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Bachelor Thesis

The impact of E-commerce on the US Economy: Case study of Amazon

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The impact of E-commerce on the US Economy : Case study of Amazon

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Objectives of thesis

The main purpose of this thesis is to discuss analytically how Amazon.com, a Giant in the E-commerce world has remarkably affected and played a huge role in the economy of the U.S. along with that, the thesis will also discuss the role of amazon in the global economy and a comparison will be made with a potential competition of this company.

Methodology

In order to reach the goal of the thesis, a literature review will be done by defining e-commerce and how such systems are actually developed as well as a brief history and how it affected the global economy. For the practical, a descriptive and comparative method will be used for Amazon.

The proposed extent of the thesis

30 – 40 pages

Keywords

E-commerce, Amazon, US Economy, Retail

Recommended information sources

CASTELLS, M. *The internet galaxy : reflections on the Internet, business, and society.* Oxford ; New York: Oxford University Press, 2001. ISBN 0-19-924153-8.

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TAYLOR, D A. *Business engineering with object technology.* New York: Wiley, 1995. ISBN 0-471-04521-7.

2. GANDOLFO, G. International finance and open-economy macroeconomics. Berlin: Springer, 2002. ISBN 3-540-43459-3.

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Declaration

I declare that I have worked on my bachelor thesis titled " **The impact of E-commerce on the US Economy: Case study of Amazon**" by myself and I have used only the sources mentioned at the end of the thesis. As the author of the bachelor thesis, I declare that the thesis does not break copyrights of any their person.

In Prague on 24.3.2020 _____

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The impact of E-commerce on the US Economy : Case study of Amazon

Abstract

The impact of E-commerce on our world is significant and has unlocked potentials for many businesses across the world to prosper and grow this, in turn, allowed many countries to take advantage of such growth for their own personal economical growth. This thesis's main focus is on how the economy of the United States of America benefited in such a way through the power of one of the biggest E-commerce sites on the globe, Amazon. Though Amazon's effect in our modern-day is not only limited to the United States, Its impact surpasses its country of origin and has reached the entire globe and in some shape or form has affected the global economy and this thesis will also delve into this impact by mentioning the major global competitors of this company.

Keywords: E-commerce, US Economy, Amazon, E-business, Global Economy, Marketing

Dopad elektronického obchodování na americkou ekonomiku: případová studie Amazonu

Abstrakt

Dopad elektronického obchodování na náš svět je významný a uvolnil potenciál pro mnoho podniků na celém světě, aby prosperovaly a rostly, což umožnilo mnoha zemím využít takového růstu pro svůj osobní ekonomický růst. Tato práce se zaměřuje především na to, jak ekonomika Spojených států amerických takovým způsobem využila sílu jednoho z největších webů elektronického obchodování na světě, Amazonu. Ačkoli se Amazonův účinek v naší moderní době neomezuje pouze na Spojené státy, jeho dopad překonává jeho zemi původu a zasáhl celou planetu a nějakým tvarem nebo formou ovlivnil globální ekonomiku a tato práce se také ponoří do tohoto dopadu tím, že uvedl hlavní světové konkurenty této společnosti.

Klíčová slova: Elektronický obchod, americká ekonomika, Amazon, elektronický obchod, globální ekonomika, marketingový

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List of Abbreviations

E-commerce: Electronic Commerce
EC: Electronic Commerce
ICT: Information communication technology
EDI: Electronic data interchange
ARPANET: Advanced research project agency network
WWW: World wide web
TCP/IP: Transmission control protocol/ Internet protocol
NSF: National science foundation
GUI: Graphical user interface.
HTML: Hypertext markup languge
ANS: Advanced network and services
B2B: Business to business
B2C: Business to consumer
B2G: Business to government
C2C: Consumer to consumer
C2B: Consumer to business
C2G: Consumer to government
G2C: Government to consumer
G2B: Government to business
G2G: Government to government
OECD: Organization of economic co-operation and development
NII: National information infrastructure

1 Introduction

The conception and the development of the internet has significantly changed the methods of which we conduct our daily activities, from communications all the way to business. The internet has also allowed us to gain access to an enormous amount of information with a simple click of a button thus, initiating an unbelievable informational revolution. One of the by-products of the internet is E-commerce, and through its birth, it has affected our global economy greatly and allowed many businesses around the world to interact with each other and as a result, enter the world of international trade, in other words, globalization.

The benefits of E-commerce are abundant, and many countries have managed to reap the full benefits of this new technology for their economic growth. One of those said nation is the U.S, its importance in the world of E-commerce cannot be underestimated as it is the birthplace of one of if not the largest E-commerce sites on the globe. This giant of the E-commerce world had a humble start by selling books and overtime it developed and became one of the largest E-commerce powerhouses in its field.

2 Objectives and Methodology

2.1 Objectives

The main purpose of this thesis is to discuss analytically and descriptivly how Amazon.com, a Giant in the E-commerce world has remarkably affected and played a huge role in the economy of the U.S. along with that, the thesis will also discuss the role of amazon in the global economy by discussing the potential competition that this company faces.

2.2 Methodology

In order to reach the goal of this thesis topic, it is important to create a literature review which will define the concept of E-commerce and its many classifications, its history and the fundamentals of the sales process as well as the technological aspects behind an E-commerce system. The literature will also include some statistics about E-commerce globally. As for the Practical part, which will utilize research methods such as comparative, descriptive methods. The practical part will focus on the E-commerce giant, Amazon.com and its role on the economy of the US as well as mention its impact on the global economy by discussing the company's toughest international competition.

3 Literature Review

3.1 Definition of E-commerce

The concept of E-commerce is rather simple, though, there may be a multitude of definitions. It can be generally defined as “the buying and selling of goods and services, or the transmitting of funds or data, over an electronic network, primarily the internet” (Rouse 2019).

There exist some definitions that are based on different perspectives, for example, two authors Kalakota and Whinston have defined the term from four different perspectives which are

- Communication
- Business Process
- Service
- Online

Communication Perspective: The communication perspective defines E-commerce as the provision of information, goods / services or payments via telecommunications channels, computer networks or any other electronic communication method

Business Process Perspective: This perspective aims to define E-commerce as a technological application that aims to automate business transactions and workflow.

Service Perspective: This views E-commerce as a tool that can be utilized by companies, firms, and consumers to cut cost of services while simultaneously enhancing the quality of these services and products and increasing efficiency in the delivery speed.

Online Perspective: Which states that E-commerce offers the means of purchasing and selling goods and information on the internet and other online services.

3.1.1 Attributes of E-commerce

Digitalization of business: "This means a comprehensive usage of ICT (Information & Communication Technology) not only within a business organization (as it has been done during the last decades by traditional (internal) information systems), but now through a more and more seamless linking and cooperation of information and communications systems of all involved business partners" (Kutz, 2016).

Focus on business process:

- "We support business processes, of course, as we did it for the last decades, but now the total processes, running through several organizations and crossing their boundaries, are supported." (Kutz, 2016)

- "We automate business processes not longer only within organizations, as it was "the" traditional objective of ICT, but now the automation is related to the total process, running through all involved organizations, and not only to the sub-process within the own organization" (Kutz, 2016)

- "We increase the speed of business processes. Additional potentials can be realized with the coupling of processes between different organizations". (Kutz, 2016)

- "We increase the economic efficiency of business processes, again through coupling of business processes at the boundaries of the business partners". (Kutz, 2016)

Usage of global network:

- "Internet plays a dominant role and has become a universal technical infrastructure. Thus it builds a global virtual place where every organization and person being interested in making business can come together without geographical and time restrictions." (Kutz, 2016)

- “Global networks allow the exchange of information without any restrictions in time and independently from any geographical distances.” (Kutz, 2016)
- “We “know” (means: assume) that the Internet is always up and running” (7·24h). (Kutz, 2016)

New potentials:

- “More or less independent persons and/or organizations work together” (Kutz, 2016)
- “Business actors can come together whenever they want it or whenever there is a need” (Kutz, 2016)

3.1.2 E-commerce vs E-business

The term E-business is also used sometimes to describe E-commerce. “Some people view the term commerce as describing only buying and selling transactions conducted between business partners. If this definition of commerce were used, the term electronic commerce would be fairly narrow. Thus, many use the term e-business instead. E-business refers to a broader definition of EC, not just the buying and selling of goods and services, but conducting all kinds of business online such as servicing customers, collaborating with business partners, delivering e-learning, and conducting electronic transactions within organizations.” (Turban, et al., 2017 p. 6). To put this in simpler terms, E-business encompasses a whole range of business activities and processes which includes E-commerce. However, for the purpose of this thesis, the term E-commerce will be used rather than the term E-business as this paper concerns itself more with the commercial aspect of E-business.

3.2 Pure and Partial E-commerce

E-commerce can either be pure or partial in its nature and that depends on three different behaviours that make up the nature of E-commerce, them being ordering and payments, order fulfilment, and delivery to customers. Each of these activities can be done either physically or digitally and that decides whether it will be pure or partial or none. If at least one of these activities is done digitally, then it is considered to be E-commerce.

However, it will only be partial since the other dimensions would be done physically. If all the activities are done digitally, then it is of pure nature and if no activity is done digitally then we have a non- Ecommerce system. In the table below it can be observed that there are 8 combinations of the types of system that can be created using this classification[1].

Table 1: **Partial or Pure E-commerce**

Activity	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Ordering, payment	P	D	D	D	D	P	P	P
Order fulfilment	P	D	D	P	P	D	P	D
Delivery	P	D	P	P	D	D	D	D
Type of E-commerce	Non-E-Commerce	Pure	Partial	Partial	Partial	Partial	Partial	Partial

***P* physical, *D* digital** Source: (Turban, et al., 2017 p. 6)

3.3 History of E-commerce

The first generation of E-commerce had its origin in the 1960's through the development of what is known as Electronic Data Interchange (EDI). EDI is the electronic exchange of business documents and information in a standardized form. "EDI originated in the mid-1960s, when companies in transportation and some retail industries were attempting to create "paperless" offices" (Tian, et al., 2006). During the 70's, EDI had become normalized by the Accredited Standards Committee of industry representatives, and overtime, specifically during the 70's and 80's more companies and industries began to adopt the EDI as their standard form of transactions, however, the technical limitations of the EDI and the high cost of connecting to it lead to the slow distribution of this technology and ultimately, by the 1990's, less than one percent of companies in the U.S and Europe used it.

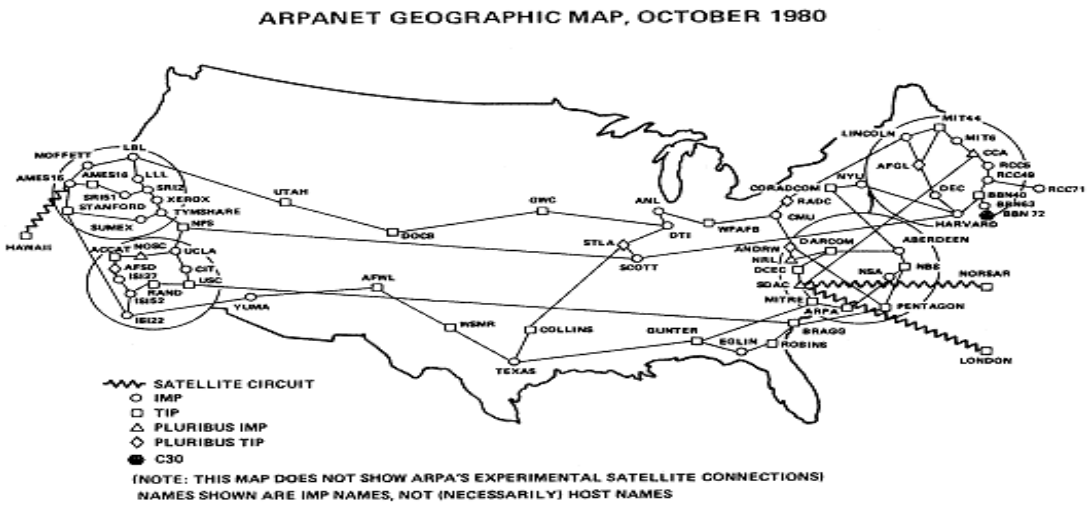
The second generation of E-commerce which was used to conduct transactions of services and products via the Internet and so It can be said that this form of E-commerce was only made possible through the invention of the internet. Initially, the internet was used only as a research tool and its creation can be dated back to the late 1960's when the Research

[1] (Turban, Whites, King, & Outland, 2017)

Projects Agency Computer Network or in short (ARPANET) the internet's predecessor was created and funded by the U.S Department of Defense as a tool for the purpose of research in high technology areas. "At the height of the Cold War, military commanders were seeking a computer communications system without a central core, with no headquarters or base of operations that could be attacked and destroyed by enemies thus blacking out the entire network in one fell swoop. ARPANET's purpose was always more academic than military, but, as more academic facilities connected to it, the network did take on the tentacle-like structure military officials had envisioned. The Internet essentially retains that form, although on a much larger scale" (Featherly, 2016).

The number of nodes on the APRANET in 1969 were very miniscule, approximately 4 nodes, and over time, they rose to 15 in 1971. The term "Internet" was not coined until 1982 when the number of nodes on the ARPANET rose to around 231. In that same year, the Transmission Control Protocol (TCP) and the Internet Protocol (IP) became the only accepted method to transmit data over the ARPANET allowing all computers on that network to send and receive information equally. The TCP basically controls the flow of the data and the IP does the routing and addressing and that just puts it into simple terms.

Figure 1: ARPANET Geographic map in the year 1980



Source: https://mappa.mundi.net/maps/maps_001/

In the year 1986, the National Science Foundation (NSF) which is a government agency deployed what is known as the NFSNET and its objective was to connect major supercomputer centres in the United States with connectivity speeds up to 56,000 bits per second at first." Over time the network speeds up and regional research and education networks, supported in part by NSF, are connected to the NSFNET backbone — effectively expanding the Internet throughout the United States. The NSFNET was essentially a network of networks that connected academic users along with the ARPANET" (Zimmermann, et al., 2017). Up until the late 80's, the internet was only used for academic purposes due to the complexity of it and the fact that it necessitates a high-level comprehension in computer science.

The creation of the World Wide Web (WWW) by Tim-Berners Lee in 1990 and the development of the Graphical User Interface (GUI) were the catalysts for the transformation of the internet from the realm of academia to the realm of commerce, in addition to that, the formation of the Hypertext Markup Language (HTML) also aided in this transformation." Perhaps the most significant milestone, however, came in 1991, when NSFNET decided to lift commercial restrictions on the use of the network and thereby opened up opportunities for e-commerce. Advanced Network & Services (ANS), established by IBM, MCI Communications Corp., and Merit Network, Inc., provided Internet connection to commercial users without government restrictions on commercial traffic online" (Tian, et al., 2006 p. 560)This lift on the commercial usage of the internet permitted many companies to begin showing their web presence; companies such as Amazon which was launched in 1995 and eBay which launched a year later, all started to conduct their transactions over the internet, hence, steering the world into the age of E-commerce.

3.4 Classifications of E-commerce

Aside from the classification of E-commerce that it is based whether it is pure or partial, there are other types of classification for E-commerce and when classifying E-commerce, it can be divided based on two important aspects which are:

- Based on the participants that are involved
- Based on the type of goods

3.4.1 Based on the participants that are involved

This classification divides the types of E-commerce depending on the transactions and the transacting members and these are typically, consumer, businesses and government. And so, we have the following list of classification's: Business-to-business (B2B), Business-to-consumer (B2C), Business-to-government (B2G), Consumer-to-Business(C2B), Consumer-Consumer(C2C), Government-to-consumer(G2C),Government-to-government (G2G) and Government-to-business(G2B).

Business-to-business (B2B): This type suggests that the transactions that occur is between businesses. Basically, any company or business whose customers are other businesses run on a B2B model. "Today, about 85% of EC volume is B2B" (Turban, et al., 2017 p. 8) An example of a company that runs on a B2B EC model is SAP, which provides enterprise software solutions for other businesses and corporations.

Business-to-consumer (B2C): The transactions that occur in this type of EC happens between a business and a consumer. This model is most commonly used by retail companies such as Amazon or Alza that sell their products or services to normal consumers. This model is also known as *E-tailing*.

Business-to-government (B2G): This type of EC refers to the transactions that occur between a business and a government agency. Usually a business providing a service to government agencies such as providing software and or creating websites.

Consumer-to-business (C2B): As the name implies, the transactions occur between a consumer and a business. For example, when an individual provides a service to a business or organization such as taking photographs for their catalogue or creating a web page for said business.

Consumer-to-consumer (C2C): This model consists of individual consumers buying and selling to each other. An example of a C2C model would be the typical online marketplaces like Amazon or eBay where individual consumers can list their own product for other consumers to purchase.

Government-to-consumer (G2C): This model is the case when a government agency provides a service or information to individual citizens. Such as facilitating the citizen to pay for their taxes.

Government-to-Business (G2B): In this model the transactions occur between a government agency and business. A government agency provides services to businesses and corporations. For example, when a business files for a business licence through a governmental website.

Government-to-government (G2G): This EC model is based on the interaction between government agencies to fulfil certain services or to collaborate amongst each other to reach a specific goal or.

The G2C, G2B, G2G models all fall under what is known as E-government EC.

3.4.2 Based on the types of goods

Physical goods: This type of EC is mostly used by the typical retail shops and the products that are sold range from books, clothes, electronics. Basically, anything that is tangible. Alza, Amazon, Bestbuy, Zalando are great examples of this. “Choosing to sell physical goods, online retailers compete with traditional brick-and-mortar businesses and their major competitive strength of a real-life purchasing experience where a possibility to view and try on goods leads to more informed purchasing decisions. Consequently, ecommerce businesses need to show how online shopping can be a worthy alternative – accurate images and detailed product descriptions help with the purchasing choice, prompt expert assistance and how-to guides cover the role of sales assistants, customer-friendly delivery and return terms add to customer risk-taking. Moreover, with the right technologies, ecommerce retailers can simulate and even outcompete offline shopping

with augmented reality or personalized product offerings during and after the purchasing process" (Yablonskaya, 2016).

Digital goods: Digital goods include intangible commodities such as software applications, E-books, media and video games just to name a few." In a way, selling digital goods sounds tempting there are low overheads due to the absence of inventory costs and delivery limits. However, sellers may face tough competition with free content or software and should stress the benefits of purchasing goods rather than getting them for free" (Yablonskaya, 2016).

Services: This can include a whole range of services from providing online educational courses, online consultancy, freelancing and so on. The requirement for purchasing a service is dependant on the seller. The consumer can either communicate directly with the service provider through their own website or through a third-party application or website such as Fiverr and some of these service providers, however, require the customer to book an appointment with them to get their needs met[2].

Figure 2: **Types of E-commerce by the types of goods**

[2] (Ecommerce Guide, 2019)

Source: https://www.scnsoft.com/blog/types-of-ecommerce

3.5 Fundamentals of sales process in E-commerce

This process illustrates the broad pattern of conducting business in distributing goods or supplying services and receiving payments for this. This will allow for the in-depth understanding of how such transactions occur in a broad sense in the world of E-commerce. There are two main components that are differentiable in the basics of sales process, Primary or kernel processes and secondary processes. The key players in these two processes are the providers of the goods and servicers or in simpler terms, the *suppliers* and the receivers of the goods and services which will be called in this case the *customers*[3].

3.5.1 Primary Processes

Primary processes have many steps and sub-steps, and each have their respective responsible key player for such steps, and these are the following:

Information step:

- Searching for a product and or a service: done by the customer.
- Searching for a supplier: done by the customer.

[3] (Kutz, 2016)

- Searching for customers: done by the suppliers.
- Providing offers: done by suppliers.
- Demands for certain goods or service: done by customers.

Initiation step:

- Contacting or communication: can be done by both suppliers and customers.
- Requesting of the delivery of goods or a service: done by the customer.
- Offering of delivering of goods or a service: done by the supplier.
- Evaluation of supplier: done by the customer.
- Evaluation of customer: done by the supplier.

Contract Conclusion step:

- Negotiation of offers: done by both supplier and customer.
- Negotiation of contracts: done by supplier and customer.
- Order placement: done by customer.
- Confirmation of orders: done by supplier.

Delivery and fulfilment step:

Proceedings for physical goods:

- Packaging of goods: done by supplier.
- Loading of goods: done by the supplier.
- Shipment of goods: done by shipping agent.
- Unloading of goods: done by shipping agent or customer or a third-party service provider.
- Assembly of complicated equipment at the customers location: done by the shipping agent or third-party service provider.
- Accepting of the delivered good: done by the customer
- Approval of contract fulfilment for billing authorization: done by customer.

Proceedings for physical services:

- Creation and maintenance of service fulfilment capability: Done by the supplier.

- Coordination between supplier and customer for meeting since customer must physically there for the service: done by supplier and customer.
- Definition of service levels: Done by supplier after the negotiation with the customer.
- Adding of service level agreement into the contract: done by the supplier.
- Accepting of service fulfilment: done by customer.
- Approval of fulfilment contract in order to authorize billing: done by customer.

Proceedings for digital goods and information:

- Sending of the digital goods or information to the customer through the internet or provide the customer the ability to download: done by the supplier.
- Securing the digital goods or information from unauthorized access: done by the supplier.
- Acceptation of delivery or confirmation of successful download of digital good or information: done by the customer.
- Approval of fulfilment contract in order to authorize billing: done by customer.

Proceeding for digital services:

- Providing the digital service through the usage of the internet: done by the supplier
- Definition of service levels: done by the suppler after negotiating with the customer.
- Adding service level agreement into the contract: done by the supplier
- Initiation of service provision: done by the customer
- Acceptation of service fulfilment: done by the customer
- Approval of fulfilment contract in order to authorize billing: done by customer.

Billing and Invoicing step:

- Generation of invoice: done by supplier,
- Generation of attachments to the invoice such as protocols of service fulfilment and certificates: done by the supplier,
- Sending the invoice to the customer through the internet or postal service: done by the supplier

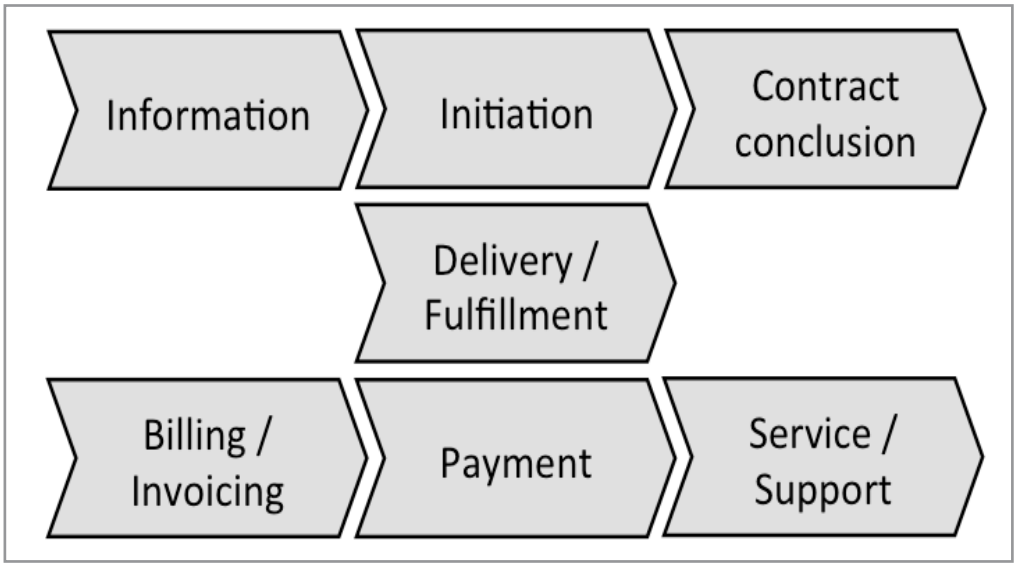
Payment step:

- Acquiring money from the customer: done by supplier or financial service provider.

Service support step:

- Offering addition information to the customer such as user manual or technical documentation: done by the supplier
- Conducting of customer support: done by the supplier
- Managing of complaints: done by the supplier
- Offering reparations: Usually done by supplier or third-party service provider.
- Managing of returns in the case of a faulty product or service or incorrect product has been delivered: done by the supplier
- Maintenance: done by the supplier or third-party service provider.

Figure 3: **Primary process**



Source: (Kutz, 2016 p. 40)

3.5.2 Secondary Process

The secondary process is divided into:

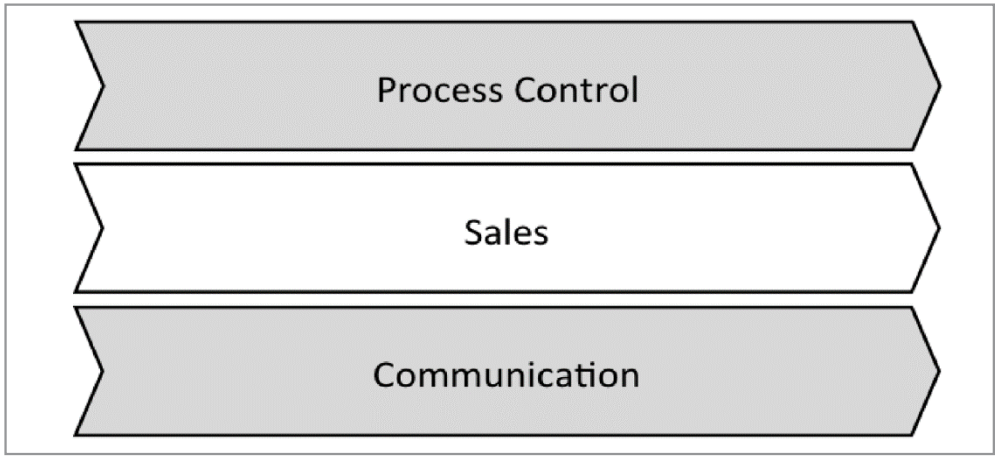
Internal process control

According to Organisation for Economic Co-operation and Development (OECD) "Internal control is about ensuring that operations are efficient, effective and in line with laws and policy objectives. Internal control processes protect governments from fraud, corruption, waste and abuse. They help governments to measure value-for-money, assess risk, and ensure compliance with laws, regulations and policies" (OECD.org).

Communication:

- Tracking and tracing of goods: done by supplier or by the shipping agent
- Information about order processing status: done by the supplier or by the shipping agent
- Announcement of delivery time: done by the supplier or by the shipping agent

Figure 4: **Secondary process**



Source: (Kutz, 2016 p. 43)

3.6 Technology behind E-commerce

In order for a business to make the transformation from a traditional business model to an E-commerce model, they must consider various technological factors that enable the creation of such systems.

3.6.1 Internet Technologies

Data Transport

There are two primary methods of transporting data across a network circuit switching and packet switching. “Circuit switching is commonly used for voice and package switching for data. Parts of the telephone system still operate as a circuit switched network. Each link of a predetermined bandwidth is dedicated to a predetermined number of users for a period of time” (Watson, et al., 2014).

The internet network operates on the packet switching method for the transportation of data and this is where the TCP/IP comes into play. The TCP part of the TCP/IP is specifically responsible for dividing the message from the sending computer into small segments of data called packets, it is also responsible for giving each individual packet a unique identification number and from there, it begins to transmit these unique packets and before it reaches the receiving computer, it combines the packets in sequential order and so the end result would be the intended message from the sending computer.

Routing and Addressability

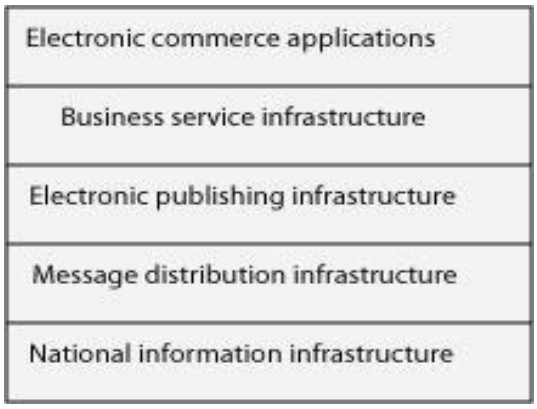
The routing process determines the path of the message that was sent from the sending end to the receiving end and the IP part of the TCP/IP suite handles that process. It dynamically determines the best possible route for the message to take. Messages over the internet network can only be transmitted if and only if each computer are distinctively identified, and that unique identification of each computer is called IP addressing. "An IP address is a unique 32-bit number consisting of four groups of decimal numbers in the range 0 to 255 (e.g., 128.192.73.60)" (Watson, et al., 2014). The current version of IP address is IPv4 which is this unique 32-bit number and so it can be said there are a finite number of addresses that can be used, to be exact, 2^{32} which equates to 4294967296 available IP addresses, and this is a problem since the number of internet users are exponentially growing. To resolve this problem, a new version of IP was put in place to eventually replace IPv4 called IPv6 which supports 2^{128} addresses since it's a 128-bit address[4].

3.6.2 E-commerce Infrastructure

Electronic commerce is created on top of a number of various technologies. These different technologies form a layered, cohesive infrastructure that allows the development and implementation of electronic commerce applications. Every Single layer is dependent on the layer below it and cannot operate without it.

Figure 5: **E-commerce Infrastructure**

[4] (Comer, 2019)



Source: (Watson, et al., 2014 p. 11)

National Information Infrastructure

"This layer is the bedrock of electronic commerce because all traffic must be transmitted by one or more of the communication networks comprising the national information infrastructure (NII). The components of an NII include the TV and radio broadcast industries, cable TV, telephone networks, cellular communication systems, computer networks, and the Internet. The trend in many countries is to increase competition among the various elements of the NII to increase its overall efficiency because it is believed that an NII is critical to the creation of national wealth" (Watson, et al., 2014).

Message Distribution Infrastructure

This layer consists of messaging software that enables the transmission of messages from the server to the client. The nature of the messages in this layer can be formatted or unformatted. Examples of a messaging software is electronic data interchange or hypertext transfer protocol.

Electronic Publishing Infrastructure

"Concerned with content, the Web is a very good example of this layer. It permits organizations to publish a full range of text and multimedia. There are three key elements of the Web:

- A uniform resource locator (URL), which is used to uniquely identify any server;

- A network protocol;
- A structured mark-up language, HTML" (Watson, et al., 2014)

Business service infrastructure

This layer is mainly intended to support common business processes. Virtually every company deals with receiving payment for the goods and services it provides. Therefore, the layer of business services facilitates secure transmission of credit card numbers by offering encryption and transfer of electronic funds. In addition, the business services layer must provide the encryption and authentication facilities.

E-Commerce Applications

This layer is the topmost layer in the E-commerce infrastructure and consists of E-commerce applications and so it must combine aspects from each layer below it. For example, a book catalogue system or a cart system. In the case of book catalogue system, an encryption method is used to secure the customer's credit card details (Business infrastructure layer),HTML is the language used to write the application (Electronic publishing infrastructure layer),HTTP is the messaging software (Message infrastructure layer) and finally the internet will deal with the transportation of the message (National information infrastructure layer).

3.6.3 E-commerce Topologies

E-commerce systems utilize three varieties of network topologies for communication and each network topology has its own individual characteristics and purpose. The type of network used depends on the intent of the organization or business, for example, an organization may want to cooperate with stakeholders and so the internet can be used for that or it might be that the organization wants to support cooperation between employees or business partners.

The internet

"The Internet is a global network of networks. Any computer connected to the Internet can communicate with any server in the system. Thus, the Internet is well-suited to communicating with a wide variety of stakeholders**"** (Watson, et al., 2014)**.**

The intranet

"Many organizations have realized that Internet technology can also be used to establish an intra-organizational network that enables people within the organization to communicate and cooperate with each other. This so called intranet" (Watson, et al., 2014).

The extranet

"In some situations, however, an organization may want to restrict connection capabilities. An extranet is designed to link a buyer and supplier to facilitate greater coordination of common activities. The idea of an extranet derives from the notion that each business has a value chain and the end-point of one firm's chain links to the beginning of another's. Internet technology can be used to support communication and data transfer between two value chains" (Watson, et al., 2014).

3.6.4 E-commerce Security

Security seems to be an ongoing issue for organizations as the need for securing stored data and transported messages is a must. The problem lies within the barriers and obstacles that organizations face when utilizing the internet. Organizations and business have always had confidential information and only a handful of trustworthy had the ability to access such data. Historically speaking, sensitive data, would either be stored in vaults or encoded, though these methods are not considered obsolete and are still feasible. The problem here, lies with the nature of the internet. "the intent of the Internet is to give people remote access to information. The system is inherently open, and traditional approaches of restricting access by the use of physical barriers are less viable, though organizations still need to restrict physical access to their servers. Second, because electronic commerce is based on computers and networks, these same technologies can be used to attack security systems. Hackers can use computers to intercept network traffic and scan it for confidential information. They can use computers to run repeated attacks on a system to breach its security" (Watson, et al., 2014) And so, in order to mitigate or

avoid such risks, an organization must focus a large portion of its efforts into implementing high security protocols and systems.

Access control

One of the major approaches in controlling access to stored information is data access control. This method of control typically starts with requiring the accessor of the information to provide certain credentials, though, it may not always be the case especially on the web as organizations and business usually want to attract visitors and not push them away by being so limiting of their information. There are many ways of authentication which will be illustrated in the table below

Table 2: **Authentication methods**

Class	Example
Personal memory	Name, account number, password
Possessed object	Badge, plastic card, key, IP address
Personal Characteristics	Fingerprint, voiceprint, signature, hand size

Source: (Watson, et al., 2014)

Firewall

Implementing just a single security measure to an E-commerce systems is generally not sufficient enough to fend off hackers as they are well-known to be persistent and keen on gaining untheorized data by any means necessary, therefore, organizations typically implement a secondary or third measures of security into their E-commerce systems aside from data access control. A firewall is one of those secondary measures. It is a device or network security system that is placed between the organizations network and the internet and its primary purpose is to monitor and restrict outside traffic coming from the internet to the organization's intranet. "There are several approaches to operating a firewall. The simplest method is to restrict traffic to packets with designated IP addresses. Another screening rule is to restrict access to certain applications" (Watson, et al., 2014).

Encryption

Encryption is a security measure used to convert data or a message into a series of randomized numbers and letters or symbols with the possibility of decrypting the encryption only with the knowledge of the type of encryption and having access to a key for deciphering. There are two main methods of encryption, the first being the traditional encryption method which uses only one key to encrypt and decrypt the message. The traditional method is quite problematic due to the fact that only a single key is utilized adding to the fact that constantly changing the key is extremely tedious and time consuming as well as that there is a probability that there is no method of sending the encryption key to the other user without it being intercepted by a hacker, thereby, jeopardizing the transmitted data or message. A better method of encryption is to use a public-key encryption system. What makes this special comparing to its counterpart is that this system uses a two-key system, a public key and a private key. "A public key can be freely distributed because it is quite separate from its corresponding private key. To send and receive messages, communicators first need to create separate pairs of private and public keys and then exchange their public keys. The sender encrypts a message with the intended receiver's public key, and upon receiving the message, the receiver applies her private key" (Watson, et al., 2014).

3.6.5 E-commerce payment methods

Electronic funds transfer

"Electronic funds transfer (EFT), introduced in the late 1960s, uses the existing banking structure to support a wide variety of payments. For example, consumers can establish monthly checking account deductions for utility bills, and banks can transfer millions of dollars. EFT is essentially electronic checking. Instead of writing a and mailing it, the buyer initiates an electronic checking transaction (e.g., using a debit card at a point-of-sale terminal). The transaction is then electronically transmitted to an intermediary (usually the banking system), which transfers the funds from the buyer's account to the seller's account. A banking system has one or more common clearinghouses that facilitate the flow of funds between accounts in different banks."

Digital cash

Digital cash is an electronic equivalent of notes and coins. Two options of digital cash are currently obtainable: prepaid cards and smart cards.

Ecash

"Digicash of Amsterdam has developed an electronic payment system called ecash that can be used to withdraw and deposit electronic cash over the Internet. The system is designed to provide secure payment between computers using e-mail or the Internet. Ecash can be used for everyday Internet transactions, such as buying software, receiving money from parents, or paying for a pizza to be delivered. At the same time, ecash provides the privacy of cash because the payer can remain anonymous." (Watson, et al., 2014).

Credit/Debit cards

Credit and debit cards are electronic cards that are usually issued by a bank in order to facilitate the payment of good, services without the need to use actual cash. Credit and debit cards are a safe, secure, and broadly used remote payment system.

3.7 Benefits of E-commerce

There are many potential benefits for E-commerce, it affects both consumers and businesses alike and generally the benefits outweigh the disadvantages.

3.7.1 Benefits to the consumer

Table 3: Benefits to consumer

Benefits	Description

1. Accessibility 2. All-presence 3. Self-design 4. Find deals 5. Real-time delivery 6. Enabling of telecommuting 7. Social contact and engagement 8. Find exclusive items 9. Comfortability of shopping	1. Massive variety of products to choose from 2. Shopping at any time and at any place 3. Consumer can self-customize their product 4. Comparison engine 5. Downloading 6. Study and work everywhere 7. Social networks 8. Through online auctions 9. Consumer can shop from anywhere without the hassle of going to physical shops

Source: (Turban, et al., 2017)

3.7.2 Benefits to Organizations

Table 4: Benefits to organizations

Benefits	**Description**
1. World-wide reach 2. Reduction of costs 3. Problem solving facilitation 4. Improvements in supply chain 5. Business availability 6. Personalization 7. Allows business innovations 8. Low communications costs 9. Allows for efficient procurement 10. Betterment of customer service relations 11. Gives room for small and medium sized enterprises (SME) the room to compete 12. Lowers inventories 13. Lowers costs of digitizable products distribution 14. Provides a competitive lead	1. Customers and supplier can be quickly located at a sensible cost globally 2. Lower cost of data processing, storage, and delivery 3. Solve complex problems that have remained unsolved 4. Delay, cost, and inventory reduction 5. Open 24/7 all year round 6. Create customer preference order 7. Unable the creation of unique business models 8. Internet is cheaper than other networks 9. Time saving and cost reduction by utilizing E-procurement 10. Direct communication with customer 11. It may help smaller businesses compete with larger ones 12. Minimizes inventories 13. Online delivery usually 90% cheaper 14. Lower costs and improved services,

Source: (Turban, et al., 2017)

3.8 Global E-commerce sales

The total E-commerce sales revenue generated in the 2019 alone equates to about 3.5 trillion USD worldwide. “Of global retail sales, 13.7 percent came from online purchases. That is, almost $14 of every $100 paid for retail goods was done over the internet. Over

the next few years, this figure is expected to increase and take a larger piece of the retail pie" (Oberlo, 2020)

3.8.1 Largest contributors of global E-commerce sales

Leading in the top of the list is China, along with the United states, these two economic powerhouses are generating a combined revenue of 1.3 trillion USD in E-commerce sales, that is almost 38% of the total generated E-commerce sales in 2019 alone.

Other leading countries in the world of E-commerce are:

1. Japan
2. Germany
3. Brazil

3.8.2 Global Annual growth of E-commerce sales revenues

Graph 1 represents the growth of the annual global sales in E-commerce. It can be observed that the growth is rising steadily from the years 2015 to the year 2017 and after that the growth gradually decreases. The average growth percentage from the year 2014 to the year 2020 is around 15%.

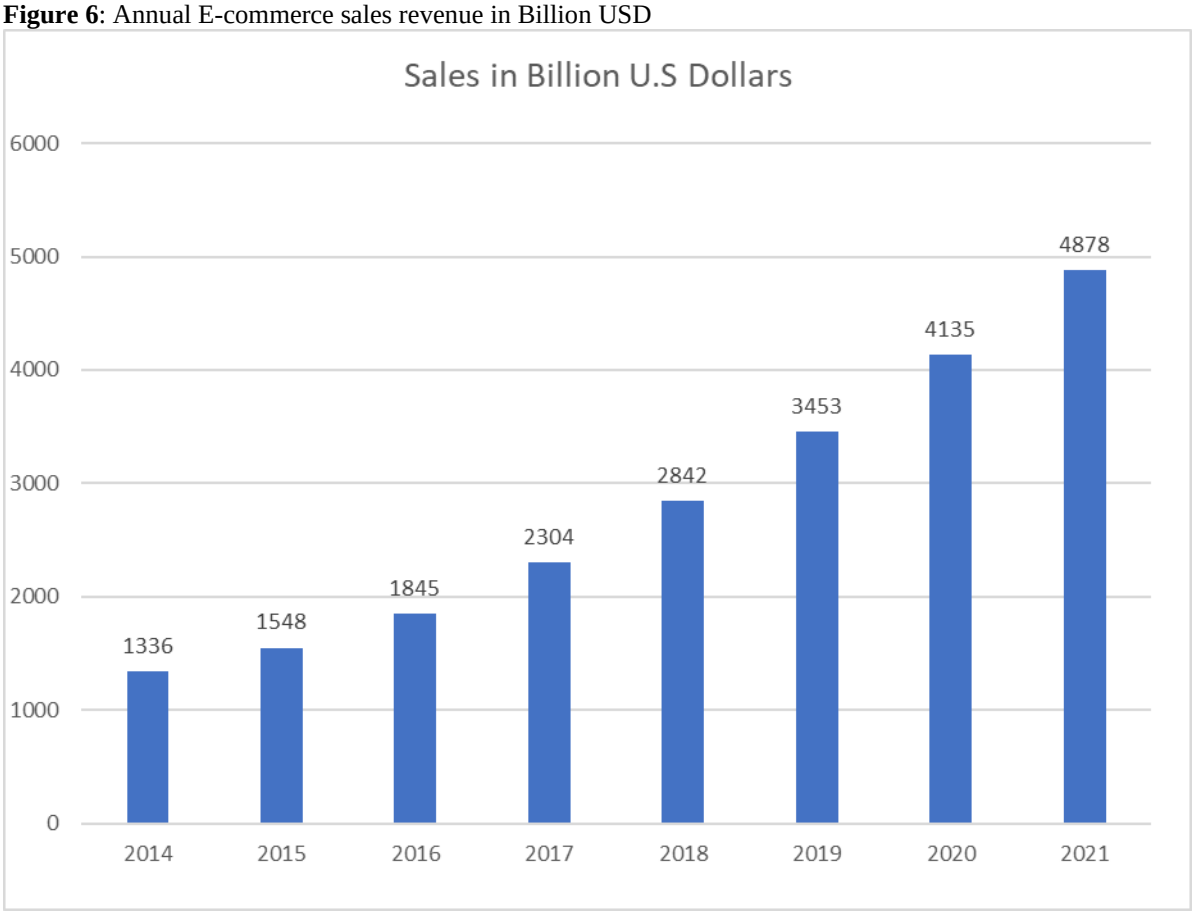
Table 5: **Annual E-commerce sales revenue in Billion USD**

Year	Revenue	Growth Percentage
2014	1336	0
2015	1548	16%
2016	1845	19%
2017	2304	25%
2018	2842	23%

2019	3453	20%
2020	4135	18%

Source: https://www.oberlo.com/statistics/global-ecommerce-sales

Figure 6: Annual E-commerce sales revenue in Billion USD



Source: https://www.oberlo.com/statistics/global-ecommerce-sales

4 Practical Part: Case study of Amazon

4.1 Amazon and a brief history

Amazon.com is a huge Internet-based company that retails books, media, housewares, electronic goods and services, toys, and several other commodities, either directly or as the intermediary between other merchants and Amazon.com's millions of consumers. Its Web services business consists of renting out data storage and computing resources, the so-called cloud computing, throughout the Internet. Because of its significant web presence, in the year 2012, 1 percent of internet traffic in the North American region passed through its data centres. The company is also responsible for the creation of the Kindle e-book readers. Its marketing of these devices has led to remarkable evolution in e-book publishing.

Amazon.com was launched by Jeff Bezos in 1994 and its online business launched in the year 1995. During which, his company was run entirely from his garage in Bellevue, Washington. He was capable of securing funding from Nick Hanauer. This initial investment of $40,000 was joined by a greater, $100,000 investment by Tom Alburg that assisted him into making his new website a more user-friendly experience.

During Bezos's first month of working in his business, he completed orders from all 50 states in the US and 48 countries world-wide. Initially, his company's main goal was delivering books. By the year 1997, the company had become public and ever since, it kept on expanding to become the leader in the world of E-commerce.

4.2 Amazon's 4P's marketing mix

"The four Ps of marketing are the key factors that are involved in the marketing of a good or service. They are the product, price, place, and promotion" (Twin, 2019)

4.2.1 Amazons Products

- **Amazon Marketplace**: Amazons Marketplace is a major platform for third-party sellers.
- **Kindle Publishing**: Kindle Direct publishing allows individual authors and publishers to get their products accessible on Kindle store. Amazon also has its own publishing section called Amazon publishing. The company provides

additional programs that allows authors, musicians, filmmakers, and app developers, to publish content and sell it online.

- **AWS:** "AWS offers a wide range of global compute, storage, database, and other service offerings" (Pratap, 2020).

- **Alexa:** Alexa is a virtual assistant similar to iPhone's Siri or Microsoft's Cortana developed by Amazon for their Amazon Echo and Echo Dot computing systems,

- **Amazon Prime:** This is Amazon's subscription-based business model which offers a lot of benefits.

- **Prime Video:** This is Amazon's streaming service similar to Netflix or Hulu.

- **Fashion:**" Amazon has also become an important destination for fashion shoppers. The company launched Prime Wardrobe which allows members to try the latest styles before buying." (Pratap, 2020).

- **Amazon Music:** This is Amazon's music streaming service akin to Spotify or Google play music.

- **Amazon whole foods:** "Amazon acquired the Whole Foods market on August 28 of 2017. After the acquisition, it immediately lowered prices on several items. Its acquisition of whole foods was a major step towards growing its range of food and grocery products" (Pratap, 2020).

4.2.2 Place

Amazons primary headquarters are located in Seattle, Washington. Though, apart from its global online presence, the company provides its customers with their goods through its enormous and worldwide network of warehouses called fulfilment centres. Amazon currently has more than 175 fulfilment centres all over the globe.

4.2.3 Price

Amazon's emphasis has always been the customer's convenience be it in terms of prices or customer service. It has largely tried to make goods available as well as cheap. Amazon's high-volume sales have ensued in overall massive net sales. However, the profit margins have mostly remained low. Its profit margins are usually kept at about 3% and have seen slight growth in recent years. Comparing to the other tech or internet companies, its profit margins may be low but overall net sales and income are high.

4.3 Amazons Impact on the US economy

There are numerous ways Amazon has impacted the economy of the USA, starting from its job creation initiatives to their tax policies and the amount of investments that the company has put back to the U.S. All these factors play a huge role into the economy of the US.

4.3.1 Investing into Innovations

Amazon has been heavily investing in the US since the year 2010, "we've made more than $270 billion in investments in corporate offices, customer fulfillment and cloud infrastructure, wind and solar farms, eco-friendly equipment and machinery, and compensation to our teams. We invest in the development of technology at our Seattle headquarters, our new headquarters in Arlington, Virginia, and at our 16 tech hubs across America. These investments are accelerating, and we estimate that they have contributed an additional $168 billion to the U.S. GDP since 2010" (Amazon, 2020)

4.3.2 Amazons U.S tax profile

- Amazon paid over 1 billion USD in federal income taxes in 2019.
- The company also paid more than 2.4 billion USD in other federal taxes which includes payroll taxes and custom duties in 2019.
- Paid 1.6 billion or more USD in local and state taxes.

"Last year alone, Amazon collected and remitted nearly $9 billion in sales and use taxes to states and localities throughout the U.S" (Amazon, 2020)

4.3.3 Other initiatives

According to Amazon "We also are making significant investments and donations in programs like Amazon Future Engineer, a comprehensive childhood-to-career program aimed at increasing access to computer science education for children and young adults from underserved and underrepresented communities. The program is providing computer science classes to thousands of kids from underrepresented communities across the country and, each year, provides 100 students from underprivileged backgrounds with 4-year $40,000 scholarships to study computer science in college. We're also committing over $130 million to address hunger and homelessness in Seattle" (Amazon, 2020).

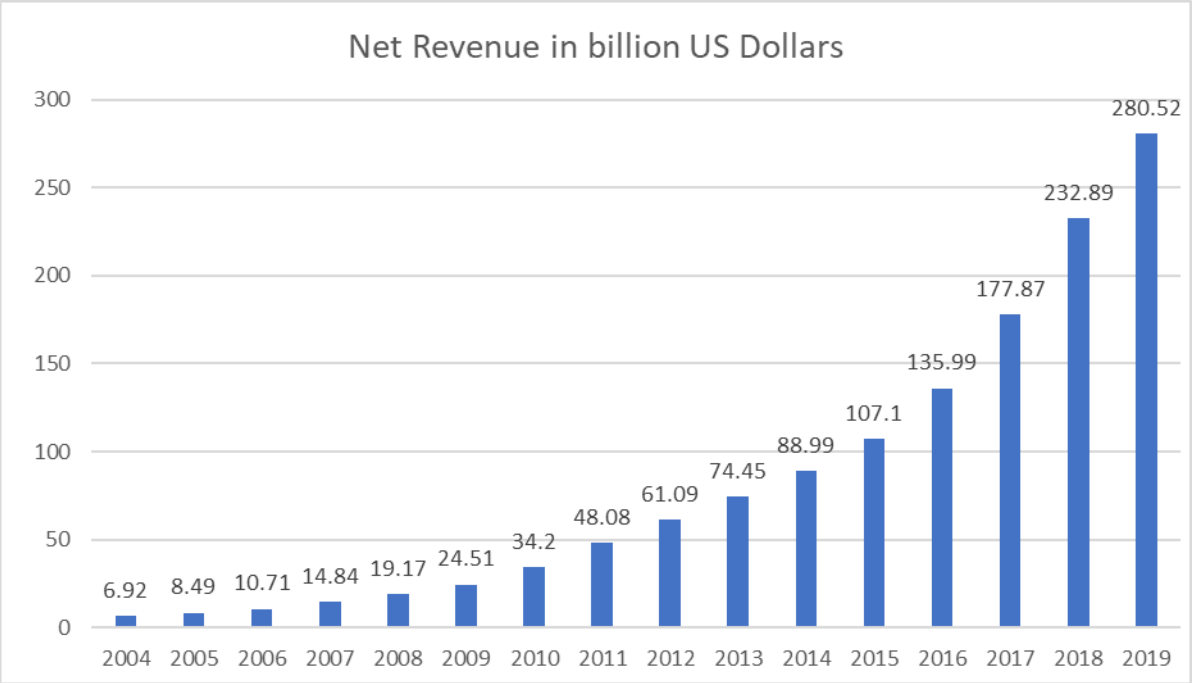
4.4 Amazon annual revenue globally

Table 6: Amazon's annual net revenue growth globally

Year	Revenue	Growth percentage
2004	6.92	0
2005	8.49	23%
2006	10.71	26%
2007	14.84	39%
2008	19.17	29%
2009	24.51	28%
2010	34.2	40%
2011	48.08	41%
2012	61.09	27%
2013	74.45	22%
2014	88.99	20%
2015	107.1	20%
2016	135.99	27%
2017	177.87	31%
2018	232.89	31%
2019	280.52	20%

Source: https://www.statista.com/statistics/266282/annual-net-revenue-of-amazoncom/

Graph 2: Amazon's annual net revenue growth globally



Source: https://www.statista.com/statistics/266282/annual-net-revenue-of-amazoncom/

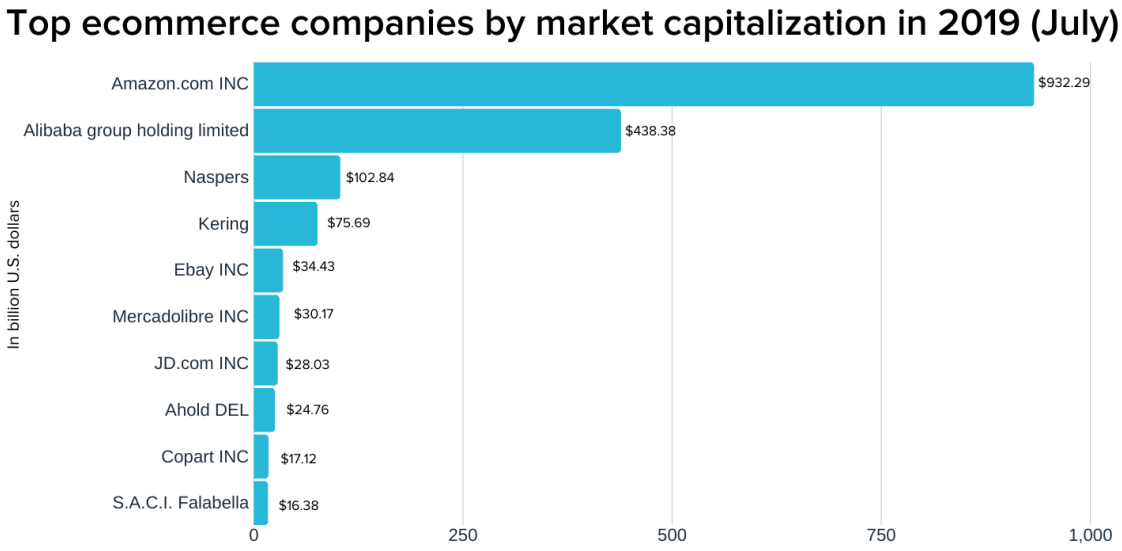
The initial growth percentage of the annual generated revenue is quite high during the first 3 years from 2004-2007, the revenue grows from 6.92 billion to 14.84 billion USD. This growth then slows down from 2007-2009. It can be observed that the highest growth percentage is recorded between the years of 2009 to 2011 peaking at 41% growth percentage, the total gained revenue grows from 24.51 billion to 48.08 billion USD meaning that the revenue has almost doubled within the span of 2 years which is quite remarkable. It then starts to gradually decrease from the years 2011 to 2015. This oscillation in the growth is usually due to many factors that affect the global economy. The average growth rate from 2004 to 2019 is around 26%. This type of growth is considered to be exponential.

4.5 Amazon competitors in E-commerce

In the world of e-commerce Amazon has always faced heavy competition. Specifically, China has proven a difficult country to crack for Amazon. China is the number one e-

commerce economy in the world and its local e-commerce players have proved to compete with Amazon, also in the global marketplace.

Graph 3: Top E-commerce companies by market capitalization 2019

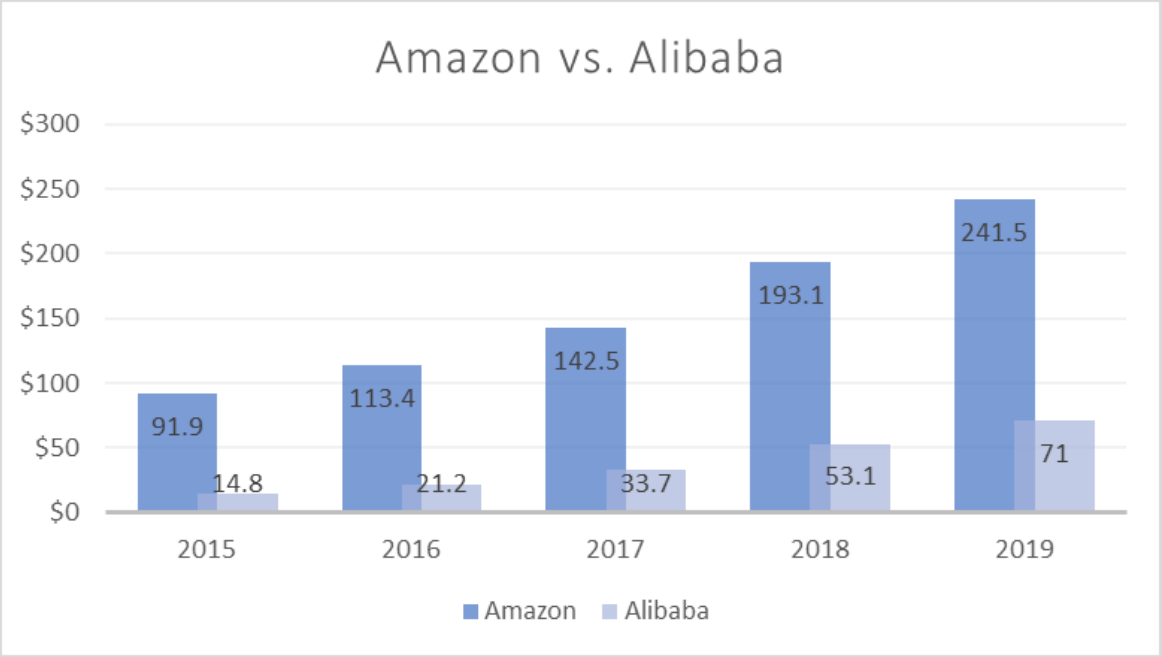


Source: https://www.feedough.com/amazon-competitors/

4.5.1 Alibaba

On a global level, Alibaba cannot be compared Amazon in terms of market capitalization and market share as that is highly dominated by Amazon. Alibaba's market cap of about 430.44 billion USD as of July 2019, which makes it the second-biggest e-commerce company in the globe. Amazon's market capitalization in the middle of 2019 was well above $780 billion. While Amazon's global presence is quite solid, the majority of Alibaba's revenue figures are from their Chinese operations alone. "Alibaba made up for 58.2% of the entirety of e-commerce sales within China in mid-2018. Amazon, with just 0.7% of the e-commerce sales, has a long way to go within China" (Sivakumar, 2020). Alibaba was created on the 4th of April 1999 by Jack Ma as a B2B e-commerce site and soon diverged out into the B2C markets and different other fields. Alibaba now is analogous to Amazon in terms of the different industries that they both operate. Both utilize B2B and B2C models, both have their own cloud computing services, and their own digital distribution services and such.

Figure 7: Amazon Vs Alibab in terms of annual generated revenue

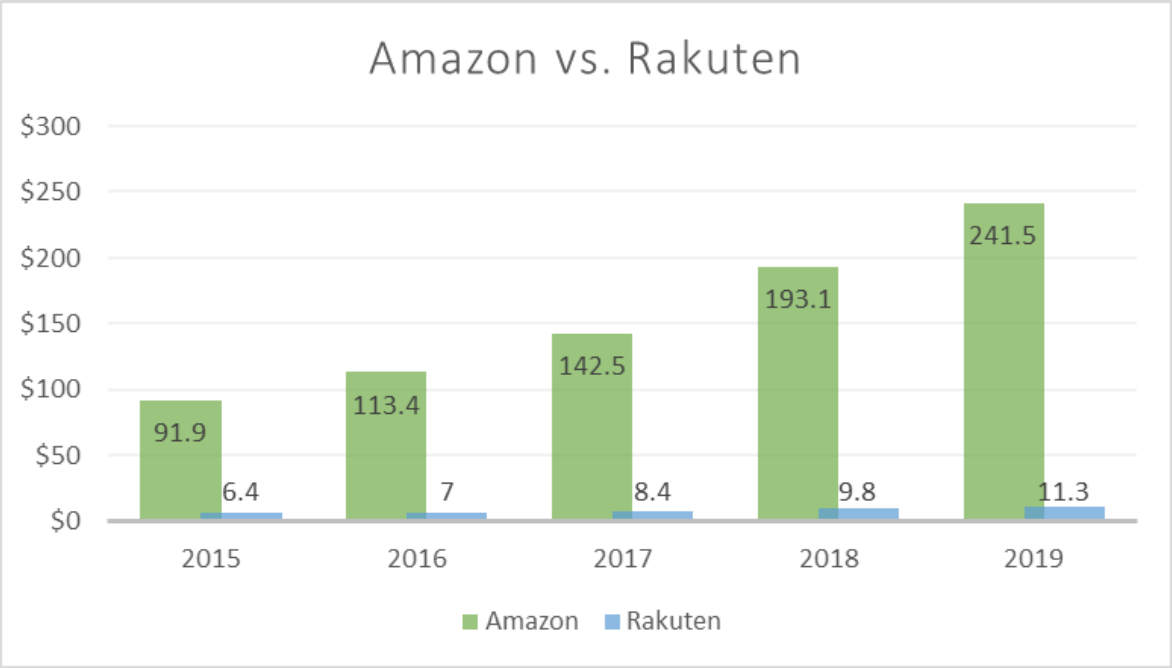


Source: https://www.marketwatch.com/investing/stock/4755/financials

4.5.2 Rakuten

“Rakuten is a Japanese ecommerce company. The business generates more than $2.3 trillion per year in retail ecommerce sales. In 2019, Rakuten controlled 14.1% of the total global ecommerce market in terms of retail sales. Furthermore, they are responsible for nearly 10% of the total ecommerce retail share in Japan.Rakuten generated more than $134 billion in Japanese ecommerce sales alone in 2019.In 2010 they purchased buy.com to expand its global presence in the United States. Aside from buy.com, Rakuten has acquired other ecommerce companies like PriceMinster (France) and Play.com (UK). They also ventured into acquisitions like Ebates (cash-back rewards) and Viber (VoIP software).As Rakuten continues to expand and buy companies across varying industries and regions, they will attempt to keep pace with Amazon.” (Inci, n.d.).

Figure 8: Amazon Vs Rakuten in terms of annual generated revenue

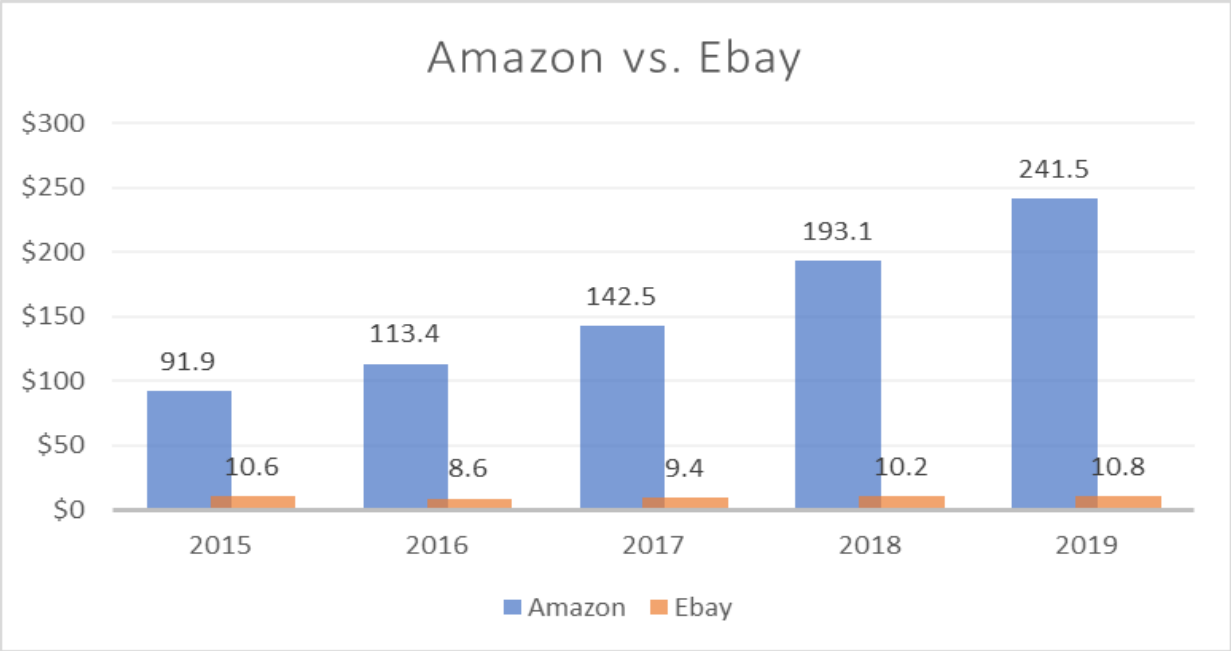


Source: https://www.statista.com/statistics/223327/consolidated-sales-of-the-rakuten-group-since-2007/

4.5.3 eBay

eBay has continually been a major rival to Amazon in the e-commerce market, even though both are known for providing different services to different types of consumers. eBay had a market capitalization of about $34 billion in the middle of 2019, making it one of the leading competitors to Amazon inside and outside of the U.S. eBay is considered to be the second closest E-commerce business second to Amazon within the U.S. “eBay was founded on September 3, 1995, a year after Amazon was launched and facilitates Consumer to Consumer (C2C) and Business to Consumer sales via its online website. eBay currently operates in 27 countries and is primarily known for its C2C model where customers can sell their used products to other customers, making eBay a popular platform for buying and selling second-hand consumer goods. Amazon, on the other hand, has its operations mainly focussed on B2C – providing a platform for businesses to sell their products to consumers online.” (Sivakumar, 2020)

Figure 9: Amazon Vs Ebay in terms of annual generated revenue



Source: https://www.macrotrends.net/stocks/charts/AMZN/amazon/gross-profit

5 Conclusion

E-commerce has had a significant impact in the world of economics and business its advantages and benefits are abundant and can lead any economies to grow and thrive if built on solid foundations. The technologies behind E-commerce are intricate and complicated but if understood correctly, they can be used to create a highly secure and efficient system that can attract customers and thus generate copious amounts of revenue to any business. Amazon, the leader in the E-commerce world is a prime example of such a beautifully built and elegant E-commerce system. And it can be seen from its exponential growth over the decades, since it’s inception. The impacts that it had on the world are not to be underestimated and should be a goal of any business out there to follow in its footsteps and possibly even surpass it.

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https://www.macrotrends.net/stocks/charts/AMZN/amazon/gross-profit