UNIT 3 TECHNOLOGY USED IN E-COMMERCE

Structure

3.0 OBJECTIVES

After studying this unit, you should be able to:

- list the building blocks of e-Commerce;
- understand the difference between app based and web based business;
- know the features of technologies used in e-Commerce;
- understand how to build, design & launch e-Commerce website;
- differentiate between app based and web based business;
- understand the impact of emerging technologies of e-commerce with special reference to Platform Economy.; and

- Understand the concept of Digital Transformation with special reference to Commerce.

3.1 INTRODUCTION

In the last decade, the way of doing business has totally revolutionized. The reason for drastic change is the emergence of new technologies and the merging of Internet facilities with these new technologies. The Internet has produced a number of innovations in the business between commercial organizations, between individuals and commercial organizations, and between individuals and individuals. These transactions are usually known as business-to-business (B2B), business-to-customer (B2C), and customer-to-customer (C2C) e-commerce.

The advancement in technologies impacted the e-commerce industry drastically; it has transformed the way consumers connect with brands. Now the customers feel more empowered as they can buy anything just with a click of a mouse, can shop more cost-effectively, track orders, find the best deal by comparing different portals and get the convenience of getting products delivered to their doorstep. All this is possible because of the emergence of new technologies, as a result now e-commerce companies are getting nearly global adoption because customers can buy products from anywhere and at any time as per their ease.

3.2 DESIGN CONSIDERATIONS FOR E-COMMERCE

None of the e-commerce applications would be possible without some basic design considerations. Attracting visitors and making them convert into customers is the real challenge. The basic design considerations, which, when set up right, will pave the way to a prosperous online business. Five important design considerations of e-commerce are discussed below:

3.2.1 Design of e-commerce Website

The design of the portal is most important, never underestimate it. The customers who visit the site should be able to find exactly what they're looking for as soon as they arrive. E-commerce portal should be such that it is fast and responsive to customers' needs, web pages should load quickly and provide smooth, intuitive navigation across all electronic devices (desktops, tablets, and smartphones).

3.2.2 Easy navigation

Easy-to-use navigation is essential for any website and even more so for online shopping. Customers prefer e-commerce portals that are spontaneous to their queries and give quick responses to what they are looking for. If the product descriptions are not properly provided on the shopping menu of an e-commerce portal, then there are high chances of losing the customers.

3.2.3 Simple checkout

Like navigation, the checkout process should be smooth, if it involves too many steps and clicks, the risk is that the customer just gets frustrated and gives up before completing the purchase. There should be the facility for payment through different payment options such as through net banking, digital wallets, debit/credit cards, and COD (Cash on Delivery). The payment process should be transparent and clearly state the shipping charges, taxes, and any other fee if applicable; there should not be any hidden fee at the time of product delivery.

3.2.4 Logistics

Logistics management is one of the key consideration points for doing business either locally or around the globe. Proper logistics should be in place to receive and fulfill orders.

3.2.5 Good Product Pages

The product page is the crucial element of any e-commerce portal, it has the power to convert a 'visitor' into 'prospective buyer'.

- The pictures uploaded on website pages should be of good quality, language used for product description must be simple and crisp.
- Feedback of the customers in form of ' product review' should also be there on e-commerce website, as the product review option increases the chances of a product purchase, nowadays customers prefer to buy a product after reading about its review.

3.3 ESSENTIAL TECHNOLOGY FEATURES REQUIRED

Essential features of technology required while designing e-Commerce are explained as follows:

1. **Ubiquit**y: E-commerce is ubiquitous i.e. it can be accessed from everywhere and at anytime. It is not restricted to any physical space and makes it possible to shop anytime, anywhere using any electronic device (laptop/desktop/mobile phone/tablet) having internet connectivity.

2. **Global Reach:** The technology has eliminated the national boundaries. In e-commerce businesses, potential market size is almost equivalent to the global population.

3. **Universal Standards**: Another obvious unusual feature of e-commerce technologies is there is one set of technical standards of the internet that is universal standards. The Internet is shared at the global level by all nations, it enables any computer to link with any other computer regardless of the technology platform used by each one of them. Using the universal standards files can be easily exchanged with any remote device across globe.

4. **Richness:** Advertising and branding are an important part of commerce. E-commerce can deliver video, audio, animation, billboards, signs and etc like traditional commerce. Information and the contents are rich can be delivered without sacrificing the reach.

5. **Interactivity**: E-commerce technologies allow for interactivity, meaning they enable two-way communication between the merchant and the consumer.

6. **Information Density**: Ecommerce technology reduces the information collection, storage, communication, and processing cost. At the same time, it has increased the accuracy of quality information, making information more useful and important than ever.

7. **Personalization**: E-commerce technology allows for personalization. On the basis of name, interests, and past purchase behavior products can be customized and personalized, further, this collected information could be used for sending marketing and promotional messages to the targeted customers.

3.4 DIFFERENCE BETWEEN APP BASED AND WEB-BASED BUSINESS

Businesses that generate their revenue directly from their website fall into the **web based business** category, these types of websites are typically informational in nature, they are made to provide the desired information typically a user demands whereas, a **mobile app** is a software application designed for use on mobile devices, such as smartphones and tablets, rather than desktop or laptop computers.

Nowadays, every individual has mobile phones, so almost everyone has switched from website to mobile application as it is convenient to use, can be carried everywhere and anytime. That is why most retailers are investing in e-Commerce app development to attract maximum customers to their online business (e-commerce).

Table 3.1: Difference between App based and web based business

Parameters	App based business	Web based business
Devices Used	Handheld devices such as Smart phones and tablets	Computers, Laptops
Internet Connectivity Requirement	Mandatory	Mandatory
Reachability	With push messages (notifications), app based business reach large number of customers, even when they are on the go	In web based business reach is limited.
Platform	Web store and native Apps (Play store in Android and App store in Apple)	Web stores

Payment Gateway	Mobile banking, net banking , Credit/Debit card, Wallets, COD.	Net banking, Credit/Debit card, Wallets, COD
Mobility	Mobility is high, as customers can buy and make transactions from anywhere, anytime as long as internet connectivity is there.	Mobility is low, as customers can buy and make transactions on their computers and laptops
Privacy and Security	There are lot many privacy and security issues related with app based business. Installation of malware on mobile is one of the major concern while shopping online using mobile app	Web based business is more secure than App based business

App-based business is the future of shopping as changing time requires changing solutions, and mobile app has proven it by providing customers the convenience and flexibility of shopping on the go.

3.5 BUILDING, DESIGNING AND LAUNCHING E-COMMERCE WEBSITE

Building an E-commerce website will strengthen the reputation of the business; it helps in the expansion of the brand nationally and internationally. The World Wide Web is all about the technologies that change the business environment and have an impact on the future of electronic commerce. The wide popularity of the internet in recent years has been fuelled largely by the prospect of performing business on-line, i.e. buying and selling of the product, services, or information via computer networks, mainly by the Internet. There are a lot many benefits of doing business through e-commerce that no company can afford to ignore. It is no longer an alternative but is chosen as the first choice for the new players in the market. Businesses are of various types, so the e-commerce model also changes accordingly. Even companies in the same industry, but different either with the size or customer base are finding that one same e-commerce models do not work. Therefore, one e-commerce model does not fit all.

3.6 SDLC CYCLE FOR DESIGNING E-COMMERCE SOLUTIONS

In the Systematic Approach of developing successful e-commerce two most important management challenges are involved, first challenge is to develop a clear understanding of the business objectives and the second challenge is to choose the right technologies to achieve identified business objectives.

Effective plan and knowledge base of the above factors will help in making sound management decisions that will help to generate consistent, optimum results in terms of increased growth of the online business (e-commerce)

For understanding the business objective Systems Development Life Cycle (SDLC) methodology is used, which helps in designing an appropriate solution. It includes the creation of documents that communicate to senior

management for achieving important milestones and the uses of resources. The five major steps of SDLC involved are:

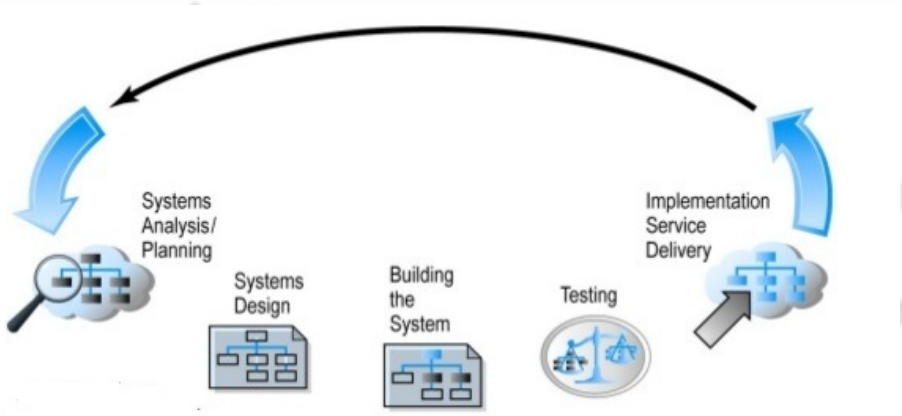
a. **System Analysis/ Planning**: In this phase objectives of website to be developed are identified and defined, system requirements are also gathered and on the basis of that System Requirement Specifications (SRS) document is prepared.

b. **Systems Design**: In this phase the system model is designed like graphical user interface and database.

c. **Building the System (Development):** In this phase the design is executed into actual e-commerce website.

d. **Testing**: In this phase a thorough testing is done on actual e-commerce website of various parameters such as speed of website, connectivity between various pages, money transactions (if applicable).

e. **Publish /Implementation:** A hosting company is chosen in this phase. Once it is finalised then payment for hosting charges are done, Hosting company provides a password that is used for uploading the website on the internet server.



Source*: *https://designsystemexamples.blogspot.com/2018/08/e-commerce-system-analysis-and-design.html)*

Fig 3.1: SDLC approach for E-Commerce website development

Nowadays, Agile method is becoming an integral part for the development of E-Commerce websites, apps and software, as it accounts for unpredictability by allowing for changes to be constantly implemented. In this method client is provided access to multiple versions (after iterations) of the website. Agile methods gained prominence from last one decade and in early personalized era, because agile method improves website quality by injecting client's feedback into a working website version.

Advantages of Agile Methodology: There are following advantages:

a. High Speed: This method gives a much higher speed than conventional web development programs, due to its well-planned streamlining development.

b. **Better product quality:** The website undergoes regular and rigorous quality checks to improve the quality, during the development process.

c. **Flexibility:** It is difficult to work nowadays using different methodology (such as Waterfall etc)because of today's fast-on-the-move environment. Agile methodology works for projects with ever-changing requirements and goals, and adapts to any environment.

d. **Regular and rigorous testing**: Quality checkups are done regularly till the final website is launched.

3.6.1 Hardware

Hardware is the basic technical requirement of an e-commerce website that can support e-commerce operations. Choosing the right kind of hardware for an e-commerce site is very important, for this consider the size, purpose, and traffic on the site to determine the use of server hardware. An E-commerce website is made up of HTML, PHP, Javascript, database, media files. The entire website is stored on a web server. Hardware for setting up a web server completely depends on the e-commerce website requirements. There are lot many that decide the hardware for hosting, such as what app you will be running on the web server. How many visitors you are expecting, what's the scalability of a site, etc.

3.6.2 Software

All e-commerce sites require basic Web server software to answer requests from customers for HTML and XML pages. It thus answers HTTP requests from customers. The choice of Web server software depends on the operating system. Apache, the leading Web server software; only works with UNIX operating system. Microsoft's Internet Information Server (IIS) is the second major Web server software.

3.6.3 Outsourcing *Vs* In-house Development of Application

In-house development of application is the process of developing and building an application on your own. It includes high risk; high skilled set and pre-built templates in this case.

Whereas, Outsourcing is hiring an outside vendor to provide develop the application that cannot be developed with in-house personnel.

This is completely different from in-house app development in terms of risk. It lowers down the risk of app failure because in this case, company hire the top app developers who are experienced and understand the market trends as well as customers/clients requirements.

Check Your Progress A

1) What is an App based business?

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2) "Advancement of technology has impacted the business." Comment.

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3) What are the advantages of agile methodology?

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4) What do you understand by in house development of an application?

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3.7 ARCHITECTURAL FRAMEWORK AND NETWORK INFRASTRUCTURE

3.7.1 Architectural Framework of E Commerce

A framework is intended to define and create tools that integrate the information and allow the development of e-commerce applications. The aim of the architectural framework is on synthesizing the diverse resources already in place to facilitate the integration of data and software for better applications. The e-commerce architectural framework consists of following six layers of functionality, or services:

1. Applications Layer services: It includes all Customer to business, business to business and intra organizational services
2. Brokerage services, data or transaction management: It includes order processing, payment process and mail interactions
3. Interface and support layers: It facilitates Directory support functions, Interactive catalogues

4. Secure messaging, security and electronic document Interchange: It deals with encrypted e-mail, Electronic Data Interchange (EDI)
5. Middle ware and structured document interchange
6. Network infrastructure and basic communications services

All the above mentioned layers are connected and help in integrating information access and exchange within the context of the chosen application. As electronic commerce applications are based on several layers, when they are integrated, then provide uniquely powerful solutions.

3.7.2 Domain Name System (DNS)

The DNS is a system for mapping alphabetic names to numeric Internet Protocol (IP) addresses like a phone book maps a person's name to a phone number.

Lets understand the concept with an example, say 'www.abc.com' is an URL. In this 'abc.com' is the domain name and 'www' is the hostname. DNS resolution (the process of translating IP addresses to domain names) maps www.abc.com into an IP address (such as 192.0.2.1). When a user needs to load a webpage, a conversion must occur between what a user types into their web browser (*www.abc.com*) into an IP address required to locate the *www.example.com* site

3.7.3 Web Servers Implementation

The server and client speak the standardized, basically the computer language of the World Wide Web. Because of this standard language, The old Mozilla Netscape browser can still talk to a modern Apache or Nginx web server. The basic language of the Web with the request and response cycle from client to the server and then back to client remains the same as it was before. Modern browsers and web servers have simply developed and extended the language of the Web to incorporate new standards and to relate to the new customers.

Web server: A web server is server software, or hardware dedicated to run the software, that can satisfy client requests on the World Wide Web.

Client request: A client sends a request to a web server by using a browser such as Internet Explorer, Firefox, or Chrome. A Web server's work is to process requests from the clients. The result of the web server's processing is a response code and is commonly a content response.

The web server can be implemented in various ways. The following web server implementations each have changing features, extensions and configurations.

- **Apache HTTP Server:** It is the most usual deployed web server on the Internet for more than 20 years.
- **Nginx:** It is the second most commonly used web server, It can also be used as a reverse proxy, load balancer.

- **Caddy:** It is a new entry and it focuses on serving the HTTP/2 protocol with HTTPS.

The file sits on the file system in a location where the web server is authorized to access and the web server sends the file to the client with a status code. If the client had already requested the file and the file has not changed, the web server will pass back a 304 "Not modified" response indicating that the client already has the latest version of that file.

3.8 IMPACT OF EMERGING TECHNOLOGIES ON E-COMMERCE

In the preceding sections, we saw how Internet the "platforms of platforms" has tremendously reduced the entry costs of new businesses / entrepreneurs in the market.

Now we would move on understanding the impact of emerging technologies on businesses.

Emerging technologies are simply new technologies that are currently developing or will be developed over the next five to ten years, and which will substantially alter the business and social environment. Broadly, emerging technologies can be understood as 'science-based innovations with the potential to create a new industry or transform an existing one', which will "substantially alter the business and social environment"

There is no established definition of Emerging technology. The term Emerging technology is interchangeably used with Disruptive Technologies. These Emerging technologies are broadly divided into three categories *viz* 'Artificial Intelligence-AI', 'Transparently Immersive Technologies' and 'Emerging Digital Platforms'. Emerging technologies such as Internet of Things (IoT), Artificial Intelligence (AI), Robotics, have influenced every sector.

The accelerating pace of adoption of Emerging technologies in e-commerce is going to be impressive, because of dramatic reductions in operating costs, easier access to the consumer as well as because of innovations possible in the design and delivery of products and services due to these newer forms of digital technologies.

Emerging technologies are also often referred to as 'Disruptive' – the one that displaces an established technology and shakes up the industry and could be termed as a ground-breaking product capable of creating a completely new industry. In the next few subsections, we shall discover the tremendous impact of Emerging technologies on businesses and that how these technologies have revolutionized the existing e-commerce business models.

Presented herewith are discussions on impact of only a select few Emerging technologies *viz* Mobile Devices and Mobility, Big Data and Big Data Analytics, AI/ML, IoT /IoE/IIoT/ Digital Twins, Cloud/ Edge/ Fog computing, and convergence of these technologies as Industrial Revolution 4.0, on the realm of e-commerce.

1) **Mobile Devices and Mobility and its Impact on e-Commerce:** In present busy lifestyle, every consumer wishes to get services on the go. These services could be as routine as payment of utility bills to ordering of food or apparels or even buying and investing in fixed / movable assets using smartphones and other handheld devices. No one could ignore the significance of mobile devices and the advantage of mobility these devices present in our daily lives.

   Growing penetration and popular acceptance of mobile devices has led to the increase, and growth of ever evolving mobile based solutions. It has also revolutionized the way online shopping had been conducted earlier. E-commerce companies are now striving hard towards offering unsurpassed User Interfaces (UI) and User Experience (UX) to their target consumers on their handheld digital devices. Mobility is indeed, becoming a highly significant aspect of e-commerce design considerations.

2) **Big Data and Big Data Analytics and its Impact on e-Commerce:** E-Commerce is a sector, in which companies handle a large amount of data on their databases. Data about customers, distributors, retailers, products, processes, prices, logistics, and several other aspects of businesses is growing faster than ever before. In such situation use of Big Data and Big Data analytics become relevant to save, update, use, process and share this ever-growing business details.

   The term Big Data is largely characterized by the mix of the 4 V's—volume, velocity, variety, and veracity. Big Data technologies not just process the huge quantity and range of data formats but also lend speed to its processing. Every second, more and more data is being created from heterogeneous components of e-commerce which also needs to be analyzed in an integrated manner in order to extract maximum value out of it.

   Big data analytics is a collection of different types of tools, including those based on predictive analytics, data mining, statistics, artificial intelligence, etc. . The complex analysis of Big Data is enabled by the science of big data analytics coupled with intelligent and predictive processing enabled by AI / ML algorithms.

   Big data analytics is the process of examining large and varied data sets *i.e.,* big data to uncover hidden patterns, unknown correlations, market trends; customer preferences and other useful information that can help organizations make more-informed business decisions. Powered by AI/ML, big data analytics help organizations to make better business decisions and forecast future trends.

3) **Artificial Intelligence (AI), Artificial General Intelligence (AGI) and Machine Learning (ML) and its Impact on e-Commerce:** Artificial Intelligence (AI) is an important Emerging technology, that has created impact on everything that we do today – right from searching the Internet, to watching series/movies on streaming platforms to what we order online.

Artificial Intelligence is the simulation of human intelligence processes by machines, especially computer systems. These processes include learning, reasoning, and self-correction.

More typically, Artificial General intelligence (AGI) is the representation of generalized human cognitive abilities in software so that, faced with an unfamiliar task, the AI system could find a solution. An AGI system could perform any task that a human is capable of. Machine learning is an application of artificial intelligence (AI) that provides systems the ability to automatically learn and improve from experience without being explicitly programmed**.**

Machine learning focuses on the development of computer programs that can access data and use it to learn for themselves. Artificial Intelligence (AI) with its core subset of Machine Learning (ML) is rapidly transforming life experiences– ranging from routine mundane chores to critical decision-making. AI/ ML permit rule-based extractions on heterogeneous multidisciplinary data collected over the entire value chain of businesses.

Artificial Intelligence is helping e-commerce businesses get closer to their customers, as with the help of AI e-commerce platforms are able to utilize large datasets regarding customers purchasing behaviour and product search patterns. Artificial intelligence self-learning algorithms can create personalized shopping experiences for online buyers.

Typically, businesses are implementing AI/ML to increase retail standards, customer experience, and profits and fast processing. Following are some facilities that AI is providing to e-commerce:

- **Personalization:** The clients are provided with a personalized experiences and easy to select products/searches based on their earlier searches (machine learning technique).
- **Real-time intent targeting**: It is the next step in personalization. Enabled by AI, it gives the ability to accurately predict ever-changing customer intent.
- **Voice Assistant:** AI is also facilitating voice assistants, by which customers can interact with and resolve their queries.
- **Recommendation engines:** A recommendation engine is a tool that filters the data by using algorithms and suggests popular products for customers. Based on the customers past purchasing behaviour, these engines will suggest items which the customer may probably purchase.
- **Chat box support:** It is a computer program that allows conversational performances, engaging purchasing more highly by text and voice. Nowadays, it is popularly used in mobile phone,

internet browsers, or internet chat rooms. A basic and simple real-time human-like interaction using both text options can also enhance user experiences (UX) and thus nurture good engagement between the customer and the online store.

4) **Internet of Things (IoT), Industrial Internet of Things (IIoT), Digital Twins and its Impact on E-Commerce:** The Internet of Things (IoT) is a system of interrelated computing devices, mechanical and digital machines, objects, animals or people that are provided with unique identifiers and the ability to transfer data over a network without requiring human-to-human or human-to-computer interventions

IoT devices keep capturing, sharing, collating, millions of zetta bytes (10^{21} bytes), which is made available to planners/decision makers for real-time decision making through state-of-art control centres.

Industrial Internet of Things (IIoT) is similar interconnected network particularly in industrial context, where all the instruments have sensors and are interconnected with each other.

Extending the concept of IIoT, is the concept of 'digital twin'- which refers to the digital process of creating a virtual representation of a product. The application of 'digital twin' can be used in product design, simulation, monitoring, optimization, and servicing and is an important concept of Industrial Internet of Things (IIoT)

The impact that IoT and its related technologies have on e-commerce is interesting. For example, IoT sensors and RFID (Radio Frequency Identification) tags have transformed the way inventory is organized at the backend of online stores.

Warehouse automation: Most of the organizations are presently concentrating on handling their warehouse operations for decreasing costs and increasing business efficiency. Automated warehouses are progressively effective, adaptable, quick and trustworthy as well. They help online shopping companies to adapt and handle the distribution of warehouse products.
Because of interconnected sensors on the products, a unique online shopping experience is possible, where both the buyers and sellers can 'view' and monitor the availability and movement of inventory in real time. Such IoT based implementations in the back-end factories lead to better 'supply chain management' models. Tracking the status of the product has never been so accurate before the advent of IoT technology. With the help of IoT sensors and RFID tags, customers can easily know what happens to the product they have ordered, where it is, what the arrival time of the product etc is.

5) Cloud Computing, Edge Computing and Fog Computing and its Impact on e-Commerce: With the increase in storage capabilities and

methods of data collection, huge amounts of data must be stored and managed well in remote data centres, called as 'cloud'.

Cloud assures to deliver on-demand computing resources and services in three basic manner *viz.* Software as a Service (SaaS), Platform as a Service (PaaS), Infrastructure as a Service (IaaS).

Cloud computing term is often referred to refer to the process of analysing the data lying in these remote data centres. A close variation of the concept of 'cloud computing' is 'edge computing'.

'Edge Computing' moves computing applications, data, and services away from centralized nodes to the logical extremes of a network. It enables analytics and data gathering to occur at the source of the data, instead of remote data centres.

'Fog computing' refers to a collection of co-located edge-computing devices and computations, connected over Internet. Therefore, fog computing is a decentralized computing infrastructure in which data, compute, storage, and applications are located somewhere between the edge and the cloud. Edge and fog computing help to process co-located data closer to where it has been captured from, rather than waiting for it to 'flow' to the remote cloud servers. Fog computing and Edge computing, therefore, reduce the time-gap between data capture, data-processing and data-dissemination.

All these varied possibilities of computing offered by Cloud, Edge and Fog allow business enterprises to launch applications without worrying about the infrastructure. These remote implementations help businesses to have access the information stored in big data storages without delays.

Cloud based e-commerce solutions are cost effective, scalable and could be considered as the best option available to those enterprises who need to access terabytes of e-commerce data, without the botheration of maintaining it on the local premises.

Another important benefit of cloud computing is that it provides security to the data by storing it in a virtual space. Physical servers or on-premises data centres cannot easily combat the risks of disasters/risks which could occur anytime.

Cloud computing, along with its emerging trends like fog computing and edge computing can be utilised in e-commerce realm to provide alternative contact points for the related business processes and to its numerous users.

6. **Block Chain Impact on E-Commerce:** A block chain is a digital record (distributed ledger), which is made to store a list of transactions (called 'blocks'). Each block has a different feature which contains a link to the previous block, a timestamp, and data about the transactions it represents. Blocks cannot be modified once they are created. Since nobody can modify a block after it's been created, all parties (buyer and

seller) can be assured that the data it contains is still valid long and remains unchanged after its creation.

Block-chain technology is a natural fit for E-Commerce since it was designed for storing transactional data. However, this data doesn't need to be financial; it can be any distinct action that requires a fixed record, including actions related to payment and order fulfilment.

There are various advantages (plus points) of block chain technology that make it an approachable technology for the e-commerce industry (and other industries) in the coming future. Some of the plus points are discussed below:

Transparency: One of the major reasons block-chain is interesting businesses is that this technology is almost always open source. That means other users or developers will have the opportunity to modify it as they prefer it to be.

Stability: Confirmed blocks are very unlikely to be reversed, meaning that once data has been registered into the block chain, it is extremely difficult to remove or change it. This makes block chain a great technology for storing financial records.

Reduced transaction costs: Blockchain lets peer-to-peer as well as business-to-business transactions to let them complete without the requirement of a third party, which is usually a 'Bank". Because there is no Inclusion of a middleman which is tied to block chain transactions, which basically means that they can actually reduce costs to the user or businesses over time.

Decentralization: Another important reason the block-chain is so exciting is because of its lack of a central data hub. Instead of running a massive data centre and verifying transactions through that hub, block-chain actually lets the individual transactions to able to have their own copy of proof of validity and the authorization to be able to enforce those constraints.

User-controlled networks: Finally, crypto currency investors are inclined to be really motivated by the control aspect of the block-chain. Rather than having the third party performs its tasks, users and developers should be the ones who get to call the shots.

From the above discussions, block chain will be the driving force for e-commerce in the future, as indicated herewith:

a. **Better Supply Chain Tracking & Monitoring:** Supply chain tracking and monitoring is the most crucial aspect of e-commerce. The well-monitored and balanced supply chain is a distant dream for e-Commerce businesses. Tracking the products, managing the stock is very hard for e-commerce. Blockchain implementation in this area will likely solve many problems, this technology could be extensively leveraged to solve supply chain issues like recordkeeping, tracking of products etc.

b. Provenance Tracking: The record keeping and provenance tracking becomes easy in a block chain enabled supply chain, as the product information can be accessed with the help of RFID tags and embedded sensors. Tracking could be done from product's inception stage to it's present status.

c. **Payments Get an Efficient Makeover:** The payment industry is obtaining ample benefits from block chain technology. Crypto currency has gained the necessary power and is being used as an alternative to the traditional currency in e-commerce. Nowadays, customers prefer crypto currency because it doesn't expose personally identifiable information such as name, credit/debit card number, etc.

d. Secure Platform for e-Commerce: Security in any form is a cause of concern for e-Commerce businesses. The Blockchain-based e-Commerce platform offers security at all levels including data and wallet security.

7. **Industrial Revolution 4.0 and its Impact on E-Commerce:** These 'smart' digital technologies including AI, IoT, Cloud computing, Big Data Analytics etc. have also led to a paradigm shift in businesses, particularly the manufacturing sector, ushering in, what is popularly referred as 'Industry Revolution 4.0' (IR4.0). Industry 4.0 completely relies on real time data exchange and digital interconnectivity enabled by cyber-physical systems (CPS) and emerging technologies. In IR 4.0, the physical world of manufacturing relates to digital world using cyber-physical systems (CPS), internet of things (IoT), and industrial internet of things (IIOT), cloud computing, and artificial intelligence for better collaboration across departments, partners, vendors, product, and people. IR 4.0 has now been accepted as a more comprehensive, interlinked, and holistic approach to manufacturing than the prevailing one. The underlying concept of IR 4.0 is "interconnectivity using emerging technologies".

3.9 DIGITAL PLATFORMS AND E-COMMERCE

As is evident from the previous section, the impact of Emerging technologies on e-commerce has been enormous in the last few years. Convergence of Emerging technologies has led to the emergence of newer cloud-based 'digital platforms', which are more complex in implementation than online stores that we had been talking so far about. Even the implementation strategies and revenue models are different than the basic e-commerce business models we had studied. Let us try to explore the concept of Digital platforms, also referred as only 'Platforms.

What are Digital Platforms : Digital platforms can be understood as digital "frameworks of complex web portals and online digital facilities that permit collaborators – users, peers, providers -- to undertake a range of activities, often creating de facto standards, forming entire ecosystems for value creation and capture.".

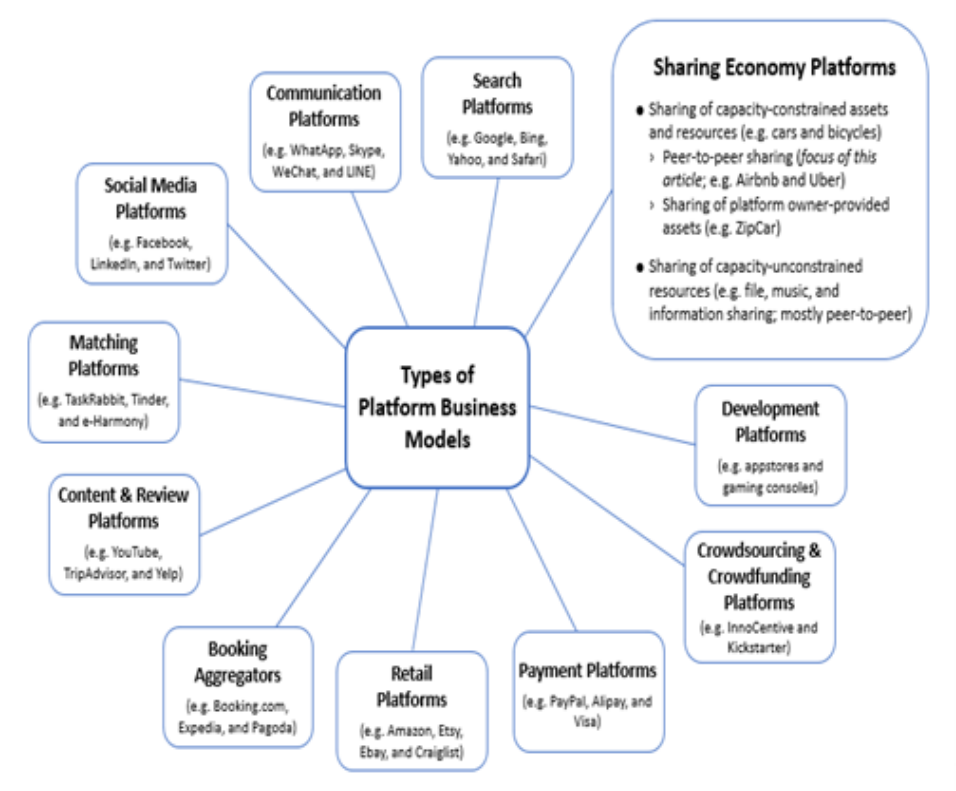
Digital platform is essentially a cloud based implementation; it employs AI/ML to personalise and contextualise each activity undertaken by the visitor to the platform; it relies on Big Data technologies to store varied, real time data and uses APIs to 'converse' with this huge , heterogenous Big Data.

How Platforms Work: All the past choices and transactions undertaken by the customer are stored in enormous databases running in the cloud. ML algorithms are employed on these huge databases to 'data-mine' and 'guess' the future choices of the customer. These 'predicted choices' are presented using customised APIs, when he/she logs in again. As already explained in the last Unit, APIs – application programming interfaces, deliver a customer's response to the system and sends the system's response back to the customer. Therefore, cloud, huge databases, AI/ML and APIs work together in the platforms to predict future choices of the customer that help to 'target' them in a more personalised manner. These predictions are not just about the 'potential product / service choices' of the customers but are also used for displaying targeted advertisements and campaigns that the customer could be potentially interested in.

Though all the e-commerce online stores use Internet itself as the foundation of designing and launching platforms but in present times, several technology companies (also referred in spoken language as 'BigTech giants') are emerging as infrastructure companies who provide Cloud infrastructure and the related AI/ML based tools to the rest of the companies for constructing their own company portals and delivering services/ products. For example, Amazon Web Services (AWS) provides digital infrastructure and tools with which other platforms are built. Similarly, Google Cloud Platform (GCP) which is also emerging as one of the fastest and enormously growing cloud-computing platforms in the market. IBM Cloud and Alibaba cloud are other two interesting players in the field of providing " Platform for Platforms".

Types of Platforms: Depending on the services offered, various researchers have categorised digital platforms in various types, such as

- Sharing Economy Platforms
- Development Platforms
- Crowd-Sourcing /Crowd-Funding platforms
- Payment Platforms
- Retail Platforms
- Booking Aggregators
- Content and Review Platforms
- Matching and Social Media Platforms
- Communication Platforms
- Search Platforms.



Source*: https://www.researchgate.net/publication/331907029_Platforms_in_the_Peer-to-Peer_Sharing_Economy/figures?lo=1)

Fig 3.2: Types of Digital Platforms

Impact of Digital Platforms on e-Commerce: Understandably, the development and application of the platform economy has a deep impact on the way business transactions could be undertaken in future.

a. The first main advantage of digital platform has been that it has initiated *disintermediation* – i.e. removal of local brokers (middlemen) from the supply chain. Using advance tools and algorithms, digital platforms, also referred as third-party marketplace or aggregators, connect sellers (for example, wholesale companies) with buyers (for example, consumers) by removing intermediaries (for example retailers) from the supply - chain. For example, *Uber* directly connects drivers with riders using basic algorithms, thereby eliminating 'Taxi stands' from the supply chain of automobile services. In the same vein, *Kickstarter or Indiegogo* for project funding have replaced traditional intermediaries.

b. Platform economy has also led to the popularising of the word '*uberisation'* which refer to the concept of buyers and sellers, consumers and producers coming together virtually on the 'digital platform'. For example, digital platforms (such as *Upwork*) now help to facilitate HR (human resource) functions.

c. Several products / services that had a huge time and cost premium attached to it are now easily available on these platforms. For example, a library of software tools for building other software utilities is available on *Github*. Similarly, there is *App Store* of Apple and Google *Play Store* for Android that provide trusted platforms to facilitate the users to

download other apps by providing inbuilt safeguard mechanisms for privacy, security and trustworthiness of content for the users.

In short, powered by Cloud, AI/ML, Big Data and related Emerging technologies, digital platforms connect all stakeholders of value chain who are involved in a business transaction and help in convergence of processes , places and people involved. They help local products and services to have a global outreach. Platforms, therefore, have a very strong multi-dimensional characteristic that would impact e-commerce business models of future.

3.10 DIGITILISATION AND DIGITAL TRANSFORMATION IN BUSINESSES

Even the e-commerce designers are reimagining how goods and services could be delivered more creatively by employing Emerging technologies. These trends towards extensive dependence on Emerging technologies made possible through mobile devices and apps, have also led to automation of internal processes of businesses (such as inventory management, HR automation and so on) as well as of customer-facing processes (such as billing, notifications to the customers and so on). This, in return has led to extensive business process reengineering and process automation of internal and external business processes using various Emerging technologies including AI/ML etc. Integrated automation of end-to-end processes of business enterprises using Emerging technologies is also called *digitilisation*(and not digitisation) or *digital transformation in enterprises*.

Digitilisation transforms delivery of services or businesses, by replacing earlier technology implementations and manual processes with redesigned digital processes that use Emerging technologies.

Undoubtedly, Emerging technologies have ushered Digital transformation in the area of trade and commerce. Businesses have become cloud-based and mobile-enabled. Enterprises have become more agile and 'virtual' in nature. Newer business models have emerged that are more 'intelligent' and responsive to the needs of their customers and customers, have, truly become the 'kings' and 'queens' getting products/ services – whichever they need and wherever they need.

Check Your Progress B

1) State the impact of Industrial Revolution 4.0 on e-Commerce.

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2) What are the various types of platform business models?

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3) State the impact of Digital Platforms on e-Commerce?

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4) "Trends towards extensive dependence on Emerging technologies made possible through mobile devices and apps." Comment.

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3.11 LET US SUM UP

In the last decade, the way of doing business has totally revolutionized. The advancement in technologies impacted the e-commerce industry drastically; it has transformed the way consumers connect with brands. Now the customers feel more empowered as they can buy anything just with a click of a mouse, can shop more cost-effectively, track orders, find the best deal by comparing different portals and get the convenience of getting products delivered to their doorstep.

None of the e-commerce applications would be possible without some basic design considerations. The basic design considerations, which, when set up right, will pave the way to a prosperous online business. Five important design considerations of e-commerce are design of e-commerce website, easy navigation, simple checkout, logistics and good product pages. Various Essential features of technology required while designing e-Commerce respectively are ubiquity, global reach, universal standards, richness, interactivity, information density, personalization.

Businesses that generate their revenue directly from their website fall into the web based business category, these types of websites are typically informational in nature, they are made to provide the desired information typically a user demands whereas, A mobile app is a software application

designed for use on mobile devices, such as smartphones and tablets, rather than desktop or laptop computers.

Building an E-commerce website will strengthen the reputation of the business; it helps in the expansion of the brand nationally and internationally. The World Wide Web is all about the technologies that change the business environment and have an impact on the future of electronic commerce. The wide popularity of the internet in recent years has been fuelled largely by the prospect of performing business on-line, i.e. buying and selling of the product, services, or information via computer networks, mainly by the Internet.

For understanding the business objective Systems Development Life Cycle (SDLC) methodology is used, which helps in designing an appropriate solution. It includes the creation of documents that communicate to senior management for achieving important milestones and the uses of resources. The five major steps of SDLC involved are System Analysis/ Planning, Systems Design, Building the System (Development), Testing, Publish /Implementation.

A framework is intended to define and create tools that integrate the information and allow the development of e-commerce applications. The aim of the architectural framework is on synthesizing the diverse resources already in place to facilitate the integration of data and software for better applications. The DNS is a system for mapping alphabetic names to numeric Internet Protocol (IP) addresses like a phone book maps a person's name to a phone number.

Emerging technologies are simply new technologies that are currently developing or will be developed over the next five to ten years, and which will substantially alter the business and social environment. Broadly, emerging technologies can be understood as ‘science-based innovations with the potential to create a new industry or transform an existing one’, which will “substantially alter the business and social environment”. Technologies are widely used in e-commerce domain. E-commerce is booming in an unprecedented way with implementation of frontier technologies. For instance, Cloud based/Fog based systems are helping businesses to have access the information stored in big data storages without delays, it’s cost effective, offers scalability and is the best option available to the larger organizations and companies who need to hold terabytes of e-commerce data.

The impact of Emerging technologies on e-commerce has been enormous in the last few years. Convergence of Emerging technologies has led to the emergence of newer cloud-based ‘digital platforms’, which are more complex in implementation than online stores that we had been talking so far about. Undoubtedly, Emerging technologies have ushered Digital transformation in the area of trade and commerce. Businesses have become cloud-based and mobile-enabled. Enterprises have become more agile and ‘virtual’ in nature.

3.12 KEYWORDS

Blockchain: A block chain is a digital record (distributed ledger), which is made to store a list of transactions (called 'blocks'). Each block has different feature which contains a link to the previous block, a timestamp, and data about the transactions it represents.

Brand awareness and image building model: Web sites that are using this model provide detailed and rational information about the firm and its offerings. The model reaches the motivated and desperate customers with an information/image-rich communications message.

Chat box: It is a computer program that allows conversational performances, engaging purchasing more highly by text and voice. It is popularly used in mobile phone, internet browsers, or internet chat rooms.

Community model: The existence of the community model is based on user loyalty. The community model may also run on a subscription fee for premium services.

Customisation model: This model provides customers with content that is customised to meet their preferences by completely customising information needs. A website built on this model can be highly attractive to visitors.

Industrial Internet of Things (IIoT): Industrial Internet of Things (IIoT) is similar interconnected network particularly in industrial context, where all the instruments have sensors and are interconnected with each other.

Info-me-diary Model: The term 'Info-me-diary' is a composite of information and intermediary. This website model aggregates information from multiple electronic commerce retailers and provide services of searching and comparison for Internet customers.

Interactivity: E-commerce technologies allow for interactivity, meaning it enable two-way communication between the merchant and the consumer.

Manufacturer model: This model is based on the power of the Web to allow manufacturers to reach buyers directly and thereby compress the distribution channel.

Personalization- E-commerce technology allows for personalization. On the basis of name, interests and past purchase behaviour products can be customized and personalized, further this collected information could be used for sending marketing and promotional messages to the targeted customers.

Recommendation Engines: A recommendation engine is a tool that filters the data by using algorithms and suggesting popular products for customers. Based on the customers past purchasing behaviour, these engines will suggest items which the customer may probably purchase.

Ubiquity: Ubiquity in E-commerce means that it can be everywhere, whereas, the traditional business market is a physical place.

Web Server: A web server is server software, or hardware dedicated to running the software, that can satisfy client requests on the World Wide Web.

3.13 TERMINAL QUESTIONS

1. What are various important design considerations of E-commerce?
2. Explain various features of technology required while designing E-Commerce.
3. What do you understand by App based business? State the differences between app based and web based business.
4. Discuss the five major steps of SDLC life cycle for designing E-commerce solution.
5. State the impact of various emerging technologies such as mobility, cloud, AI and IoT on E-commerce.
6. What are the facilities that Artificial Intelligence is providing to E-commerce?
7. What are digital platforms? How do they work? State various types of platform business models.
8. Write a short note on followings:
    1. Architectural Framework of E-Commerce
    2. Web Server Implementation
    3. Domain Name System
    4. Digital Transformation in Business

Note	These questions are helpful to understand this unit. Do efforts for writing the answer of these questions but do not send your answer to university. It is only for your practice.