Electronic Commerce

Unit-1

History of E-commerce

Most of us have shopped online for something at some point, which means we've taken part in e-commerce. So it goes without saying that e-commerce is everywhere. But very few people may know that e-commerce has a history that goes back to before the internet began.

E-commerce actually goes back to the 1960s when companies used an electronic system called the Electronic Data Interchange to facilitate the transfer of documents. It wasn't until 1994 that the very first transaction took place. This involved the sale of a CD between friends through an online retail website called Net Market.

The industry has gone through so many changes since then, resulting in a great deal of evolution. Traditional brick-and-mortar retailers were forced to embrace new technology in order to stay afloat as companies like Alibaba, Amazon, eBay, and Etsy became household names. These companies created a virtual marketplace for goods and services that consumers can easily access.

Meaning of e-commerce

As is obvious, the term e-commerce is an abbreviated term for ‘electronic commerce’, which refers to the process of undertaking business transactions over internet. Almost anything - ranging from basic items such as breads or soaps, to high end expensive products such as computers or cars and even highly specialized services such as sale of second-hand products to purchase of property, are all available on the related e-commerce web-portals. Depending on the products and services available, e-commerce web-portals could be understood to be ‘Generic’ and ‘Specific’. Examples of generic ecommerce portals are ‘Flip Cart’, ‘Amazon’, where one could buy any product, ranging from furniture to flowers. On the other hand ‘Big Basket’ could be termed as a specific e-commerce web portal as the customer can order for only grocery related products on this web portal.

Framework of e-commerce

E-commerce frameworks are software platforms or structures that provide a foundation for building and managing online stores and digital commerce websites. They are pre-built,

customizable solutions designed to streamline the development and deployment of ecommerce websites, making it easier for businesses to set up and manage their online presence. By using an e-commerce framework, businesses can save time and resources, as they don't need to build these functionalities from scratch.

The Pillars of E-commerce Framework

Technological **Digital Marketing**

Infrastructure

Pillar I: Technology Infrastructure

A solid and dependable technology infrastructure is at the heart of any successful **e-commerce** venture. This pillar focuses on the technical aspects that allow an online store to run smoothly and provide a seamless user experience e-commerce framework.

- **Responsive and User-Friendly Website Design**

Attracting and retaining customers requires a mobile-responsive and user-friendly website design. With the growing use of smartphones and tablets, customers expect a unified shopping experience across all devices. A responsive design ensures that the website adjusts to the size of the screen, allowing for optimal viewing and navigation.

- **Secure Payment Gateways**

E-commerce security is a top priority. Integrating secure payment gateways ensures that sensitive financial information provided by customers is encrypted and protected from unauthorized access. This instills trust in customers, encouraging them to conduct secure online transactions.

- **Inventory Management System**

Inventory management is critical for ensuring that products are available and ready for shipment. An automated inventory system keeps track of stock levels, which reduces the likelihood of overselling or stock outs.

- **Order Processing and Fulfillment**

Order processing and fulfillment have been streamlined to ensure that customers receive their purchases on time and accurately. Order verification, packing, shipping, and tracking are all part of an efficient fulfillment process.

- **Customer Relationship Management (CRM) Software**

CRM software enables companies to manage customer interactions, track customer preferences, and provide personalized experiences. It aids in the development of strong customer relationships and fosters loyalty.

Pillar II : Digital Marketing Strategies

The second pillar of the **e-commerce** framework is centered on marketing strategies that drive traffic, raise brand visibility, and ultimately increase sales. To remain competitive in the online marketplace, effective digital marketing strategies are required.

- **Search Engine Optimization (SEO)**

SEO refers to the process of optimizing a website so that it appears higher on search engine results pages. Businesses can increase organic traffic to their website and reach potential customers who are actively searching for their products or services by optimizing for relevant keywords.

- **Pay-Per-Click (PPC) Advertising**

Businesses can use PPC advertising to display advertisements on search engines and social media platforms. Advertisers only pay when users click on their ads, making it a low-cost method of driving targeted traffic to a website.

- **Social Media Marketing**

Businesses can use social media platforms to engage with their customers, raise brand awareness, and drive traffic to their online stores. Brand perception and customer acquisition can be significantly influenced by engaging content and targeted advertisements.

- **Email Marketing**

Email marketing is a great way to nurture leads and build customer loyalty. Sending subscribers personalized and relevant content can result in increased repeat purchases and higher customer retention rates.

- **Content Marketing**

Content marketing entails producing useful and informative content in order to attract and engage the target audience. Well-crafted blog posts, videos, info graphics, and other content formats can help a brand establish itself as an industry authority.

Tools of e- commerce

e- commerce tools are pieces of software like apps, platform and plug-ins that help business owners manage their online stores.

Ecommerce tools are literally the building blocks of any online store. If you're running an online store, there are a lot of moving parts to keep track of: customer support, marketing, logistics.

7 types of ecommerce tools

- Ecommerce platforms
- Content creation
- Communication and internal organization
- Sales and logistics
- Marketing
- Analytics
- Customer service

There are numerous ways to create, manage, and boost your ecommerce website. Below are seven types of ecommerce tools that are most commonly used by online businesses.

1. Ecommerce platforms

The first step to building an online store is choosing the right ecommerce platform. An ecommerce platform essentially is the software that an ecommerce store uses to take care of core needs, from product pages to order fulfillment.

Your platform affects your customers' shopping experience. It needs to be user friendly, fast, and reliable to ensure a smooth shopping experience, which can directly influence customer satisfaction and return rates. Example-

Shopify is an all-in-one ecommerce platform that helps online businesses get up and running. Offerings include a robust set of ecommerce tools like a website builder with paid and free themes, built-in marketing tools to help build, execute, and analyze digital marketing campaigns, a shopping cart with 100 payment gateways, and multichannel selling.

2. Content creation

Creating content for an ecommerce website can be a powerful way to increase visibility. It's also fairly straightforward, thanks to ecommerce tools like the following: Example-

Canva

Canva is an ecommerce tool that helps teams—even those with little to no experience—create visually pleasing designs. Whether designing a brand identity or just creating supportive imagery for your online store, Canva's drag-and-drop tools make it easy to create and share well-designed assets.

3. Communication and internal organization

Ecommerce tools can also be beneficial for the inner workings of an online business. This could mean anything from having a dedicated space to communicate with employees, to a platform for streamlining project management tasks. Example-

Slack

A messaging platform designed with workers in mind, Slack lets you and your employees chat with each other in real time. This can be a productivity booster for remote workers, especially because Slack enables teams to get organized, manage each other, and communicate about daily to-do.

4. Sales and logistics

Sales and logistics are a significant part of running an online business. While some ecommerce platforms offer these tools as part of their overall services, there are also a few prominent stand-alone options. Example-

Shipwire

Shipwire is a global fulfillment platform that fulfills orders for direct-to-consumer, retail, and dropship channels. By integrating with your existing shopping cart and marketplace, Shipwire provides logistical support and enables both national and international shipping.

5. Marketing

There are many different marketing tools, from content marketing to paid ads. Among the options are: Example-

Mailchimp

Email newsletters are a powerful ecommerce tool: They provide a direct channel to customers and offer a dedicated space to share updates, promotions, and other information.

An email platform like Mailchimp streamlines the marketing process by helping you build, send, and track email marketing campaigns. An added bonus: Mailchimp integrates with Shopify, meaning it syncs your Shopify data—including customer, product, and purchase data—to Mailchimp.

6. Analytics

Ecommerce analytics measure user behavior, performance trends, and return on investment (ROI). With the right tool, it's easier to make informed decisions that potentially increase sales and reduce costs. Example-

Google Analytics

With an ecommerce tool like Google Analytics, it's possible to gather insights about returning visitors as well as data around real-time stats like: How many people are on the website? Where is the traffic coming from? How are visitors engaging with products?

7. Customer service

An ecommerce tool that helps support online shoppers during their customer journey is crucial. Ideally, you'll want a customer support platform that both helps retain repeat customers and attracts new ones. Example-

Acquire

Acquire's platform helps online stores provide high quality customer support, streamlining workflows and customer information for customer service agents. Think of it as a unified experience: Customer service representatives can see queries across all digital channels in one place and resolve issues more efficiently.

Growth of e.commerce

E-commerce in India has developed extensively and offers abundant opportunities in developing countries like India. Highly dense urban areas with very high literacy rates, an

enormous rural population with fast increasing literacy rate, a rapidly growing internet user base, technology advancement and adoption and such other things make India a dream destination for e-commerce players. The online travel industry has some private players such as made my trip, clear trip and yatra as well as a strong government presence in terms of IRCTC, which is a successful Indian Railways initiative. The online classified segment is universally divided into three sectors; Jobs, Matrimonial and Real Estate. Mobile Commerce is also growing promptly and proving to be a stable and secure supplement to e-commerce due to the record growth in mobile user base in India, in recent years.

What Is an E-commerce Website?

An e-commerce website is any site that allows you to buy and sell products and services online. Companies like Amazon and Alibaba are examples of e-commerce websites.

What Is the Difference Between E-commerce and E-business?

E-commerce involves the purchase and sale of goods and services online and is actually just one part of e-business. An e-business involves the entire process of running a company online. Put simply, it's all of the activity that takes place with an online business.

Socio-economic Impacts of E-commerce

Electronic commerce has great potential to change the scenario of economy and society. Developed economies and developing economies are witnessed of e-commerce impact on Society and Economy. It affects the way of communication, Business, Finance, Trade, Life Style and Cultural Values.

s.no.	**Economic Impacts**	s.no.	**Social Impact**
1	E-commerce and increasing GDP	1	Digital Divide
2	Transformation in Business Activity	2	Information and knowledge
3	Employment Generation	3	Helpful in work life balance
4	New platform for Micro, Small and	4	Change in life style

	Medium enterprises		
5	Global opportunities to Rural and Local Industries	5	Access of Educational institution
6	Encouraging Entrepreneurship	6	Social Loneliness
7	Reduction in Transaction cost	7	Loss of Individuality and Privacy
8	Price competition		
9	Easy access to products		
10	Easy access to Financial Services		

Economic Impacts

Continuous growth of e-commerce industry is expected to have deep impact on structure and functioning of Indian Economy at various levels:

- **E-commerce and increasing GDP:** It helps in generating the economic wealth for a country. It is expected that by 2020 e-commerce will contribute around 4% to GDP of India.
- **Transformation in Business Activity:** with the advancement of technology the way of communication between buyers and sellers has changed and it is helpful to minimize the cost of transportation, advertising and marketing.
- **Employment Generation:** This is true that due to digitalization less job opportunities are available for unskilled labor but on the other side it is also true that e-commerce industry is net job creator in economy for skilled and highly skilled labor. Overall due to digitalization the mode of operation has changed.
- **New platform for Micro, Small and Medium enterprises:** E-commerce provides new market access, business opportunity, enhance competitiveness to MSMEs. It solves the problem of funding, technology, infrastructure & ineffective marketing.
- **Global opportunities to Rural and Local Industries:** E commerce provides platform to Local industries to compete and develop at globally.

- **Encouraging Entrepreneurship:** Internet provides the opportunity to exchange new business ideas and to reach the target customers at minimum cost.
- **Reduction in Transaction cost:** E-commerce reduces transaction cost by removing many of geographic and time barriers that buyers and sellers previously faced.
- **Price competition:** Local industries and small industries have to face price competition globally.
- **Easy access to products:** with the upgraded technology of internet now consumers can easily reach to products sitting at home, can compare with available alternatives. It reduces the chances of degraded quality and fraudulent.
- **Easy access to Financial Services:** Internet Banking and M-banking reduces the transaction cost of banking industry thereby increasing access to financial services through rapidly growing Internet banking and M- banking market.

Social Impact

- **Digital Divide:** Nowadays society has become digital society. Still everybody is not able to access online services. Hence, digitalization and e-commerce industry is creating gap between those who can access and those who cannot access
- **Information and knowledge:** internet enabled public to get information and expert advice.
- **Helpful in work life balance:** With the technological advancement companies are providing flexibility of time and place to work that is helpful in balancing the professional and personal life.
- **Change in life style:** with the access of internet public can communicate across the world, they can shop at any time and at anywhere. With the help of social media public can express their views, ideas and can get the knowledge without going outside. Most of the countries have been observing the transition of society.
- **Access of Educational institution:** E-learning and M-learning enhances the access of the educational institutions in remote areas. 314 Inspira- Journal of Commerce, Economics & Computer Science: July-September, 2017

- **Social Loneliness:** Continuously increasing internet penetration among youth and increasing virtual interaction within community can be risky for society. It may increase de-socialization among individuals. • Convenient transport system: E-commerce also impacts the transport system have to be delivered directly to the home.
- **Loss of Individuality and Privacy:** Through the mobile and web e-commerce companies can record individual information and that is very risky for customers privacy.

Advantages and Disadvantages of E-commerce

E-commerce offers consumers the following advantages:

- **Convenience**: E-commerce can occur 24 hours a day, seven days a week. Although e-commerce may take a lot of work, it is still possible to generate sales as you sleep or earn revenue while you are away from your store.
- **Increased Selection**: Many stores offer a wider array of products online than they carry in their brick-and-mortar counterparts. And many stores that solely exist online may offer consumers exclusive inventory that is unavailable elsewhere.
- **Potentially Lower Start-up Cost:** E-commerce companies may require a warehouse or manufacturing site, but they usually don't need a physical storefront. The cost to operate digitally is often less expensive than needing to pay rent, insurance, building maintenance, and property taxes.
- **International Sales:** As long as an e-commerce store can ship to the customer, an e-commerce company can sell to anyone in the world and isn't limited by physical geography.
- **Easier to Retarget Customers:** As customers browse a digital storefront, it is easier to entice their attention towards placed advertisements, directed marketing campaigns, or pop-ups specifically aimed at a purpose.

Disadvantages

There are certain drawbacks that come with e-commerce sites, too. The disadvantages include:

- **Limited Customer Service**: If you shop online for a computer, you cannot simply ask an employee to demonstrate a particular model's features in person. And although some websites let you chat online with a staff member, this is not a typical practice.
- **Lack of Instant Gratification**: When you buy an item online, you must wait for it to be shipped to your home or office. However, e- HYPERLINK "https://www.investopedia.com/terms/e/electronic-retailing-e-tailing.asp"tailers like Amazon make the waiting game a little bit less painful by offering same-day delivery as a premium option for select products.
- **Inability to Touch Products**: Online images do not necessarily convey the whole story about an item, and so e-commerce purchases can be unsatisfying when the products received do not match consumer expectations. Case in point: an item of clothing may be made from shoddier fabric than its online image indicates.
- **Reliance on Technology:** If your website crashes, garners an overwhelming amount of traffic, or must be temporarily taken down for any reason, your business is effectively closed until the e-commerce storefront is back.
- **Higher Competition:** Although the low barrier to entry regarding low cost is an advantage, this means other competitors can easily enter the market. E-commerce companies must have mindful marketing strategies and remain diligent on SEO optimization to ensure they maintain a digital presence.

Unit-2

What is e-business?

E-business is either a commercial or a business transaction where information is shared across the internet. It enables business processes within the value chain via internal and external networks. Amazon.com is one of the earliest e-businesses that has become extremely successful. It is a new business strategy that redesigns old business models and differentiates with information and communication technology in support of all business activities.

It works for three segments of market participants, including businesses, consumers, and administration. E-business is a method of utilizing digital information and communication technologies to streamline and support business processes. It is a way of conducting business on the internet, which includes trading goods, servicing customers, and collaborating with business partners. Types of e-business

2.1 The importance of e-commerce business are:

1. **Convenient:** Very conveniently while sitting in one place you can easily shop, buy and sell products using the e-commerce website.
2. **Always Available:** You can approach e-commerce websites at any time of the day. You cannot do this while shopping from the physical markets. For people who get rarely any time due to their workloads e-commerce shopping is bliss for them.
3. **Large Platform:** E-commerce offers you a large platform to reach consumers belonging to different geographical ranges. For consumers, it is highly beneficial as they can purchase their choice of products from any region in the world.
4. **Low Costing:** In e-commerce businesses due to automated processes, there is a very low reduction in the costs. Also, consumers can save a large amount of money while doing e-commerce shopping. Along with discounts and offers it also helps them to save the extra expense of traveling, electricity, etc.
5. **Economy:** Since there is zero amount of expenditure in setting and maintaining the infrastructures sellers can save a large amount of money. Contrarily they can spend more money on the products, services, strategies, and promotion of their goods. Just like you could increase the ranking of your website by checking out keywords rank checker, ensuring the promotional side of running your business is up to date, this increase of marketing of services will take their e-commerce website business to a new level of fame and awareness.
6. **Product Information:** E-commerce websites provide you with complete detailed information about the products along with their pictures. However, it helps you get the idea of your product from its looks to credibility and usability.

2.2 The following are the different types of e-businesses.

1. Business to Business (B2B)

Also known as B-to-B, this type of e-business is a form of transaction among businesses. Instead of being conducted between individuals and companies, it is conducted among businesses. Such transactions occur in the supply chain where one company purchases raw materials from another for the manufacturing process. There are two types of B2B models: including Vertical B2B and Horizontal B2B models.

The vertical B2B model is oriented to manufacturing and business. This can be both upstream and downstream. Through the vertical B2B model, companies can more efficiently promote its product which enriches transactions as they help customers understand their products. The Horizontal B2B is a transaction pattern for the intermediate trading market.

2. Business to Consumer (B2C)

It is the process of selling products and services between businesses and consumers who serve as the end users of products and services. This type of commerce transaction sells products and services to its customers directly. This e-business model has a higher number of clients, but the revenue is low since the sales cycle is shorter. It includes intermediaries, direct sellers, fee-based, community-based, and advertising-based.

3. Business to Administration (B2A)

It refers to every transaction between public administrations and companies. B2A refers to trade between the business sector as a supplier and a government body as a customer. It provides a platform to bid on government opportunities presented as solicitation in the form of RFPs through reverse auction. It includes the segment of business-to-business marketing known as public sector marketing that encompasses marketing services and products to different government levels.

4. Consumer to Business (C2B)

It is an e-business where consumers offer products and services to companies. Unlike the traditional business model, it is a part of the bi-directional network where consumers can become their own businesses. This e-business model has become more prominent with the improvement

in technologies so that consumers are easily able to build businesses. Through this model, both businesses and consumers benefit from C2B model.

5. Consumer to Consumer (C2C)

This e-business model represents a market environment. Here, a customer purchases goods from another customer via a third-party platform for facilitating transactions. It provides a way to allow customers to interact with one another. In the consumer-to-consumer segment, electronically facilitated transactions between consumers through the third party are possible.

6. Consumer to Administration (C2A)

It is an e-commerce model where consumer utilizes electronic media to read out to the administration. Website, applications, and portals are used by consumers to interact with the government. Data collected via C2A systems is used for understanding lacunae in service delivery. For this purpose, citizen-generated data, such as big data analytics, is used.

7. Intra B-commerce

This is a type of e-business where the parties involved in electronic transactions are from within a given business firm. This model of e-business allows businesses to allow flexible manufacturing. Computer networks allow departments to constantly interact with each and build customized products as per the requirement of individual customers.

2.3 Present Status of E-commerce Development in India

E-commerce has revolutionized the way businesses operate and consumers shop globally, and India is no exception to this digital transformation. With a population of over 1.3 billion people and increasing internet penetration, the Indian e-commerce market has witnessed remarkable growth in recent years. This article provides a comprehensive overview of the current status of e-commerce development in India, highlighting key trends, challenges, and opportunities in this dynamic sector.

1. Rapid Growth and Increasing Market Size:

The Indian e-commerce industry has experienced phenomenal growth, driven by factors such as rising disposable incomes, widespread smartphone usage, and improved internet connectivity. According to recent reports, the Indian e-commerce market is projected to reach a value of $200 billion by 2026, showcasing the immense potential and opportunities for e-commerce development in the country.

2. Dominance of Mobile Commerce:

One significant factor contributing to the growth of e-commerce in India is the dominance of mobile commerce or m-commerce. With affordable smartphones and accessible mobile internet, a substantial portion of online transactions is conducted through mobile devices. This trend has propelled the expansion of e-commerce platforms and necessitated the development of mobile-friendly applications and websites.3. Expansion of Tier II and Tier III Cities:

While metropolitan cities have traditionally been the epicenters of e-commerce development, the penetration of online shopping is rapidly expanding to tier II and tier III cities in India. This expansion can be attributed to improved logistics infrastructure, increased digital literacy, and the availability of a wider range of products and services online. E-commerce platforms have recognized this untapped potential and are actively working towards addressing the needs of these emerging markets.

3. Competitive Landscape and Market Consolidation:

The Indian e-commerce sector is fiercely competitive, with major players vying for market share. Industry giants like Flipkart, Amazon, and Snapdeal have been instrumental in shaping the e-commerce landscape in India. Moreover, the recent entry of global players has intensified the competition further. Consolidation through mergers and acquisitions has become a common strategy, allowing companies to leverage synergies, enhance operational efficiency, and expand their customer base.

4. Regulatory Framework and Policy Reforms:

The Indian government has recognized the significance of e-commerce in driving economic growth and employment generation. Consequently, several policy reforms and regulatory frameworks have been introduced to foster a conducive environment for e-commerce

development. Initiatives like the Digital India campaign and Make in India have provided impetus to the sector by promoting digital infrastructure and encouraging domestic manufacturing.

5. Logistics and Last-Mile Delivery Challenges:

While e-commerce has witnessed remarkable growth in India, the sector continues to face challenges related to logistics and last-mile delivery. Given the country's vast geographical expanse and diverse population, ensuring timely and efficient delivery remains a significant concern. E-commerce companies are actively investing in logistics infrastructure, innovative delivery solutions, and partnerships with local vendors to overcome these challenges and enhance customer satisfaction.

6. Emerging Technologies and E-commerce Innovation:

The Indian e-commerce landscape is embracing cutting-edge technologies to enhance customer experiences and streamline operations. Artificial intelligence (AI), machine learning (ML), big data analytics, and augmented reality (AR) are being employed to personalize recommendations, optimize supply chain management, and create immersive shopping experiences. E-commerce companies are actively investing in research and development to stay ahead of the curve and harness the potential of emerging technologies.

2.4 Regulatory Framework for E-Commerce In India

As far as regulatory framework governing e-commerce activities is concerned, there are no dedicated e-commerce laws in India. Various ministries and department of the government of India deal with different aspect of e-commerce. For instance, the ministry of Electronics and Information Technology look after the technical aspects of e-commerce through the information technology Act, data privacy issues, etc. The Department of Consumer Affairs takes care of the consumer protection issues. The Department for promotion of Industry and Internal Trade deals with the foreign investment related matters on e-commerce. The Department of commerce deals with the WTO discussions on e-commerce. Although there is no dedicated law governing e-commerce, such activities are governed by a number of laws & regulations applicable to various

segments of the e-commerce value chain. Some of these laws come under the purview of central government whereas others fall within the jurisdiction of state governments.

1. **Data Protection Regulatory Framework**

Section 79 of IT Amendment Act, 2008 sets out conditions under which an intermediary will not be liable for any third party information, data or communication link made available or hosted by him. Data protection has been made more explicit through the insertion of Clause 43A that provides for compensation to a person whose personal data may have been compromised by a company. Under section 72A, punishment for the disclosure of information in breach of a lawful contract is prescribed. Any person including an intermediary who has access to any material containing personal information about another person, as part of a lawful contract, discloses it without the consent of the person will attract punishment with imprisonment of up to 3 years and/or fine of 5 lakh. Section 69 on crimes against national security has been made stronger for interception and monitoring. Sections 66 & 67 on hacking and obscene material have been updated by dividing them into more crime-specific subsections, thereby making cybercrimes punishable.

2. **Payment And Settlement Regulations**

To allow online payments receipt and disbursements for e-commerce activities, one has to take a license from the reserve bank of India [RBI]. Payment & settlement systems are regulated by the payment & settlement systems Act, 2007 [PSS Act] and Settlement System Regulations, 2008. As per Section 4 of the PSS Act, no person other than the RBI can commence or operate a payment system in India unless authorized by the RBI. The RBI has since authorized payment system operators of prepaid payments instruments, card schemes, cross-border in-bound money transfers, automated teller machine [ATM] networks and centralized clearing arrangement.

3. **The Draft E-Commerce Policy, 2018**

The government came out with a draft of much needed policy on e-commerce in 2018. both domestic and international concerns must have guided the framing of such policy. The draft policy has a number of facilitative elements for e-commerce players. For instance, the recommendation to establish a central registry for KYC will reduce the cost and burden of KYC

compliance by the payment systems. Similarly the provisions to have controlling stake in spite of minority share by the promoters will allow the young entrepreneurs to grow and seek funding support without giving up control in their entity. There were criticisms of the draft e-commerce policy as it was considered as a regressive step by many. However, one must see this policy from developments at the international arena pertaining to e-commerce. The proposals submitted in the WTO on e-commerce tend to include almost everything under the sun, including physical trade, online trade, payment systems, consumer protections, telecommunication networks, spam mail and source code, to name a few. If all these things are being discussed in the WTO, and may be negotiated in future, the government must know its landing zones in international negotiations on various elements of e-commerce.

4. Policy Suggestions

In India, e-commerce is rapidly growing and is likely to change the way business is performed. Many online companies are venturing into India e-commerce market space to take the first mover advantage. However, it is observed that many e-commerce companies are not adequately following the rules and regulations pertaining to the e-commerce business. This is partly due to the fact that e-commerce laws in India are in evolving stage. India does not have dedicated laws for various types of e-commerce activities are very important from a public policy perspective and hence require specialized rules and regulations to safeguard the consumers against any wrongdoing. For instance, online sales of prescribed medicines in India. The government needs to have specialized laws on these issues as applicable in other countries. For instance, in the USA, the health insurance portability and accountability Act of 1996 and health information technology for economic and clinical health Act are some of the laws that take care of medico-legal and techno-legal issues of e-health and telemedicine.

2.5 The Environmental Impact Of E-Commerce

Online shopping has become a popular way for consumers to purchase goods without leaving the comfort of their own homes. However, this convenience comes at a cost to the environment, particularly in the form of packaging waste. E-commerce has revolutionized the way we shop, making it easy to buy anything from the comfort of our homes. With the increase in online

shopping, the amount of packaging waste generated has also increased significantly. Online shopping generates various kinds of waste, including:

1. **Packaging waste:** This is one of the most significant forms of waste generated by online shopping. Items are often packaged in layers of plastic, bubble wrap, and cardboard boxes, which can be difficult to recycle.
2. **Electronic waste:** The rise of e-commerce has also led to an increase in electronic waste. As more people purchase electronics online, the disposal of old electronic devices becomes a growing problem.
3. **Carbon emissions:** The transportation of goods from warehouses to consumers generates significant carbon emissions. This can contribute to air pollution and climate change.
4. **Single-use products:** Online shopping can also contribute to the use of single-use products, such as packaging materials and shopping bags, which can end up in landfills or oceans. Every online purchase is shipped in some form of packaging, whether it's a cardboard box, plastic envelope, or padded envelope.
5. **Returns and disposal waste:** The ease of online shopping has also led to an increase in returns, which can result in additional waste generated from packaging, transportation, and disposal of unwanted items.

❖ **E-Commerce Impact the State Of Health**

The healthcare industry is digitizing quickly. The consumers are getting comfortable in going online to source for their healthcare needs by researching on symptoms, specific doctors, buying products, paying bills, and getting more educated about their health option," said, Amy Madonna, Principal Founder of Madonna.

E-Commerce Impact the Health

1. **Unrestraint Access to Information:** One of the key benefits of e-commerce marketing in the health and wellness industry is that it offers an immediate release of information to healthcare providers (hospitals), insurers, and clients/patients. The most important aspect of this is visible in some parts of the world where access to healthcare is limited.

2. **Open Channel Communication**: Another area in which different types of e-commerce platforms impact the health and wellness industry is the provision of a unique opportunity that seeks to improve communication among hospitals, doctors, and of most important, between healthcare providers their different patients.
3. **Improved Outcomes and Convenience:** E-commerce makes it possible for healthcare providers to connect with patients, assisting them in the area of medical regimen compliance, chronic disease management, and answering general questions, all of which helps in keeping people healthier and increasingly engaged in managing their overall health needs. Services offered through e-commerce online store also goes a long way in removing or reducing inconvenience related to health and wellness shopping. Gone are the days when you need to purchase and transport about large healthcare items like milk feeds, diapers, and more. With online digital marketing, you can easily buy larger items and get them easily delivered quickly to your doorsteps. In addition, you can make purchases 24 hours o the day and at any time you want.
4. **Efficiency:** E-commerce use of technology helps to reduce time-consuming and redundant activities most medical professionals, and healthcare providers have to undertake to render their services. With increased technology, it is easier to spot and purchase a wide variety of products under a more transparent price regime. The use of e-commerce in the health and wellness sector offers lower prices and discounts. The ability to leave feedback and previews, plus replacement and refund policies make e-commerce in the health and wellness industry efficient and effective.

❖ **Impact of e-commerce on Education**

1. An increase in blended learning - Online learning will become an important component of our educational system. Universities will change from their conventional learning paradigm to a blended learning strategy that includes both online and offline instruction.

2. Learning Resources - Enhancement Universities and colleges can enhance their instructional materials. Blended learning will aid in the development of new methods for designing and delivering material. It also increases academic transparency and openness.

3. The need for LMS - Learning management systems are in high demand as a of online education. It created a fantastic opportunity for LMS providers. Companies can improve and expand their learning management systems (LMS) for result use by universities and colleges.

4. Global Exposure - This program provides professors and students with an excellent chance to study and engage with individuals from all around the world. Many students may now obtain credentials from international colleges thanks to this online technique.

Unit-3

Internet resources for commerce

Introduction: An 'Internet Resource' refers to the various types of information available on the Internet, including websites, documents, multimedia files, and other digital content that can be accessed and shared online.

Resources required for the successful implementation of e-commerce are:

(i) Computer System:

The presence of the computer system is the first requirement of e-commerce; because the basis of e-commerce is the Internet and the computer is the medium of transaction. The computer can be linked with the Internet, by pressing its keys. The business transaction under e-commerce can be seen on the computer screen.

(ii) Internet Connection:

For conducting e-commerce transactions, Internet connection is essential. We can get this facility of Internet connection, sitting at home, through Private Service Provider companies.

When we open our Internet connection, the service provider tells us to install the Web Browser. It controls the activities of e-commerce. It is the Web Browser which takes us into the world of e-commerce. (Browser means a programme that lets us look at or read documents on the Internet).

(iii) Technically Qualified Workforce:

The business enterprise must have technically qualified people who are capable of working with computer networks and the Internet without difficulty.

(iv) System of Receiving Payments:

The business enterprise must have a full-proof system of receiving payment for the goods sold. The business enterprise must make arrangements with banks, credit card agencies etc. to facilitate receipts and payments electronically.

(v) Well-Designed Website:

To communicate effectively with customers and others, the business enterprise must develop a comprehensive website. The information must be detailed and hyperlinked with suitable supporting pictures etc. (Hyperlink is a place in an electronic document on a computer that is linked to another electronic document).

(vi) Effective Telecommunication System:

For a successful implementation of e-commerce, an effective telecommunication system is necessary. If telephone lines are getting frequently disconnected; e-commerce is not successful.

Technology for Web Server

A web server is software and hardware that uses HTTP (Hypertext Transfer Protocol) and other protocols to respond to client requests made over the World Wide Web. The main job of a web server is to display website content through storing, processing and delivering webpages to users. Web server hardware is connected to the internet and allows data to be exchanged with other connected devices, while web server software controls how a user accesses hosted files.

What is Web Technology?

Web technology is a term used to describe all the different things people use to make websites and web-based applications. This includes software and hardware tools, programming languages, and standards needed to create and run web apps on the internet. Web technology comprises many areas, including web design, web development, web servers, web browsers, e-commerce, and content management systems.

Classification of Web Technology

World Wide Web (WWW): It enables users to browse and access information through web browsers.

Web servers: They process requests and send responses to web browsers

Web browsers: They are the tools we use to look at web pages

HTML: It's a language that helps structure and show content on web pages

CSS: It helps make web pages look pretty by adding colors, fonts, and styles

JavaScript: It's a language that makes web pages do cool stuff like animations and interactive features

Backend Technologies: They are the tools used to make the server-side parts of web apps work

Database Systems: They store and retrieve data used in web apps

Importance of Web Technology

Global Reach: The Internet and web technology allow businesses to reach a worldwide audience with their products and services.

Cost-Effective: Web technology enables businesses to reduce costs by automating processes, improving efficiency, and reducing the need for physical infrastructure.

Improved Communication: Web technology facilitates communication and collaboration across organizations and geographies, enabling better knowledge sharing and decision-making.

Enhanced Customer Experience: Web technology allows businesses to provide a more personalized, interactive, and engaging customer experience.

Access to Data: Web technology provides vast amounts of data that can be used for analysis, insights, and informed decision-making.

Mobile Access: Web technology enables businesses to reach customers through mobile devices, which have become increasingly important in people's lives.

Innovation: Web technology drives innovation by providing a platform for new products, services, and business models.

Social Impact: Web technology can improve social and economic outcomes by providing access to education, healthcare, and other essential services.

What is Internet?

The Internet in simple terms is a network of the interlinked computer networking worldwide, which is accessible to the general public. These interconnected computers work by transmitting data through a special type of packet switching which is known as the IP or the Internet protocol.

Major Internet tools and services

Internet is a worldwide collection of networks. The Internet has different tools and services that are provided:

E-mail

Voice mail

FTP

WWW

E-Commerce

Chat

Search Engine

Electronic mail (email): E-mail is an electronic mail. The messages can be sent electronically over a network. For sending or receiving an email, the user must have an email address; email address is given as:

Voice mail: Initially only text mails were being sent. If the voice information is to be sent or received, then the user has to send it as an attachment file. But nowadays, the new technology

allows us to send and receive the voice data directly through the Internet as a voicemail. The only requirement is that computer should have a multimedia facility and voice mail software.

FTP (File Transfer Protocol): It is a fast application level TCP/IP protocol widely used for transferring both text- based and binary files to and from remote systems through the Internet. Most of the people use FTP program for downloading the software on the Internet.

World Wide Web (WWW): In the Internet, different types of computer are connected to each other. These computers may have different operating systems. When the data is to be transformed from one computer to other computer and if the operating systems of both computers are different, then both operating systems should understand the data format which is to be transferred. The www provides an interactive document and the software to access the data on any computer.

E-Commerce: Web technologies play a very important role in business. Websites are created to perform the business. Online trading is now a very important feature of the Internet. It is also called as e-commerce. So the geographical boundaries have become faint due to Internet and e-commerce.

Chat: It is an Internet application. Using the program, the user needs to get connected in a chat. The user has to log in the chat- room, get access in a particular chat room, find other users connected in a chat room and start chatting with the users connected in that room.

Search Engine: It is used to search the required information over the Internet. This is possible by getting the home pages or websites dedicated to the particular subject. There are different types of search engines on the type of search criteria for indexing pages and returning results. Size of the index, review of web pages, links with priorities, net tags, importace of pages are the categories for getting the different search approaches of the search engines.

Advertising on Internet

Internet advertising, also known as online advertising or digital advertising, refers to the use of the Internet as a medium to promote products, services, or brands to a wide audience. It encompasses a variety of formats, including display ads, search engine marketing (SEM), social media advertising, email marketing, content marketing, and affiliate marketing. The goal is to

drive consumer action, whether it be making a purchase, signing up for a service, or engaging with a brand.

Types of Internet Advertising

1**. Display Advertising**

Banner Ads: Graphic display ads usually placed on websites, often at the top, bottom, or sides of a page. Rich Media Ads: Interactive ads with multimedia elements such as audio, video, or interactive components.

2. Search Engine Marketing (SEM):

Search Engine Advertising (SEA): Paid advertisements that appear on search engine results pages (SERPs), usually labeled as “sponsored” or “ad.”

3. Social Media Advertising:

Facebook Ads: Advertisements on the Facebook platform, including Instagram.

Twitter Ads: Promoted tweets or accounts on Twitter.

LinkedIn Ads: Advertising on the professional networking platform.

Pinterest Ads: Promoted pins on the visual discovery platform.

4. Video Advertising:

In-stream Ads: Video ads that play before, during, or after online video content.

Out-stream Ads: Video ads that appear outside of video content, such as within articles or social media feeds.

5. Native Advertising:

In-Feed Ads: Ads that blend seamlessly into the content of a website or platform.

Advertorials: Advertisements designed to resemble editorial content.

6. Email Marketing:

Promotional Emails: Emails sent to a targeted list of recipients with the goal of promoting products, services, or offers.

7. Affiliate Marketing:

Affiliate Links: Partnerships where a business rewards affiliates for driving traffic or sales to the advertiser's website through the affiliate's marketing efforts.

8. Content Marketing:

Branded Content: Creating and promoting content that is related to a brand without being explicitly promotional.

9. Influencer Marketing:

Collaborations with Influencers: Partnering with individuals who have a significant following on social media to promote a product or service.

10. Retargeting/Remarketing:

11. Display Ads Retargeting: Showing ads to users who have previously visited a website or interacted with a brand.

What is website marketing?

Website marketing means promoting a business website in order to bring in more visitors. These visitors should be people who are likely to purchase the business's services or products. More visitors means more opportunities to try to convince potential customers to buy.Website marketing usually means getting on the first page of search results.

You can get on the first page of search results by:Putting great content on your website Using tips and tricks to get search engines like Google to find you better Social media posts web marketing strategies, including:

SEO: Attract website traffic, users, and sales via search engines like Google and Bing.

PPC: Drive immediate traffic and sales via ads on search engines and websites.

Content marketing: Build brand awareness and website traffic with original, quality content.

Email marketing: Acquire and nurture valuable leads with personalized emails.

Social media marketing: Earn followers, brand awareness, and sales with social media.

Display advertising: Generate sales and brand awareness with targeted ads on websites.

1. Search engine optimization (SEO)

SEO services is the process of boosting your website's ranking in the search results. Since Google fields 3.5 billion searches a day, using SEO is an excellent way for you to reach valuable leads for your business because so many people search for information through this search engine.

2. Pay-per-click (PPC) advertising

Pay-per-click (PPC) advertising is a great method to reach leads that are ready to convert. PPC advertisements are paid ads that appear at the top of the search results. These are tagged with the word "ad" to indicate paid content.

3.Content marketing

Content marketing is one of the best methods for helping your reach more valuable traffic for your business. When you create content, you provide your audience with the valuable information they need. Your audience is constantly seeking valuable information, so it's important that you take advantage of the opportunity to attract them to your business.

4. Email marketing

Email marketing is one of the oldest and most effective web marketing methods to date. While many businesses think that email is ineffective, it actually has the power to earn your business up to $44 for every $1 spent. To start using email marketing, you need to obtain a list of subscribers. The best way to do this is through your website. You can create email sign-up forms that give visitors the opportunity to sign up for your emails.

5. Social media marketing

Aside from email marketing, social media marketing is the only other marketing method that enables you to connect directly with your audience. Social media makes it easy for your business to connect with leads and share valuable content.

6. Display advertising

Display advertising allows your business to take advantage of ad networks like the Google Display Network (which reaches 90% of the world's Internet users) and Facebook Audience Network. It also lets you leverage the power of visuals, from images to GIFs to video, to draw users to your ad.

Unit-4

Electronic Payment System

What is E-Payment or Digital Payment?

E-payments, or Digital Payments, refer to online transactions between the payer and payee using digital or electronic payment methods. These payments facilitate instant money transfers from the comfort of your home, making them convenient and hassle-free.

What are the Different Types of Electronic Payment Systems?

Various types of electronic payment systems including debit and credit cards are commonly used for online transactions. Virtual payment cards offer a secure payment method without sharing personal information. Digital wallets provide convenience by storing payment details on a mobile device.

Here are some of the commonly used types of e payment system:

1. Debit Cards

Debit cards are an easily accessible payment method for online businesses. Banks widely issue them upon account opening and they are available to most individuals without complex eligibility requirements. In India, the use of debit cards for transactions has been increasing steadily in recent years. As of January 2023, there are over 945 million active debit cards in India, indicating a growing trend for transactions.

2. Credit cards

Credit cards have become a preferred method for companies to pay suppliers due to their convenience and flexibility. Credit cards have evolved to offer revolving credit lines, allowing cardholders to manage online payments more effectively. To facilitate credit card payments, businesses use merchant accounts and payment gateways which provide all-in-one solutions like Razorpay or simplified processing tools like Paypal. These electronic payment methods enable seamless transactions, making it easier for businesses to conduct online transactions.

3. Digital wallets

Digital wallets are becoming increasingly popular as a convenient and secure electronic payment method. They allow you to store payment information securely on your smartphone or other digital devices, making online transactions quick and hassle-free.ecurely.

4. Bank Transfers

You can make payments through bank transfers via bank routing and account numbers. Businesses can initiate bank transfers on behalf of customers, often using a reference number. Bank transfers encompass various electronic transfer types like ACH and wire transfers, thus offering versatility and security.

5. Mobile Pay

Mobile pay resembles an electronic wallet that securely stores credit card and banking information for seamless transactions. Mobile payments offer advantages over traditional wallets, especially in the post-COVID world where contactless transactions are preferred.

Embracing mobile payment options can enhance convenience and security for both businesses and consumers.

Defining e-cash

In its simplest form, e-cash can be defined as electronic cash. It's a way of paying for goods and services that isn't in physical cash. There are two forms of e-cash an online form and an offline form. Online e-cash The term e-cash was originally used by a company called Digital Cash, founded by David Chaum. Digital Cash went bankrupt in 1998. The idea of e-cash however, lived on. It was the idea that started online transactions, as well as crypto currency. It worked for all types of transactions.

With online e-cash, information regarding currency is downloaded to a hard drive. It stays there until it is transferred to another person or business online. This is the basis of crypto currency, in a very simple way.

Offline e-cash

The idea behind offline e-cash has its roots in credit cards and debit cards. Offline e-cash would function similarly to a debit card. Funds from a hard drive would be linked to a digitally encoded card. This card would replace paper money (like a debit card). However, the main difference here is that physical money no longer exists to begin with. With a debit card, physical money is still present, in a way.

How Does e-cash Work?

In the e-cash model, users would download their electronic money from their bank. It would then be stored on their hard drive until it's ready to use. Then, when preparing to make an online purchase, they'd use their "digital wallet" to transfer funds to the merchant. The merchant, however, would need the same "digital wallet" software in order to receive these funds.

The software that manages the “digital wallets” would be run by the e-cash bank. This way the money being transferred would be able to be verified. This is similar to the payment concepts that are behind debit and credit card transactions.

After the transferred amount has been verified, the merchant would be able to pay transaction fees to have it uploaded to a traditional bank. Ideally, transactions between customers and merchants would not have any transaction fees. The only fees that would be incurred would be between the traditional banks and their customers.

Currency Server Overview

Related Links

Download Now

New Features of Currency Server 6

New Features of Currency Server 5

Currency Server was designed to be the most advanced currency-enabling component on the market. It provides exchange rate information and currency internationalization, conversion and rounding services via COM, .NET and SOAP Web services, and Ajax-style scripting. Currency Server supports more clients, more platforms, and a larger number of independent providers of exchange rate data than other tools.

By working locally rather than relying on remote servers for each transaction, Currency Server provides a unique level of performance, reliability and independence. The service is always available to satisfy thousands of information and conversion requests per second. Support for a variety of data providers (both free and subscription-based) and advanced administration notification options assure fault tolerance and peace of mind.

When the software is implemented on a web server, visitors can see prices in their "language" without having to use third-party sites for currency-related services and without being subject to external pop-ups, frames, advertising and cookies. Currency Server is one of the fastest and most

cost-effective tools to add value to an e-commerce site. Either alone or as part of a complete internationalization effort, Currency Server can easily plug into an existing system and open up a new world of opportunities and user experience.

Applications

Possible applications include:

E-commerce - Integration with web or commerce server to create a dual-currency or multi-currency shopping site (customers see prices in currency of their choice)

Back-office - Interfacing with database, accounting, procurement, expense management, spreadsheets, etc.

Information - Web-based currency converters, widgets, popups, or maintenance of exchange rate data files (e.g. to post exchange rates in XML, CSV or HTML format, or for custom clients)

Web services - Use as a .NET or SOAP server to provide web services to remote clients

Electronic Cheques

Electronic cheques are one of the most popular online payment processing systems. They will deduct money from a checking account. This online payment mechanism eradicates the need for users to prepare their cheques in written form, helping sellers deposit them into their bank accounts. Electronic cheques have many security features compared to traditional paper checks, including verification, digital signatures, public key cryptography, and encryption.

Owners of these checks can perform a function similar to what they can carry out through a traditional paper check. The benefit of using these e-checks is that they need fewer steps to process them. The processing costs of e-cheques are comparatively lower than the standard paper checks. The direct deposit system offered by several employers is one of the more regularly used versions of the e-cheques

E-cheques are cheques that are written and processed electronically. This means that the funds are transferred from the payer’s account to the payee’s account through an electronic network

instead of a physical cheque. These cheques are also known as “digital cheques” or “electronic cheques”.

Features of E-cheques

Nowadays many people are using these cheques because they provide a number of benefits over traditional paper cheques. For example, e-cheques are faster and more secure than paper cheques. Let’s take a closer look at some of the features of e-cheques:

Faster: E-cheques are processed faster than traditional paper cheques. This is because there is no need to wait for the cheque to be physically delivered to the payee.

More Secure: E-cheques are more secure than traditional paper cheques because they are processed through an electronic network. This means that there is less chance for them to be lost or stolen.

Easier to Track: E-cheques can be easily tracked through online banking systems. This makes it easy to see where the funds are going and who they are being transferred to.

Reduces Paper Waste: E-cheques reduce paper waste because they do not require the use of physical cheque stock. This means that fewer trees need to be chopped down in order to produce paper cheques.

Saves Time and Money: E-cheques save time and money because they eliminate the need for manual processing. This means that there is less chance for human error and that the funds will be transferred more quickly.

Overall, e-cheques offer a number of benefits over traditional paper cheques. They are faster, more secure, easier to track and reduce paper waste. They also save time and money. If you are looking for a more efficient and secure way to process cheques, then e-cheques may be the solution for you.

Unit-5

Electronic data interchange

What is electronic data interchange?

Electronic data interchange (EDI) is the automated exchange of business documents between organizations. Daily business workflows require the exchange of documents like invoices, purchase orders, and shipping forms. Traditionally, paper-based documents or emails with attachments are shared between company representatives, who then manually process and fill the document data in their enterprise data systems. EDI technology automates these workflows so that digital systems can share and process documents across organizational boundaries without human involvement. Organizations can connect IT systems to others in their B2B network to save time and eliminate errors from manual processing.

What is a digital signature?

A digital signature is an electronic, encrypted, stamp of authentication on digital information such as email messages, macros, or electronic documents. A signature confirms that the information originated from the signer and has not been altered.

Digital signatures are widely used in various industries, including finance, healthcare, legal, and government, to facilitate digital transactions and document signing. With the increasing shift towards digitalization and remote work, digital signatures have become essential to modern business operations. How Digital Signature Works?

To understand how digital signatures operate, it's crucial to understand the following concepts:

Hash Function (aka Hash)

A hash function, commonly known as a "hash," is a powerful tool used to generate a unique, fixed-length string of numbers and letters from any kind of data, such as an email, document, picture, or any other type of file. This string is created using a mathematical algorithm, making it impossible to reverse-engineer and identify the original data.

In simpler terms, the hash function creates a digital fingerprint of the file, which can be used to verify its authenticity or detect alterations. Today's widely adopted hash functions encompass

the Secure Hashing Algorithm-2 suite (SHA-2 and SHA-256), Secure Hash Algorithm-1 (SHA-1), and Message Digest 5 (MD5).

Public Key Infrastructure (PKI)

Public Key Infrastructure, or asymmetric encryption, is a powerful cryptographic method to secure data. The public key encrypts data, while the private key decrypts it.

A digital signature transaction with PKI generates a pair of keys: a private and a public key. Only the signer uses the private key to sign documents electronically. In contrast, the public key is available and can be used by those who need to validate the signer's electronic signature.

Certificate Authority (CA)

A Certificate Authority (CA) is a reliable third-party entity to verify an individual's identity. The CA creates a public/private key pair and links the existing public key to the signer's identity. The CA signs a digital certificate proving the signer's identity. This digital certificate helps to authenticate the individual associated with their public key when requested.

Digital Certificates

Digital certificates serve a similar function to driver licenses, as they identify the certificate holder. These certificates include the public keys of individuals or organizations, verified and signed by a CA. The certificate can also include additional information about the certificate holder and the CA.

What is Cryptography?

Cryptography is the process of hiding data and information in an unreadable manner to make sure only the intended recipients can understand and access it. It is the study of secure communication in which only the message sender and intended recipient have access to and understanding of the message's contents.

Although cryptography has been used since ancient Egyptian times, the science of coding has advanced greatly with time. Modern cryptography is a blend of various disciplines, including

advanced digital technology, engineering, and arithmetic. It helps create highly secure and advanced cyphers and algorithms to protect sensitive data in the digital age.

In the context of cyber security, it refers to the application of decryption and encryption algorithms to protect sensitive information from unauthorised access and exploitation. It is widely used for digital signatures, secure communication, cryptographic key generation, and data verification.Types of Cryptography

In cyber security, you can apply cryptographic techniques in a number of ways. So, different uses of techniques result in different kinds of cryptography. Mainly, there are three important types of cryptography:

Symmetric Cryptography

In symmetric cryptography, both the sender and the receiver use a single common key to encrypt and decrypt messages. This method is efficient and fast. The only challenge lies in exchanging the key between the sender and the receiver in a secure manner.

Popular symmetric key encryption systems include data encryption standard (DES) and advanced encryption standard (AES).

Asymmetric Cryptography

This type of cryptography is also known as public key encryption. It involves using a set of mathematically related pairs of keys: a public key for encryption and a private key for decryption. The public key for encryption can be widely distributed, allowing anyone to encrypt messages. However, only the holder of the corresponding private key can decrypt them. This method allows both parties to communicate over public channels without sharing any secret keys.

It is commonly used in secure protocols such as hypertext transfer protocol secure (HTTPS), secure sockets layer (SSL) and secure shell or secure socket shell (SSH).

Hash Function

These are the types of cryptographic algorithms that do not require any keys. Instead, they encrypt the data using a hash value, which is a number with predetermined lengths that serves as a unique data identifier and is calculated according to the plaintext length information. This approach is widely utilised to safeguard passwords across a variety of operating systems.

What is Interoperability?

Interoperability is the property that facilitates unrestricted sharing and use of data or resources between disparate systems via local area networks (LANs) or wide area networks (WANs). There are two types of data interoperability - syntactic interoperability, which is a prerequisite to semantic interoperability and enables different software components to cooperate, facilitating two or more systems to communicate and exchange data; and semantic interoperability, which refers to the ability of computer systems to exchange meaningful data with unambiguous, shared meaning.

Efficient automated data sharing between applications, databases, and other computer systems is a crucial component throughout networked computerized systems, especially interoperability in healthcare information and management systems.

How Does Interoperability Work?

For two or more systems to be interoperable, they must be able to exchange, interpret, and present shared data in a way that is understood by the other. This is accomplished with the establishment of syntactic interoperability, which involves adopting a common data format and common data structure protocols, followed by semantic interoperability, which involves the addition of metadata that links each data element to a controlled, shared vocabulary. Within this shared vocabulary are associated links to an ontology, which is a data model that represents a set of concepts within a domain and the relationships among those concepts.

The adoption of these common standards enables the transmission of meaningful information that is independent of any information system. The benefits of interoperability include increased productivity, reduced costs, and reduced errors.

System and software interoperability capabilities are essential in such fields as:

Healthcare: hospitals and labs are increasingly adopting new technologies and devices that are driven by sophisticated software, which must integrate at the point of care and with electronic systems, such as electronic medical records

E -Government: solutions address challenges such as language barriers and different specifications of formats and varieties of categorizations in the collaboration of cross-border services for citizens, businesses and public administrations

Public Safety: addresses the ability of law enforcement, fire fighting, EMS, and general public health and safety first responders to effectively communicate between different agencies during wide-scale emergencies

Military: Force Interoperability refers to the ability the forces of two or more nations to operate together coherently, effectively, and efficiently to execute Allied tactical, operational and strategic objectives

Flood Risk Management: in the context of urban flood risks, the ability of a water management system to redirect water and make use of other systems to maintain or enhance its performance during water exceedance events

Compatibility vs Interoperability

Compatibility is the technique by which two or more applications or systems interact within the same environment, each performing their expected tasks independently without interfering with the performance of another application or system. Compatibility is not concerned with interoperability as the two components are not required to communicate with one another, but simply hold residence in the same environment.