable} = \left[\frac{\text{number of in-scope households with cable TV}}{\text{total number of in-scope households with a TV}} \right] * 100$

Percentage of in-scope households with cable TV:

- $HH13\% \text{all households, cable TV} = \left[\frac{\text{number of in-scope households with cable TV}}{\text{total number of in-scope households}} \right] * 100$

Indicator HH14: Barriers to household Internet access

This measures the barriers to Internet access for households without Internet access. It is expressed as a proportion of households without Internet access.

Barriers (that is, reasons for not having Internet) are:

- Do not need the Internet (not useful, not interesting, lack of local content)
- Have access to the Internet elsewhere
- Lack of confidence, knowledge or skills to use the Internet
- Cost of the equipment is too high
- Cost of the service is too high
- Privacy or security concerns
- Internet service is not available in the area
- Internet service is available but it does not correspond to household needs (e.g. quality, speed)
- Cultural reasons (e.g. exposure to harmful content)

Model question:

Why does this household not have Internet access? Respondents should select all reasons (see above) that apply.

Some countries may ask about barriers as a series of yes/no questions.

This question should be asked of households with no access to Internet at home.

Calculation:

The number of in-scope households with a given barrier to Internet access is calculated by aggregating the weighted responses for each TV service.

Proportions are expressed as percentages and are calculated by dividing the number of in-scope households with a given barrier by the total number of in-scope households without Internet access, and then multiplying the result by 100.

Example:

Percentage of households without Internet access for which cost of equipment is too high:

- $HH14\%_{\text{cost too high}} = \left[\frac{\text{number of in-scope households for which cost of equipment is too high}}{\text{total number of in-scope households without Internet access}} \right] * 100$

Indicator HH15: Individuals with ICT skills, by type of skills

This refers to ICT skills, defined for the purpose of this indicator as having undertaken certain computer-related activities in the last three months.

Computer-related activities to measure ICT skills are as follows:

- Copying or moving a file or folder
- Using copy and paste tools to duplicate or move information within a document
- Sending e-mails with attached files (e.g. document, picture, video)
- Using basic arithmetic formulae in a spreadsheet
- Connecting and installing new devices (e.g. a modem, camera, printer)
- Finding, downloading, installing and configuring software
- Creating electronic presentations with presentation software (including text, images, sound, video or charts)
- Transferring files between a computer and other devices
- Writing a computer program using a specialized programming language

Model question:

Which of the following computer-related activities have you carried out in the last three months?

Respondents should select all that apply (see above).

Some countries may ask about tasks as a series of yes/no questions.

This question is asked of individuals having used a computer in the last three months.

Calculation:

Indicator HH15 is calculated as the proportion of in-scope computer users (HH5) who have carried out each computer-related activity. The indicator is expressed as a percentage.

For instance, the percentage of individual computer users having copied or moved a file or folder can be calculated as:

- $HH15_{\text{copied or moved a file}} = \left[\frac{\text{number of in-scope individuals who copied or moved a folder or file}}{\text{number of in-scope individuals who used a computer}} \right] * 100$

Indicator HH16: Household expenditure on ICT

This measures the percentage of total household expenditure that is expended on ICT goods and services as follows:

- Telephone and telefax equipment (COICOP 08.2.0): Purchases of telephones, radio-telephones, telefax machines, telephone-answering machines and telephone loudspeakers; repair of such equipment.
- Telephone and telefax services (COICOP 08.3.0): Installation and subscription costs of personal telephone equipment; includes telephone calls (from any location), information transmission services, Internet connection services, hire of telephones.
- Equipment for the reception, recording and reproduction of sound and picture (COICOP 09.1.1): Television sets, video cassette players and recorders, television aerials of all types; radio sets, car radios, radio clocks, two-way radios, amateur radio receivers and transmitters; gramophones, tape players and recorders, cassette players and recorders, CD-players, personal stereos, stereo systems and their constituent units (turntables, tuners, amplifiers, speakers, etc.), microphones and earphones.
- Information processing equipment (COICOP 09.1.3): Personal computers, visual display units, printers and miscellaneous accessories accompanying them; computer software packages such as operating systems, applications, languages, etc.; calculators, including pocket calculators; typewriters and word processors. (Also includes laptops, tablets, e-book readers.)
- Repair of audio-visual, photographic and information processing equipment (COICOP 09.1.5)

Model question:

As this indicator will usually be derived from household budget survey, no model question is proposed.

Calculation:

The indicator is calculated as the percentage of total household expenditure that is expended on ICT goods and services as defined above.

1.8 Use of ICT by businesses

Businesses may use ICT to increase productivity and growth, for example, by investing in ICT infrastructure to streamline processes, or by engaging in e-commerce to expand into international markets. The following indicators may be used

Core indicators on use of ICT by businesses (Basic core)

B1 Proportion of businesses using computers

B2 Proportion of employees using computers

B3 Proportion of businesses using the Internet

B4 Proportion of employees using the Internet

B5 Proportion of businesses with a Web presence

B6 Proportion of businesses with an intranet

B7 Proportion of businesses receiving orders over the internet

B8 Proportion of businesses placing orders over the internet

B9 Proportion of businesses using the Internet by type of access

B10 Proportion of businesses with a Local Area Network (LAN)

B11 Proportion of businesses with an extranet

B12 Proportion of businesses using the Internet by type of activity

1.10 The ICT Development Index

The ICT Development Index (IDI) is a composite index combining 11 indicators into one benchmark measure that serves to monitor and compare developments in information and communication technology (ICT) across countries. The IDI was developed by ITU in 2008 and first presented in the 2009 edition of Measuring the Information Society (ITU, 2009a). It was established in response to ITU Member States' request to develop an ICT index and publish it regularly.

The main objectives of the IDI are to measure:

- the level and evolution over time of ICT developments in countries and relative to other countries;
- progress in ICT development in both developed and developing countries: the index should be global and reflect changes taking place in countries at different levels of ICT development;
- the digital divide, i.e. differences between countries with different levels of ICT development;
- the development potential of ICTs or the extent to which countries can make use of ICTs to enhance growth and development, based on available capabilities and skills.

Conceptual framework

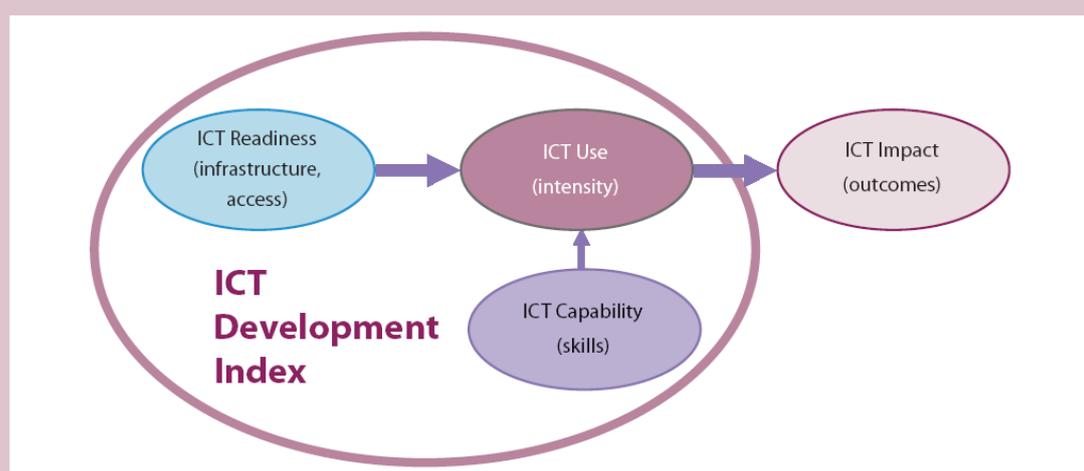
The ICT development process, and a country's transformation to becoming an information society, can be depicted using the following three-stage model (Figure 2.1):

Stage 1: ICT readiness (reflecting the level of networked infrastructure and access to ICTs)

Stage 2: ICT intensity (reflecting the level of use of ICTs in the society)

Stage 3: ICT impact (reflecting the result/outcome of efficient and effective ICT use).

Figure 2.1: Three stages in the evolution towards an information society



Source: ITU.

The indicators of ICT development index, reference value and weights is provided below

Figure 2.2: ICT Development Index: indicators, reference values and weights

ICT access	Reference value	(%)	40
1. Fixed-telephone subscriptions per 100 inhabitants	60	20	
2. Mobile-cellular telephone subscriptions per 100 inhabitants	190	20	
3. International Internet bandwidth (bit/s) per Internet user	621'834*	20	
4. Percentage of households with a computer	100	20	
5. Percentage of households with Internet access	100	20	
ICT use	Reference value	(%)	40
6. Percentage of individuals using the Internet	100	33	
7. Fixed (wired)-broadband subscriptions per 100 inhabitants	60	33	
8. Wireless-broadband subscriptions per 100 inhabitants	100	33	
ICT skills	Reference value	(%)	20
9. Adult literacy rate	100	33	
10. Secondary gross enrolment ratio	100	33	
11. Tertiary gross enrolment ratio	100	33	

ICT Development Index

Note: * This corresponds to a log value of 5.79, which was used in the normalization step.

Source: ITU.

Few examples of Dynamic IDI countries:

Between 2011 and 2012, there was hardly any change in the top ten IDI economies and only one country – the United Kingdom – joined the group from its previous 11th position. Although most countries in the ICT Development Index do not see dramatic changes in their IDI value or rank within a year, there are some significant and noteworthy movements. A number of so-called “dynamic” countries report *above average* positive changes in their IDI rank and/or IDI value over the 12-month period. This group of dynamic countries predominantly includes developing countries found in the upper and medium group of the IDI. The most dynamic countries come from all regions, except Europe, where IDI values are generally already very high and growth is more moderate.

The **United Arab Emirates** records the highest increase in rank, shooting up 12 places to 33rd in the IDI 2012. Value increases in the access and use sub-indices are both considerably above the global average. All indicators included in the access sub-index showed improvement from 2011 to 2012. Mobile-cellular telephone penetration in particular rose by more than 14 per cent, to 170 per cent in 2012. A household survey conducted by the country’s Telecommunication Regulatory Authority (TRA, 2012) confirms that virtually all residents use a mobile phone and that 85 per cent of the population use the Internet regularly, and for the most part through a high-speed connection. In the use sub-index, UAE registered great progress in the number of wireless-broadband subscriptions. By end 2012, penetration had reached 51 per cent, as against 22 per cent the previous year. Furthermore, services are relatively cheap: the UAE ranks among the most affordable countries for prepaid mobile-broadband services, which cost less than 1 per cent of GNI p.c.

Lebanon has an IDI value of 5.37, and ranks 52nd in the IDI 2012. It is the country with the highest increase in IDI value of 0.75 points. In the IDI 2011, the country stood out for increases in the access sub-index (ITU, 2012a). The 2012 data show that while the access sub-index value continues to improve, Lebanon was able to translate progress in ICT access and infrastructure into more intense use of services. The country’s broadband market has seen a number of changes between 2011 and 2012, in particular with the introduction of wireless broadband. 3G was commercially launched in November 2011 by Touch and Alfa, Lebanon’s two state-owned mobile operators, and wireless-broadband penetration went up from 11 per cent in 2011 to 26 per cent in 2012. Fixed (wired)-broadband penetration more than doubled, from 5 per cent in 2011 to 12 per cent in 2012. A new entry-level broadband plan was introduced by governmental decree in September 2011, lowering the cost of entry-level broadband by 70 per cent. The price of this new package lies below the Arab States average, according to a study by the Lebanese Telecommunications Regulatory Authority (TRA). The proportion of individuals using the Internet climbed to 61 per cent in 2012, up from 52 per cent in 2011.

Oman improved its IDI by 0.56 value places and four ranks, moving up to 54th position in the IDI 2012. Progress is visible on both the access and use sub-indices, and can be linked to the country's e-Oman digital strategy. Wireless broadband penetration has seen a sizeable increase, from 39 per cent in 2011 to 58 per cent in 2012, and the country's operators are not only expanding the 3G network but also deploying WiMax and LTE.⁴⁹ Mobile broadband is relatively affordable in Oman: the 1 GB postpaid computer-based basket remains below 1 per cent of GNI p.c. and is one of the cheapest in the region. Internet usage proportion increased between 2011 and 2012, from 48 per cent to 60 per cent.

1.11 Statistical Indicators used to compute IDI

The selection of indicators was based on certain criteria, including relevance for the index objectives, data availability and the results of various statistical analyses such as the principal component analysis (PCA). The following 11 indicators are included in the IDI (grouped by the three sub-indices: access, use and skills).

A. ICT infrastructure and access indicators

Indicators included in this group provide an indication of the available ICT infrastructure and individuals' access to basic ICTs. Data for all of these indicators are collected by ITU.

1. *Fixed-telephone subscriptions per 100 inhabitants*

Fixed-telephone subscriptions refer to the sum of active analogue fixed-telephone lines, voice-over-IP (VoIP) subscriptions, fixed wireless local loop (WLL) subscriptions, ISDN voice-channel equivalents and fixed public payphones. It includes all accesses over fixed infrastructure supporting voice telephony using copper wire, voice services using Internet Protocol (IP) delivered over fixed (wired)-broadband infrastructure (e.g. DSL, fibre optic), and voice services provided over coaxial-cable television networks (cable modem). It also includes fixed wireless local loop (WLL) connections, which are defined as services provided by licensed fixed-line telephone operators that provide last-mile access to the subscriber using radio technology, when the call is then routed over a fixed-line telephone network (and not a mobile-cellular network). In the case of VoIP, it refers to subscriptions that offer the ability to place and receive calls at any time and do not require a computer. VoIP is also known as voice-over-broadband (VoB), and includes subscriptions through fixed-wireless, DSL, cable, fibre-optic and other fixed broadband platforms that provide fixed telephony using IP.

2. *Mobile-cellular telephone subscriptions per 100 inhabitants*

Mobile-cellular telephone subscriptions refer to the number of subscriptions to a public mobile-telephone service which provides access to the public switched telephone network (PSTN) using cellular technology. It includes both the number of postpaid subscriptions and the number of active prepaid accounts (i.e. that have been active during the past three months). It includes all mobile-cellular subscriptions that offer voice communications. It excludes subscriptions via data cards or USB modems, subscriptions to public mobile data services, private trunked mobile radio, telepoint, radio paging and telemetry services.

3. *International Internet bandwidth (bit/s) per Internet user*

International Internet bandwidth refers to the total used capacity of international Internet bandwidth, in megabits per second (Mbit/s). It is measured as the sum of used capacity of all Internet exchanges offering international bandwidth. If capacity is asymmetric, then the incoming capacity is used. *International Internet bandwidth (bit/s) per Internet user* is calculated by converting to bits per second and dividing by the total number of Internet users.

4. *Percentage of households with a computer*

A *computer* refers to a desktop computer, a laptop computer or a tablet or similar handheld computer. It does not include equipment with some embedded computing abilities, such as smart TV sets, and devices with telephony as a main function, such as mobile or smartphones. *Household with a computer* means that the computer is available for use by any member of the household at any time. Data are obtained by countries through national household surveys and are either provided directly to ITU by national statistical offices (NSO), or ITU carries out the necessary research to obtain them, for example from NSO websites. There are certain data limits to this indicator, insofar as estimates have to be calculated for many developing countries which do not yet collect ICT household statistics. Over time, as more data become available, the quality of the indicator will improve.

5. *Percentage of households with Internet access*

The *Internet* is a worldwide public computer network. It provides access to a number of communication services, including the World Wide Web, and carries e-mail, news, entertainment and data files, irrespective of the device used (not assumed to be only a computer – it may also be a mobile phone, games machine, digital TV, etc.). Access can be via a fixed or mobile network. *Household with Internet access* means that the device to access the Internet is available for use by any member of the household at any time. Data are obtained by countries through national household surveys and are either provided directly to ITU by national statistical offices (NSO), or ITU carries out the necessary research to obtain them, for example from NSO websites. There are certain data limits to this indicator, insofar as estimates have to be calculated for many developing countries which do not yet collect ICT household statistics. Over time, as more data become available, the quality of the indicator will improve.

B. ICT use indicators

The indicators included in this group capture ICT intensity and usage. Data for all of these indicators are collected by ITU.

1. *Percentage of individuals using the Internet*

Individuals using the Internet refers to people who used the Internet from any location and for any purpose, irrespective of the device and network used. It can be via a computer (i.e. desktop computer, laptop computer or tablet or similar handheld computer), mobile phone, games machine, digital TV etc.). Access can be via a fixed or mobile network.

Data are obtained by countries through national household surveys and are either provided directly to ITU by national statistical offices (NSO), or ITU carries out the necessary research to obtain them, for example from NSO websites. There are certain data limits to this indicator, insofar as estimates have to be calculated for many developing countries which do not yet collect ICT household statistics. Over time, as more data become available, the quality of the indicator will improve.

2. *Fixed (wired)-broadband subscriptions per 100 inhabitants*

Fixed (wired)-broadband subscriptions refers to the number of subscriptions for high-speed access to the public Internet (a TCP/IP connection). High-speed access is defined as downstream speeds equal to, or greater than, 256 kbit/s. Fixed (wired) broadband includes cable modem, DSL, fibre and other fixed (wired)-broadband technologies (such as Ethernet LAN, and broadband-over-powerline (BPL) communications). Subscriptions with access to data communications (including the Internet) via mobile-cellular networks are excluded.

3. *Wireless-broadband subscriptions per 100 inhabitants*

Wireless-broadband subscriptions refer to the sum of satellite broadband, terrestrial fixed wireless broadband and active mobile-broadband subscriptions to the public Internet. \square *Satellite broadband subscriptions* refers to the number of satellite Internet subscriptions with an advertised download speed of at least 256 kbit/s. It refers to the retail subscription technology and not the backbone technology.

- *Terrestrial fixed wireless broadband subscriptions* refers to the number of terrestrial fixed wireless Internet subscriptions with an advertised download speed of at least 256 kbit/s. This includes fixed WiMAX and fixed wireless subscriptions, but excludes occasional users at hotspots and Wi-Fi hotspot subscribers. It also excludes mobile-broadband subscriptions where users can access a service throughout the country wherever coverage is available.

- *Active mobile-broadband subscriptions* refer to the sum of standard mobile-broadband subscriptions and dedicated mobile-broadband data subscriptions to the public Internet. It covers actual subscribers, not potential subscribers, even though the latter may have broadband-enabled handsets. *Standard mobilebroadband subscriptions* refers to active mobilecellular subscriptions with advertised data speeds of 256 kbit/s or greater that allow access to the greater Internet via HTTP and which have been used to set up an Internet data connection using Internet Protocol (IP) in the past three months. Standard SMS and MMS messaging do not count as an active Internet data connection, even if the messages are delivered via IP. *Dedicated mobile-broadband data subscriptions* refers to subscriptions to dedicated data services (over a mobile network) that allow access to the greater Internet and which are purchased separately from voice services, either as a standalone service (e.g. using a data card such as a USB modem/dongle) or as an add-on data package to voice services which requires an additional subscription. All dedicated mobile-broadband subscriptions with recurring subscription fees are included regardless of actual use. Prepaid mobile-broadband plans require use if there is no monthly subscription. This indicator could also include mobile WiMAX subscriptions.

C. ICT skills indicators

Data on adult literacy rates and gross secondary and tertiary enrolment ratios are collected by the UNESCO Institute for Statistics (UIS).

1. *Adult literacy rate*

According to UIS, the *Adult literacy rate* is defined as the percentage of population aged 15 years and over who can both read and write with understanding a short simple statement on his/her everyday life. Generally, 'literacy' also encompasses 'numeracy', the ability to make simple arithmetic calculations. The main purpose of this indicator is to show the accumulated achievement of primary education and literacy programmes in imparting basic literacy skills to the population, thereby enabling them to apply such skills in daily life and to continue learning and communicating using the written word. Literacy represents a potential for further intellectual growth and contribution to economic-socio-cultural development of society."

2. *Gross enrolment ratio (secondary and tertiary level)*

According to UIS, "The *gross enrolment ratio* is the total enrolment in a specific level of education, regardless of age, expressed as a percentage of the eligible official school-age population corresponding to the same level of education in a given school-year."

Calculating IDI

Sub-indices were computed by summing the weighted values of the indicators included in the respective subgroup. \square *ICT access* is measured by fixed-telephone subscriptions per 100 inhabitants, mobile-cellular subscriptions per 100 inhabitants, international Internet bandwidth per Internet user, percentage of households with a computer and percentage of households with Internet access.

- *ICT use* is measured by percentage of individuals using the Internet, fixed (wired)-broadband Internet subscriptions per 100 inhabitants and wireless broadband subscriptions per 100 inhabitants.
- *ICT skills* are approximated by adult literacy rate, secondary gross enrolment ratio and tertiary gross enrolment ratio.

The values of the sub-indices were calculated first by normalizing the indicators included in each sub-index in order to obtain the same unit of measurement. The *reference values* applied in the normalization were discussed above. The sub-index value was calculated by taking the simple average (using equal weights) of the normalized indicator values. For computation of the final index, the ICT access and ICT use sub-indices were given 40 per cent weight each, and the skills sub-index (because it is based on proxy indicators) 20 per cent weight. The final index value was then computed by summing the weighted sub-indices.

1.12 Strategic targets for the future information society

Efforts towards information society are elevated to a global scale with the World Summit on Information Society organized by the United Nations, the first phase of which took place in 2003 in Geneva and the second phase in 2005 in Tunisia with the participation of 175 countries. Countries are developing their own strategies for the future information society.

Turkey's process of transformation into an information society (2006-2010) pursued around the following 7 fundamental strategic priorities.

1. Social Transformation; "ICT Opportunity for all" Through effective usage of ICT by citizens in their day-to-day and professional activities, economic and social benefits will be increased.
2. ICT Adoption by Businesses; "Competitive advantage to businesses through ICT" SME's will be encouraged to engage in e-commerce through increasing computer ownership and Internet access in one hand, and ICT needs of sectors and regions that have strategic importance will be determined and sector specific productivity programs will be launched meeting these needs, on the other.
3. Citizen-focused Service Transformation; "Delivery of public services at high standards" With the help of ICT, public services will be moved to electronic channels, prioritizing services of high usage and high return. Business processes will be reengineered in line with user needs, and hence effectiveness in service delivery will be ensured.
4. Modernization in Public Administration; "Public administration reform supported by ICT" An effective e-government model having organizational and process structures in conformity with country's conditions and prioritizing efficiency and citizen satisfaction will be developed via ICT.
5. A Globally Competitive IT Sector; "IT sector active as an international player" The focus will be on expanding into foreign markets by developing sector competencies via public-private partnerships and with project based services in the field of IT services, and on vertical solutions with highest competitive advantages in software.
6. Competitive, Widespread and Affordable Telecommunications Infrastructure and Services; "The opportunity of high quality and affordable broadband access to all segments of the society" In order for the development and widespread usage of telecommunications infrastructure and services, an effective competitive environment will be established in the services and infrastructures in the telecommunications sector; and hence, a conducive environment will be created for the establishment of telecommunications infrastructures based on new technologies and for the provision of fast, secure, continuous and quality services at affordable prices.

7. Improvement of R&D and Innovation; “New products and services in conformity with the demands of global markets” As an innovative sector with a high value added and with an increasing demand in global markets, priority will be given to R&D activities in the ICT sector; development of new technologies in this field and transformation of these technologies into products will be supported. On the other hand, ICT will be used to the maximum extent in the development and improving effectiveness of R&D and innovation activities.

UNIT-2

Big data for official Statistics

2.1 Introduction

Big data refers to the dynamic, large and disparate volumes of data being created by people, tools and machines. It requires new, innovative and scalable technology to collect, host and analytically process the vast amount of data gathered to derive real-time business insights that relate to consumers, risk, profit, performance, productivity management and enhanced shareholder value. It also refers to the data sets that are nearly impossible to store and process using common software tools, regardless of the computing power or the physical storage at hand. Big Data is often largely unstructured, meaning that it has no pre-defined data model and/or does not fit well into conventional relational databases.

Big data includes information garnered from social media, data from internet-enabled devices (including smartphones and tablets), machine data, video and voice recordings, and the continued preservation and logging of structured and unstructured data. It is typically characterized by the four “V’s”:

- **Volume:** the amount of data being created is vast compared to traditional data sources
- **Variety:** data comes from different sources and is being created by machines as well as people
- **Velocity:** data is being generated extremely fast — a process that never stops, even while we sleep
- **Veracity:** big data is sourced from many different places, and as a result you need to test the veracity/quality of the data

Big Data is generating tremendously and some of the major sources are the followings:

- a) **Administrative data**-electronic medical records, hospital visits, insurance records, bank records etc.;
- b) **Transactional data**-Credit card transactions, on-line transactions;
- c) **Sensor data**- Satellite imaging, road sensors, climate sensors etc.;
- d) **Tracking device data**- Mobile phones, GPS etc.;
- e) **Behavioral data**- online searches about a product or service, online page view etc.;
- f) **Comments data**-Comments on social media etc.

2.2 Challenges and opportunities on using Big Data

Big Data represent a number of challenges and responsibilities for the NSOs and particularly with the Methodological, technological and skills issues. Using enormous amount of data needs to develop new exploration and analytical methods- such as text mining, tools and ideas to make effective use of Big Data sources. To handle the Big Data issue efficiently, NSOs need to invest huge amount of money in IT equipment, technologies and skills training.

Some of the challenges for Big Data usages in official statistics are:

- a) **Dimension**-Storing of Big Data requires advanced data architectures to handle not-structured data; Processing of Big Data is quite a very hard job because of complexities.
- b) **Quality**-quality dimensions i.e., accuracy, timeliness consistency is an vital issue for Big Data. For instance- the quality of sensor data, that takes into account sensor precision and sensor failures. Cleaning up data to ensure that incomplete, inaccurate, and duplicate data is removed should be the first step.
- c) **Accessibility**-Sometimes it is not easy task to access some giant Big Data produces (Viz. Google, Facebook) and gain data, their data may be locked, i.e., Big Data are not always open data.
- d) **Standard classifications**- For any international comparison of information derived from Big Data or presenting in a meaningful way, a standard classification of the Big Data source is needed.
- e) **Big Data technologies**-The NSO's like BBS have to adopt new technologies and methods to enable sound statistical analysis on Big Data.
- f) **Policies relating to Big Data**-There is in need to formulate Policies relating to Big Data and the roles of the NSOs.
- g) **Skills**- Big Data doesn't process like online transactional data does-and it requires a different strategy for both storage and processing. Necessary analytical capability for the officials of NSO should be developed to cope up with the requirement of handling Big Data.
- h) **Budget**-Most of the NSOs are suffering from budget cut issues with demand for producing statistics in new fields. Handling of Big Data need investment in IT equipment, technologies and skills training.

Opportunities of using of big data can be categorize in different areas, both supply and demand side:

- On the supply side, opportunities will be linked to the launch of new services and/or the establishment of new businesses offering Big Data related services/technologies

- On the demand side, opportunities will be linked to the value generated in both horizontal and vertical specific processes of EU companies across all vertical markets.

It is evident that the deployment of Big Data analytics will offer strong opportunities to companies in the different vertical sectors to streamline their processes, reduce costs, increase efficiencies and provide better and/or new products and services. At the same time, the Big Data move will create opportunities supply-side for existing or new players offering new products and services to meet (or create) companies' demand.

Besides, Big Data offers the opportunity for an improved understanding of human behavior that can support the field of global development in three main ways:

- **Early warning:** early detection of anomalies in how populations use digital devices and services can enable faster response in times of crisis;
- **Real-time awareness:** Big Data can paint a fine-grained and current representation of reality which can inform the design and targeting of programs **and policies**;
- **Real-time feedback:** the ability to monitor a population in real time makes it possible to understand where policies and programs are failing and make the necessary adjustments.

RESOURCES

ESSENTIAL READING

Measuring the Information Society Report (2014), ITU International Telecommunication Union Place des Nations CH-1211 Geneva Switzerland

The Global Information Society: a Statistical View, United Nations Publication, LC/W.190 Copyright © United Nations, April 2008. All rights reserved Printed in Santiago, Chile – United Nations

Statistical Commission Forty-sixth session 3 – 6 March 2015 : Report of the Global Working Group on Big data for official statistics - Note by the Secretary-General

OTHER REFERENCES

The following are possible alternatives to the main text

Measuring-the-Digital-Economy_A-New-Perspective, Corrigenda to OECD publications may be found on line at: www.oecd.org/about/publishing/corrigenda.htm. © OECD 2014

Handbook for the Collection of Administrative Data on Telecommunications/ICT (2011), International Telecommunication Union Place des Nations CH-1211 Geneva, Switzerland

ICT HH Manual 2014-Manual for Measuring ICT Access and Use by Households and Individuals, © ITU 2014 International Telecommunication Union Place des Nations CH-1211 Geneva Switzerland.

<http://www.computerweekly.com/feature/Big-data-and-analytics-a-large-challenge-offering-great-opportunities>

OECD (2014), Measuring the Digital Economy: A New Perspective, OECD Publishing. <http://dx.doi.org/10.1787/9789264221796-en>

The Global Information Society: a Statistical View, United Nations Publication, LC/W.190 Copyright © United Nations, April 2008. All rights reserved

Handbook for the Collection of Administrative Data on Telecommunications/ICT 2011, Original language of publication: English © 2011 ITU, International Telecommunication Union Place des Nations CH-1211 Geneva, Switzerland.

Framework for a set of e-government core indicators March 2012, Economic Commission for Africa

Australia Bureau of Statistics - Some initiatives on Big Data - 23 July 2014

UN Global Pulse - Mining Indonesian Tweets to Understand Food Price Crises - Methodology

Big Data for Development - UN Global Pulse - June2012

International Telecommunication Union (ITU) - Big Data today, normal tomorrow