DEFINITION OF ICT

ICT stands for Information and Communication Technology. It refers to the combination of computer applications and communication technologies used for gathering, processing, storing, and disseminating (sharing) information.

In simple terms, ICT involves using computers and related tools to turn raw data into meaningful information and make that information available to the right people at the right time. ICT is built on two core areas working together: computer technology, which provides the tools and systems for storing data and processing it into useful information in digital form, including the hardware and software that handle calculations, storage, and manipulation of data; and communication technology, which enables the sending, receiving, and exchanging of information through networks and digital channels, allowing information to move quickly and securely between people, devices, or locations.

ICT covers a wide range of tools, devices, and technologies that work together to manage and share information, including computer hardware such as processors, memory, storage devices, monitors, keyboards, and printers; computer software such as operating systems, application programs, and databases; telecommunication technologies such as networks, internet connections, and mobile networks; projection devices such as projectors and large screens for presentations; network systems including Local Area Networks (LAN) and Wide Area Networks (WAN); digital cameras; Compact Discs (CDs); Digital Video Discs (DVDs); cell phones and smartphones; satellites; fibre optics cables; and many other digital tools used for creating, storing, processing, and transmitting information.

ICT combines the power of computers to process and store information with the ability of communication technologies to share that information instantly across distances. This combination allows businesses, governments, schools, and individuals to work more

efficiently, make faster decisions, reduce paperwork, reach wider audiences, and stay connected in real time.

ROLE OF ICT IN BUSINESS

ICT plays a central and transformative role in modern business operations by enabling faster, more efficient, and more effective ways of conducting activities across all functions of an organization. Its applications contribute significantly to competitiveness, cost reduction, customer satisfaction, and long-term sustainability.

Quick and effective communication

Communication is essential for maintaining strong relationships between different stakeholders in a business, including employees, suppliers, and customers. ICT simplifies and accelerates communication processes by providing various digital tools and platforms that allow instant interaction, real-time exchanges, and global connectivity. These tools enable businesses to deliver prompt responses, share information efficiently, and maintain continuous contact with all parties involved, regardless of location or time differences.

Global expansion of business

ICT enables businesses to operate and extend their reach far beyond their physical location without the need for extensive physical presence in multiple regions. Through digital platforms, online systems, and remote access technologies, organizations can offer products, services, and support to customers worldwide, enter new markets, and establish a broader customer base. This capability allows businesses to scale operations internationally, increase market share, and generate revenue from diverse geographical areas with reduced infrastructure costs.

Enhances effective decision making

ICT supports better and faster decision making by providing tools and systems that collect, analyze, and present business performance data in real time. Software applications and dashboards display key information about finances, customers,

inventory, sales trends, and other critical metrics in an accessible format. This allows managers and employees to view up-to-date data, identify patterns, evaluate options, and make informed choices regarding resource allocation, product focus, customer engagement, and operational adjustments.

Aids in automation of business processes

ICT facilitates the development and implementation of automated systems that handle routine and repetitive business tasks with minimal human intervention. Automation streamlines processes such as billing, data collection, inventory monitoring, order processing, and reporting, allowing these activities to be completed more quickly, accurately, and cost-effectively. By using enterprise software and centralized databases, organizations can reduce manual work, eliminate intermediaries, improve consistency, and free up human resources for higher-value activities.

Helps to improve business security and reduce risks of theft and loss of confidential information

ICT provides robust mechanisms for protecting valuable business information, including transaction records, client details, employee data, and other sensitive content stored in databases. Through secure storage solutions, access controls, encryption, and monitoring systems, organizations can safeguard data from unauthorized access, theft, loss, or damage. These technologies help maintain confidentiality, ensure compliance with legal requirements, and minimize the risk of security breaches or data compromise that could lead to financial or reputational harm.

Aids in marketing and advertising of a business to create awareness

ICT has revolutionized marketing and advertising by shifting most campaigns to digital platforms and channels that are more targeted, measurable, and cost-effective. Businesses use ICT tools for content creation, online advertising, search engine optimization, and audience analysis. Digital marketing allows organizations to reach specific customer segments, track consumer behaviour and trends, identify profitable opportunities, and promote products or services to a wide audience, including remote or previously inaccessible markets.

For each point, think critically about how these applications are used in real Ugandan businesses or in your own experience, and be prepared to discuss specific examples in class.

STRATEGIC USES OF ICT

ICT can be strategically applied in various ways to enhance a business's competitive advantage, improve market position, and ensure long-term sustainability. The following are the key strategic applications of ICT in business.

Customer Lock-in through ICT

Many businesses use ICT techniques to retain existing customers and make it difficult or inconvenient for them to switch to competitors. This is achieved by creating digital ecosystems where customers invest time, money, or data into the business's platform, such as purchasing digital content, applications, subscriptions, or building personal profiles and transaction histories. Once customers have committed resources to the platform, transferring them to another provider becomes costly, time-consuming, or impractical. As a result, customers tend to remain loyal to the original business, strengthening customer retention, reducing churn rates, and creating barriers to entry for competitors.

Innovation through ICT

Businesses invest in research and development to create new products, services, or business models that attract customer interest and meet emerging needs. Advancements in ICT make innovation essential for staying competitive in a rapidly changing market. ICT enables the development of entirely new ways of delivering value, often disrupting traditional industries by introducing simpler, more convenient, or more efficient alternatives. Continuous investment in ICT helps companies acquire new skills, adopt emerging technologies, and respond quickly to market shifts, leading to differentiation and growth.

Differentiation through ICT

Businesses can stand out from competitors by adopting and integrating new technologies that others have not yet implemented. ICT allows organizations to offer unique features,

improved user experiences, or added conveniences that create a distinct value proposition. This differentiation can include specialized digital tools, enhanced service delivery methods, secure or simplified processes, or personalized interactions that make the business more attractive to customers. By providing something competitors do not, the business builds stronger customer preference and loyalty.

Cost Reduction through ICT

Cost reduction through ICT is a deliberate business strategy aimed at lowering the expenses associated with producing or delivering products and services to improve overall profitability. This is achieved through various ICT-enabled changes, particularly the automation of manual or repetitive business processes that previously required significant human labour. Automation improves operational efficiency, reduces the number of staff needed for routine tasks, minimizes errors, speeds up workflows, and lowers operational costs. By streamlining processes and eliminating unnecessary intermediaries, ICT helps businesses reduce both internal expenses and costs passed on to customers, leading to higher competitiveness and stronger market positioning.

For each point, critically think about how these strategies are applied in real Ugandan businesses or in your own experience, and be prepared to discuss specific examples in class.

DATA AND INFORMATION

DATA

Data refers to a collection of raw facts or figures about a given phenomenon, entity or business. Many businesses collect data about their customers, suppliers, employees, products and services etc. and they highly rely on this data by transforming it into information that they need to gain insights into their business operations which later on guides their business activities. Data can be in form of text, numbers, observations, symbols or simply description of things, events or entities gathered with a view to drawing inferences.

Computers use binary digits of 0 and 1 to store data. A binary digit or bit is the smallest unit of data in a computer. So the binary numbers are made up of binary digits (bits) for example the binary number 1001 has 10 bits i.e. 1111101001. Human beings interact with the computer using computer programs which are sets of instructions and each instruction is translated into machine code/binary codes. These instructions are converted by a translator into binary digits that the computer can process. All software, music, documents etc. that is processed by a computer is stored in binary form.

DATA STORAGE UNITS CHART: FROM SMALLEST TO LARGEST

Unit	Value	Size
bit (b)	0 or 1	1/8 of a byte
byte (B)	8 bits	1 byte
kilobyte (KB)	1000^1 bytes	1,000 bytes
megabyte (MB)	1000^2 bytes	1,000,000 bytes
gigabyte (GB)	1000^3 bytes	1,000,000,000 bytes
terabyte (TB)	1000^4 bytes	1,000,000,000,000 bytes
petabyte (PB)	1000^5 bytes	1,000,000,000,000,000 bytes
exabyte (EB)	1000^6 bytes	1,000,000,000,000,000,000 bytes
zettabyte (ZB)	1000^7 bytes	1,000,000,000,000,000,000,000 bytes
yottabyte (YB)	1000^8 bytes	1,000,000,000,000,000,000,000,000 bytes

The smallest unit of data storage are bits. When 8 bits are combined, you get a byte. Bytes are used to store a single character, whether it's a letter, number or punctuation. All memory storage is expressed in terms of bytes, so although bits might be the foundation upon which data storage is built, bytes are the building blocks that truly denote the usability of any one storage solution.

Because storage is expressed in terms of bytes, all greater units are typically referred to by their shortened names. This means that you could keep adding more prefixes to talk about more and more data. Above terabyte (TB), we have petabyte (PB), Exabyte (EB), zettabyte (ZB) and yottabyte (YB)

FORMS OF DATA

Text data: This is data presented in form of human-readable sequence of characters and the words they form that can be encoded into computer-readable formats such as ASCII. Text data can be in form of plain text such as alphabetical letters, numbers, symbols and special characters.

Numerical data- This refers to any data in form of numbers and not in any language or descriptive form. For example; integers, whole numbers, decimals, fractions etc. It can be number of objects, number of sales made, count of money etc.

Image data- This refers to a photographic or trace objects that represent the underlying pixel data of an area of an image element, which is created, collected and stored suing image constructor devices. This data can be in form of graphics or pictures. It can be produced by scanning a surface with an optical or electronic device. Scanned documents in business such as invoices, contracts, appointment letters etc, aerial photographs and so on.

Audio data- This refers to data inform of sound. Specifically, digital audio data is sound that has been converted into digital form. For example, audio meeting recordings, audio music.

Video data- This refers to data in form of moving visual images. Files containing video data are a collection of images, audio and other data. Examples include; business videos such as marketing videos, tutorials on how to use company products and services.

Multimedia data- This refers to data of more than one medium. It's data that represents multiple forms of medium to capture information and experiences related to objects and events. Common used forms of data are numbers, alphanumeric, text, images, audio and video. For example; a movie with subtitles, a web page with animations etc.

TYPES OF DATA IN A BUSINESS

Transactional data; This is data that is captured from transactions. It records the time of the transaction, the place where it occurred, the price points of the items bought, the payment method employed, discounts if any and other quantities and qualities associated with the transaction. This data is usually captured at the point of sale. For example; data collected from invoices, daily sales, returns, purchases, debits, payroll, trades, payments etc.

Master data; Master data represents data about the business entities that provide context for business transactions. The most commonly found categories of master data are parties such as customers, suppliers, employees, products/services, finances etc.

Customer data; This refers to all personal, behavioral and demographic data that is collected by marketing companies and departments from their customer base. For example; customer contacts, customer feedback, payment methods, offers, customer name and Id etc.

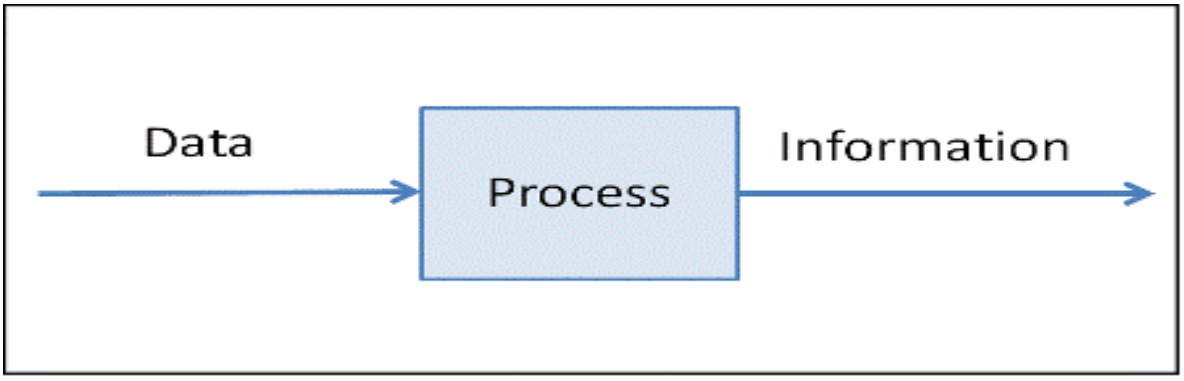
Machine data; This is digital data created by the activity of machines such as computers, mobile phones, embedded systems and other networked devices without any human intervention. Application, server and business process logs, call detail records and sensor data are prime examples of machine data.

Reference data; This refers to data that is used to classify or categorize other data. For example; geographical locations like list of districts or cities in a country, country codes, computing data like a list of standard computing values like HTTP status codes etc

Quantitative data; This refers to data that can be quantified. It is in numeric form. It can be counted or measured and given a numerical value such as length in centimeters or revenue in Ugx. This type of data tends to be structured in nature and is suitable for statistical analysis.

DATA PROCESSING

This is the process where raw data is manipulated and transformed into meaningful context that can be understood and utilized by the end users.



Data is entered into the computer as input system using computer hardware devices such as keyboards. It is then processed (manipulated and converted) into meaningful form using a computer's central processing unit. Activities such as classification, storing, summarizing, calculations and analysis are carried out on that data in order to transform it into a more meaningful and useful form which is information. This information can be retrieved by or communicated/disseminated to the end users.

Data processing is crucial for organizations to create better business strategies and increase their competitive edge. By converting the data into a readable format like graphs, charts, and documents, employees throughout the organization can understand and use the data.

STAGES OF DATA PROCESSING CYCLE

The data processing cycle is the set of operations used to transform data into useful information. The intent of this processing is to create actionable information that can be used to enhance a business. This cycle involves the following steps;

1. **Data Collection:** Data is pulled from available sources including social networks, connected devices, data lakes, data warehouses etc. The type of raw data collected has a huge impact on the output produced. Hence, raw data should be gathered from defined and accurate sources so that the information that comes out of it is valid and usable. Raw data can include monetary figures, website cookies, profit/loss statements of a company, user behavior etc.

2. **Data Preparation:** In this stage, data is cleaned up and organized. It is sorted and filtered to remove unnecessary and inaccurate data. It is checked for errors, duplication, miscalculations or missing data and transformed into a suitable form for further analysis and processing. This is done to ensure that only the highest quality data is fed into the processing unit.

3. **Data Input:** After the data has been cleaned it is then entered into its destination/a computer system for example into a CRM (Customer Relationship Management system) like salesforce or a data warehouse. At this stage, raw data is converted into machine readable form and fed into the processing unit. This can be in form of data entry through a keyboard, scanner or any other input devices.

4. **Processing**: At this stage, the raw data is subjected to various data processing methods using machine learning and artificial intelligence algorithms to generate a desirable output.

5. **Data output:** At this stage, data is finally transmitted and displayed to the user in a readable form like graphs, tables, vector files, audio, video, documents, etc. Employees of a business can now begin to access the data and put it to its intended use. For example, examining advertising patterns, medical diagnosis, determining customer needs etc.

6. **Data storage:** This is the final stage of the data processing cycle, where data and metadata are stored for further use. It is necessary for data to be stored properly for compliance purposes with data protection legislation like GDPR (General Data Protection Regulation). When data is properly stored, it can be quickly and easily accessed by members of the organization whenever needed.

IMPORTANCE OF DATA PROCESSING TO A BUSINESS

Data processing plays a fundamental and indispensable role in modern business operations by transforming raw data into meaningful, usable information that drives efficiency, competitiveness, and growth. It enables organizations to manage large volumes of information systematically, ensuring that decisions are based on reliable insights rather than guesswork or incomplete knowledge.

Data processing helps you make better decisions

When it comes to decision making in a business, there is nothing as persuasive as having accurate and well-processed data to support choices. Processed data provides the foundation for informed decisions across all areas of the organization. Businesses rely on data to determine strategies for attracting new customers, improving customer retention, enhancing customer service, optimizing marketing efforts, monitoring social media interactions, and forecasting sales trends. Where reliable data is available, employees and managers can make smarter, evidence-based decisions about the direction of the company, resource allocation, and operational improvements.

Data processing helps you understand performance

Collecting and processing data allows a business to evaluate how it is performing in key areas such as marketing efforts, customer service, accounting, finance, and overall operations. This performance evaluation provides clear visibility into whether investments are generating returns, where resources are being used effectively, and which areas require attention or adjustment. Processed data reveals strengths and weaknesses, enabling the organization to measure progress against goals and identify opportunities for improvement.

Data processing helps you solve problems

A business can track and review data from its various processes to uncover performance breakdowns, inefficiencies, or issues. Processed data helps identify the root causes of problems by providing a detailed view of each stage of operations. When challenges arise, such as reduced performance in certain areas or unexpected difficulties, data processing allows the organization to examine the information systematically, understand what went wrong, recognize which sections are performing well, and determine the most appropriate actions to resolve the issues.

Data processing helps you understand customers

A business needs processed data about its customers to gain insights into their preferences, behaviours, satisfaction levels, and responses to products or services. This understanding helps the organization assess whether its offerings meet customer needs and whether marketing or service efforts are effective. Processed customer data enables the business to develop strategies for delivering better experiences, building stronger relationships, and increasing loyalty.

Speed, accuracy, and reliability

Data processing ensures that the collection, organization, and analysis of facts and figures are carried out speedily and with minimal or no errors. When data is processed through appropriate computer systems and software, the chances of mistakes are greatly reduced or eliminated entirely. If the input data is accurate, the output will also be accurate. Processing can be completed at much greater speed and with higher precision when the

right combination of tools and software is used. Another critical advantage is the increased reliability of information in a competitive environment. Access to high-quality, processed data is more dependable than unprocessed or poorly managed data, supporting predictive modelling, data cleaning, data validation, and batch processing to ensure consistent and trustworthy results.

Cost reduction

Data processing contributes significantly to cost reduction by treating collected data as a valuable asset that can be stored and reused efficiently. Once data is processed and stored digitally, there is no need to repeatedly collect the same information, which saves time and resources. It becomes easy and convenient to make copies of stored data, transfer it securely, and use it for various purposes without additional effort. Digitization of processes makes operations more cost-effective overall. The potential losses a company might face due to lack of information or poor data management are drastically reduced because processed data enables wise, informed decisions that prevent wasteful spending and optimize resource use.

Storage and distribution is easy when data is processed

When data is left in raw or unorganized form, it requires significant physical space for storage and carries a high risk of loss, misplacement, or confusion. Processed data eliminates the need for large physical storage areas because it is stored digitally in a compact, organized, and labelled format. All information is managed through a complete computerized setup, making it straightforward to locate, retrieve, and use any required data without confusion. Having data stored in digital form rather than hard copies simplifies access, sharing, and distribution across the organization or with external parties.

For each point, critically think about how these benefits apply to real businesses in Uganda or in your own experience.

DATA PROCESSING METHODS

Manual data processing: Data is processed by hand in this data processing method. The entire process of data collecting, filtering, sorting, calculation and other logical operations

are all done with human intervention without the use of any other electronic device or automation software. It's a low-cost method and requires little to no tools; however, it produces high errors and requires high labor costs and lots of time.

Mechanical data processing: Data is processed using machines and simple devices such as typewriters, calculators, printing press, etc. Simple data processing operations can be accomplished by this method. There are fewer errors compared to manual data processing, but the increase of data has made this method more complex and difficult.

Electronic data processing: Data is processed with modern technologies using data processing software and programs. A series of instructions are given to the software to process the data and produce the desired output. This method is the most expensive but provides the fastest processing speeds with the highest reliability and accuracy of output. It is more expensive but provides faster processing with the highest reliability.

DATA PROCESSING MODES

Batch processing: The collection and processing of data is done in batches where there is a huge quantity of data, thus reducing the cost of processing. Examples include payroll, examination and billing system. The main characteristic of this method of data processing is that different jobs of diverse users are processed in the order they are received.

Real-time processing: For a small quantity of data, real-time processing is done where data can be processed within seconds of data input. This mode is suitable when decisions to be made are instant and requires use of internet connection and all data is kept online. For example; tickets booking for flights, banking systems and movie tickets.

Online processing: As and when data is available, it is automatically entered in the CPU. This is useful for processing of data continuously for example; Barcode scanning.

Multiprocessing: This also goes by the name parallel processing, where data is fragmented into small frames and processed in two CPUs within a single computer system which increases efficiency. Examples include; Weather forecasting.

Time-sharing: Allocates computer resources and data in time slots to several users simultaneously. Here one CPU is sued by many users. All users share one CPU but time

allocated to users might differ. As per allocated time, the processing takes place at various intervals for various users.

TAKE HOME ASSIGNMENT

Describe how the following systems process data.

- *Automated Car Parking System*
- *Automated Teller Machine (ATM)*

INFORMATION

Information is processed, organized and structured data. It provides context for data and enables decision making. For example, a single customer's sale at a restaurant is data – this becomes information when the business is able to identify the most popular or least popular dish.

Information assigns meaning and improves the reliability of the data, thus ensuring understandability and reduces uncertainty. When the data is transformed into information, it is free from unnecessary details or immaterial things, which has some value to the business. Examples of information include; receipts, financial statements, transcripts/reports etc.

TYPES OF INFORMATION

Strategic information; This refers to information used for gaining competitive advantage and formulating business strategies by organizations for example; sales, marketing research, product performance and financial analysis information.

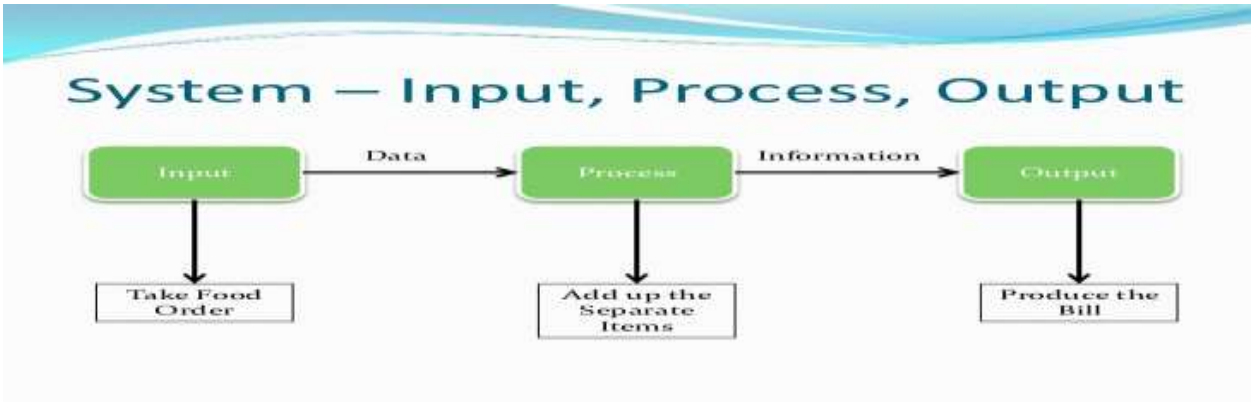
Tactical information; This refers to information used by managers to measure the success of their functional processes in carrying out the enterprise strategies.

Operational information; This refers to the information about the day-to-day operations of the organization.

RELATIONSHIP BETWEEN DATA AND INFORMATION

Data refers to raw input that when processed or arranged makes meaningful output. Information is usually the processed outcome of data. When data is processed into information, it becomes interpretable and gains significance. As such, it becomes useful

for businesses to make decisions, and it forms the basis of progress. *The illustration below explains the relationship further.*



COMPARISON BETWEEN DATA AND INFORMATION

Below is a distinct difference between data and information.

	DATA	INFORMATION
MEANING	Data is raw, unorganized facts that need to be processed. Data can be something simple and seemingly random and useless until it is organized.	When data is processed, organized, structured or presented in a given context so as to make it useful, it is called information.
What is it	It is just text and numbers	Refined data
EXAMPLE	Each student's test score is one piece of data.	The average score of a class or of the entire school is information that can be derived from the given data.
BASED ON	Records and observations	Analysis
FORM	Unorganized	Organized
USEFUL	May or may not be useful	Always

SPECIFIC	No	Yes
DEPENDENCY	Does not depend on information	Without data, information cannot be processed

QUALITIES OF GOOD INFORMATION

Information quality has three dimensions;

- Time
- Content
- Form

TIME DIMENSION

Timeliness: Information should be provided when needed.

Currency: Information should be up-to-date when it is provided.

Frequency: Information should be provided as often as needed.

Time Period: Information about the past, present, and future time periods.

CONTENT DIMENSION

Accuracy: Information should be free from errors.

Relevance: Information should be related to the information needs of a specific recipient.

Completeness: All the information needed must be provided.

Conciseness: Only the needed information should be provided.

Scope: Information can have a broad or narrow scope, or an internal or external focus.

Performance: Information can reveal performance by measuring activities accomplished and progress made.

FORM DIMENSION

Clarity: Information should be provided in a form that is easy to understand.

Detail: Information can be in detail or summary form.

Order: Information can be arranged in a predetermined sequence.

Presentation: Information can be presented in narrative, numeric, graphic or other forms.

Media: Information can be provided in the form of printed paper, documents, video displays, or any other media.

UGANDA VISION 2040 – KNOWLEDGE AND ICT SECTOR

Uganda Vision 2040 is the country's long-term development blueprint aimed at transforming Uganda from a low-income to a competitive middle-income country by the year 2040. One of the six priority sectors identified in Vision 2040 is the Knowledge and ICT Sector. This sector is viewed as the foundation for all other sectors because it drives innovation, efficiency, and competitiveness in a global knowledge-based economy.

The Uganda Vision 2040 identifies the Knowledge and ICT Sector as one of the six key priority areas for transforming Uganda into a competitive middle-income country by 2040. It positions knowledge creation, innovation, and ICT as the central engine that powers economic growth, job creation, and improved service delivery across all other sectors. Below, each key focus area is explained in detail with clear relevance to marketing students and practice.

Building high-speed broadband infrastructure nationwide

This focus area involves rolling out fast, reliable, and affordable internet connectivity across the entire country — urban and rural areas alike. High-speed broadband means installing fibre optic cables, expanding mobile 4G/5G networks, building internet exchange points, and reducing the cost of data and connectivity.

For marketing students and professionals, strong broadband infrastructure is the foundation of almost every modern marketing activity. Without fast internet, it is impossible to run real-time digital campaigns, upload high-quality video or image content, stream live product demonstrations, or manage large customer databases in the cloud. Reliable broadband allows marketers to reach customers in every corner of Uganda (including remote villages), conduct online market research, run geo-targeted

advertisements, and engage audiences on social media, YouTube, or TikTok without interruptions. It also enables cost-effective cross-border marketing by connecting Ugandan businesses to regional and global online marketplaces.

Expanding digital skills among citizens

This involves massive training and education programs to equip Ugandans — from school children to adults and business owners — with basic and advanced digital skills. It includes teaching computer literacy, internet navigation, online safety, data analysis, digital marketing tools, e-commerce platforms, and app development.

For marketing students, a digitally skilled population is essential because it creates a large, active online audience that can be reached through digital channels. When citizens know how to use smartphones, social media, mobile money, and online shopping apps, marketers can design more sophisticated campaigns, collect richer consumer data, run targeted promotions, and measure campaign performance accurately. A digitally skilled workforce also means businesses can hire marketers who are proficient in tools like Google Ads, Facebook Business Manager, Canva, or analytics platforms, reducing training costs and improving campaign quality.

Promoting local innovation and research

This priority area encourages Ugandan researchers, startups, universities, and private companies to develop home-grown ICT solutions, software, apps, and technologies tailored to local needs. It includes funding research centres, innovation hubs, tech incubators, and supporting intellectual property protection for Ugandan inventions.

For marketing students, local innovation means more Ugandan-made digital tools, platforms, and applications become available for marketing use. Examples include locally developed e-commerce apps, mobile advertising platforms, customer analytics tools, or social media management software designed for Ugandan businesses. These tools are often cheaper, more relevant to local languages and consumer behaviour, and better integrated with mobile money systems like MTN MoMo and Airtel Money. Promoting innovation also creates job opportunities for marketers in tech startups and digital agencies, expanding career paths beyond traditional advertising.

Developing e-government services

This involves moving government services online so citizens and businesses can access them digitally — for example, online tax filing, business registration, passport applications, land title searches, and government procurement portals.

For marketing students, e-government services create new digital touchpoints and data sources. Marketers can use government portals to reach business clients (e.g., advertising to newly registered companies), collect official demographic data for segmentation, or partner with government agencies for public awareness campaigns. A strong e-government system also builds public trust in digital transactions, which makes consumers more comfortable buying online — directly benefiting e-commerce and digital marketing efforts.

Creating an enabling environment for e-commerce and digital entrepreneurship

This includes policies, regulations, tax incentives, access to finance, and infrastructure support to help Ugandans start and grow online businesses. It covers laws that recognize electronic contracts and signatures, reduce barriers to online payments, protect consumers in digital markets, and encourage investment in digital startups.

For marketing students, this is the most directly relevant area. An enabling environment for e-commerce means more Ugandan businesses sell online, creating a larger digital marketplace. Marketers can run campaigns on platforms like Jumia, Jiji, or local online shops, use mobile money for instant payments, target customers through digital ads, and track purchases in real time. Digital entrepreneurship also means more startups need marketing services, creating demand for skills in social media marketing, SEO, content creation, influencer partnerships, and data-driven advertising.

Class Activity

For each of the five focus areas above, critically think of at least one practical way it directly affects marketing practice or opportunities in Uganda today. Be prepared to discuss real examples from Ugandan businesses (e.g., Jumia, SafeBoda, MTN MoMo campaigns, or local startups) in class. This will help you connect Vision 2040's ICT goals to your future career as a marketer.

UGANDA'S KEY CYBER LAWS (2011)

Uganda enacted three foundational cyber laws in 2011 to support the rapid growth of the ICT sector, enable secure and legally enforceable digital transactions, and protect individuals, businesses, and government systems from cyber threats. These laws remain the backbone of Uganda's digital economy and are especially important for marketing students because they provide the legal certainty needed for digital marketing, e-commerce, online advertising, customer data protection, influencer partnerships, and secure online business operations.

1. Electronic Transactions Act 2011

Status: No major amendments to the principal Act since enactment.

Current operative law: Electronic Transactions Act, 2011 (Act No. 8 of 2011) as originally passed, supplemented by the Electronic Transactions Regulations, 2013 (Statutory Instrument No. 19 of 2013).

Purpose & Key Provisions

This Act is the primary law that gives legal validity to electronic business activities in Uganda. It declares that:

- Electronic records and electronic documents have the same legal effect as paper documents.
- Contracts formed electronically (e.g., via email, website checkout, or mobile app) are valid and enforceable just like traditional paper contracts.
- Electronic payments and digital transactions are legally recognized.
- Electronic signatures are valid when they meet reliability standards (cross-referenced with the Electronic Signatures Act).

The 2013 Regulations provide detailed operational rules, including:

- Certification and accreditation of electronic signature providers.
- Consumer protection rules in e-commerce (e.g., right to cancel certain online purchases, clear disclosure of terms).
- Rules for admissibility of electronic evidence in Ugandan courts.

Relevance to Marketing

This law removes legal uncertainty from digital marketing and e-commerce activities. Marketers can now confidently:

- Sell products and services through online shops, mobile apps, or social media marketplaces (e.g., Jumia, Jiji, WhatsApp Business).
- Enter into binding digital contracts with influencers, advertising agencies, suppliers, or clients via email or digital platforms.
- Accept mobile money payments (MTN MoMo, Airtel Money) or online card payments as legally valid transactions.
- Use order confirmations, digital receipts, and email agreements as enforceable proof of sale in disputes.

Without this Act, businesses would face significant risk when running digital campaigns, processing online orders, or signing digital marketing agreements.

2. Electronic Signatures Act 2011

Status: No amendments to the principal Act since enactment.

Current operative law: Electronic Signatures Act, 2011 (Act No. 7 of 2011) as originally enacted.

Purpose & Key Provisions

This Act specifically makes electronic signatures legally equivalent to handwritten (wet ink) signatures, provided they meet defined reliability criteria. Key features include:

- An electronic signature is considered reliable if:
- It is uniquely linked to the signer.
- The signer has sole control over the method used to create it.
- Any changes after signing are detectable.
- It establishes standards for certification authorities that issue digital certificates to verify signers.
- Electronic signatures are allowed in both private and government transactions (unless law excludes them).

The Act works hand-in-hand with the Electronic Transactions Act 2011 to make fully digital agreements possible.

Relevance to Marketing

This law enables faster, paperless marketing processes. Marketers can now:

- Obtain legally binding digital approvals for advertising contracts, creative briefs, or campaign budgets.
- Sign electronic influencer agreements, partnership MOUs, or service contracts online.
- Use electronic signatures for client subscriptions to marketing services, online campaign approvals, or NDAs.
- Confidently rely on digital signatures in court if disputes arise over online agreements.

This eliminates the need for physical meetings or courier services, making digital marketing workflows quicker, cheaper, and more scalable.

3. Computer Misuse Act 2011 (as amended in 2022)

Status: Significantly amended.

Current operative law: Computer Misuse Act, 2011 (Act No. 2 of 2011) as amended by the Computer Misuse (Amendment) Act, 2022 (assented to by the President on 14 October 2022).

Purpose & Key Provisions

The original 2011 Act was Uganda's first comprehensive cybercrime law. It criminalized:

- Unauthorized access to computer systems or data.
- Hacking, spreading viruses/malware, identity theft.
- Cyberbullying, unauthorized interception of data.

Major Changes Introduced by the 2022 Amendment

- Expanded definition of unauthorized access to include viewing, sharing, or using information without permission.
- New offences added:

- Unauthorized sharing of information relating to children.
- Abuse of social media (posting content intended to cause harm, distress, or panic).
- Transmission of misleading or malicious information online.
- Increased penalties (higher fines and longer prison terms for many offences).
- Convicted persons barred from holding public office for 10 years.

The amendment has sparked debate: supporters argue it strengthens protection against fraud, misinformation, and online abuse, while critics say it gives excessive power to control online speech and has been used against journalists, activists, and opposition voices.

Relevance to Marketing

For marketers, the amended Act provides important protections but also imposes new responsibilities:

- Protects customer data collected during digital campaigns from hacking or unauthorized access.
- Safeguards company websites, social media accounts, email marketing systems, and ad platforms from competitors or malicious actors.
- Requires marketers to ensure online advertising content is truthful and not misleading (to avoid the new offence of transmitting false information).
- Protects brand reputation by criminalizing cyberbullying, false posts, or malicious campaigns targeting the business online.

Marketers must now be extra careful with claims in digital ads, sponsored posts, and influencer content to avoid violating the expanded provisions.

CLASS ACTIVITY

For each law, think critically about:

- One way it directly supports a specific marketing activity in Uganda today (e.g., Jumia sales, influencer contracts, social media ads).
- One potential risk or limitation marketers face if they ignore the law (especially the 2022 Computer Misuse amendments).

Be ready to discuss real Ugandan examples in class.

RELEVANCE OF UGANDA'S ICT SECTOR AND CYBER LAWS TO MARKETING

The Knowledge and ICT Sector under Uganda Vision 2040 and the three foundational cyber laws of 2011 (Electronic Transactions Act, Electronic Signatures Act, and Computer Misuse Act) work together to create a strong legal and infrastructural foundation for modern marketing in Uganda. Below, each major point of relevance is explained in detail.

Enables design and execution of data-driven marketing campaigns

Vision 2040's emphasis on expanding broadband infrastructure, digital skills, and local innovation, combined with the legal recognition of electronic records and transactions, allows marketers to collect, store, and analyze large volumes of customer data legally and efficiently. Marketers can now use digital tools to gather real-time data from social media interactions, mobile app usage, mobile money transactions, website visits, and online purchases. This data can be processed into meaningful insights (e.g., customer preferences, buying patterns, peak shopping times) using analytics software. The Electronic Transactions Act and Electronic Signatures Act ensure that customer consent forms, privacy notices, and data collection agreements are legally binding when done digitally. The Computer Misuse Act (as amended in 2022) protects this collected data from unauthorized access or hacking. As a result, marketers can move from guesswork-based campaigns to evidence-based strategies that are more targeted, personalized, and effective.

Supports widespread use of social media and mobile apps to reach customers across Uganda

High mobile penetration in Uganda (over 70% of the population owns a mobile phone) is amplified by Vision 2040's push for nationwide broadband and digital skills training. Marketers can now reach customers in every region — urban centers like Kampala, secondary towns, and rural villages — through platforms such as Facebook, WhatsApp Business, TikTok, Instagram, and local apps. The cyber laws provide legal certainty:

- Electronic Transactions Act makes online orders and mobile payments legally enforceable.
- Electronic Signatures Act allows digital confirmations and agreements via mobile apps.
- Computer Misuse Act protects social media pages and marketing accounts from hacking or unauthorized changes.

This nationwide digital reach lets marketers run low-cost, location-specific campaigns (e.g., geo-targeted ads in Gulu or Mbale), engage customers in real time through WhatsApp groups or live streams, and build communities around brands without needing physical stores or billboards.

Enables real-time analysis of consumer behaviour using digital tools

Vision 2040's focus on ICT infrastructure and innovation supports the deployment of analytics tools, CRM systems, and customer data platforms. Marketers can track consumer behaviour in real time — which products are viewed, abandoned carts, time spent on ads, click-through rates, and social media engagement — using tools like Google Analytics, Facebook Insights, or local platforms integrated with mobile money. The 2011 laws ensure that:

- Data collection is legally recognized (Electronic Transactions Act).
- Customer consent for data use is binding (Electronic Signatures Act).
- Customer data is protected from misuse or theft (Computer Misuse Act).

This real-time insight allows marketers to adjust campaigns instantly (e.g., boost ads for high-performing products, retarget abandoned carts), test messaging variations (A/B testing), and personalize offers based on behaviour, significantly improving conversion rates and return on marketing investment.

Facilitates secure and legally enforceable e-commerce

The combination of nationwide broadband expansion (Vision 2040) and the legal framework of the 2011 laws creates a safe environment for e-commerce. Marketers can

sell products through online shops, social media marketplaces, mobile apps, or WhatsApp catalogues with confidence that:

- Online orders and payments are legally valid (Electronic Transactions Act).
- Digital receipts and order confirmations are enforceable (Electronic Transactions Act).
- Electronic agreements with suppliers or delivery partners are binding (Electronic Signatures Act).
- Customer data used in e-commerce is protected from hacking or unauthorised access (Computer Misuse Act).

This legal certainty reduces risk for both businesses and consumers, encouraging more Ugandans to shop online, use mobile money for purchases, and trust digital marketing channels. It also enables marketers to offer seamless omnichannel experiences (e.g., browse online, pay via mobile money, collect in-store).

Builds customer trust in digital marketing channels

The cyber laws directly address privacy and security concerns that previously made customers hesitant about digital channels. The Computer Misuse Act (especially after the 2022 amendment) criminalizes misuse of personal data, unauthorized access, and false advertising online, while the Electronic Transactions Act and Electronic Signatures Act ensure that customers' digital interactions (e.g., placing orders, signing up for newsletters) are legally protected. Vision 2040's push for digital skills and broadband further increases public confidence in using smartphones and the internet for shopping and brand engagement. As a result, marketers can build stronger trust through:

- Transparent privacy policies backed by law.
- Secure mobile money and online payment systems.
- Ethical digital advertising that avoids misleading claims (to comply with the Computer Misuse Act).

Higher trust leads to greater customer willingness to engage with brands online, share personal data for personalization, and complete purchases digitally.

Allows shift from traditional to cost-effective, targeted, and measurable digital strategies

Vision 2040's ICT goals (broadband, skills, innovation, e-commerce environment) combined with the legal protections of the 2011 laws enable marketers to move away from expensive traditional methods (TV/radio ads, billboards, print flyers) toward more efficient digital alternatives. Digital strategies are:

- Cost-effective — lower production and distribution costs compared to traditional media.
- Targeted — reach specific demographics, locations, or interests using data and platforms.
- Measurable — real-time tracking of impressions, clicks, conversions, and ROI using analytics.

The laws ensure these digital strategies are legally safe and enforceable, allowing marketers to invest confidently in social media ads, SEO, email marketing, influencer partnerships, and mobile campaigns that align with global best practices while remaining compliant in Uganda.

CLASS ACTIVITY

For each of the six points above, critically think of at least one specific Ugandan example (e.g., a brand, campaign, or platform) that shows how these developments have changed marketing practice. Be prepared to discuss in class how each point gives marketers a competitive advantage or solves a traditional marketing problem in Uganda.

CHALLENGES FACING UGANDA'S ICT SECTOR AND CYBER LAW IMPLEMENTATION

Despite Uganda's progressive Vision 2040 policies and the 2011 cyber laws (plus the 2019 Data Protection Act), the ICT sector and its legal framework face significant practical challenges. These barriers slow down the full adoption of digital marketing tools, limit the effectiveness of online campaigns, and create risks for businesses and consumers. Each challenge is explained in detail below.

Infrastructure gaps – especially unreliable electricity and slow internet in rural areas

Uganda still has major gaps in basic ICT infrastructure, particularly outside major urban centers like Kampala, Entebbe, and Jinja. Many rural and peri-urban areas suffer from:

- Frequent and prolonged power outages (load-shedding).
- Very slow or no internet connectivity (3G/4G coverage is patchy, fibre optic is limited to towns).
- High latency and low bandwidth even where internet exists.

These gaps severely limit widespread adoption of digital marketing tools. Marketers cannot reliably run live social media campaigns, stream product videos, upload high-resolution ads, or use real-time analytics in areas with poor connectivity. Rural consumers also cannot consistently access online shops, mobile money promotions, or digital content. For marketing professionals, this means campaigns are mostly effective only in urban markets, leaving large rural segments underserved. Businesses lose potential customers, and national digital marketing strategies remain fragmented and urban-biased.

Low digital literacy among some marketers and consumers

Even with growing mobile phone ownership, many Ugandans — especially older adults, rural residents, and people with limited formal education — lack the skills to use digital tools confidently and safely. This includes:

- Difficulty navigating apps, websites, or social media platforms.
- Low understanding of online privacy settings, secure payment methods, or spotting fake ads.
- Limited ability to use digital marketing tools (e.g., creating content, running basic ads, analyzing performance).

For marketers, low consumer digital literacy reduces campaign effectiveness — people may not understand online promotions, distrust digital purchases, or fail to complete online transactions. On the supply side, many small business owners and marketers themselves lack advanced digital skills, so they underutilize tools like Google Ads, Facebook Business Manager, SEO, or CRM systems. This keeps many Ugandan

businesses stuck in traditional marketing methods (radio, posters, word-of-mouth), even when digital channels would be cheaper and more targeted.

Weak enforcement of the cyber laws

Although the laws exist on paper (Electronic Transactions Act, Electronic Signatures Act, Computer Misuse Act 2011 as amended 2022, and Data Protection Act 2019), enforcement remains weak due to:

- Limited technical capacity and training in the police (Cybercrime Unit is under-resourced).
- Slow and overburdened judicial system (few judges understand digital evidence).
- Lack of specialized cyber forensic labs and investigators.
- Low reporting of cybercrimes by victims (fear, lack of trust, or not knowing how to report).

For marketing students and professionals, weak enforcement creates ongoing risks: customer data breaches go unpunished, hacked social media accounts or websites are rarely investigated, and online fraud (fake ads, phishing) continues with little deterrence. This undermines trust in digital marketing channels — consumers fear sharing personal information or paying online, and businesses hesitate to invest heavily in digital campaigns when legal recourse is unreliable.

Data privacy concerns when businesses collect large amounts of customer data

Many Ugandan businesses collect extensive customer data through mobile apps, loyalty programs, social media interactions, and mobile money transactions, but strong privacy protection mechanisms are often lacking. Challenges include:

- Weak awareness of the Data Protection and Privacy Act 2019 among SMEs.
- Limited use of encryption, secure storage, or privacy-by-design principles.
- No mandatory data protection officers in most companies.
- Frequent data breaches with little consequence due to weak enforcement.

For marketers, this creates a major dilemma: collecting rich data improves targeting and personalization, but poor handling risks legal liability (under the 2019 Act), reputational

damage, customer distrust, and loss of business. Consumers become reluctant to share information, reducing the quality of marketing databases and campaign performance.

High costs of high-speed internet and modern devices

Despite falling data prices, high-speed reliable internet and modern smartphones/laptops remain expensive for many Ugandans and small businesses. Key issues:

- High cost of 4G/5G data bundles in rural areas.
- Expensive smartphones capable of running modern apps and viewing high-quality ads.
- Cost of laptops, tablets, or computers for small enterprises.

For marketing professionals, this restricts market reach — many potential customers cannot access or engage with digital campaigns effectively. Small and medium enterprises (SMEs) — which form the majority of Ugandan businesses — struggle to adopt digital marketing tools due to high setup and running costs. This keeps digital marketing concentrated among larger urban firms, leaving SMEs at a competitive disadvantage.

CLASS ACTIVITY

For each of the five challenges above, critically think of:

- One specific Ugandan business or marketing campaign that has been affected by this challenge.
- One realistic action marketers or policymakers could take to reduce or overcome it.

Be prepared to discuss real examples in class (e.g., how poor rural internet limits Jumia's reach, or how weak enforcement affects trust in mobile money ads).

ICT FOR SUSTAINABLE DEVELOPMENT GOALS

The Sustainable Development Goals (SDGs), also known as the Global Goals, were adopted by the UN in 2015 as a universal call to action to end poverty, protect the planet,

and ensure that by 2030 all people enjoy peace and prosperity. There are 17 SDGs and these are integrated to mean that action in one area will affect outcomes in others, and that development must balance social, economic and environmental sustainability.

THE ROLE OF ICTS IN ACHIEVING SUSTAINABLE DEVELOPMENT GOALS (SDGS)

ICTs can help accelerate progress towards every single one of the 17 SDGs in the following ways;

Goal 1- No Poverty; The aim of this goal is to end poverty in all forms and dimensions by 2030. ICTs have been found to be an economic, social and political tool for the poor as it is open to all individuals, no matter the status. Use of radio, television, social media platforms, smart phones to record videos/audio by the poor will ensure that their demands reach authorities and decision makers directly. This is because ICTs increase the information flow between the population, government and other stakeholders and would reduce obstacles to people's participation in poverty eradication activities both at national and local level. Other ways ICTs can be used is through increased access to internet, Skilling through ICT to teach people how to use basic apps such as social media apps, mobile payment apps, Microsoft office, desktop applications like adobe publisher, content creation on you tube, TikTok, Facebook etc.

The impact of ICT on this goal is that; People are able to share ideas on important issues in the country, that include political debates, health issues, agriculture, education, environment and gender issues, which have a high impact on their lives. The power of information sharing helps to create public awareness and involvement. Platforms such as social media serve as an inclusive forum for people who have experienced poverty to share their experiences, concerns and opinions. Informing a wide range of audiences on poverty reduction issues. Providing an open forum to reflect different public views, including those of poor people. Scrutinizing and holding actors to account. Look for business opportunities. Earn income online. Access and share information about business, health etc.

Goal 2- Zero Hunger; The aim is to end all forms of hunger and malnutrition by 2030, making sure all people-especially children have sufficient and nutritious food all year. ICTs can help governments and developmental organizations to enhance food security and improve rural livelihoods through both knowledge and skills transfer, as well as improving the capacities of communities in agricultural productivity, pests control and easier access to markets. Use drones to map vast agricultural lands to predict the quality and quantity of harvests. QR codes on food items helping customers track products to the farm level. Software programs to analyze soil, determine fertilizer requirements, give advice on best seeds and deal with pests and diseases.

This will result into improved agricultural productivity. Facilitate access to better market information and financial services and products such as credit, savings and insurance, as well as weather information to ensure better capacity to predict rainfall and better preparedness for extreme weather events".

Goal 3- Good health and wellbeing; This goal aims to ensure healthy lives and promote wellbeing for all for all ages. ICTs can help patients to contact and access healthcare services remotely regardless of their proximity to a health center. Health care workers can, for example, learn and prepare for disease outbreaks, identify patient symptoms, follow established treatment protocols, perform remote diagnostics, access expert support and so on. Big Data analytics can help produce snapshots, analyze trends, and make projections about disease outbreaks, health service usage, and patient knowledge, attitudes, and practices. The impact of using ICTs in this goal would be reduced costs of providing healthcare, increased access to specialists, less chance of catching new disease and overall improved health.

Goal 4-Quality education; The aim of this goal is to ensure inclusive and equitable quality education and promote lifelong learning opportunities for all. Use of video conferencing technology such as zoom, teams etc. These have special features like; Pre-recorded resources (webinars, lectures, etc.), A digital library, Live and pre-recorded webinars, Video recordings and/or live streaming of lectures, Group breakout sessions

during an online class or lecture, Text chats. E-learning platforms such as Mubsep, Muele (Makerere University). Radio and television –dedicated educational channels and radio stations to broadcast programs to supplement the school syllabus. Social media apps like Facebook, virtual reality. The use of these ICT tools can lead to increased learner motivation and engagement (students are able to learn and connect with each other), bring learners from all corners of the world into one space to conveniently share knowledge, allow for extra help with tutors in online meetings, students are able to use text chat to ask questions without interrupting the lecture or class, group work is still possible as well as group discussions and conversations, enables easy access to education materials, speeds up student registration, access to courses, enrolment options, viewing student marks, sitting exams etc.

Goal 5-Gender equality; This goal aims to achieve gender equality and empower all women and girls. Through mentorship programs for Girls in Computer Science. Girls entering the field of computer science are likely to face more resistance than in subject areas more heavily populated by females. Adults can bolster their resolve by providing examples of strong, successful females thriving in their careers. Whether by creating a mentorship program at the different education levels, bringing in speakers, or using female leaders as case studies, educators and parents can instill confidence in girls who pursue careers in historically male-dominated fields. Emphasis of STEM (Science, Technology, Engineering, Mathematics) education. Equipping women with digital devices such as smart phones. All of this and more promotes women empowerment, women are able to take up leadership positions in the IT field that is highly dominated by men, increases employment (high paying career choices) and productivity of women, reduces the skills gap, reduces occupational segregation, STEM helps young girls feel more comfortable using new technologies, helps break down gender stereotypes, pushes women to become problem solvers, connects and allows women to participate in business and improve their livelihoods.

Goal 6-Clean water and sanitation; To ensure availability and sustainable management of water and sanitation for all. ICTs are an enabler in the management of water as a natural resource. ICTs can facilitate the collection and analysis of data and information on water sources and potentially improve their management and enumeration. Technologies such as remote sensing and geographical information systems have been used by water authorities to track water usage and forecast river levels. These technologies are also applied in irrigation and water based early warning systems. ICTs and smart water management (SWM) systems are being applied to a variety of development projects for water management and sanitation. Smart water meters can provide individuals, businesses and governments with information about their own water use.

ICTs are helping both the providers as well as the consumers. Using ICTs in this goal leads to improved monitoring and managing of water losses, gives consumers better ways of reporting water quality or quantity problems, advanced monitoring allows for better planning and management, especially during cycles of drought and flooding, there is better management and monitoring of sewer systems, better understanding of the water system, detection of leaks, conservation, and monitoring of water quality.

Goal 7- Affordable and clean energy; This goal aims to ensure access to affordable, reliable, sustainable and modern energy for all**.** IoT (Internet of Things) connects all the elements of power production and consumption, improves visibility in the processes, and provides real control at every step of energy flow. Sensors and connected devices allow companies to access real-time energy data and transmit it to the power grid for advanced storage and analysis. Automation is particularly important when it comes to generating clean energy. In wind or solar, for example, IoT devices can help detect the most favorable conditions for energy production and automatically change the direction of turbines or panels. Using devices and their data for the monitoring and efficient working of these power generators enables for maximum efficiency to improve power output and reduce operating costs. Not only does IoT enable better operation control in this way, but it also

improves safety on the premises. As in the case for more reliable water supplies, maintenance for clean energy systems is also hugely improved with IoT. Generation, transmission, and distribution sensors enable remote asset monitoring and management, something of import when energy production plants are distributed and social distancing is mandatory. Meanwhile, better load management is possible thanks to new insights on voltage control, load switching, and network configuration. Ensuring access to affordable, reliable, and sustainable energy for all requires new efficiencies – and these are being made possible by IoT.

As a result, connected devices enable decision makers to build data-driven optimization strategies. Users are able to understand their energy consumption habits and adjust accordingly. Using devices and their data for the monitoring and efficient working of these power generators enables for maximum efficiency to improve power output and reduce operating costs. IoT enables better operation control. Improves safety on the premises.

Goal 8- Decent work and economic growth; The aim is to promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all. High speed internet, Mobile broadband and computing, E-commerce- Digital market places/platforms like Jumia are some of the ICTs that can be applied to create entrepreneurial activities and boost economic growth. This makes it easier for people to interact and exchange ideas, makes workers more productive, reduced foot traffic in shops and supermarkets, enables a business to tap into new markets, lowers cost of doing business.

Goal 9- industry, innovation and infrastructure; The aim is to build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation**.** Mobile cellular services that increase connections between people**.** Mobile apps in transportation sector for example safeboda, uber**.** Online ticket booking**.** Mobile broadband networks**.** Digital infrastructure. All of these ICTs and more make it easy to access businesses online and also run businesses with faster and cheaper internet.

Goal 10- Reduced inequality; The aim is to reduce inequality within and among countries. Increasing broadband availability and adoption, increasing internet affordability, increasing digital skills to the most disadvantages groups. All of this will help to reduce the cost of doing business, open up doors for new opportunities to do business/ work and also increase house hold income among the poor population hence closing the inequality gap.

Goal 11- Sustainable cities and communities; This goal aims to make cities and human settlements inclusive, safe, resilient and sustainable. Smart cities use IoT devices such as; Smart utility meters, Smart transportation, Smart grids, Smart wastage management solutions, Smart air quality monitors, Wifi-ughub, Surveillance cameras. This in turn; Improves contact between citizens and city stakeholders. Reduces costs and resource consumption. Enables data collected to be used to improve infrastructure, public utilities and services etc., Ensures Public safety. Better traffic management. Leads to improvement in mobility and urban parking management. Improved urban planning and the environment. Improved air quality. Enhanced communication

Goal 12- Responsible consumption and production; The aim is to ensure sustainable consumption and production patterns. ICT strategies include; Use of software, computer systems and technology-based tools to replace any physical forms of communication or operation that directly or indirectly causes emission, pollution and unsustainable patterns of consumption and production. Environmental Informatics and Environmental Information Systems (EIS): to collect, gather, sort and analyze data and information related to environment. These ICTs help to reduce emission of computers and electronic devices. Enable energy efficiency of electronic products. Easy monitoring of the environmental changes, understanding complex systems, sharing of data and building consensus among stakeholders

Goal 13- Climate action; The aim of this goal is to take urgent action to combat climate change and its impacts. ICTs to boost this goal include; Weather satellites that track the progress of hurricanes and typhoons. Weather radars that track the progress of

tornadoes, thunderstorms, and the effluent from volcanoes and major forest fires. Radio-based meteorological aid systems that collect and process weather data, without which the current and planned accuracy of weather predictions would be seriously compromised. Earth observation-satellite systems that obtain environmental information such as atmosphere composition (e.g. CO2, vapor, ozone concentration), ocean parameters (temperature, surface level change), soil moisture, vegetation including forest control, agricultural data and many others. Terrestrial and satellite broadcasting sound and television systems and different mobile radio communication systems that warn the public of dangerous weather events, and aircraft pilots of storms and turbulence. Satellite and terrestrial systems that are also used for dissemination of information concerning different natural and man-made disasters (early warning), as well as in mitigating negative effects of disasters (disaster relief operations). As a result, these ICTs provide observational data that improves environment and climate monitoring, data dissemination and early warning. They safeguard life and property through the detection, forecasting and warning of severe weather phenomena such as local storms, tornadoes, hurricanes, or extra-tropical and tropical cyclones. Data from GOS are also used in support of environmental programs everywhere

Goal 14- life below water; Aim is to conserve and sustainably use the oceans, seas and marine resources for sustainable development. Use of satellite-based monitoring to track all fishing vessels in real-time to protect fisheries around the world. Use of detectors that automatically identify manatees (or sea cows) in ocean images. Instead of having researchers sift through thousands of aerial photos to spot the animals, they simply feed the pictures through an image recognition system that can identify the manatees' body shapes. As an impact, these ICTs provide fishing boat data so that researchers, law enforcement agencies and the public can keep watch on key trends such as frequency and monitor if any fishing boats venture into protected waters. This information helps conservationists track populations, identify the results of human interventions in manatee habitats and can play a key role in managing the future of this endangered

species. The software developed also shows promise for tracking other marine life as well, such as humpback whales and other ocean mammals.

Goal 15- life on land; The goal here is to protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss. Allocating and coordinating the use of the radio-frequency spectrum and satellite orbits allow satellite observations that play a significant role in monitoring oceans, marine life and terrestrial ecosystems. ICT makes improved monitoring and reporting possible for the conservation and sustainable use of land, as well as preventing biodiversity loss. This includes the use of big data to analyze short- and long-term trends and to plan mitigation strategies. Sensors, data collection and analysis also help in land restoration

Goal 16- Peace, justice and strong institutions; The aim is to promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels. Use of digital platforms (such as social media, blogs, podcasts and online forums), Advanced technologies such as big data, artificial intelligence (AI), Virtual reality and video games to more actively engage people in peace building. Online, interactive citizen service portals to enable citizens conveniently interact with the justice system for example, access to information and advice, paying fees and fines, make appointments for hearings for minor offenses. Back office and shared services can benefit from cloud and on-premises solutions built on Microsoft's Dynamics CRM and ERP platforms. Such services include financial and accounting systems as well as human resource management, procurement, training, and recruitment functions. Use of surveillance cameras, fingerprint and facial identification systems, x-ray machines, tracking devices, the labelling of documents, cyber security policies, and other solutions to tighten physical and cyber court security. With technologies such as SharePoint, Dynamics CRM, SQL Server and Power BI, people in the legal fraternity are able to search for, analyze and store legal documents. These processes can be automated and accelerated, resulting in faster and more informed

decision-making. Creation of digital knowledge platforms for both law firms and government entities which make it easy to obtain, view and use information. Virtual court rooms to secure testimonies, save money. This makes it much easier, and more trials could proceed to their conclusion. In the public and private sector, block chain technology, big data analytics, data mining, mobile applications, forensic tools are being employed to strengthen internal processes, prevent fraudulent practices and combat corruption risks.

These ICT tools boost security, peace and stability in a country, increase transparency, empower citizens and drive economic growth. They also help to obtain, communicate and transmit accurate and timely information, triggering appropriate responses.

Goal 17- Partnerships for the goals; The purpose of this goal is to strengthen the means of implementation and revitalize the global partnership for sustainable development. Billions of people are connected by mobile devices with unprecedented processing power, storage capacity and access to knowledge. This potential is multiplied by technologies such as artificial intelligence, robotics, big data processing, the Internet of Things, autonomous vehicles, 3-D printing, block chain, computers, video and radio communication, security and communication protocols etc. which allows several partners/countries to act collectively. Boosts knowledge sharing on mutually agreed terms. Interactive settings that allow a range of partners to define common questions and come up with mutually acceptable solutions, to pool and co-create new knowledge and to shape and test innovative solutions should go a long way to redefine and revitalize global partnerships for development. Improves coordination among existing mechanisms, in particular at the United Nations level, and through a global technology facilitation mechanism. Promotes the development, transfer, dissemination and diffusion of environmentally sound technologies to developing countries on favorable terms, including on concessional and preferential terms, as mutually agreed.