Block-4

Development and Digital Media

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BLOCK 4: DEVELOPMENT AND DIGITAL MEDIA

Introduction

Unit 14: ICT for Development in India

Our expedition begins with "ICT for Development in India," a unit that unravels the evolution, meaning, and the myriad benefits of information and communication technology. Delving into its profound connection to economic growth, this unit lays the groundwork for understanding the pivotal role played by ICT in shaping India's developmental trajectory.

Unit 15: Digital Media and Social Development

Dive deeper into the synergy between digital media and societal progress with "Digital Media and Social Development." This unit explores the characteristics of digital media and its transformative impact on various fields such as education, health, poverty alleviation, and agriculture. Gain insights into how digital media serves as a catalyst for positive social change across diverse sectors.

Unit 16: Digital Media and Economic Development

In "Digital Media and Economic Development," we embark on a historical journey that traces the roots of digital media's impact on economic progress. Explore the economic implications, delve into the concept of e-governance, and understand how digital media has shaped and continues to influence the economic landscape on a global scale.

Unit 17: Knowledge Society: Developing Countries' Perspective

The final leg of our exploration leads us to "Knowledge Society: Developing Countries' Perspective." This unit dissects the nuances between a knowledge society and an information society, shedding light on the characteristic changes and the concept of access. Navigate the complexities of the digital divide and gain a deeper understanding of the challenges and opportunities that developing countries face in their quest for knowledge-driven progress.

As we wrap up this insightful journey through "Development and Digital Media," we invite you to reflect on the dynamic interplay between media, technology, and societal progress. In an era where digital advancements shape the fabric of our communities, this block equips you with the knowledge to critically analyze the transformative impact of ICT on development. Embrace the opportunities and challenges presented by the digital age, and consider the role you can play in contributing to a more inclusive and digitally empowered future.

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UNIT 14 ICT FOR DEVELOPMENT IN INDIA

Structure

14.0 INTRODUCTION

ICT deals with how digital information passes between the devices. The most prolific example is the Internet, a worldwide network of computers linked together by telephone lines. There are however, other examples, like mobile phones, interactive televisions and personal organizers. It is a cross cutting theme in the objective of the programme because of the recognition by the European Commission and UK Government that ICT has the potential to have a major impact on the prosperity of Merseyside. When ICT is applied to business, it can Lower Costs, raise productivity and improve customer and supplier relationship. In learning, ICT widens participation and raises attainment. In public services, ICT engages people with services more effectively and in communities, ICT links people to economic opportunity and brings together those with common agendas.

14.1 LEARNING OUTCOMES

After going through this unit, you should be able to:

- describe the meaning and different forms of ICT;
- explain the evolution of ICT;
- list the advantages of ICT;
- state the E-readiness assessment of States/UTs;
- discuss the global scenario of ICT; and
- discuss the role of ICT in economic growth.

14.2 EVOLUTION OF ICT

The first major use of Information Technology (IT) could be said to have started with the introduction of early mainframe computers to respond to the needs of scientific research and the Government's statistical data gathering and processing, where the technology helped to speed up research and forecasting. These techniques were later applied to the business environment where mainframe computers and robotics were used to automate business processes and number crunching functions. From automation of business processes, IT was then applied to higher value-adding, functions such as design, resource planning, sophisticated manufacturing and mission critical functions the developments and applications of IT have stretched beyond imagination. Together with the rapid development and innovation in telecommunication technology and the Internet, this evolution has ushered in many new business models and applications.

ICT is robust that it can be harnessed in many ways, but its true potential is limited only to the human mind. With ICT, the physical boarder dissipates as information moves freely through the digital medium which is less controlled as compared to other existing mass media. Globalisation is said to accelerate, and enabled by ICT, making market bigger and more accessible by business with strong capital, management and technology. Business or E-commerce has started to be done virtually and transaction occurs at a click of a mouse anywhere and any time. Scientific findings churn faster and newer discoveries and inventions through the journal and reports are made available through ICT. The technology that began life as a faster way to process data and compute statistics has become pervasive in almost all parts of our life today. So ICT has become the backbone of Techsavvy Society, having combined both information technology and communication through digital environment today.

Check Your Progress: 1

Note: 1) Use the space below for your answers.

2) Compare your answers with those given at the end of this unit.

1. Fill in the Blanks

   a) ICT has become the backbone of _____.

   b) ……, …….. interactive televisions are few examples of ICT

2. What are the advantages of ICT? Explain

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   ……..

   ……..

14.3 MEANING OF ICT

ICT is an acronym that stands for Information Communications Technology

However, apart from explaining an acronym, there is not a universally accepted definition of ICT Why? Because the concepts, methods and applications involved in ICT are constantly evolving on an almost daily basis. It is difficult to keep up with the changes because they happen very fast.

Let us focus on the three words behind ICT:

- **INFORMATION,**
- **COMMUNICATIONS, and**
- **TECHNOLOGY**

A good way to think about ICT is to consider all the uses of digital technology that already exist to help individuals, businesses and organizations also use information.

ICT covers any product that will store, retrieve, manipulate, transmit or receive information electronically in a digital form. For example, personal computers, digital television, email and robots.

ICT is concerned with the storage, retrieval, manipulation, transmission or receipt of digital data. Importantly, it is also concerned with the way these different uses can work with each other.

In business, ICT is often categorised into two broad types of product: -

1) The traditional computer-based technologies (things you can typically do on a personal computer or using computers at home or at work); and
2) The more recent and fast growing range of digital communication technologies (which allow people and organizations to communicate and share information digitally)

Let us have a brief look at these two categories to demonstrate the kinds of products and ideas that are covered by ICT:

Traditional Computer Based Technologies

These types of ICT include:

Application Use

Standard Office Applications - Main Examples are as below: Word processing, e.g. Microsoft Word: Write letters, reports etc;

- Spreadsheets, e.g. Microsoft Excel, Analyse financial information, calculations, create forecasting models etc.
- Database software, e.g. Oracle, Microsoft SQL Server, Access, Managing data in many forms, from basic lists (e.g. customer contacts to complex material like catalogue).
- Presentation software, e.g. Microsoft PowerPoint, make presentations, either

directly using a computer screen or data projector, publish in digital format via email or over the Internet

- Desktop publishing, e.g. Adobe In design, Quark Express, Microsoft Publisher, produce newsletters, magazines and other complex documents; and

- Graphics software, e.g. Adobe PhotoShop and Illustrator, Macromedia Freehand and Fireworks, create and edit images such as logos, drawings or pictures for use in DTP, web sites or other publications

- Specialist Applications - Examples

- Accounting packages, e.g. Sage, Oracle, manage an organization's accounts including revenues/sales, purchases, bank accounts etc. A wide range of systems are available ranging from basic packages suitable for small businesses to sophisticated ones aimed at multinational companies.

Computer Aided Design (CAD) is the use of computers to assist the design process. Specialized CAD programs exist for many types of design like architectural, engineering, electronics and roadways.

Customer Relations Management (CRM) is a software that allows businesses to better understand their customers, by collecting and analysing data, such as their product preferences, buying habits etc. Often linked to software applications that run call centers and loyalty cards, for example, traditional computer based technologies.

The C part of ICT refers to the communication of data by electronic means, usually over some distance. This is often achieved via networks of sending and receiving equipment, wires and satellite links. The technologies involved in communication tend to be complex. You certainly do not need to understand them for your ICT course. However, there are certain aspects of digital communications that you need to be aware of. These relate primarily to the types of network and the ways of connecting to the Internet. Let us look at these two briefly (further revision notes provide the details to support your study).

i) **Internal networks**

Network which used to share information between a specific group or peoples of an entity. Internal network is also known as private network. In corporate world internal network mean the entire employ realm login to one common domain "not Microsoft OS domain" to access the enterprise's shareable application like payroll, health insurance, or emergency services or business development services. This type of applications are proprietary to the particular organization. To share the information between employees or different groups of organization, it requires its own network which is also called as private network or internal network.

This is also usually referred to as a local area network (LAN), this involves linking a number of hardware items (input and output devices plus computer processing) together within an office or building. The aim of a LAN is to be able to share hardware facilities such as printers or scanners, software applications and data. This type of network is invaluable in the office environment where the colleagues need to have access to common data or programs.

ii) **External networks**

Like we discussed the internal network is the private network and restricted from the outer world. External network is also called public network. A business entity or the corporate provide the information and business solution on the www form or web page to the public on external network of the company, so all the individuals can go the external network and fetch the information from anywhere according to their requirement. External network is provided by the service provider or also called backbone carrier. For example, AT& T "the mother bell" is also known as the backbone carrier or service provider world wide. It means when two remote business entity like to share the private information they can use any service provider network i.e. "External network" to complete their communication path.

Often you need to communicate with someone outside your internal network; in this case you will need to be a part of a Wide Area Network (WAN). The Internet is the ultimate WAN - it is a vast network of networks.

ICT in a Broader Context

ICT will almost certainly cover the above examples of ICT in action, perhaps focusing on the use of the key applications such as spreadsheets, databases, presentations, graphics and web design software.

It will also consider the following important topics that deal with the way ICT is used and managed in an organization:

- **The nature of information (the "I" in ICT):** this covers topics such as the meaning and value of information, how information is controlled, the limitations of ICT, legal considerations;

- **Management of information:** this covers how data is captured, verified and stored for effective use the manipulation, processing and distribution of information, keeping information secure, designing networks to share information; and

- **Information systems strategy:** this considers how ICT can be used within a business or organization as part of achieving goals and objectives.

Thus, ICT is a broad and fast-changing subject.

A new generation of computer network software aims at building virtual communities: permanent (or at least recurring) online meeting places where people can work and play, buy and sell, gossip and govern, flirt and fight and generally seek their fortunes. The first such places are being built more or less ad hoc. Their builders are mostly

innocent of the history of human efforts to shape the spaces where people live so that these might better serve people's needs and express their dreams. Construction tools appropriate to the physical (i.e. electronic) constraints of shared online environments are rapidly becoming available. But there is no generally accepted conceptual framework for their design, nobody of validated experience to guide their construction. There is not yet any architecture for cyberspace.

In a world so new that its most fundamental properties are still being created (gravity, for example), cyberspace designers confront - consciously or unconsciously - many of the classic architectural challenges which may be classified as:

i) **Selecting from alternative construction approaches and materials:** The "native" medium of cyberspace, a finely woven mesh of polygons with subtly refractive polychrome surfaces, demands more machine resources than most visitors can currently afford to. A richly realised environment is thus, in cyberspace as elsewhere, inevitably an elitist one. Buildings based on simple cubes covered with low-resolution bitmaps are accessible to all, but are also banal and dispiriting. How can we build virtual villages that are at once idiomatic, pleasant to be in and socially inclusive?

ii) **Using pre-fabricated elements to reduce costs and speed up construction:** Cyberspace is made of software; and software engineers have been wrestling for decades with a problem that is also central to modern architecture - how systems can be modularly designed to make them more economic and more reliable. Here, however, the issues are more complex, since cyberspace communities are built on a constantly shifting infrastructure. In fact, the relationship between structure and infrastructure is all but reversed; how can we design places for human community that can survive a continual re-design of the foundations on which they are built?

iii) **Supporting sensible patterns of traffic flow:** In most virtual settings, people can fly. In some, they can also "beam" instantly from one point to the next, ignoring all barriers. People may be present without taking up any visible space, or alternatively their virtual representative ("avatar") may be so huge or so resource- intensive that it fills a space intended to hold a hundred visitors. What is "traffic" when the users of a space are themselves constructs produced by other (perhaps even antagonistic) designers?

iv) **Designing to human scale:** In the virtual world, the role of "size" as a design factor is disconcertingly variable. It depends on the visitor's/user's field of view and functional reach, which in turn depends on the power of the user's display and controls. It is like the shift to electronic music, where timbre, volume and tonal range, once given by the physical nature of instrument, become variables, which the composer/performer must learn to control. Issues of appropriate scale do not go away, but must be redefined in relative terms: what is the ratio of sizes that must be maintained to support different experiences?

v) **Designing new structures (or re-purposing the old ones) to enhance existing settings:** The Musee D'Orsay and the new subterranean entrance arcade created for the Louvre will soon have their analogues in cyberspace; perhaps a conference room smuggled into the design model of an automobile engine, or an entire city whose "streets" are the circuit diagrams of a computer processor. Current work to build a database of 3D mages (the "Digital Human") to serve as an explorable setting for medical education suggests part of the challenge; how can virtual reality help making physical/natural structures more accessible? The far broader issue is: how can we connect the various virtual environments we build to one another? What design criteria can be established to aid the process of linking new worlds to the old?

There would-be cyber-architect navigating this maze of conflicting constraints in search of more than just the solution to a puzzle. In cyberspace as in the physical world, the goal of architectural design is always a place which, while fulfilling its various functions, also communicates something to (and about) the people.

Check Your Progress: 2

Note: 1) Use the space below for your answers.

2) Compare your answers with those given at the end of this unit.

1) Discuss the meaning of the term information and communication technology?

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2) Discuss E-readiness assessment of State/UTs?

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14.4 BENEFITS OF ICT

Obviously, there are significant tangible and intangible benefits of ICT:

- Can be a powerful enabler of development goals because its unique characteristics dramatically improve communication and the exchange of information to strengthen and create new economic and social networks;

- Is pervasive and cross cutting as it can be applied to the full range of human activity from personal use to business and government. It is multifunctional and flexible, allowing for tailored solutions — based on personalisation and localisation — to meet diverse needs; and

- Facilitates disintermediation, as it makes it possible for users to acquire products and services directly from the original provider, reducing the need for intermediaries. This not only become a considerable source of efficiency, but has in fact been one of the factors leading to the creation of an alternative development paradigm that skips the formation of Co-operatives and self- help groups.

  It is, thus, evident that ICT has the potential to bring in multiple benefits in the areas of governance, integration of marginalized sections, development of rural areas profitability, and productive improvement in major sectors of the economy. This would provide the much-needed forward linkage by adding value to information for using it as an enabler that has been discussed widely in literature. What needs to be tested are the various hypotheses that evaluate the role of ICT and its contribution and impact on the Indian economy.

14.5 E-READINESS ASSESSMENT OF STATES/UTs

It is defined as the degree to which a country/state is prepared to participate in the networked world. It would demand the adoption of important applications of ICTs in offering interconnection between government, business and citizens.

In this context, it has become important to regularly take stock of e-readiness at the country level, states/UTs level and in major verticals to ascertain the status of underlying infrastructure, human resources, policy regimes, investments climate etc and arrive at what steps need to be taken to optimize investment and reach free potential. In that sense, "India: E-readiness Assessment Reports 2003 & 2004" which carry out the assessments at the disaggregated level of states/UTs throw up some useful and valuable insights.

Encouraged by the overwhelming response and positive feedback received on the E-readiness Assessments 2003 & 2004, Department of Information Technology (DIT), Govt. of India (GOI) has initiated E-readiness Assessment 2005 for the states and UTs. National Council of Applied Economic Research (NCAER), which is a premier research agency has once again been entrusted the task of state government and ranking based on the fair selection process.

States have used e-readiness assessment reports to carry out the road map of improving their network readiness as well as increasing the penetration of ICT for economic development; in fact the states are engaged in policy competition for improving the e-readiness.

E-readiness Assessment 2005

In the current report, effort has been given to analyse the time series data to understand how states have adopted strategies/action plan to improve the network-readiness. The section on case studies in the current report would not only confine to appearing projects but also would examine e-governance initiatives undertaken, general governance changes, policy changes initiated as per the act of increased penetration of ICT etc.

E-readiness Framework 2005

The network readiness index framework will be used for the e-readiness study 2005 and is based on the following broad parameters, which are further classified into sub indication:

- Environment for ICT offered by agent country or community:
  - Market; Political/regulating; and Infrastructure;
- Readiness of the community's key stakeholder to use ICT:
  - Individual readiness; Business readiness; and Government readiness;
- Usage of ICT among the stakeholders:
  - Individual usage; Business usage; and Government usage. The chosen framework is based upon the following premium.
  - There are 3 stakeholders to consider in the development and use of ICT: Individual, Business & Government.
  - The degree of usage of ICT by (and hence the impact of ICT on) the three stakeholders is linked to their degrees of readiness (or capability) to use and benefit from ICT.
  - There is a general macro economic and regulatory environment for ICT in which the stakeholders play out their respective rules.

E-readiness Index 2005

A factor analytic technique will be used to construct the e-readiness index and based on this, the states will be classified into following six categories:

- Leaders
- Aspiring Leaders
- Encepeatants
- Average Achievers
- Below Average Achievers
- Leant Achievers

Check Your Progress: 3

Note: 1) Use the space below for your answers.

2) Compare your answers with those given at the end of this unit.

1. Discuss E-readiness assessment of State/UTs?

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2. True or False

   i) E-readiness is the degree to which a country/state is prepared to participate in the networked world. (T/F)

   ii) States have used e-readiness assessment reports to carry out the road map of improving their network readiness as well as increasing the penetration of ICT for economic development. (T/F)

   iii) A factor analytic technique will be used to deconstruct the e-readiness index. (T/F)

14.6 THE GLOBAL SCENARIO

All the countries are making serious efforts to participate in the digital economy. Asia has become an emblem of the borderless economy. India's famed IT-enabled service (ITES) sector, which now contributes an estimated US$17bn to the economy annually, is a Shining example to the emerging markets. India's success story has been replicated throughout the region — there are booming call centres surrounding Manila, customer help desk centres in Malaysia, and Korean and Japanese language software production houses in China. It is ironic that India hardly appears on the e-ready radar screen, though it is starting to push ahead. Many countries are reaping benefits from being at least partially e-ready, even if they do not have all the components that support digital services (Complete technology infrastructure, favourable policy, business and social environments) in place. But it is also clear that having one or more of the basics in place can go a long way, as a country leverages what e-assets it has to generate competitive advantage. In the Indian context, it would be helpful to look at the level of e- preparedness of the Indian states, as this would be helpful in assessing the strengths and weaknesses in the e-readiness environment and consequently appropriate remedies can be planned.

During 1991, the twin programs of macro economic stabilisation and structural reforms were initiated. It has been argued that reforms carried out till date are not enough for the Indian economy if the country wishes to ensure the quality and sustainability of growth on a long-term basis. This, the policy planners argue, would be accomplished through second-generation reforms. The second-generation reforms simply aim at improving government efficiency through a reduction in the fiscal deficit. They aim to bring about increased private sector participation in developmental activities and sustaining high growth through appropriate institutional mechanisms. It can be observed from factors that indicate the health of the state (debt to GSDP, levels of fiscal deficit, primary deficit and revenue deficits to GSDP) that the objective of the second-generation reforms is to improve the governance and observe the requisite fiscal discipline. It is here that one can see a major role for ICT and e-governance. In practice, state reform and government modernisation nowadays can hardly proceed without calling upon ICTs. In fact, from long-term perspective the second-generation reforms are needed to sustain the ICT revolution. The second-generation reforms in general suggest that increased involvement of the private sector in development activities and promotion of private investment in the industry and infrastructure segments of the state is required. Hence,

reforms, particularly in the areas of right institutions, administrative, legal and regulatory functions of the state coupled with the restructuring of the incentives and actions that are required for greater participation of the private sector in developmental activities has become imperative.

E-governance: ICT has made the development of a new service delivery model possible, which can bring about a major shift in the way the government does business. Anywhere anytime access brings in incredible opportunities, but there is a downslide for state and local governments.

First, the public sector is held to a higher standard than the private sector particularly in terms of risk. Second, with new technologies come whole new levels of competition. Digital government is all about using technology to improve the access to and delivery of public services. The goal is to create a network that builds closer relationships with all stakeholders˜ citizens, businesses, governments and the workforce˜ while maintaining security. With the expansion of e-governance, there are increasing concerns about the security of transactions, which also need to be addressed. Specific e-governance initiatives that provide particular solutions to some governmental problems which are associated with ICT components, can contribute to one or more of these valued functions:

- **Increasing the efficiency of government operations:** economists and social scientists call this "greater efficiency of the public administration by the automation/digitization of administrative functions"—in other words, simplifying processes and improving service delivery. Resources are used more effectively, and better tools are made available to both staff and agencies, as well as to the clients' interaction with the service. Efficiency gains are the first quoted arguments for ICT infusion. It is usually the first step, which started decades ago when automation was brought in, but the process is a long, continuous one.

14.7 ICT AND ECONOMIC GROWTH

According to NASSCOM data, the IT industry's contribution to the Indian GDP has also increased from approximately 1.4 per cent in 1998-99 to more than 3 per cent in 2002-03 and is estimated to grow further to 3.8 per cent, highlighting its increasing importance to the Indian economy. Contrast this share of ICT around 3.8 per cent of GDP with the combined share of all registered manufacturing in various industry segments ranging from food processing, beverages, textiles, leather, basic chemicals, petrochemicals, iron and steel, basic metals such as aluminum, copper, rubber and petroleum, machinery, both electrical and mechanical which is just around 11 per cent of GDP. This combined share had marginally declined during the 1990's while the ICT sector in the national income is increasing at a brisk pace now . Obviously the importance of this sector needs no further emphasis. Apart from the indirect contribution that IT makes to the Indian Economy through e-governance etc the direct contribution of IT exports is becoming increasingly important. The sectors that exhibit strong backward-linkages with other sectors of the economy are presumed to have a higher output multiplier. Sectors, which have an output multiplier of two or more, can be treated as key sectors for economic growth. The

ICT sector which reveals an output multiplier that is higher than the average contrary to the popular perception that this sector may not have strong backward linkages can be an eye-opener for the Indian policy planners. The ICT sector, in context of the output multiplier, has a rank of 30 of a total 115 sectors and the Software Sector corresponds to a rank of 80 out of 115 sectors. The increase in ICT output does have a significant output multiplier effect and should thus be encouraged. The employment multiplier for the ICT industry has been estimated at 0.183 man-years per lakh of output in 2000-01 prices. In other words, an additional output of the ICT sector to the tune of Rs 1 lakh would ensure 0.183 man-years of jobs created. For the software sector alone, which is the sector of interest, the output multiplier is 1.78 and the employment multiplier is 0.2096. In other words, increased output of one lakh in the software sector creates an additional employment of 0.2096 man-years. The rank for both the ICT and the software sector in terms of the employment multiplier is 110 out of total 115 sectors.

It is important to look at the economic implications of the above observations. For instance, the CSO has estimated that the value of output at current prices for the software sector during 1999-2000 is at Rs 21,263. The linkages among different sections of an economy are of crucial significance in understanding the trajectory of any industry. The significance and potential of any industry can be observed by looking at three important indicators, i.e. the output multiplier, the employment multiplier and the degree of forward linkage. As elaborated earlier, the output multiplier can be defined as a total increase in output generation for one unit increase of final demand in a particular sector. The employment multiplier is specified as man-years of additional employment created for an increased unitary output of the sector. Both these measures spell out the backward linkages with the other sectors of the economy in terms of output and employment effect. Forward linkages refer to the inter relationship between a particular sector and all other sectors which demand the output of the former as inputs. To better understand the macroeconomics of the ICT sector we analyse these parameters. In the input-output table, the' Other Services Sector's'' employment and output multiplier coefficients were taken as output and employment multiplier of "ICT sector''in the first iteration. However, the importance of ICT sector cannot be clubbed with Other Services category. Thus, the NCAER research team looked at direct coefficients (employment/output and input/output) for ''Software Sector'' from the CSO and for ''Hardware Sector'' from the ASI data. Since the direct coefficients from input-output table and CSO table were available, we used two sets of direct coefficients; one from the 114th sector of the input - output table which corresponds to the "Other Services Sector" and the other for software and hardware clubbed together to obtain output and employment multiplier coefficient that is reflective of the entire ICT sector. For the ICT sector (software and hardware) output in 2000-01 is at Rs. 21,263 crores and at Rs. 50,302 crores in 2002-03. Within this short gap of 3 years, the output of the software sector has increased by 29,039 crores and in this period the economy has been able to create 6.8 lakh man-years of employment, or in simpler terms, this sector has been able to create jobs for 24,500 people who would be able to work in this sector for the next 25 years. Its contribution to GDP in 1999-2000 was Rs 14,619 crores and Rs. 34,584 crores in 2002-03 current prices. The contribution of the software sector alone out of the ICT sector, in GDP has increased from 0.83

per cent in 1999-2000 to 1.54 per cent in 2002-03 (all figures in current prices). Direct employment in the software sector in 1999-2000 was 322983 according to CSO (corresponding figures for the year 2002-03 are not available). The contribution of the hardware sector to GDP in 1999-2000 was Rs 796 crores and employed around 16,800 persons. The output of the hardware sector in 1999-2000 was Rs. 4400 crores. Though the ICT industry in India is mainly export oriented, domestic consumption does show a forward linkage that is not high as on date but is expected to increase in the coming years as the economy and the using domestic sectors mature making greater use of ICT in business, governance and society.(Resource:CSO report 2005, NASSCOM MCKINSEY Report 2005)

Check Your Progress: 4

Note: 1) Use the space below for your answers.

2) Compare your answers with those given at the end of this unit.

1) What are the indicators to determine the importance and potential of any industry?

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2) How does ICT help to grow the economy? Analyse it from Indian point of view

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14.8 LET US USM UP

- ICT stands for information, communication and technology.
- ICT is concerned with the storage, retrieval, manipulation, transmission or receipt of digital data. Importantly it is also concerned with the way these different uses can work with each other.
- ICT is very essential for businesses, individual and government.
- E-readiness is the degree to which a country/state is prepared to participate in the networked world and demand the adoption of important applications of ICTs in offering interconnection between the government, business and citizens.
- It is important to regularly take stock of e-readiness at the country level, states/ UTs level and in major verticals to ascertain the status of under lying infrastructure, human resources, policy regimes, investments climate etc and arrive at what steps need to be taken to optimize investment and reach free potential.

- ICT has the potential to bring in multiple benefits in the areas of governance, integration of marginalized section, development of rural areas profitability and productive improvement in major sectors of the country's economy.

- In practice, state reforms and government modernisation can hardly proceed without calling upon ICT.

14.9 FURTHER READINGS

1. Government of India. Ministry of communication and Information Technology. InformationTechnology Annual Report. Department of Information Technology 15 Jan.2007< http://www.mit.govt.in.>.

2. Government of India. Ministry of Statistics & Program Implementation. Millenium Development Goals India Country Report. CSO Reports and Publications. 2005. 26 Dec.2006< http://www.mospi.nic.in/>.

3. NASSCOM Mckinsey Report. NASSCOM.2005.30 Dec.2006 <http://www.nasscom.in/nasscom/templates/normalpage.aspx?id.

14.10 CHECK YOUR PROGRESS: POSSIBLE ANSWERS

Check Your Progress: 1

1. (i) Tech Savvy Society and

   (ii) the Internet, Mobile Phone

2. Refer to section 15.5 of the unit

Check Your Progress: 2

1. ICT stands for Information Communications Technology. ICT is concerned with the storage, retrieval, manipulation, transmission or receipt of digital data.

2. Refer to section 15.6 of the unit

Check Your Progress: 3

1. Refer to section 15.7 of the unit.

2. True /False

   (i) True

   (ii) True

   (iii) False

Check Your Progress: 4

1. The significance and potential of any industry can be observed by looking at three important indicators, i.e. the output multiplier, the employment multiplier and the degree of forward linkage.

2. Refer to section 15.8 of the unit.

UNIT 15 DIGITAL MEDIA AND SOCIAL DEVELOPMENT

Structure

15.0 INTRODUCTION

Information and Communication Technologies (ICTs) is recognized as a key factor in the social development of developing countries, including India. ICTs have played a vital role in the development of society and current economies. It has affected every sphere of human life. ICT has opened new areas in economics, It has given a tool to the society leading greater accountability of the government. It has also helped in cultural development.

All the countries have recognized that the ICT can play an important role in socio-economic development of a country.

There have been many studies suggesting how ICT can be helpful in development of society. Scholars believe that introduction of technology, Economy and society interact in ways which create new socio-economic context, where traditional social structures become more inclusive. The emergence of internet virtual society and its dominance over other social structure is a world-wide phenomenon.

The introduction of ICT in mainly three important areas- health, education and employment may help in positive changes. Many studies have proved that ICTs have contributed towards the achievement of the above-mentioned specific areas of social development.

15.1 LEARNING OUTCOMES

After going through the unit, you will be able to:

- analyzing the specific needs and challenges of different communities or development sectors helps in devising relevant and effective ICT interventions;
- exploring successful ICT-based development projects globally can provide valuable insights for replication and adaptation in new contexts; and
- understanding the complex challenges of development and applying technology-driven solutions requires critical thinking, problem-solving, and innovation skills. Learning about the potential pitfalls of ICTs, like digital divides and privacy concerns, fosters responsible and ethical technology use for positive societal impact.

15.2 UNDERSTANDING ICT

ICT includes a wide range of technologies. ICT is a combination of computing and telecommunications that makes information accessible and communication seamless. The technologies that fall under ICT can be broadly categorized into four groups: hardware, software, networks, and communication technologies.

Hardware includes all the physical devices that you interact with, such as computers, networking equipment, mobile devices, and storage devices. Software is the brain behind the hardware, including operating systems, applications, programming languages, and databases. Networks are the highways for information flow, including the internet, local area networks (LANs), wide area networks (WANs), and cellular networks. Communication technologies are tools for information exchange, including telephony, email, instant messaging, video conferencing, and social media.

ICT differs from IT and telecom in that it encompasses a broader spectrum of information creation and management. IT focuses primarily on managing and maintaining computer systems and data, while telecom focuses on technologies specifically designed for communication. ICT is like a whole orchestra, where all the instruments (technologies) work together to create the music (information flow). We can understand ICT by dividing it into various parts. It encompasses following things:

1. **Hardware:** This includes all the physical devices you interact with, like:
    - **Computers:** PCs, laptops, tablets, smartphones, servers.
    - **Networking equipments:** Routers, switches, modems, cables.
    - **Mobile devices:** Smartphones, tablets, wearables.
    - **Storage devices:** Hard drives, flash drives, cloud storage.
2. **Software:** This is the brain behind the hardware, including:
    - **Operating systems:** Windows, macOS, Linux, Android, iOS.
    - **Applications:** Word processors, email clients, social media platforms, games, web browsers.
    - **Programming languages:** Python, Java, C++, Swift, Kotlin.
    - **Databases:** Storage and organization of information.
3. **Networks:** These are the highways for information flow, including:
    - **The internet:** Global network of interconnected computers and networks.
    - **Local Area Networks (LANs):** Connect devices within a building or campus.
    - **Wide Area Networks (WANs):** Connect geographically dispersed locations.
    - **Cellular networks:** Connect mobile devices like smartphones.
4. **Communication Technologies:** These are tools for information exchange, including:
    - **Telephony:** Landline and mobile phone calls.
    - **Email:** Electronic messaging systems.
    - **Instant messaging:** Chat platforms like WhatsApp and Telegram.
    - **Video conferencing:** Real-time video communication over the internet.
    - **Social media:** Platforms for sharing information and connecting with others.

15.2.1 Culture of Technology

Human development is based on technological advancement. Since our ancestors started walking the path of development, we find a culture of technological advancement to support the pursuit of development. Think of the time when our ancestors started using their thumbs and made early tools. From those early tools to internet human beings always supported culture of technology. Each new technological advancement brings benefits and challenges, forcing us to adapt and find new ways to harness its power for good. Understanding the historical context of how technology fosters innovation helps us anticipate future trends and navigate the consequences more effectively.

As far as Information Communication Technology (ICT) is concerned it has also went through a continuous advancement. In 15th century when printing press was invented, it revolutionized communication and dissemination of information. It enabled widespread literacy and the rise of modern information age. In 18th century when steam engine was invented it triggered industrial revolution, transportation, fast printing and society as a whole. 19th century telegraph made instant communication possible and it also dealt with issue of geographical distance. It impacted everything from news to warfare. In 20th century, starting from radio which bridged the gap between literate and illiterate to Television which made information entertaining to the internet which connected the world never before.

Humans are known for their relentless pursuit of innovation, which is both its defining characteristic and a driving force behind rapid societal change. The rise of smartphones, artificial intelligence, and social media platforms are some examples of how technology has fundamentally changed how we communicate, access information, and conduct business. While these innovations have brought about many benefits, they have also raised ethical questions about job displacement and bias, spread misinformation, and fueled polarization.

Navigating the innovation wave can be overwhelming, but it's crucial to remember that we have a say in shaping its direction. By fostering open dialogue, promoting responsible development, and ensuring equitable access, we can harness the power of innovation for the benefit of all. By engaging with the culture of innovation critically and proactively, we can help shape a better future for all.

15.2.2 ICT Tools

ICT tools open up new possibilities for development. ICT tools for development can be broadly categorized into several areas, including education and learning, healthcare and well-being, agriculture and sustainability, economic growth and entrepreneurship, and governance and citizen engagement.

1. **Education and learning:** Tools like online platforms, mobile apps, educational simulations, and teacher collaboration platforms.

2. **Health:** Telemedicine systems, electronic health records, health education apps, and mental health support platforms.

3. **Agriculture:** Precision agriculture tools, weather forecasting and market information apps, digital knowledge-sharing platforms, and mobile money solutions.

4. **Economy:** E-commerce platforms, digital skills training programs, crowdfunding platforms, and mobile banking services.

5. **E-governance:** E-government platforms, open data initiatives, citizen feedback tools, and social media platforms.

ICT is evolving day by day. Many new areas are adding into it and ICT is promoting development. We have to ensure equitable benefits to all the citizens regardless of their economic, social and education status and rural-urban differences.

15.3 CHARACTERISTICS OF ICT

ICTs or Information and Communication Technologies allow to access variety of services and information. With the use of ICT information can be processed and delivered efficiently and in no time. Let us discuss some important characteristics of ICT in relation to promoting development:

15.3.1 Digitalization

Digitalization is a transformative opportunity of our time. Digital technologies and platforms are increasingly important in addressing developmental challenges and also create new opportunities in economy by providing access to information and improve efficiency and transparency in the system. Government should ensure digitalization so that people can take full advantage of the Digital Development revolution.

Digitalization speeds up development, helps economic growth, brings people closer together and enables better use of resources. It is important for inclusive and sustainable development in the new digital era.

Digitization refers to creating a digital representation of physical objects or attributes. It enables to make date driven decision based on insight through data and analytics. Digitization make the information accessible to everybody leading more interconnected world where information and services are readily available regardless of location.

15.3.2 Knowledge Revolution

The ICT revolution has brought significant change in the way we communicate and access information. The digital and ICT revolution has

made information and knowledge accessible. It has also made processes speedy which is very beneficial for citizens. Access to information is crucial for knowledge revolution. One knowledge revolution took place in 14th century Europe when supported by renaissance Gutenberg came up with a new printing technology which made printing fast and cheaper. Due to this common people also had access to the knowledge and information which led to industrial revolution.

Similarly, ICT is also leading a new knowledge revolution where there is a shift in economy where information computerization and digitization is crucial for economic growth. The knowledge revolution is characterized by the increasing importance of knowledge in the economy, the growth of knowledge-intensive industries, and the increasing importance of information technology.

The ICT revolution has played a crucial role in the knowledge revolution by enabling the creation, storage, and dissemination of knowledge. The use of ICTs has led to the development of new forms of knowledge, such as e-learning, e-commerce, and e-government.

15.3.3 Interconnectivity

Interconnectivity is one of the most important characteristics of ICT. It is the ability of different devices and systems to communicate with each other, regardless of their location or type. Interconnectivity is essential for the functioning of modern communication systems, as it enables the exchange of data and information between different devices and networks.

Interconnectivity allows to share data and resources across different departments and locations, which is crucial for knowledge driven development. Interconnectivity is bridging the digital divide. Internet and mobile technologies provide access to vast amounts of information and educational resources, even in remote areas. This empowers individuals and communities to learn new skills, pursue higher education, and participate in the global knowledge economy.

It also promotes social development as it enables telemedicine consultations and remote healthcare services, improving access to medical care in underserved areas. ICT interconnectivity is a powerful tool for driving development across various sectors and regions.

15.3.4 Innovation and Creativity

ICT has fueled innovation and creativity. It has transformed how we think and express ourselves. Affordable tools like online platforms and various tools have made creative tools available for everybody. Take the example of YouTube, it has empowered individuals to become content creators and reach global audiences. These ICT platforms have also enabled individuals and organizations to collaborate globally, bringing together different perspectives to find and reach new creative boundaries.

ICT has also made instant feedback possible. Now individuals give instant feedback through social media, which in return accelerates the process of innovation and creativity. These platforms enable collaboration and knowledge sharing, allowing people to find creative solutions to local problems.

With the use of ICT tools citizens can also collect valuable data to promote development. Take the example of climate change, citizens can collect data of air quality or other relevant indicators and share it to online community. Through this they can participate in climate change initiative by contributing valuable data and insights to tackle this problem.

AI-powered platforms tailor learning experiences to individual needs and learning styles, improving engagement and outcomes. Virtual Reality (VR) and Augmented Reality (AR) have provided interactive learning environments, bringing abstract concepts to life and enhance engagement. Mobile learning platforms and offline content make learning accessible even without consistent internet access.

15.3.5 Research and Development

Information and Communication Technologies (ICT) are not just shaping the present, they're actively shaping the future. ICT has created an environment which supports research and development related to information communication technology. There are various areas of R&D in ICT.

Artificial Intelligence (AI) has opened new opportunities and it is transforming every sector. From doing many routine works to medical diagnosis, AI focuses on developing more advanced algorithms, ethical considerations, and human-AI interactions.

AI platforms are providing personalized learning by adapting to individual learning styles and pace. It is capable of offering tailored resources and assessments for improved outcomes. AI-powered translation tools and virtual reality experiences are breaking down language barriers and geographical limitations, making education accessible to underserved communities.

As ICT is increasingly affecting every sphere of our life Research and Development taking place in cybersecurity. R&D efforts tackle malware detection and secure communication protocol. Internet has created vast network of data. R&D focuses on making these connections more secure, efficient, and impactful.

Humans and technology interaction is constantly evolving. R&D is taking place in the areas of virtual reality, augmented reality to create more natural and intuitive interactions.

Check Your Progress: 1

Note: 1) Use the space below for your answers.

2) Compare your answers with those given at the end of this unit.

1. Mention some characteristics of ICT.

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15.4 ICT AND SOCIAL DEVELOPMENT

ICT (Information and Communication Technology) has played a significant role in social development by providing greater access to information, communication, and resources. For development we need well informed citizens. Many times it is found that people don't have the relevant and critical information at the time of need. ICT has made it very easy and accessible. Anybody with an internet connected device can access ocean of information. It has facilitated the spread of knowledge, connected people across the globe, and empowered individuals and communities to participate in social and economic activities.

ICT has also been instrumental in advancing education, healthcare, and governance, leading to improved quality of life and social well-being. In developing nations like India where infrastructure is still getting better ICT has provided access of quality e-education, e-healthcare facilities to the people living in remote areas. E-governance has enabled citizens to get various services easily.

ICT has also been used for poverty reduction and creating new sources of income and employment for the poor. The World Summit on the Information Society (WSIS) recognized that ICTs are keys to eradicating poverty and unemployment and building a people-centered, inclusive, and development-oriented Information Society.

In India, ICT is playing vital role in social development. India is one of the countries, that recognizes technological advancement in communication can play a vital role in socio-economic development of the society. In 1975 when India got opportunity to test satellite-based communication for awareness and teacher training, India readily grabbed this opportunity and SITE program was launched in India. Now when internet-based communication technologies are seen as a key component for promoting development, India has included ICT as a key component in its national vision to improve the quality of life, knowledge, and international competitiveness. Let us discuss role of ICT in some key areas of social development.

15.4.1 ICT and Education

ICT has revolutionized the field of education by providing new opportunities for learning, teaching, and collaboration. It has transformed traditional educational methods and opened up new possibilities for accessing information, interactive learning, and personalized instruction. ICT in education has the potential to bridge the gap between urban and rural

education, improve access to quality education, and enhance the overall learning experience. Let us discuss how ICT is revolutionizing the field of education:

1. **Personalized Learning:** ICT has made personalized learning possible. By using ICT platforms students can search relevant information very easily. Apart from getting textual information users can get multimedia content also. There are various AI powered platforms which can identify individuals' strengths, weaknesses and learning styles. On the basis of these data platforms can provide curated content to the users. This improves engagement and outcomes.

2. **Accessibility:** ICT has made quality content available to everybody. Online learning provides access to these contents for students living in remote areas or facing other difficulties to traditional classroom learning. It has also filled the language barrier for learning new things. Now, students can translate available content in any language of their choice with the help of translation tools, which are available free.

3. **Assistive technologies:** Tools like screen readers, text-to-speech software, and voice recognition programs make education accessible to students with visual or hearing impairments.

Initiatives:

1. **Smart School:** The Smart School Initiative, launched in 2008 by the Government of India, aims to transform traditional schools into technology-enabled learning hubs. This ambitious program seeks to enhance the quality of education, bridge the digital divide, and improve the learning experience for all students.

2. **Digi-Gaon:** Innovative projects like "Digi-Gaon" bridge the digital divide in rural areas by setting up community learning centers, empowering communities through ICT literacy.

3. **DIKSHA platform:** The Government of India's national e-learning portal offering a vast repository of digital educational resources in various languages.

4. **SWAYAM MOOCs:** Massive Open Online Courses (MOOCs) on SWAYAM platform provide access to quality higher education from renowned institutions across India.

5. **Smart classrooms initiative:** Government initiatives like PRASAD (Public R-O-W Access in Rural Areas through Satellite Dish) program connect schools in rural areas with satellite internet and smart classroom technology.

6. **Mobile learning apps:** Several innovative mobile apps catering to diverse learning needs, like Aarogya Setu for health education and Diksha app for accessing educational resources.

15.4.2 ICT and Women Empowerment

ICT is also playing a role in empowering women. Through ICT women have gained awareness and access to information, knowledge and employment. ICT has improved the social, economic, political, and legal strength of women by ensuring equal rights for them. The use of ICT has enabled women to find and share information, access educational and health services, generate income, interact, collaborate, network, and have their voices heard.

Affordable internet access has brought all the information to the fingertip bridging the information gap. Earlier in various developing countries due to conservatism in the society women were not able to have access to the information. Now internet has provided it very easily. Digital platforms have removed barriers to information and education, providing women with crucial tools for personal and professional development. Let us discuss how ICT is helpful in women empowerment:

1. **E-learning:** Access to online courses and digital learning platforms have made them learn new skills. These skills are helping them to start new businesses and participate in digital economy. Women are launching content app or platforms for information sharing. ICT has helped them to break geographical and societal limitations.

2. **Financial inclusion:** Digital wallets and e-payment services give women control over their finances and access to financial services previously unavailable, promoting economic independence and security.

3. **Empowering voices and participation:** Social Media platforms have enabled women to connect, share experiences and make their voices heard on various social issues directly affecting them. Now, women can create online communities based on specific concern or area-wise. There are various social media campaigns focusing on issues such as education, employment, healthcare, and political representation for women. Some well-known women empowerment campaigns include the #MeToo movement, HeForShe, and the Global Fund for Women. These campaigns use various strategies such as advocacy, awareness-raising, and policy change to address gender inequality and empower women.

4. **Citizen Journalism:** ICT has also strengthened citizen journalism and online content creation. Women are using digital tools to share their stories, challenge societal norms, and bring local issues to light, promoting greater visibility and representation. ICT also provides online consultation platforms and online voting facility, which ensures women voices are heard and considered in policy decisions.

5. **Combating violence and discrimination:** Online platforms and helplines provide options to women to report harassment, violence, and discrimination, connecting them with support services and legal

aid. Social media campaigns are also making them aware of gender-based discrimination and mobilize them to question the authority and demand justice. We have seen #JusticeForNirbhaya campaign, which culminated into strong legislation against violence against women.

Initiatives:

1. **Women on Wheels:** The "Women on Wheels" initiative empowers women rickshaw drivers through mobile app-based booking systems and financial literacy training.

2. **Ujjawala scheme:** Providing digital tablets and training to rural women entrepreneurs to promote business skills and financial inclusion.

3. **Gram Panchayat Information Centers:** Connecting villages with internet access and information kiosks to empower rural communities, especially women.

4. **SEWA Bharat's mobile platform:** Enabling women garment workers to connect with clients, access training, and manage their businesses digitally.

5. **Cyber Saathi initiative:** Equipping women with digital literacy skills and awareness about online safety to navigate the digital world confidently.

15.4.3 ICT and Health

ICT (Information and Communication Technology) has played a significant role in the healthcare sector. It has helped in improving access to health care facilities and reduce inequality. E-health includes the ICT-enabled health related information, information related to healthcare facilities, telehealth and telemedicine.

ICT has also helped in reducing the cost of healthcare and increasing the quality of care. The use of ICTs has the potential to promote patient-centered healthcare at a reduced cost, educate health professionals and patients, and stimulate a different sort of interaction with patients and health care providers.

World Health Organization (WHO) has urged all the countries to focus on developing ICT infrastructure to promote availability of health facilities to everybody. ICT has a great possibility in improving the quality of life among poor and less privileged people. ICT has demonstrated its importance in improving the communication between patients and healthcare providers. Let us discuss some key benefits of ICT in health sector:

1. **Access to healthcare:** ICT has increased the access to health care facilities especially to unprivileged communities and those facing geographical limitations. ICT has provided telemedicine facilities

which connect patients of remote areas to healthcare professionals through audio or video consultation. There are several mobile health apps which provides medical information and medication management tools. These facilities strengthen self-management of patients. ICT has also enabled to maintain electronic health records which make it possible to access medical history of the patients, treatment plan at any time. ICT has also helped in creating community health networks by utilizing digital platforms to facilitate knowledge sharing and collaboration.

2. **Quality care:** ICT is helping in providing quality care through better diagnosis, treatment options and monitoring. AI powered algorithm analyze medical reports with greater accuracy which helps in early disease detection personalized treatment plan. Electronic health records are also very helpful in providing quality care as reports can be accessed from clinical data repositories online. ICT has also enabled remote patient monitoring. Those who have geographical limitations or physical inability, they can be treated remotely with the help of ICT.

3. **Empowered patients:** With easier access to information, tools for self-management, and active participation in their healthcare decisions. Mobile health apps provide access to health-related information, treatment options, and self-management tools for various conditions. ICT has helped creating online patient portals. Now, to get reports and fixing appointments with the doctor, patients need not stand in a long queue, they just need to go to the portal, download reports and get appointment. ICT has provided health educational resources which empower patients with evidence-based information on diseases and preventive measures.

Initiatives

1. **Aarogya Setu App:** India's effective use of a mobile app for contact tracing and health information dissemination during the COVID-19 pandemic.

2. **E-Aushadhi platform:** Online platform for affordable medicine procurement in various Indian states.

3. **Telemedicine initiatives:** Numerous state-led telemedicine programs expanding access to specialist care in rural areas.

4. **M-Chitra health information platform:** Providing reliable health information and resources in multiple Indian languages.

15.4.4 ICT and Employment

The impact of Information and Communication Technology (ICT) on employment generation is positive. A study done in India on impact of ICT on employment on organized sector in India suggests that ICT has increased the job creation both in ICT producing industry and non ICT industry.

A report by the World Bank suggests that information and communication technologies (ICTs) are transforming the world of work, creating new job opportunities and making labor markets more innovative, inclusive, and global. Three trends are driving this shift: greater connectivity, the ability to telecommute and outsource work, and globalization of skills.

The OECD has also reported significant growth in ICT employment as a result of ICT dissemination throughout the economy. This includes employment directly in the ICT sector but also indirectly in terms of ICT-specialists in non-ICT sectors (e.g. health) and also among ICT-intensive users in all sectors which rely on ICT skills to perform their work. Let us discuss some key points related to ICT and employment:

1. **Job creation:** The ICT sector itself is booming, generating new jobs in software development, IT infrastructure, data analysis, cyber security, and more. For instance, the development of the mobile phone applications industry has created new opportunities for small- and medium-sized enterprises (SMEs). A firm that provides a digital application to the Apple app store, for example, gains access to over 500 million app store account holders. ICTs connect people to jobs. Online employment marketplaces are helping an estimated 12 million people worldwide find work by connecting them with employers globally. Babajob in India, Duma and M-Kazi in Kenya, and Souktel in the Middle East and North Africa are examples of job search services using internet-based and mobile tools. Such services empower workers by making labor markets more transparent and inclusive; for instance, Souktel targets low-income and marginalized communities.

2. **Innovations:** ICT also supports innovation that has created new, more flexible forms of employment and work. Online contracting uses ICT to increase access to work opportunities worldwide, mainly for smaller employers. Popular services include oDesk and Elance. In 2012, about 2.5 million jobs were posted on these services, for tasks ranging from writing to customer service to software development. Microwork platforms break down large business processes into smaller discrete tasks – such as data entry and verification, copy-writing, or graphic design – and distribute them to workers across geographic boundaries.

3. **Empowering skills:** ICT literacy and digital skills have become essential for most jobs, offering individuals the potential to adapt to changing demands and remain employable. Automation is changing the existing job market and creating new opportunities. ICT skills make individuals capable of learning new tools and adaptability to enhance the chances of their employability. ICT skills have also opened the doors to remote work possibilities. Now whole world market is open for individuals to work remotely with flexibility. This is benefitting those individuals who have geographical limitations. ICT skills enable efficient communication, information management, and teamwork via digital tools. This leads to increased productivity and effectiveness, making individuals valuable assets in any team.

No doubt, ICT has created new job opportunities in the ICT sector and beyond, and has also enabled businesses to expand their reach and has increased the demand for skilled workers in areas such as e-commerce and digital marketing. It has also provided new avenues for job creation that could help tackle global unemployment, such as online employment marketplaces and microwork platforms. Finally, ICT has supported innovation that has created new, more flexible forms of employment and work.

Initiatives

1. **Digital India program:** Government initiatives like "Digital India" and "Startup India" aim to bridge the digital divide, promote digital literacy, and nurture a thriving tech ecosystem.

2. **Skill development programs:** Various programs like Pradhan Mantri Kaushal Vikas Yojana (PMKVY) focus on skilling and upskilling the workforce to match industry needs in the digital age.

3. **Remote work platforms:** Platforms like Upwork and Freelancer connect skilled individuals with remote work opportunities, empowering them to access global markets.

15.4.5 ICT and Poverty Reduction

ICT has the potential to reduce poverty by improving access to markets, health care, government services, and micro-finance for the poor. It has also provided new avenues for job creation that could help tackle global unemployment, such as online employment marketplaces and microwork platforms. Finally, ICT has supported innovation that has created new, more flexible forms of employment and work.

The relevance of ICT in improving living standards has been demonstrated during the COVID-19 pandemic. Globally, ICT usage increased during the COVID-19 pandemic, significantly improving access to healthcare, education, social cohesion, and business activities. There are many areas where ICTs can help address poverty. The focus is on using ICT as a tool to help address some aspect of poverty.

1. **Communications and Community Access:** Apart from its role in helping to improve livelihoods, education and healthcare, communications can play a vital role in addressing issue of poverty. Humans are social animals and communication can bring a feeling of well-being and empowerment. ICT provides inexpensive, accessible and effective communication system. With the advent of low-cost mobile telephone, accessibility has been revolutionized. In rural areas, over 80% of households use mobile communication to family contact, market contact, access to government services and much more. ICT based communication technology can be operated regardless of the language barrier and do not require literacy, which helps high utility and utilization.

2. **Livelihoods:** The basic definition of poverty includes the inability to provide food and shelter. Enhancing livelihood opportunities is thus a key requirement in relieving poverty. ICT is considered effective at both enhancing traditional livelihoods and creating new opportunities. Simple examples of enhancements include providing weather forecasts to farmers, providing crop information and providing market rates. New livelihoods enabled by ICTs include internet-based businesses, ICT based goods and services. The income improvements have many variables but there is no doubt that ICT is one of the important variables.

3. **Financial inclusion:** Mobile banking and digital payment systems promote financial inclusion. It allows individuals to do financial transaction and access other financial services securely and conveniently. This is promoting economic participation among poor people. Providing access to mobile banking and digital payments empowers communities, enhances financial security, and facilitates participation in the formal economy.

Initiatives

1. **Grameenphone Village Phone initiative:** Empowering women through mobile phone access, connecting them to information, markets, and financial services.

2. **E-Choupal:** Connecting farmers directly to buyers through digital platforms, eliminating middlemen and increasing profit margins.

3. **Aarogya Setu app:** India's effective use of a mobile app for contact tracing and health information dissemination during the COVID-19 pandemic.

4. **DBT (Direct Benefit Transfer) scheme:** Direct transfer of government subsidies and benefits through Aadhaar-linked accounts increases transparency and reduces leakages.

15.4.6 ICT and Agriculture

ICT (Information and Communication Technology) has enabled farmers to stay updated with the latest information about weather, agriculture, and newer and more advanced ways of enhancing crop quality and production.

ICTs in agriculture technology include those networks, mobiles, devices, services, and applications that help in processing, management, and exchange of data, information, or knowledge. The purpose of ICT is to transfer information from one point to another.

The use of ICT in agriculture can provide farmers with vital information pertaining to sowing, crop protection, and improving soil fertility that enables them to improve agricultural productivity. Weather-related advisories and alerts help them to prepare for sporadic events such as floods, drought, or

even pest and disease outbreaks. Such information help in preventing significant crop loss.

ICT can also be used to transform agricultural extension and business development services, for example, by using mobile to provide timely information to farmers. Such digital farming technologies also empower rural farmers to have better access to effective production strategies, banking and financial services, etc. Let us discuss some specific uses of ICT in agriculture:

1. **Precision agriculture:** Sensors, drones, and AI-powered analytics can provide precise data on soil conditions, rain forecast and ground water level, and crop health which help farmers to optimize irrigation, fertilization, and pest control, leading to increased yields and resource efficiency. Weather forecasting tools and data analysis predict weather patterns, pest outbreaks, and crop yields, allowing farmers to make informed decisions and minimize risks.

2. **E-commerce platforms:** These platforms connect farmers directly to consumers through online platforms. Due to this role of middlemen has reduced which has increased the profit margins to farmers. It has also opened up new market opportunities. Online platforms provide farmers with access to market prices, farming best practices, weather updates, and government initiatives, empowering them to make informed decisions.

3. **Financial inclusion:** Mobile banking and digital payments enable farmers to access financial services, receive government subsidies, and manage their finances securely. Secure digital transactions decrease dependence on loan sharks and exploitative lending practices, improving financial stability. Direct transfer of subsidies and benefits through digital platforms ensures transparency and minimizes leakage, reaching intended beneficiaries.

4. **Skill development:** Online training programs and digital resources equip farmers with new skills for adopting ICT tools to managing their farms effectively and accessing new markets.

Initiatives

1. **Kisan Credit Card (KCC) scheme:** KCC provides access to credit for short-term agricultural needs through bank cards, benefitting millions of farmers.

2. **DBT (Direct Benefit Transfer) scheme:** Direct transfer of government subsidies and benefits through Aadhaar-linked accounts increases transparency and reduces leakages.

3. **E- Choupal:** Connecting farmers directly to buyers through digital platforms eliminates middlemen and increases profit margins.

4. **Financial literacy programs:** Various initiatives by NGOs and government agencies provide digital literacy training and awareness programs for farmers.

5. **E- Gram Swaraj:** Providing digital infrastructure and services in rural areas to improve agricultural practices, access to markets, and livelihoods.

15.4.7 ICT and Governance and Transparency

ICT (Information and Communication Technology) plays a crucial role in promoting governance and transparency in various sectors. It enables governments and organizations to improve access to information, enhance communication and collaboration, and increase accountability.

ICT can be used to develop e-governance platforms, digitalize government services, and provide citizens with access to important information and resources. It also facilitates transparency by enabling the collection, analysis, and dissemination of data related to government activities and public services.

1. **E-governance:** Online consultations and citizen feedback mechanisms allow for more inclusive and democratic policymaking. With the help of ICT now public services are delivered efficiently. Now, citizens can avail many facilities online, before that they had to face many difficulties to get those facilities. It has made the system more accountable and brought transparency in the system. Take the example of subsidy transfer, now with the help of online facilities subsidy can be transferred directly to the beneficiary accounts, it has reduced corruption and promoted fair practices.

   Digital systems for procurement, licensing, and permit granting have also reduced corrupt practices in the system. Digital system has also made all the records digitally available. It has enabled data driven decision making. Through available data targeted intervention and effective resource allocation is possible.

2. **Enhancing Transparency:** ICT has also brought transparency in the system. Publishing government data online in easily accessible formats fosters citizen participation, enables independent analysis, and holds authorities accountable.

   E-government platforms not only give access to government services but also enable citizens to file complaints and track administrative decisions online. Platforms for registering and tracking complaints against government officials or services offer greater accountability and citizen empowerment. Secure online platforms for reporting corruption or misconduct create a culture of transparency and encourage responsible governance.

Initiatives

1. **Open Government Data Platform:** One of the world's largest open data platforms, providing access to data on various government departments and initiatives.
2. **MyGov platform:** Citizen engagement platform enabling feedback on government policies, participation in consultations, and idea-sharing.
3. **Aadhaar-based identification system:** Unique identification system supporting various e-governance initiatives and reducing fraud.
4. **Mobile governance:** Several states utilizing mobile apps for service delivery, grievance redressal, and information dissemination.

Check Your Progress: 2

Note: 1) Use the space below for your answers.

2) Compare your answers with those given at the end of this unit.

1. Define interconnectivity.

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2. How has ICT revolutionized the field of education?

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3. Give some examples of assistive technology tools.

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4. Elucidate the uses of ICT in agriculture.

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15.5 LIMITATIONS OF ICTs IN SOCIAL DEVELOPMENT

We discussed so far, the role of Information Communication Technologies (ICT) for social development. However, there are certain limitations of ICT

which are creating hindrance to provide the benefits of ICT led social development to the whole population. Let us discuss some key limitations:

1. **Digital Divide:** There is a digital divide in the society. Everyone does not have equal access to Information Communication Technologies. Digital divide is present at various levels. First, there is a lack of proper internet infrastructure; due to this rural areas have no fast internet infrastructure. The lack of infrastructure leads to create hinderance in accessing quality multimedia content.

   At another level there is a content based digital divide in the society also. As we know that India is a multilingual society but on internet majority of the content available is in English language, this leads to content oriented digital divide. Content in all regional languages needs to be created to fill this gap. Indian government has come up with Digital India Campaign which focuses on providing all the ICT services in local languages.

2. **Digital Literacy:** Sometimes ICTs are available but the population lacks required skill to navigate online platforms, understand information critically and use technologies effectively. This can further increase the gap between haves and have nots. This thing critically hampers the ability of individuals to participate in social development.

3. **Affordability:** Accessing devices, internet connection, and digital services can be expensive for many. This further creates barrier to social development initiatives. Government needs to address this issue and ensure affordability concerns to ensure equitable access.

4. **Security and Privacy:** Security threats and data breaches can compromise personal information and put individuals at risk. Robust data protection measures and cybersecurity awareness are crucial to ensure safe and secure online participation in social development initiatives.

5. **Ethical Concerns:** Algorithmic bias, misinformation, and online manipulation can further minimize the benefits of ICTs. Responsible use of technology and ethical considerations are essential to mitigate these risks and promote inclusive social development.

Check Your Progress: 3

Note: 1) Use the space below for your answers.

2) Compare your answers with those given at the end of this unit.

1. How ICT is aiding women empowerment?

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15.6 STRATEGIES TO MITIGATE LIMITATIONS OF ICTs

There is a strong need to mitigate these limitations so that everyone can get benefits of ICT led social development. Let us discuss some of the important strategies:

1. **Infrastructure Development:** Government needs to focus on infrastructure development of ICT particularly in rural areas. This will ensure access of ICTs among rural population. Indian government has already started National Broadband Mission to provide broadband internet connection in all the villages. Many private players are also coming up with new technologies like satellite internet to provide internet connection easily.

2. **Increase Affordability:** Government should try to bring low-cost devices and data plans so that less income group can also have access to all the online facilities. Government should also try to create public access points to bridge the affordability gap. Indian government has taken initiatives such as the BharatNet project, which aims to connect all 250,000 gram panchayats (village councils) in the country with high-speed internet. Another initiative is the National Digital Communications Policy (NDCP) 2018, which aims to ensure universal broadband access and provide affordable internet services to all citizens.

3. **Addressing Digital Literacy:** Government should also try to address the issue of digital literacy. Context specific training program can be launched keeping local needs and languages. Government of India has started some initiatives to make citizens digitally literate. The government's Digital India initiative aims to provide citizens access to digital infrastructure and services and increase digital literacy. In 2023, the government launched a Digital Literacy Program aimed at making at least one member of every household in India digitally literate.

4. **Security and Privacy:** We have to promote cybersecurity awareness among users to wiser use of ICT. Users should know how to identify fake news and not to circulate it further. Because this effects the authenticity resulting in less use of the online platform. Promoting awareness campaign, implementing strong data protection laws, strict regulations and ethical guidelines to safeguard personal information can ensure security and privacy of users. Indian government has brought Cyber Surakshit Bharat initiative. It is started in association with the National e-Governance Division (NeGO) and industry partners, this initiative aims to build capacity, spread awareness and enable government departments to take the necessary steps for creating a resilient IT setup. Government has also introduced Cyber Suraksha Diwas, under this initiative, all the banks and government

organizations are required to celebrate Cyber Jagrukta Diwas on the first Wednesday of every month.

5. **Social and Ethical Considerations:** Government need to implement a mechanism to identify bias in algorithms so that social development initiatives can be assessed in fair manner and ensure equitable outcomes. We need to promote critical thinking among users and empower them to identify misinformation and avoid manipulation.

Check Your Progress: 4

Note: 1) Use the space below for your answers.

2) Compare your answers with those given at the end of this unit.

1. What are the limitations of ICT uses in social development?

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15.7 LET US USM UP

We discussed so far how ICT can play a vital role in social development. Now, we know that ICTs can play a role in education, health, reducing poverty, E-governance etc. The Indian government has recognized the importance of ICTs in socio-economic development and has implemented policies and plans to transform the country's economy into an information and knowledge economy. Overall, ICTs hold immense potential for social development in India, but addressing the challenges and implementing targeted strategies are crucial for ensuring everyone benefits from the digital revolution.

15.8 KEY WORDS

Digital divide : Gap between those who have access to computers and internet and those who have not

Virtual reality : Computer generated scenes that seem to be real

Augmented reality : Real time use of information integrated with real world objects (E.g. PokemonGo)

Artificial Intelligence : Science of making machines that can think like human beings

15.9 FURTHER READING

- ICT for Education, Development, and Social Justice, Charalambos Vrasidas, Michalinos Zembylas, Gene V Glass, Information Age Publication, USA

- ICTs and Indian Economic Development: Economy, Work, Regulation, Ashwani Saith, M Vijayabaskar, Sage Publication
- Information & Communication Technology (ICT) In Education, Prof. A. Ramakrishna Prof. T. Mrunalini, R.A. Books, India
- ICTS and Indian Social Change: Diffusion, Poverty, Governance, Ashwani Saith, Sage Publication, India

15.10 CHECK YOUR PROGRESS: POSSIBLE ANSWERS

Check Your Progress: 1

Ans. 1 Some major characteristics of ICT are

a. Interconnectivity

b. Knowledge revolution

c. Digitalization

Check Your Progress: 2

Ans. 1: It is the ability of different devices and systems to communicate with each other, regardless of their location or type

Ans.2 ICT has revolutionized the field of education by providing new opportunities for learning, teaching, and collaboration. It has transformed traditional educational methods and opened up new possibilities for accessing information, interactive learning, and personalized instruction.

Ans.3 Tools like screen readers, text-to-speech software, and voice recognition programs come under assistive technology tools.

Ans.4 Some specific uses of ICT in agriculture are:

i. **Precision agriculture:** Sensors, drones, and AI-powered analytics can provide precise data on soil conditions, rain forecast and ground water level, and crop health which help farmers to optimize irrigation, fertilization, and pest control, leading to increased yields and resource efficiency. Weather forecasting tools and data analysis predict weather patterns, pest outbreaks, and crop yields, allowing farmers to make informed decisions and minimize risks.

ii. **E-commerce platforms:** These platforms connect farmers directly to consumers through online platforms. Due to this role of middlemen has reduced which has increased the profit margins to farmers. It has also opened up new market opportunities. Online platforms provide farmers with access to market prices, farming best practices, weather updates, and government initiatives, empowering them to make informed decisions.

iii. **Financial inclusion:** Mobile banking and digital payments enable farmers to access financial services, receive government subsidies, and manage their finances securely. Secure digital transactions decrease dependence on loan sharks and exploitative lending practices, improving financial stability. Direct transfer of subsidies and benefits through digital platforms ensures transparency and minimizes leakage, reaching intended beneficiaries.

iv. **Skill development:** Online training programs and digital resources equip farmers with new skills for adopting ICT tools to managing their farms effectively and accessing new markets.

Check Your Progress: 3

Ans.1 ICT is aiding women empowerment in following ways :

i. **E-learning:** Access to online courses and digital learning platforms have made them learn new skills. These skills are helping them to start new businesses and participate in digital economy. Women are launching content app or platforms for information sharing. ICT has helped them to break geographical and societal limitations.

ii. **Financial inclusion:** Digital wallets and e-payment services give women control over their finances and access to financial services previously unavailable, promoting economic independence and security.

iii. **Empowering voices and participation:** Social Media platforms have enabled women to connect, share experiences and make their voices heard on various social issues directly affecting them. Now, women can create online communities based on specific concern or area-wise. There are various social media campaigns focusing on issues such as education, employment, healthcare, and political representation for women. Some well-known women empowerment campaigns include the #MeToo movement, HeForShe, and the Global Fund for Women. These campaigns use various strategies such as advocacy, awareness-raising, and policy change to address gender inequality and empower women.

iv. **Citizen Journalism:** ICT has also strengthened citizen journalism and online content creation. Women are using digital tools to share their stories, challenge societal norms, and bring local issues to light, promoting greater visibility and representation. ICT also provides online consultation platforms and online voting facility, which ensures women voices are heard and considered in policy decisions.

v. **Combating violence and discrimination:** Online platforms and helplines provide options to women to report harassment, violence, and discrimination, connecting them with support services and legal aid. Social media campaigns are also making them aware of gender-

based discrimination and mobilize them to question the authority and demand justice. We have seen #JusticeForNirbhaya campaign, which culminated into strong legislation against violence against women.

Check Your Progress: 3

Ans. Key limitations of ICT uses in social development are as follows:

i. There is a digital divide in the society. Everyone does not have equal access to Information Communication Technologies. Digital divide is present at various levels. First, there is a lack of proper internet infrastructure; due to this rural areas have no fast internet infrastructure. The lack of infrastructure leads to create hinderance in accessing quality multimedia content.

   At another level there is a content based digital divide in the society also. As we know that India is a multilingual society but on internet majority of the content available is in English language, this leads to content oriented digital divide. Content in all regional languages needs to be created to fill this gap. Indian government has come up with Digital India Campaign which focuses on providing all the ICT services in local languages.

ii. **Digital Literacy:** Sometimes ICTs are available but the population lacks required skill to navigate online platforms, understand information critically and use technologies effectively. This can further increase the gap between haves and have nots. This thing critically hampers the ability of individuals to participate in social development.

iii. **Affordability:** Accessing devices, internet connection, and digital services can be expensive for many. This further creates barrier to social development initiatives. Government needs to address this issue and ensure affordability concerns to ensure equitable access.

iv. **Security and Privacy:** Security threats and data breaches can compromise personal information and put individuals at risk. Robust data protection measures and cybersecurity awareness are crucial to ensure safe and secure online participation in social development initiatives.

v. **Ethical Concerns:** Algorithmic bias, misinformation, and online manipulation can further minimize the benefits of ICTs. Responsible use of technology and ethical considerations are essential to mitigate these risks and promote inclusive social development.

UNIT 16 DIGITAL MEDIA AND ECONOMIC DEVELOPMENT

Structure

16.0 INTRODUCTION

You must be aware about the benefits Information Communication Technology (ICT) is providing in our daily life. ICT is making our life quite comfortable and providing us world of opportunities. At the same time ICT is helping our economy to progress. This unit examines the role of ICT in bringing economic development. There are also discussions on hoe e-governance is bringing economic transformation. We will also discuss about

ICT entrepreneurship, digital start up ecosystem and the stand point of global bodies and countries on the transforming role of ICT in the economic system.

16.1 LEARNING OUTCOMES

After completing this unit, you will be able to:

- list out the core concepts of ICT and key milestones in the development of ICT;
- know the role of ICT in bringing economic development;
- understand the impact of e-governance on economic transformation;
- explain the digital start-up and their ecosystem; and
- discuss the global stand point on ICT and economic development.

16.2 INTRODUCTION TO ICT AND ECONOMIC DEVELOPMENT

Economic development refers to a process in which an economy grows and overall development happens among the citizens of the country. the Economic development of a country depends on various factors. Among them, technology is considered as an important factor that contributes to the development process of a nation. In the late twentieth century, the revolution seen in the Information Communication Technology (ICT) sector has helped many economies, especially India to go up in the ladder of economic development. ICT includes both information and communication technology that helps to process information. By creating huge job opportunities, ICT sector is directly contributing to the growth of a nation. The service industry is directly helping the economy to develop by exporting software and other services. There is a direct link between ICT and economic development within an economy. It has also been recognised quite a long ago.

The trade reforms during 1990s had brought accolades for India as the fastest growing economy during 2000 and afterwards. And for this, the knowledge driven ICT sector has played a crucial role. The concept of global village as coined by Marshall McLuhan has become a reality with the growth of ICT sector. Liberalisation and globalisation process has added fuel to the growth of ICT sector across the globe. The increasing adoption of ICT in various other sectors is giving a big push for the economic growth in India. At present, ICT sector is contributing more than 13% to the overall GDP of India. According to NASSCOM, the technology industry has grown from $ 220 billion revenue in 2020 to $ 227 billion in 2021. All these data shows that the revenue generated from ICT sector is directly contributing to the development of Indian economy. In the developing economies, an appropriate ICT infrastructure which includes internet usage along with hardware and software deployment through innovation is bringing economic development.

16.2.1 Foundational Concepts of ICT and Its Role in Shaping Economic Landscapes

Information is power. It is an organised, meaningful and useful interpretation of data. Data and information can be used interchangeably. This data may be text, sound, images, visuals etc. It is the news that the information seeker wants and that is passed on either orally or written. But now with the invention of technology, information is passed on to the receiver with the help of technology. The basic concept of ICT revolves round three important elements, they are information, communication and technology. The introduction of desktop computer is the first step that led to the invention of ICT. Later, the invention of internet and mobile technologies have added fuel in the development process of ICT all over the world. ICT is an umbrella term that includes hardware, software and internet technologies. These technologies are helping people to communicate and share information digitally within fraction of time. The invention of telephone, computer and internet has changed the way people used to communicate earlier. The technology uses computers, networking equipment, software along with internet to store, process, retrieve and protect information. The term ICT is an extension of the term IT (Information Technology). The integration of communication technology such as audio-visual broadcasting, telecommunication equipment along with internet help users to store, process, access, transmit and manipulate information as and when required. The communication term in the ICT refers to the communication of information or data through the use of internet in electronic form. The technology used in the present era is digital technology. These digital technology helps people to communication information digitally throughout the globe.

The three main components of ICT are computers, communication networks and digital technology for smooth transmission of data. Computers are the electronic devices that can be given instruction to process, store and publish data to the user. We need hardware, software programs, data or information to run a computer. Next comes the communication network, which includes networking devices and internet to transmit and receive data. Connectivity and wireless technology are the greatest contributor in the development of advanced networking. Mobile and wireless communication devices have changed the ICT landscape. Electronic media devices also play an important role in managing information.

You must be aware about various benefits of the ICT. Application of ICT is seen in every field, be it in science, technology, communication, business, entertainment and many other. It not only improves our lives but also helps the economy to grow across the globe. E-commerce, E-banking, E-governance, E-learning are some of the areas where ICT has been applied. In the initial phase of development, ICT has a very limited role in shaping the economic landscapes rather the process was very slow. Later, investment in infrastructure and innovations in this area have impacted the economic landscapes of different countries. ICT has played as a catalyst in bringing

economic development amongst developing countries in the past couple of decades.

If we will look back 20 years down the lane, the whole situation has changed dramatically due to various technological innovations. Big corporates have taken interest and invested crores of rupees in this sector. ICT sector that includes hardware, software, applications, content, network, telephony, service support and others through their business are contributing major revenue to the economy. This sector has proven itself as the foundation for every other sector in the business enterprise segment. By providing necessary information, solution, immediate connection, enhanced production, access to global market, virtual geographical markets, ICT has brought economic growth at every level. Organisations using ICT tools are seeing faster growth which eventually shapes the economic growth of a nation. It is facilitating economic growth by making an impact on the GDP (Gross Domestic Product) of a nation. The ICT which includes hardware, software, telecommunications, electronic equipment manufacturers are playing lead role in the economic growth. Various research studies have also found that high internet penetration along with technological deployments have directly impacted the economic development of nations. Following are few benefits of ICT that helped to shape the economic landscape towards growth and development of various nations, especially India.

- **Faster Connectivity**: Use of digital technology has helped businesses to overcome many problems about connectivity. It has totally wiped out the distance barrier, thus helping organisations to facilitate information, expanding their product markets, monetary transactions through wire transfers, communication through email, voice and video calling etc. It is improving the information access and communication habits of people.

- **Employment generation**: ICT is creating job opportunity for the unemployed. We have a huge talent pool of educated youth who are equipped with highly skilled and semi-skilled knowledge. ICT deployment in business houses is also creating IT related jobs for the younger generation job seekers. In return it is helping organisations to allocate workers efficiently and to maintain transparency in the employment markets.

- **Global Investment**: Due to advanced technology deployment and huge technical experts, multi-national companies in the telecommunication, electronic equipment, hardware and software sectors are investing crores of rupees. This is directly impacting the Foreign Direct Investment scenario of a nation.

- **Increase in Efficiency**: We can see the increase in efficiency of the working population with high-speed internet, broadband connectivity, increasing speed of computing and application of various ICT related technologies. Even government organisations in low income and

developing countries have realised the importance of ICT and have started investing in digital infrastructure through e-governance, e-banking and others.

- **Growth of Social Capital**: To achieve economic growth, a nation needs to develop its social capital. Innovations in digital technology is directly impacting the development of social capital. Availability of social media platforms along with cheap data has been helping people to connect with each other throughout the globe. If the society is functioning properly then the nation will develop and for this, we need a strong social capital base. ICT is helping the social capital base to develop and contribute positively towards an economic growth.

These are some of the positive impacts of digital technologies on an economic scenario of a nation. Apart from this, application of ICT is also creating knowledge cities, increase in agricultural produce exports, digital innovation, reduced the consumer and business transportation cost etc. Therefore, there is a positive corelation between ICT and economic growth.

16.2.2 Historical Perspectives and Key Milestones in the Evolution of ICT

It is always interesting to go back to the history of any area of study. For the students of journalism and mass communication it is as important to know the history of printing press and at the same time also to know the history of computers, internet and digital technology in total. There are some significant milestones that happened in the process of development of ICT that we use today. It was in the late 90s that major happenings were seen in the ICT sector. Let us have a detailed discussion about the history and important inventions and achievements that happened in the ICT sector.

16.2.2.1 History of Computers

Computers have been playing a lead role as far as application of ICT is concerned. The computers that we are seeing today had many incarnations in the long past. Computers have passed through various generations to reach this modern digital form. One generation of computer is different from other generation on the basis of technology used, physical appearance, computing speed and applications. The first generation of computers were developed from 1946-1958 and were characterised by huge size and vacuum tube technology. UNIVAC and ENIAC are some of the names of first-generation computers. Second generation computers replaced vacuum tube with small transistors. Hence, these computers were bit smaller in size. The third-generation computers used integrated circuit chip for faster calculations, while the fourth-generation computers used microprocessors. Their sizes were smaller and were available in cheaper prices but the fifth-generation computers used artificial intelligence. They basically intend to stimulate the human thinking process and intelligence.

There are various categories of computers. They are analog, digital, hybrid, mainframe, mini, super, personal, desktop, notebook, laptop and others. According to the requirements, the users can choose the type of computers. Digital computers are now dominating the computing world. Another notable development happened in the computing world is through the invention of mobile computing.

16.2.2.2 History of Internet

The birth of internet is considered as an important turning point in the history of ICT so far. Internet has changed the communication system of the whole world. It was not possible to share information that was stored in a computer over network to a distance place. Cold War had played a catalyst to develop the network and share information on war strategy. US Defence Department had developed the ARPANET (Advanced Research Project Agency Network) to share information between different computers within a limited area. Before this there were not any standard way available for the computers to connect with each other. In 1969, two computers were first connected with each other for information sharing. A computer scientist named Vinton Cerf has developed TCP/IP to connect more computers with each other. Apparently, this information sharing network was allowed to operate in some of the educational institutes in USA.

It was Tim Berners-Lee, a computer programmer from Switzerland has introduced the concept of World Wide Web (WWW) in 1991. With WWW, people all over the world can search, retrieve, and share information on the web. After this development, a group of researchers from the University of Illinois have developed a browser, known as Mosaic. This web browser allowed people to search any kind of information from the web. Other features like clickable links, scroll bars and others are added into the web browser. Not only the educational institutes but also the government, industry and other major players of the economic system have come forward to deploy this new technology.

With the passing of time, research and developments have been seen in this area of technology. Application of advanced technology in the internet segment has brought several changes. High speed, performance and higher level of functionality were seen. The world of internet has been passing from Web1.0 to Web 5.0. The web technology has progressed tremendously. Earlier we have been experiencing static pages and now we are using virtual reality, artificial intelligence and many more. The journey of internet so far is endless and we are also seeing a brighter future ahead.

Though in between various other developments have happened in the ICT sector. But the next big thing that happened in the ICT segment is the commercialisation of artificial intelligence (AI) in the 21st century. It is not a new technology. The idea of artificial intelligence is quite old. But officially, it was John McCarthy, who for the first time introduced the term in a workshop. It is a technology used by computers to create systems that can

replicate human intelligence. Machines can now think just like human beings. Social media sites are now using AI chatbots to interact instantly with the users. In the upcoming days we will see more applications of AI in our day-to-day life.

16.2.2.3 History of Communication

You must have read in other blocks on communication about the transition of human communication from inscription on rocks to smoke signals to pigeons as messengers. From that period to we have moved to the era of telegraph, telephone, radio, television, email and now instant messaging, audio and video calling, blogs and social networking. The invention of telegraph in 1832 is considered as the biggest turning point in the history of communication. Later the invention of telephone brought new opportunities in human communication in the same century. But the introduction of internet and smart phone has made the communication process much faster, flexible and easier. We are now living in the age of online communication. There are no geographical boundaries between people living across the globe. With the advancement in technology, the communication system has been able to surprise us from time to time. Telecommunication industry which is an important segment in the ICT sector has grown into many folds and hence contributing a major chunk into the GDP.

Let us have a look at various milestones achieved in the development process of ICT.

Key Milestones in the Evolution of ICT

1823-1833: Charles Babbage invented computer.

1832: Samuel Morse invented telegraph.

1940-1956: First generation of computer was developed using vacuum tube.

1956-1963: Second generation of computer was developed that replaced vacuum tube with transistor.

1956 : It was for the first time John McCarthy used the term Artificial Intelligence.

1964-1971: Third generation of computer was developed with the use of integrated circuit (IC) chip

1969: ARPANET connected few computers to share information

1970s: Fourth generation computer was developed using VLSI circuits. Personal computer was developed using small scale IC.

1971: Email was introduced for the first time by Ray Tomlinson.

1973: The handheld cellular mobile phone was launched.

1977: PC MODEM was developed for internet connections.

1980: Analog cellular system was used for the first time and the period is know as 1G (first generation systems.

1980s: Laptops with flip form factor was built for the first time in 1982-83. Ethernet was introduced also.

1981: IBM launched its first personal computer.

1982: TCP/IP was officially formalised.

1984: Steve Job's Apple Inc introduced its first Macintosh computer

1985: Microsoft launched its Windows Operating System. The first virtual community 'The WELL' was started.

1991: World Wide Web was developed by Tim Berners-Lee.

1992: First text messaging was sent through personal computer.

1993: Web browser named 'Mosaic' was released.

1996: The first internet enabled mobile device by Nokia was developed in Finland.

1997: First social media site 'Six Degrees' was created. First wireless LAN was launched. The Institute of Electrical and Electronics Engineers (IEEE) approved Wi-Fi.

1998: Search engine giant Google was launched in USA. Napster was also launched to share audio files over internet.

2000: Mass adoption of broadband internet was seen among developed nation. It was also in the same year the dotcom collapsed, resulting in huge losses for the businesses.

2001: Online encyclopaedia 'Wikipedia' was started by Jimmy Wales and Larry Sanger. #G was launched and audio and video streaming on mobile phone became possible.

2003: Two social media networking sites LinkedIn and MySpace were started. Android was found to build operating system.

2004: Emergence of Web 2.0

2005: Video hosting and sharing site YouTube was launched.

2006: Facebook and Twitter (now known as X) were launched.

2007: iPhone was launched by Apple. In this year there was a joint initiative taken by three broadcasters in USA to make few TV shows available online.

2010: Apple introduced iPad to the world. Web 3.0 helped people to create things on the online platform.

2011: Apple introduced the first virtual assistant SIRI.

2012: Smart phone and tabs with Quad core processor were launched.

2016: The National Payments Corporation of India launched United Payments Interface (UPI) for digital payments. Chinese app Tik Tok made huge ripples among users for creating and sharing of video content.

2019: 5G roll out happened in some of the countries.

2020: Open AI started beta testing for creating various content.

2022: ChatGPT launched to help people gather, share and generate texts with the use of AI technology.

Check Your Progress: 1

Note : 1) Use the space provided below for your answers.

2) Compare your answers with those given at the end of this unit.

1. Point out the benefits of ICT that contribute to the economic growth of a nation.

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16.3 THE ECONOMIC IMPACT OF DIGITAL TECHNOLOGIES

Digital technology mainly comprises of internet, automation of different sectors, artificial intelligence, 5G and others are playing a leading role in the economic growth process of a nation. Adoption of digital technologies in various sectors is creating employment opportunities, increasing exports, high quality industrial production etc. The ICT sector itself is also helping the industrial sector to reduce their cost of operation, assisting back-office support, enhancing the efficiency of the workforce and in many other ways. Whether an economy is progressing or not can be measured by the GDP rate. The higher the GDP rate of a nation, the higher the economy of that country progresses. The dynamic ICT sector is impacting the economy in a positive way. According to NASSCOM, the revenue from Indian technology industry's revenue is estimated to cross $245 billion which is an addition of $19 billion over last year. This amount can be a clear eye opener for all of us to realise the contribution ICT sector is making to the Indian economy.

16.3.1 Digital Technologies Influence Economic Growth And Productivity

Economic growth in a country is realised only when the size of that country's economy increases over a period. Economic growth is achieved when the total production of goods and services increased as compared to the last year.

There are several sectors that contribute mainly to the economic growth. It was only during 1990-2000, ICT sector has been recognised as an important sector that is playing a leading role in shaping the economic condition of few nations, especially India. The software industry in India with its highly skilled labour has been able to attract foreign investments and generation of foreign currency. India is now considered as the economic powerhouse because of its continuous rising GDP growth rate.

Manufacturing sector, especially electronics and telecommunication industries have dominant share in the total revenue earning of the government. As of 2023, the GDP rate of India is more that 7% and the government is positive about achieving more than 8% in the coming financial year. The high rate of broadband penetration has also direct effect on the GDP growth rate. The growth of ecommerce platforms such as Amazon, Flipkart, Zomato, JioMart and others have influenced the Indian economy. The introduction of online payment applications and systems have further pushed the economy ahead.

Digital automation is the most important advantage of digital technology. This automation has saved a lot of working hours. These workers can utilise their free time in more productive work. Various offerings of public services through online platforms and mobile applications have increased the productivity of common mass. Digitalisation of banking, government, manufacturing, and other sectors have impacted the productivity in a positive way. Seamless communication, access to the latest technology and various digital tools have increased the productivity across the sectors. The decline cost of data charges, high speed internet and low-cost computing, advantage of time difference etc. have added fuel for the economic growth.

16.3.2 Case Studies on Successful Integration of ICT in Various Industries

Integration of ICT in various industries have increased the efficiency of workers, their productivity, easy access to goods, services and information etc. It has opened the doors for the business to access global markets. Digital technologies have been integrated into banking, manufacturing, governance, agriculture, roads and transport and other sector. Let us discuss few successful case studies on application of ICT tools in various sectors that helped to grow Indian economy.

1) **The Gyandoot Case Study:** It was a government to citizen initiative taken by the Madhya Pradesh (MP) to provide services regarding agricultural produce pricing, marketing, other citizen services like application and issuing of income certificate, domicile certificate, caste certificate, public grievance redressal etc. This project was implemented in Dhar district in 2000. In this project the MP government has developed an intranet system to run a web portal through which the common citizen can access the information with the help of ICT tools. The project was also aimed to connect citizens with

the local administration. This project has been able to contribute to the development of human being and hence the economy.

2) **e-Choupal.com:** This is another initiative taken by the business conglomerate ITC Limited to connect farmers directly with the corporates for selling their produces. The company's agri-business segment is an exporter of agricultural products. In order to connect the farmers directly with the company without any interference from the middle men, so that they can get the actual benefits. Integration of ICT has helped to connect the farm directly to the factory. This has helped the farmers to handle the challenges such as fragmented farms, weak infrastructure such as absence of cold storage etc. This initiative has helped to increase the rural income through higher productivity, high quality produce and hence there is a demand for higher industrial goods. This demand will directly impact the economy.

16.4 E-GOVERNANCE AND ECONOMIC TRANSFORMATION

As per a survey report published by the United Nation in 2022, there is a positive relation found between income level of a country and its E-Government Development Index (EGDI) value. Denmark, Finalnd, Republic of Korea, New Zealand, Sweden are some of the countries that are doing good in the e-governance sector. The ICT tools is helping the government across the globe in delivering public services efficiently and transparently. There is much accountability in the system and it is now considered as the most reliable platform to connect with the citizen. With the electronic governance, citizens are asked to participate actively in the administrative process and there is less corruption found in the system. These initiatives are helping small business houses to be part of the economic system and contribute in the income generation process of a nation. E-governance projects have the potential to contribute both directly and indirectly to the economic transformation of a nation. Active citizen participation couple with efficient e-governance initiative can contribute towards economic development through proper information channel, transparent administrative systems, less processing time, less travel time, reduction in cost etc. The role of e-governance in India is an important driver to achieve the concept of digital economy. In India the first e-governance project was started in e-learning in Kerala.33

16.4.1 Role of ICT in Transforming Governance Structures for Economic Advancement

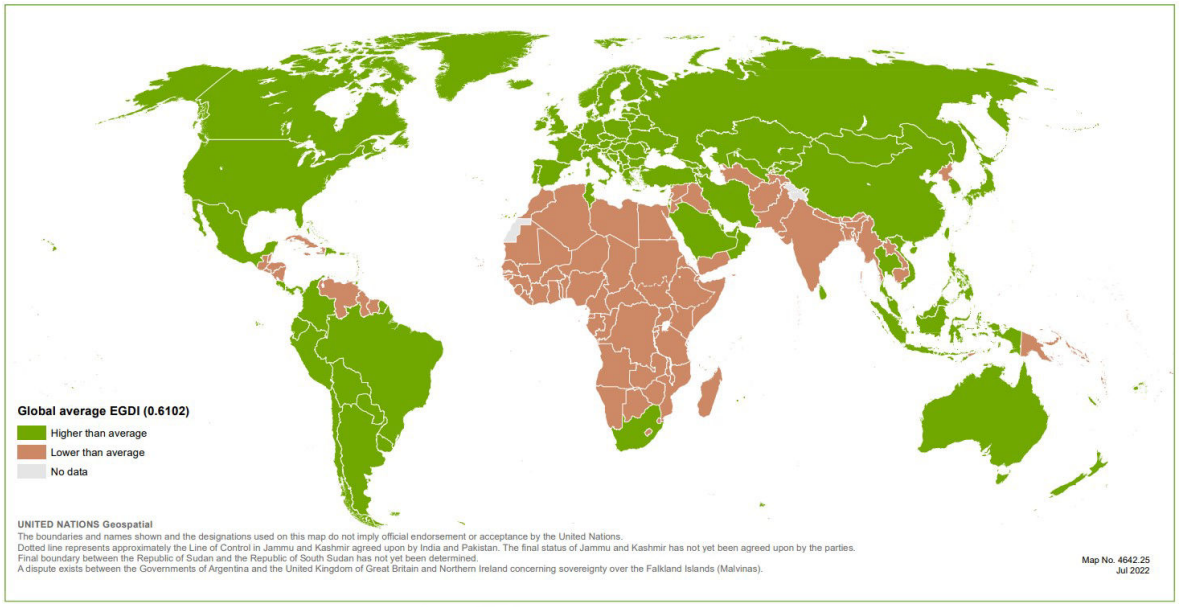
In the present era, technology is helping us to transform the governance by making governments of different countries more transparent, efficient, and effective and responsive. ICT is playing a lead role as far as the e-governance project implementations are concerned. The digital technology used in e-governance initiatives have the capacity to improve the government

information management system. It is empowering the citizen with easy access to information, government services, optimising collaborations with businesses etc. Some of the initiatives taken by government of India in this area are Adhaar, Digi-Locker, Mobile Seva, online tax filing and payment and many other services. Under the National e Governance Plan (NeGP) launched in 2015, India government has moved from mere computerisation of government departments to providing citizen centric services. The implementation of digital technology in various government departments have helped the citizens to directly pay various fees and taxes that contribute to the exchequer of the nation. The Government e-Marketplace project has been able to benefit business houses in e-auctioning, e-bidding, comparing prices, searching better business options and other e-commerce options. In order to empower citizens digitally, Government of India has launched Digital India programme under e-governance project.

Several research studies have been also done on the contribution of strong e-governance initiatives towards economic growth of various nations. Increase in e-governance index will have positive impact on the GDP rate. Another important element in fuelling economic advancement is the reduction of corruption practices. Various online web portals providing citizen services have been playing a key role in tackling corruption issues at large. Though it has not been able to root out from the administrative and bureaucratic system but to some extent the scale has been reduced. This is also translating into economic advancement of a nation. Let us take an example of e-filing of income tax. The online income tax filing has various benefits for the tax payers as well as government. It is providing an easy and convenient way to file, secure transaction, less administrative burden for the government and no involvement of middle man, swift transfer of funds to the government exchequer etc. Therefore, the ICT tools have made positive impact on various governance structures though more competitive business environment, easy access of information, better method of record keeping etc.

16.4.2 Global Best Practices in E-governance And Their Impact on Economies

Both World Bank and United Nations are stressing on the use of digital technologies in delivering services to citizens to bring transparency, faster communication process and corruption free state. Most of the countries in the world are now practising e-governance in their operations. The USA has taken initiative to use IT in the government systems to reduce the paper work, faster response time etc. from 2001 onwards. Around the same time, New Zealand government has also set up an e-government unit to integrate ICT into the governmental system. United Nations Department of Economic and Social Welfare (UNDESA) surveys the member nations on their performance and progress in e-governance initiative from time to time.



Let us discuss some of the best practices that have faired well and made positive impact on country's economic growth. India's 12-digit ADHAAR card system has been a landmark offering for its citizen. This system has been able to facilitate identity verification, easy service delivery, increased the financial inclusion of common man, reduced fraud, and higher social benefits. Increase in financial inclusion of common man has a direct impact on the economy of a nation.

Norway's Altinn Platform is another best practice in e-governance initiative to discuss. The Norway government has developed a one stop website to have direct interaction between businesses and all government agencies. The government also publish all kinds of regulatory information from time to time required for the businesses. This system has been able to increase productivity of the business houses, enhancement of regulatory compliance system, less burden on the government machinery etc. The National Job Bank of Canada is one such initiative where the young people in the age group of 15-30 can search for job opportunities available across Canada. The Canadian government has installed multiple kiosks across the nation which are connected to internet. Youths can search career information, programmes and services offered for them etc. These are directly related to the employment generation segment of its economic advancement.

Requirement of a strong ICT infrastructure has been felt by the Malaysian government long ago. Its poor telecommunication infrastructure was a deterrent for the development of the economy. By recognising its weaknesses, the government has invested huge amount on the basic telecommunication infrastructure. ICT tools were then integrated into the government systems and lots of e-commerce initiatives were taken into consideration. MyBiz is a website developed for the small and medium business houses by the government to facilitate their business requirements and to reach global customers. By helping the businesses for collaborative

marketing and making conducive environment for industries with the help of electronic governance initiatives. Some other countries like Sweden, Republic of Korea, New Zealand are also doing good. They have a good digital strategic policy that has helped them to achieve economic growth.

Check Your Progress: 2

Note : 1) Use the space provided below for your answers.

2) Compare your answers with those given at the end of this unit.

1. Briefly explain the role of e-governance in economic transformation.

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16.5 ICT ENTREPRENEURSHIP AND START-UP ECOSYSTEMS

According to Nobel Peace Prize winner and microfinance pioneer, Muhammad Yunus, all human beings are entrepreneurs. So, anyone can be an entrepreneur now. Flexible enterprise policy along with advancement of technology and transformation in the business environment have given thought to many young talents to choose entrepreneurship over highly paid jobs. The growing digital technology market has attracted people to venture into this segment. According to statista.com, the global ICT market is expected to reach six trillion dollars in 2023. The young entrepreneurs with proactiveness, innovativeness and risk-taking capability are entering into ICT business with new concepts. Entrepreneurs are looking to do business in the upcoming technologies such as Artificial Intelligence, Internet of Things, Cloud Computing, digital products, and others which have large potential in the upcoming days.

Digital transformation has opened various opportunities as well as challenges for us. Entrepreneurs are starting companies with an aim to develop a product or service in the ICT sector. These new companies are known as as start up and they are on their initial phase of operation. They are separate from other enterprises due to their capability of high risk taking, innovative and agile method. Start-up companies, people, funding organisations, government, support organisations and others form the start up ecosystems. There are mentors, investors, advisors and facilitators who are also part of the entire start up ecosystem. Apart from this money, time and skilled workers are also components of the ecosystem. An interesting subject of this ecosystem is that the partners are not likely to be operating form the same place. They may be located at different parts of the world but working for the same start up. Venture capitalists, crowd funding and other grant or loan providing agencies are the source of investment for the start up.

16.5.1 ICT Role to The Rise of Entrepreneurship

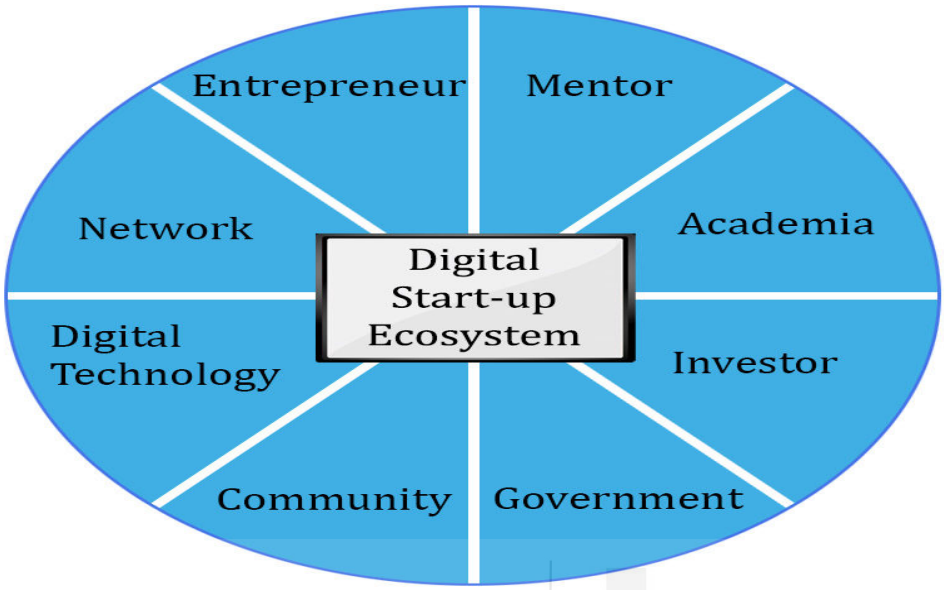
Though there are several reasons behind the rise of entrepreneurship but it is the ICT ecosystem that has increased the number of entrepreneurs. Entrepreneurship plays a leading role in bringing growth for a nation. An entrepreneur must have the capability to take risk, innovate, determination, looking for new opportunities. After the invention and integration of ICT in the business ecosystem, there is a rise seen in the number of entrepreneurs. Going digital is the new mantra for the businesses to succeed. ICT has the capability to expand economic opportunities by providing better process efficiencies and facilitating information needs of the entrepreneurs. It is the key enabler for a business house to do business in an effective way. The application of ICT in the financial and education sectors have especially benefitted many entrepreneurs to earn profit. This has attracted others to join the bandwagon.

Entrepreneurs are now finding new ways to deal with the customers after ICT integration into their business processes. They can track their customers orders, respond quickly to their queries and retaining customers in a much easier way. Along with this, sales, marketing, production, consumption processes also offer much flexible operations after the integration of ICT into main infrastructure of every business. The ease of doing business by seating in a remote place and expanding your business throughout the globe has encouraged many people. Government policy of different countries are now introducing digital entrepreneurship action plans to bring youngsters into the entrepreneurship forum. Higher penetration of internet along with ICT tools have reduced the cost of communication and hence created cooperation among large and small businesses. Therefore, small businesses with limited resources are depending on big firms for cooperation on innovation. Use of digital technology in various government processes have also simplified the process of business registration, licensing, facilitating training for the professionals and applying for grants etc.

16.5.2 Digital Start-Up Ecosystem

Digital start-ups are now considered as an important element in the economic system of a country. They are the companies working in the digital technology areas and are innovative high-tech companies. They prefer to work on low scale at first with low investment and low cost. Later with various innovative business models they expand to reach global markets. Digital transformation has brought new generation of entrepreneurs in the digital technology segment. These start ups are not only generating employment opportunities but also contributing to the economic growth of a country. Various stakeholders are there in a digital start up ecosystem. They are start-up companies, mentors, investors, academia, government, incubators, support organisations and others. They are interdependent on each other and includes communities, organisations, resources, service providers etc. They basically work in collaboration with each other to help the start up companies to progress as a system. Digital start up ecosystems are controlled

by various factors such as marketing environment, financial climate, innovations, skill of various persons etc.



The digital start up ecosystem must function under certain policies, practices, protocols etc. These start-ups are doing business in different areas of upcoming technologies such as artificial intelligence, virtual reality, augmented reality, Internet of Things, mobile applications, digital devices and many other advanced areas of digital technology. As per the data available in the start-up website of India government, India has the third largest start up ecosystem in the world in 2018. Out of 50,000 start-ups, more than 9000 start-ups are operating in the technology space. Indian government has started a new initiative called 'Startup India' to encourage young talents to be part of the start up culture and build an ecosystem for the entrepreneurs to do their business smoothly in 2015. Some of the digital start up companies operating in India are Paytm, Boat, Razorpay, Unacdemy, CRED etc. Corporate connect and government support are the two catalysts that helped to grow the start-up ecosystem in India.

16.6 GLOBAL PERSPECTIVES ON ICT AND ECONOMIC DEVELOPMENT

Countries around the world have already realised the integration of technology with various platforms is essential for sustainable economic development. There were numerous studies done on this subject too which have also established a direct relationship between ICT usage and economic development. United Nation is optimistic about the contribution of ICT to achieve all the 17 Sustainable Development Goals (SDG). International Telecommunication Union (ITU) which plays a dominant role in upgrading ICT infrastructure of developing countries though various initiatives. It provides supports to developing countries for making ICT tools affordable for all. Most of the global bodies are of the opinion that benefits of ICT integration and ICT for all are realised only in developed countries. As per

the Digital Development Review page of the World Bank website, about one-third of the global population remain offline in 2023. It is also found that in the ICT segment, usage of internet, mobile phone and broadband penetration has direct impact on economic development of a nation. There is still digital divide found in some developing and low-income countries.

European Union has drafted policy guidelines under the Digital Education Action Plan (2021-2027) for integrating ICT tools in the digital education ecosystems. According to European Commission, the development of ICT is important for Europe to remain ahead in the digital economy. It has already realised the importance of ICT for economic growth and therefore over 20 billion euro from European Regional Development Fund has been available for ICT investment from 2014 to 2020. After realising the role of ICT in economic development, UAE's Digital Economy Strategy has planned to double the contribution of digital economy to 20% of GDP by 2031. The government has taken strong steps to digitalise the private and public sectors to boost its economy. The Information Technology and Innovation Foundation in an article has opined that the ICT sector through its exports have helped to drive economy upward and counter the inflation along with job creation.

16.6.1 Comparing and Contrasting International Approaches to Leveraging ICT for Economic Growth

Among various determinants of economic growth in the present era, ICT is considered as one of the important among all. Many empirical studies have done on the positive contribution of ICT towards economic growth in various advanced economies. There are some developed countries like USA, Japan, UK etc. who have already leveraged ICT to achieve economic growth. There are some developing countries like India, China who have started integration of digital technologies in various segments to achieve economic growth. But there are also some under developed countries where we are seeing wide gap in accessing digital technology. There are differences found in getting return on investment in ICT in different countries. Though World Bank in its various reports on ICT has expressed that digital technology should be used to reduce information barriers, increase productivity through automation and bring innovations through building knowledge societies. Since 2007, the World Bank has started supporting countries in increasing internet penetration, providing high speed broadband through investment in telecommunication and mobile infrastructure. Still lots of people in Asia and Pacific, Arab region and African countries are still need to be connected to internet. There is also gap found among men and women in accessing digital services like accessing internet, e-banking services, usage of smart phone etc.

India as a developing country has been able to attract investment from both foreign and domestic investors in the ICT sector. Therefore, ICT sector has been able to generate employment opportunities and thus contributing to the GDP. In this digital era, e-commerce is one of the major generators of revenue. USA is the largest e-commerce market in the world. E-commerce is

earning a whopping revenue of 925 billion US dollar. Consumers are getting rich online shopping experience with the use of smart phones. Now social media platforms such as Instagram, Facebook and others have also created opportunities for the seller community. Most of the countries have made their mark on integration of ICT in the education sector. Covid-19 restrictions have compelled some of the governments to think of boosting ICT infrastructure in their respective countries. To meet the health emergencies, countries like India has upgraded the data management systems to connect government with health care providers and public. The government in USA is still spending around 70% of its ICT budget on upgrading to new technology. Developing countries are now adopting cloud computing to manage their IT resources. This technology comes to rescue government to manage their exponential growing data. When Russia attacked Ukraine in 2022, Ukrainian government suddenly secured its civil service provisions though the use of cloud computing.

16.6.2 Global Interconnectedness of Digital Economies

As per the survey report of UNDESA 2022, the global digital economy is growing at a faster rate than the global GDP. It is expected to reach $25 trillion within next 5-6 years. The backbone of digital economy emphasises on interconnectedness among people, machine, internet and organisations. Digital data, digital technology and digital infrastructure are the three pillars of digital economy. The new trend and policies practised by various countries in their e-governance approach will rise their respective digital economies. Frontier technologies such as AI, IoT, VR, cloud computing etc. will drive the economic growth. The Covid 19 and other challenges have compelled the world leaders to think in a collaborative way to face the difficult situations. Mobile applications developed for transferring money has benefitted people residing in rural areas where banking operations were distant dream. Internet Governance Forum is a platform created for multiple stake holders from different countries can collaborate and share knowledge on global scale. World Bank has started working with partners like ITU on policy formulations. It has also worked with African countries for financing ICT infrastructure.

There should be a proper policy guideline to introduce digital economy integration among nations. We are seeing digital divide in many countries due to non-availability or poor availability of ICT infrastructure. It is a difficult task to bring them into the purview of digital economy. To bring these countries into the global digital economy scenario, the developed countries along with UN and ITU must guide and support in the process of digital transformation. IT giants Microsoft, Google, Facebook and others have played important role in building ICT infrastructure in less developed countries to provide wide range of ICT services. Due to interconnected global economic activities our economies are interconnected with each other. The digital transformation through digital data, technology and infrastructure will help to achieve the global interconnectedness in the digital economy.

Check Your Progress: 3

Note : 1) Use the space provided below for your answers.

2) Compare your answers with those given at the end of this unit.

1. Write a brief note on the digital start-up ecosystem in India.

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2. Name four frontier technologies that are in the lime light through-out the globe.

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16.7 LET US SUM UP

In this unit, we have discussed various elements of ICT, role of ICT in bringing economic development and growth. We came to know about the role E-Governance is playing in the economic transformation process of a nation. We have also discussed on the digital start-up ecosystem and its contribution to the economy. At last, but not the least, discussions on global perspectives on ICT and digital economy were also analysed.

16.8 KEYWORDS

Entrepreneurship : The ability of the entrepreneur to do business by taking risk to earn profit.

Economic growth : It is the development happens within an economy in a specified period of time, i.e. in a year.

Digital economy : It is an economy where digital technology plays an important role in connecting people, organisations, data, businesses etc.

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16.10 CHECK YOUR PROGRESS: POSSIBLE ANSWERS

Check Your Progress: 1

1. Four benefits of ICT that contribute to the economic growth are faster connectivity, employment generation, global investment, increase in efficiency and growth of social capital.

Check Your Progress: 2

1. E-governance is playing an important role in economic transformation of a nation. Efficient e-governance initiative can contribute towards economic development through proper information channel, transparent administrative systems, less processing time, less travel time, reduction in cost.

Check Your Progress: 3

1. India has the third largest start up ecosystem in the world in 2018. Out of 50,000 start-ups, more than 9000 start-ups are operating in the technology space. Indian government has started a new initiative called 'Startup India' to encourage young talents to be part of the start-up culture and build an ecosystem for the entrepreneurs to do their business smoothly.

2. Four frontier technologies are artificial intelligence, virtual reality, Internet of Things and cloud computing.

UNIT 17 KNOWLEDGE SOCIETY: DEVELOPING COUNTRIES PERSPECTIVE

Structure

17.0 INTRODUCTION

Human beings have changed the course of nature in the name of development for many centuries. Our earth has been exploited and contaminated by the end products of industrialization and globalization. These two concepts were proudly celebrated and highlighted by every human for being able to live an enhanced and developed life. All these developments became possible when humans used their knowledge as it played a crucial role in evolving us, enabling the development of our lifestyle. Knowledge differentiated us from our cousins – the apes, aided in creativity, logic and critical thinking making decisions on right and wrong. There is a big debate on defining knowledge by various philosophers over thousands of years, but the essentials of Knowledge reveal its nature. Knowledge is something we know already or the complex ideas we try to learn. Plato defined knowledge as attainable which is the truth,

Socrates says it's the awareness of one's ignorance which possibly be the truth and Aristotle believed knowledge must be objectively true and necessary. Knowledge serves as a foundation for effective communication between human beings. The ability to communicate verbally was one of the major reasons for the evolution and development of humans. Human communication uses a combination of verbal and non-verbal cues, alphabets, codes, and various symbols. For the past two centuries, electronic communication helped us to communicate faster, and it evolved to the recent technology of the Internet and social media.

17.1 LEARNING OUTCOMES

After learning this Unit, you will be able to;

- understand the relationship between the Information Society and the Knowledge Society;
- know the types of economy and access to knowledge;
- understand Agrarian, Industrial, Information/Knowledge, and Internet economies;
- understand international and national aspects of knowledge access;
- assess information needs for national development, especially in developing countries;
- assess the cost of information support in developing countries;
- understand international cooperation in information;
- analyze technology transfer communication cost and its impact on developing economies;
- understand information support for development planning, including rural planning; and
- understand the digital divide and its attempts to bridge it.

17.2 INFORMATION SOCIETY AND KNOWLEDGE SOCIETY

17.2.1 Information Economy and Wealth of Nations

'Information is power' is an adage. There are several examples in history when an information-rich society, advanced in technology and industrial development, with the capacity to produce an abundance of material wealth, had become predatory, and arrogated to itself the control of and dominance over other societies, had eventually turned self-destructive. Therefore, in recent years, from the point of contribution to real sustained benefits to society, the issue 'Which is it knowledge or information?' has arisen. Hence, also the associated terms Knowledge Society and Information Society.

The scope of the two terms 'Information Economy' and 'Economics of Information' indicate that they are related and not mutually exclusive. Yet in their scope, they can be differentiated. The former concept relates to the macro-level (cf. agrarian economy and industrial economy) to a country as a whole; the latter, on the other hand, is more applicable to the micro-level, dealing with, for example, the efficiency or input/output ratio of a specific information service, such as selective dissemination of information, online access, etc. The relationship between the wealth of nations and the information economy impacts various factors such as globalization, Human capital development and overall infrastructure that fosters growth and wealth.

British economist Adam Smith wrote that a nation may lose its physical material wealth. Still, if it were able to save and retain the knowledge by which such material wealth was produced then it would be possible to create once again that material wealth. Still, if the knowledge by which the material wealth was produced was lost or destroyed then all would be lost. The growth of a knowledge-based society will bring about fundamental changes in the production, distribution, and exchange of information and almost every social and cultural institution will change in some ways.

The 20th century is called the Information Age, which experienced a rapid shift from traditional methods of communication to electronic and Digital methods. The invention of the Internet is seen as one of the greatest of all as it allows us to communicate faster and more efficiently. Internet technology contributed to Knowledge society through enhanced applications such as Web 2.0 enabling unbound possibilities of creating and sharing, unrestricted time and physical constraints in accessing information.

17.2.2 Digitally Empowered Society and Knowledge Economy

In today's techno-centric world, Digital literacy and competency are essential to accessing information and the knowledge economy. However, access to digital tools is not yet fully accessible to millions of people. Digital literacy is the ability to consume digital communication tools, applications, and networks to access information in a knowledge society. The Internet has transformed from a medium of information dissemination to a platform of content creation, reproduction and sharing, enabling users to create, reproduce and information. Globalization and other technological developments have paved the way for digital information flow but still, knowledge may not have reached many people. Without Knowledge dispersal to the right receivers, the digital divide acts as the greatest challenge in underdeveloped and developing countries. Many researchers have argued across disciplines that knowledge plays a major role in sustainable development.

UNESCO aimed to foster knowledge societies by providing access to information with the help of technologies for economic development and intercultural dialogue. Countries like Estonia, Singapore and South Korea implemented a comprehensive E-governance system enabling citizens to include digital signatures in documents, and smart cities with high-speed

internet facilities. In 2015 Indian government initiated the Digital India programme with a vision to transform our nation into a digitally empowered society and knowledge economy. The programme focused on digital infrastructure, digital literacy and digitalized payments to utilize the power of digital technologies for the development of the nation. However there are challenges in this programme such as digital divide, data theft and privacy issues.

Check Your Progress: 1

Note: 1) Use the space below for your answer.

2) Compare your answers with those ones given at the end of this uni.

1) Discuss the role of Knowledge in human evolution.

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2) Explain the role of Digital empowerment in development.

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17.3 CHARACTERISTICS OF CHANGE: SOME INDICATORS

17.3.1 Production to Demand-Based Economy

For many centuries human beings have been totally dependent on nature to provide for most of their needs such that the level of production determined the level of consumption. The application of knowledge, especially scientific, technical and managerial knowledge, to development has changed that scenario.

One characteristic of the change is the increasing proportion of returns to a given effort and investment (a value-added return) and a subtle shift in the axis of economics from a supply base to a demand base. A demand-based economy now experiences a shift from a production-based economy to a demand-driven approach which focuses on the consumers 'preferences and needs. Understanding consumer behaviours is essential for strategic decision-making in the business environment. The dependent nature of humans has changed over time with knowledge application shifting from supply-based to demand-based which enabled the mass production of demands from society. Knowledge-based economy indicators reduce environmental deterioration by transforming demand culture, with the help of technology. Technology helps people's lives by improving the quality, and ease of access to various

applications, and modernizations as well as educating society. Education thus enhances productivity and creativity facilitating the efficiency in knowledge.

17.3.2 Mass Society and De-Massification

The concepts of Mass Society and De-massification are widely used in cultural studies and sociology to illustrate cultural patterns and social structures. Urbanization and industrialization crafted a social condition of homogeneity among people. Problems of modern societies arise from their growing complexity, that is, multiple interactions and interdependence, thanks in a large measure to developments in ICTs and transportation. Resolution of the problem calls for the formulation of appropriate policies and the creation of political and administrative structures responsive to the new scales of social demands, and the development of more comprehensive, secular and integrated goals that diverse people can share. The characteristics of Mass society include mass production, consumption, centralization of power making the public consume similar products on a mass scale, and generalization in opinions created by Mass media.

The main characteristic of a second wave industrial economy is mass production of large quantities of goods using machines that repeat rapidly predefined actions. The third wave information economy is characterised by the use of information-intensive, robotised manufacturing systems capable of endless, cheap variations and even customised end-products to meet customer's special needs and micro-markets. This enables small specialised units to compete with larger general production units or obtain contracts from the latter to produce value-added products and services. The smaller units, say in developing countries, can create their own niche markets. All these are changing the nature of market competition, and mail-ordering systems. It is revolutionizing, de-massifying production and distribution systems. De-Massification involves customisation and personalisation of products and services based on individual/customer needs and preferences. The concept extended its arms when the Internet and digital technologies were invented. Decentralised applications and network platforms like social media enable customers to access information and content based on their needs and preferences.

17.3.3 Technology, Innovation and Workforce Changes

In an information economy the main items of trade would be information and data, products of the information industry, hardware and software and related knowledge and expertise. More enterprises will be able to access data and information about their competitors and customers. Customers will be able to access and receive information about competing firms and their products and services. Loyalty, trust and open communications will reshape the nature of customer and supplier contracts; suppliers will draw directly on information held in databases by their customers, working on closely and seamlessly as an in- house supplier now does. Electronic mail and billing systems will reduce the cost of transactions.

With a global reach for communicating electronically, distance will not be a determinant of markets and costs. Enterprises organise certain types of work in shifts according to the time zones – Australia and East Asia, Europe, and America, such that work on a project or a product can go on almost round the clock in different countries. Add to this the profit from wage differential, for example, in developing countries with an abundance of skill and expertise. Clients can receive customised products and value-added services when and where they want thanks to the networks. Gartner Glossary highlighted the impact of digital technologies in the Industrial Revolution and mentioned it as the fourth Industrial Revolution leading to the rise of small industrial businesses. Gartner Glossary defined Digitalization as the use of digital technologies to transform business models and generate revenue.

With the aid of affordable digital devices and reduced Internet costs, India is currently experiencing a digital revolution. According to the MSME (Ministry of Micro, Small and Medium Enterprises) report for the financial year 2021-2022 there are 30 million small and medium enterprises (SMEs) in our country. The SME sector is growing at a rate of 8% per year and by 2026, 12 million people will be involved in small-scale enterprises. The Digital India programme facilitated a growth in digital payments through UPI (Unified Payment Interface).

The workforce challenges are poor infrastructure and insufficient training in accessing digital technologies. In 2016 The IFC (International Finance Corporation) reported a massive finance demand gap in SME sectors. It also recommends reforming our educational system to provide skill development and upskilling programmes to meet the current industry needs. One of the most important challenges is data security, due to poor infrastructure and inadequate financial support, digital technologies are prone to cyber attacks.

Check Your Progress: 2

Note: 1) Use the space below for your answer.

2) Compare your answers with those ones given at the end of this unit.

1. Discuss the current status of Digital India towards development.

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17.4 INFORMATION ACCESS: INTERNATIONAL AND NATIONAL ASPECTS

17.4.1 International Flow of Information

Knowledge is embodied in people, in things natural and man-made, and in documents and other media. Knowledge – scientific, technical and managerial – is a key input to socio-economic development. Knowledgeable persons,

intellectuals and scholars are, therefore, the most valuable resources or assets of a nation. Investments for the development of this resource, the best basis for sustainable long-term national development, should receive top priority in any national development plan. Developing countries majorly rely on technical knowledge for their economic development, but the information systems in their information systems lack the technological advancements to access and analyse information. These developing countries benefit from the information accessed from developed countries having a better understanding of their countries' resources. Information flows across cultures, nations ignoring traditional borders and leading to a change through the major forms of

- Digital technologies
- Media and other entertainment tools
- News channels
- Participatory journalism applications

17.4.2 ICT and Development

Information and Communication technology utilizes computing and telecommunication technologies to facilitate information creation, collection transmission and storage, including computing technologies and wired and wireless technologies to support various communication technologies. ICT has enhanced the pace of learning, and knowledge creation, boosted productivity and accelerated the economy.

The role of ICT in development is fundamental as it transforms society and leads to growth. The Asian Development Bank (ADB) emphasizes that ICT for development is not just digitalization or technological improvement, but is about educating the communities for inclusive growth, innovation and improved well-being.

Check Your Progress: 3

Note: 1) Use the space below for your answer.

2) Compare your answers with those ones given at the end of this unit.

1. How do ICT tools transform society?

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17.5 DIGITAL DIVIDE

In the 20th century, the term Digital Divide was coined to define the divide between individuals who own a telephone and who don't. After the invention

of the Internet, the same term was used to describe individuals with and without digital and internet access. The digital divide in underdeveloped and developing countries is characterized by unequal access to the internet as well as bandwidth inequality. In 2023 more than 692 million internet users are in India of which 67 percent are from urban and 31 percent from rural population. According to the Centre for Monitoring Indian Economy (CMIE) report Indian women are 33 % less likely to access the internet than men.

The harsh reality of the enormous digital divide hit us hard during the pandemic situation, a significant issue in various sectors such as education, healthcare and the economy was evident despite continuous efforts being taken under the Digital India programme. Disparities in accessing online education, limited resources of e-learning and lack of digitized library resources made the pandemic a difficult situation for students. This divide is often caused by poverty, lack of infrastructure, and cultural expectations. Women and girls in our country and worldwide can harness ICT's potential to improve their lives, and communities, and participate in policy decisions

17.5.1 Data Security

The process involves the protection of digitized information in any digital device including, hardware, software, and storage devices, against cyber attacks, insider threats, data thefts etc. Data security is essential in International and National level organizations to protect the data from theft, data breaches and protection from financial and reputational loss. Censorship and information filters have been implemented by governments of few countries. Changes in work culture, such as telecommuting, working for multiple organizations simultaneously, and the formation of virtual teams, Online meetings had become an inevitable one post-pandemic. These changes offer advantages to the family and individual but also disadvantages depending on socio-economic and technological development, nature of work, and existing work culture and habits. IT developments are happening at a pace that leaves little time for national authorities, managers, and decision-makers to understand and evaluate their impact on the social, political, economic, and cultural fabric of the country. Privacy and confidentiality of information; freedom of access to and publication of information; sovereignty and conflicts vis à vis nation-states; intellectual property and business law-related matters; trade in information services across national borders; and activities of transnational corporations in technology transfer, and information services. To determine the extent of economic and political vulnerability caused by a country’s heavy reliance on external information, information services, and technologies, and to take steps to reduce such dependence if necessary.

Check Your Progress: 4

Note: 1) Use the space below for your answer.

2) Compare your answers with those ones given at the end of this unit.

1. Discuss the consequences of Digital Divide.

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17.6 ECONOMICS AND POLICY ISSUES

Economics and policy issues play an important role in the development of any society. Information is not merely an input resource for effective socio-economic development planning, but it is essential to ensure the optimal allocation and utilization of all other resources. Despite this vital characteristic of information about development planning, very few national development plans of developing countries have an information chapter, not even a separate budget line for it. Even within sectoral plans, one may not find a separate budget line for information. Yet it is often reiterated that information is a national resource and that national information policy and plan should be coordinated with or be derived from national development policy and programme. National development planning should recognize the information sector, like other economic sectors like agriculture, industry, science and technology, education, and culture. This will integrate information infrastructure development plans, understand the mutual influences between information and other sectors, provide data for the information economy, and formulate guidelines for apportioning national resources among information sector elements and other sectors. The level of information handling capability is a socio-economic indicator. Criteria for allocating resources for producing, processing, distributing, and accessing transient information, such as commercial or stock market information, should be developed. Priority among information demands should be based on socio-economic and cultural contexts and developmental stages of a country. Economists can help develop a suitable classification of information processes once the concept of an information sector is accepted. Many considerations support policy-making towards development, they are:

- Achieving and maintaining a stable economy through structural reforms
- Reducing poverty through sustained economic growth and education
- Investing in Infrastructure development and innovation
- Increasing sustainable small and medium-scale business environment
- Upskilling programmes to be included in school-level education.
- Creating fair labour market opportunities
- RTE (Right to Education) and RTI (Right to Information) ensure more transparent governing system and inclusive development by decreasing the disparities.

The right to information is a fundamental human right that influences information system design, networking, outsourcing, virtual team formation, and joint research. However, information processes operate imperfectly, and access to information is not equal to all classes. The capacity for effective use of information differs significantly among individuals, classes, and nations. The use of information also depends on the environment, such as R&D, higher education, industrialization, and commerce. The appropriateness of information accessed also influences the use of information. Efficient and effective use of information in a country also depends on the level of infrastructure development, which may vary within and among countries.

Check Your Progress: 5

Note: 1) Use the space below for your answer.

2) Compare your answers with those ones given at the end of this unit.

1. Discuss the considerations that support policy making towards development.

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17.7 LET US SUM UP

Knowledge has played a crucial role in human evolution, fostering creativity, logic, and decision-making. The evolution of communication from verbal to electronic interactions has revolutionized societal interactions. Information Economy and the Economics of Information are related but differ in scope. The Internet has facilitated a shift towards a knowledge society, impacting factors like globalization, human capital development, and infrastructure. Initiatives like UNESCO's aim to foster knowledge societies and Digital India highlight the role of digital empowerment in development. Changes include a shift from a production-based to a demand-based economy, with mass society focusing on customization and personalization. Digital technologies, media, news channels, and participatory journalism facilitate information access at the international level. However, the digital divide persists, posing challenges in access to digital tools and knowledge. The consequences of the digital divide include disparities in education, healthcare, and the economy. Data security is essential to protect against cyber threats, and economic and policy issues focus on stability, poverty reduction, infrastructure investment, and fair labor market opportunities.

17.8 KEYWORDS

Idea : The product of thinking, reflecting, imagining, etc. got by the intellect by integrating with the aid of logic, a selection from the apperception mass, and/or what is

directly apprehended by intuition, and deposited in the memory (Ranganathan, 1967, CR2). Alternative term: Concept.

Knowledge : The totality of ideas conserved by humans. In this sense Knowledge is equivalent to the connotation of the term 'Universe of Ideas'.(Ranganathan, 1967, CR21)

Information : Information is "organised data which are (or rather can be) communicated" (Porat, 1977). Knowledge is information that has been assimilated or "appropriated", or information that has been meaningfully aggregated into a reservoir of facts and concepts that can be applied. WordNet defines 'Information' as a collection or facts from which conclusions may be drawn; and as knowledge acquired through study or experience or instruction. Ranganathan defines information as 'Idea communicated by others or obtained by personal study and investigation. He adds 'Knowledge and information are sometimes treated as synonyms. (Ranganathan, 1967, CR22).

Communication : The term 'To communicate' is derived from the term 'to commune' meaning to share. Information is the message carried through the communication medium (human or machine) by a communicative action. The process of communication helps to move, transfer, circulate information from the point of its generation or recording or location to points of its potential use.

Development : Development is the bridge between the hopes and aspirations of a people on the one hand and the realities of the world on the other. In this context information and knowledge are the pillars of that bridge. For sustained development, it is not a question of information or knowledge; both are required. "Development, even economic development is a knowledge based process." (Boulding, 1966)

Energy Axis : The investments in and undertakings for the identification of energy sources, energy generation, storage, processing, transfer, use, and conservation (and the related economics and geopolitics).

Information : Communication Axis The investments in and undertakings for the generation, recording, storage, processing, accessing, communication and use of

information (and the related economics and geopolitics).

Poverty Index : The index measures the percentage of households in a country deprived in three dimensions: monetary poverty, education, and basic infrastructure services, providing a comprehensive picture of poverty.

17.9 FURTHER READINGS

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17.10 CHECK YOUR PROGRESS: POSSIBLE ANSWERS

Check Your Progress: 1

1. Discuss the role of Knowledge in human evolution.

Knowledge significantly influences human evolution, shaping both biologically and culturally. Early humans demonstrated cognitive abilities through tool use and innovation, leading to the development of sophisticated tools. Cultural transmission of knowledge about tool-making and tool use facilitated efficient sharing and transfer, fostering social cohesion. Knowledge within communities, such as hunting techniques and medicinal plant use, contributed to group survival. Environmental knowledge enabled adaptation to ecosystems, while technology and innovation led to advancements in tools and agriculture.

2. Explain the role of Digital empowerment in development.

Digital empowerment is crucial for societal development, contributing to economic, social, and cultural progress. It involves using digital technologies to enhance individuals' capabilities and engage in the digital landscape. Access to digital tools is essential, but challenges persist in ensuring full accessibility. Digital literacy is essential in a knowledge society. Initiatives like UNESCO and national programs like Digital India emphasize the importance of digital empowerment, but challenges like the digital divide, data theft, and privacy need to be addressed for inclusive development.

Check Your Progress: 2

1. Discuss the current status of Digital India towards development.

The Digital India initiative, launched in 2015, aimed to transform India into a digitally empowered society and knowledge economy. Key achievements include expanding internet access, enhancing digital literacy, promoting e-governance, and digital payments. Key achievements include cybersecurity, rural connectivity, digitizing health records, developing smart cities, and launching the MyGov platform for citizen participation in governance.

Check Your Progress: 3

1. How do ICT tools transform society?

ICT tools have revolutionized society by accelerating learning, boosting productivity, enabling global communication, and transforming work culture. They provide access to vast information, facilitating knowledge creation and collaboration, and streamlining processes. They break down geographical

barriers, fostering global partnerships and work continuity. ICT tools also democratize access to information, allowing smaller units to compete with larger ones. Digital India initiatives, like UPI, support SMEs in India. However, challenges like poor infrastructure, insufficient training, and data security persist.

Check Your Progress: 4

1. Discuss the consequences of Digital Divide

The digital divide, characterized by unequal access to digital tools and the internet, significantly impacts education, healthcare, and the economy. It exacerbates existing inequalities, particularly in underserved communities, and has been exacerbated by the pandemic. Economic disparities are also exacerbated, as individuals without adequate digital literacy miss out on opportunities for online employment, digital entrepreneurship, and e-commerce. The digital divide also deepens social and cultural divides, and workforce challenges arise due to limited digital access and skills. Gender disparities are also a concern.

Check Your Progress: 5

1. Discuss the considerations that support policy-making towards the development

    - Achieving and maintaining a stable economy through structural reforms
    - Reducing poverty through sustained economic growth and education
    - Investing in Infrastructure development and innovation
    - Increasing sustainable small and medium-scale business environment
    - Upskilling programmes to be included in school-level education.
    - Creating fair labour market opportunities
    - RTE (Right to Education) and RTI (Right to Information) ensure more transparent governing system and inclusive development by decreasing the disparities.

The right to information is a fundamental human right that influences information system design, networking, outsourcing, virtual team formation, and joint research. However, information processes operate imperfectly, and access to information is not equal to all classes. The capacity for effective use of information differs significantly among individuals, classes, and nations. The use of information also depends on the environment, such as R&D, higher education, industrialization, and commerce. The appropriateness of information accessed also influences the use of information. Efficient and effective use of information in a country also depends on the level of infrastructure development, which may vary within and among countries.