CHAPTER II
LITERATURE REVIEW

2.1 Artifical Intelligence

According to the Oxford English Dictionary, artificial intelligence is "the capacity of computers or other machines to exhibit or simulate intelligent behavior." In the literature, you will find a further distinction between General AI, Narrow AI, and something called Machine Learning (Kietzmann Paschen & Treen, 2018). Artificial Intelligence has been developing for tens of years, thus we have reached to a stage that the building blocks of Artificial Intelligence have had a lifetime of development by computer scientists and researchers all over the world. Here are the building blocks as per (Kietzmann et al., 2018). Rich and Knight (1991) note that AI is demonstrated by machines and they think that different from the natural intelligence displayed by humans and other animals, AI is how to make computers do things intelligently like humans.

After all, AI enables an ecommerce website to recommend products uniquely suited to shoppers and enables people to search for products using conversational language or images, as though they were interacting with a person. This has been one of the key missing ingredients for a larger ecommerce revenue share within the retail industry: lack of the personalization brick-and-mortars can offer. In that same vein, other opportunities emerging include using AI to personalize the customer journey. This alone could be a huge value-add to online retailers. Retailers that have implemented personalization strategies see sales gains of 6-10%, a rate two to three times faster than other retailers, according to a report by Boston Consulting Group (BCG). It could also boost profitability rates by 59% in the wholesale and retail industries by 2035, according to Accenture. Embracing AI for ecommerce is no longer a feat of Amazon's unparalleled resources. In 2016, artificial intelligence was democratized as cloud-based microservices and made available for fractions of a penny per transaction. The same disruptive forces powering Amazon, Google, Facebook, and Netflix is now democratized. Many ecommerce leaders are pondering how data and artificial

intelligence can be their differentiator. In retail, some patterns have emerged on where the industry is focused.

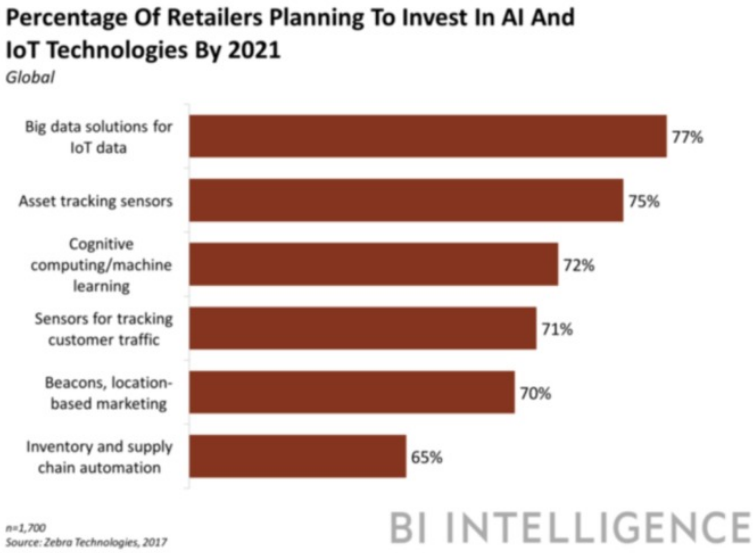

Figure 1 : Precentage of Retailers Planning

(Source : BI Intelligence)

2.1.1 Artifical Intelligence (AI) Recommendation Engine Technology

A recommendation engine is an information filtering system uploading information tailored to users' interests, preferences, or behavioral history on an item. It is able to predict a specific user's preference on an item based on their profile. With the use of product recommendation systems, the customers are able to find the items they are looking for easily and quickly. A few recommendation systems have been developed so far to find products the user has watched, bought or somehow interacted with in the past. The recommendation engine is a splendid marketing tool especially for e-commerce and is also useful for increasing profits, sales and revenues in general. That's why personalized product recommendations are so widely used in the retail industry, eleven more highlighting the importance of recommendation engines in the e-commerce industry. For a recommendation system to be useful, it should be flexible to new user

behavior. It should be able to act in a dynamic environment, providing the users timely information about special offers, changes in the assortments and prices.

A recommendation engine or a recommender system is a tool used by developers to foresee the users' choices in a huge list of suggested items. Generally, algorithms developed for recommendation systems rely on purchases and page views done before. What is more, today there are many services suggesting in-the-moment recommendations, as they use artificial intelligence for analyzing interactions of the users and find visually proper products that will interest any individual customer. Due to AI, recommendation engines make quick and to-the-point recommendations tailored to each customer's needs and preferences. With the usage of artificial intelligence, online searching is improving as well, since it makes recommendations related to the user's visual preferences rather than product descriptions. Seemingly, **artificial intelligence consulting engines** may become the alternatives of search fields since they help users find items or content that they may not find in another way. That's is why today recommendation engines play an essential role for sites like Amazon, Facebook, YouTube and so on.

In order to provide customers with service or product recommendations, recommendation engines use algorithms. Lately, these engines have started using machine learning algorithms making the predicting process of items more accurate. Based on the data received from recommendation systems, the algorithms change. Machine learning algorithms for recommendation systems are generally divided into two categories; collaborative and content-based filtering**.**

However, modern recommendation systems combine both of them. Content-based filtering considers the similarity of product attributes and collaborative methods count similarity from customers' interactions.

Generally, the core of machine learning is to develop a function predicting the utility of items to one another. With so much information on the Internet and so many people out there using it, it has become of vital importance for organizations to search and provide date to their customers corresponding to their needs and tastes.

2.1.2 Technology and Applications of AI

2.1.1.1 Machine vision

Machine vision, also known as computer vision, refers to the use of cameras and computers to replace human eyes' recognition, tracking, and measurement of objects, and further to do image processing. This makes computer processing more suitable for human eye observation or sending images to the instrument (Chen, 2016). Computer vision technology is one of the important core technologies of AI. Compared with traditional visual technologies, machine vision enables computers to have a visual perception like human grading recognition of image features with high speed, high precision, and high accuracy. Its biggest feature is fast speed, a large amount of information, and many functions. It has been widely adopted in video surveillance, autonomous driving, vehicle/face recognition, medical image analysis, archeology, and aerial remote sensing measurement (Barcelo & De Almeida, 2012).

2.1.2.2 Expert System

The expert system can be considered as one of the first genuinely successful applications of AI and one of the fastest growing and most widely used technical directions in the field of AI (Russell & Norvig, 2016). It includes a well-organized body of knowledge that mimics expert problem- solving skills in a limited area of expertise with three components, namely the knowledge base, the inference engine, and the user interface (Bahrammirzaee, 2010; McDermott, 1982; Pannu, 2015). XCON is the first successful expert system that was developed to verify the technical correctness of customer orders and to guide the assembly of such orders for the DEC. An expert system

has a huge impact on various fields. Usually, the expert system is the first step adopted by many firms towards AI (Muller, Magill, Prosser, & Smith,1993; Rao, Nahm, Shi, Deng, & Syamil, 1999). However, after the hype in the 1980s, the expert system was no longer a separate AI concept in the 1990s. However, it has still been applied to solve complex tasks. For example, an expert system has been widely used in the process of decision support and problem-solving (Liao, 2005). The expert system is not just rigorous mathematical or simulation schemes. It can handle facts or heuristics as well as coping with uncertain, unreliable, or even missing data (Jayaraman & Srivastava, 1996; Waterman, 1986).

2.1.2.3 Natural language understanding

Natural language understanding includes natural language processing (NLP), speech recognition, and speech synthesis (Qi et al., 2007). Voice-based search queries are currently the fastest growing search type. With the help of AI, computers can be programmed for gaining knowledge, understanding language, and translating languages (Norvig, 2012). In specific, NLP can let computers understand the thoughts or intentions of natural language texts and express these thoughts or intentions in natural language texts as well. Therefore, NLP works well for text analytics because it facilitates understanding sentence structure and meaning, sentiment, and intent through statistical and machine learning methods. Currently, NLP has been applied in fraud detection and security, automated assistants, machine translation, subtitle generation, text semantic comparison, and unstructured data mining (Hauptmann, Witbrock, & Christel, 1997). There are already some commercially available NLP products on the market, such as IBM's Watson, Apple's

2.1.2.3 Applications of Artificial Intelligence in Business:

Artificial intelligence today is not just a theory. It, in fact, has many practical applications. A 2016 Gartner research shows that by

2020, at least 30% of companies globally will use AI in at least one fragment of their sales processes. Today business across the globe are leveraging artificial intelligence to optimize their process and reap higher revenues and profits. We reached out to some industry experts to share their outlook on the applications of artificial intelligence. Here are the insights we received

1. Chatbots:

   Artificial intelligence continues to be a hot topic in the technology space as well as increasing its inception into other realms such as healthcare, business, and gaming. AI-powered chatbots in enterprises will also see an influx of people get more comfortable with how AI can actually benefit businesses versus, say, take away their jobs. From an analytical standpoint, AI can be incorporated into interfaces to change how they receive and understand data. Chatbots, in particular, are always on, delivering smart and flexible analytics through conversations on mobile devices using standard messaging tools and voice-activated interfaces. This dramatically reduces the time to collect data for all business users, thereby accelerating the pace of business and streamlines the way analysts use their time, preparing companies for the growing data needs of the near future. **(**Adrien Schmidt, CEO of Bouquet – world first AI-powered chatbot that turns data analytics into meaningful conversation).

2. Artificial Intelligence in e-Commerce:

   Artificial Intelligence technology provides a competitive edge to e-commerce businesses and is becoming readily available to companies of any size or budget. Leveraging machine learning, AI software automatically tags, organizes and visually searches content by labeling features of the image or video. AI is enabling shoppers to discover associated products whether it is size, color, shape, or even brand. The visual capabilities AI is improving every year. By first obtaining visual cues from the uploaded imagery, the

software can successfully assist the customer in finding the product they desire. Many e-commerce retailers are already becoming more sophisticated with their AI capabilities, and I only expect this to grow in the future. **(**Ian McClarty, President, PhoenixNAP Global IT Services @phoenixnap**)**

3. AI to Improve Workplace Communication:

   Current business communication is overloaded with content, channels, tools, and so-called solutions, depriving individuals (and companies) from hitting targets while also harming work-life balance. Artificial Intelligence will help businesses improve communication internally and externally by enabling individual personalization for each professional, allowing for enhanced focus and increased productivity. With such AI personalization, each individual will be empowered thanks to an intelligent virtual assistant, helping take care of mundane or repeatable tasks, save time by understanding your needs and goals, as well as recommend next-best-action to take…as to utilize time much more efficiently, without requiring any extra effort. In the short to long run, business processes will improve, innovation will grow as employees will clear their tasks, and stress may decrease. (Eran Abramson, Head of Marketing at Knowmail @Knowmail**)**

4. Human Resource Management:

   AI and Machine learning are going to drastically and irrevocably change how HR and recruitment work in every company and this is going to be awesome. In fact, HR is likely to be one of the first areas of business that will benefit from AI for two simple reasons. Firstly there are tons of top quality data in HR, and secondly, HR is one part of any company that is both essential and yet feels the pressure of time. If aspects of the recruiting and HR job can be automated the HR workers can have the freedom to directly work with people in the business or potential hires, spending the quality human time necessary for a great HR department. It might seem paradoxical but

the more Artificial Intelligence a company deploys in HR, the more 'Human' a company it can be. Artificial Intelligence will essentially take out all of the "worst" elements of every HR professionals job (mundane screening, time-consuming paperwork, and annoying data entry) as well as deliver powerful tools and insights are a bonus to make their work better. HR's automatic generation of top quality data and the incredible benefits of AI make it one of the first places to experience the 4th industrial revolution. **(**Xavier, Co-Founder, and CEO, PLATO Intelligence – an AI-based HRMS. @avierParker116**).**

5. Artificial Intelligence in Logistics and Supply Chain:

   When combined with customer data and analytics, physical artificial intelligence removes friction from the customer experience. Artificial intelligence empowers businesses to act on consumer data to drive improvements throughout many areas of supply chain operations. Mobile technology and the "Uberization" of things have made consumers hungry for AI. Consumers demand shorter delivery waits from retailers and retailers will expect the same from manufacturers and distribution centers. Autonomous trucks and robotic picking systems allow supply chains to make fulfillment seven days a week. Within the next five years, the shipping term "business days" will become obsolete as consumers expect delivery on nights and weekends. (Matthew J. Brosious, CEO FreightCenter, Inc. @FreightCenter).

6. Retail

   Shopping online creates rich data footprints regarding the individual preferences, spending habits and preferred channels of individual consumers. Feeding these digital breadcrumbs into an AI-engine helps bring curated shopping journeys to mass audiences. Automated bots can create lifelike, seamless customer service experiences, addressing the consumer on their purchase history and known preferences. On the marketing side, AI may

deliver that extra dash of relevancy programmatic advertising has been waiting for all these years. On the consumer side, AI helps create individualized display ads that website visitors want to see, while on the accounting side, "the bots handle invoicing and payment for these transactions, giving marketers more time to focus on the big picture. **(**Andrew Person, president of Intelligencia – a software consulting company. The above two use cases were shared by him during an interview with our team. @intelligenciaAI**).**

2.1.3 Recommendation engine processes data in four phases

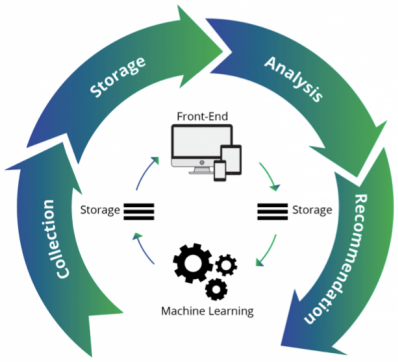

Figure 2: Recommendation Engine Data Processing Phase

Source : SMARTHINT TECNOLOGIA LTDA | CNPJ: 27.146.750 / 0001-22 2019

1. Collecting the data

   Data gathering is the first phase of creating a recommendation engine. In reality, data is classified into explicit and implicit ones. Data provided by users, like ratings and comments are explicit. Whereas, implicit data may consist of a search log, order and return history, clicks, page views, and cart events. This kind of data is collected from any users who visit the given website. Collecting behavioral data is not difficult, since you can keep user activities logged on your website. As each user likes or dislikes various items, their datasets are different. During some time, when the recommender engine is feed with more data, it becomes more clever and the

recommendations become more relevant too, so the visitors are more inclined to click and buy.

2. Storing the data

   To have better recommendations, you should create more data for the algorithms you use. It means that you can turn any recommender project into a great data project quickly. You can decide what type of storage you need to use with the help of the data you use for creating recommendations. It is up to you whether to use a NoSQL database or a standard SQL database or even some sort of object storage. All of these variants are practical and conditioned with whether you capture user behavior or input. A scalable and managed database decreases the number of required tasks to minimal and focuses on the recommendation itself.

3. Analyzing the data

   In order to find items with similar user engagement data, it is necessary to filter it with the use of various analyzing methods. Sometimes it is necessary to provide recommendations immediately when the user is viewing the item, so the type of analysis is required. Some of the ways to analyze this kind of data are as follows:

   a. Real-time system

      In case you need to provide fast and split-second recommendations you should use the real-time system. It is able to process data as soon as it is created. The real-time system generally includes tools being able to process and analyze event streams.

   b. Near-real-time analysis

      The best analyzing method of recommendations during the same browsing session is the near-real-time system. It is capable of gathering quick data and refreshing the analytics for few minutes or seconds.

   c. Batch analysis

      This method is more convenient for sending an e-mail at a later date since it processes the date periodically. This kind of approach suggests that you need to create a considerable amount of data to make the proper analysis like daily sales volume.

4. Filtering the data

   The next phase is filtering the data to provide relevant recommendations to the users. For implementing this method, you should choose an algorithm suitable for the engine you use. There are a few types of filtering, such as:

   a. Content-based

      The focus of content-based filtering is a specific shopper. The algorithms follow actions like visited pages, spent time in various categories, items clicked on and etc. And the software is developed based on the description of the products the user likes. Afterwards, the recommendations are created based on the comparison of user profiles and product catalogs.

   b. Cluster

      Cluster analysis is intended for smaller groups of cases. It tries to group more similar to one another in contrast to other types of cases. In this respect, recommended items fit each other regardless of what other users have watched or liked.

   c. Collaborative

      It makes predictions conditioned with the tastes and preferences of the customer and allows you to make product attributes. The essence of collaborative filtering is the following; two users who have liked the same item before will like the one in the future.

2.1.4 The AI of Personalized E-Commerce Product Recommendations

Product recommendations have been around since the first magazines were ever sold as a personalized marketing tactic. From suggestions of ingredients to use for a recipe to the famous “Complete the look” items, you’d get in fashion magazines. These old methods though just weren’t smart and instead provided clearly subjective suggestions. A smart and accurate recommendation system for e-commerce is always AI-driven. Simply put, e-commerce websites now use a shopper’s past behavior to give recommendations for products they might like. Kind of like you might already be using a web user’s preferences to send targeted ads or emails. Despite knowing how strong the power of personalization is, marketers are

still not doing it correctly, sending all the wrong product recommendations. According to a survey by Bazaarvoice, only 25% of users have seen personalized home pages on the websites and stores they checked out and fewer than 20% can say these were very relevant to their needs. However, as many as 63% of people would want to get these exclusive offers that are tailored to their own preferences.

The primary purpose of AI-based e-commerce recommendation systems is to help choose the right products to get in front of shoppers. Everything is backed by real data on products they've previously liked or showed interest in so no longer have to guess what buyers might be looking for. This will also allow to send customized newsletters in the future so every subscriber will get different recommendations. And the entire process is automatized, of course.

2.2 Content-based Filtering

Content-based filtering uses item features to recommend other items similar to what the user likes, based on their previous actions or explicit feedback. The model should recommend items relevant to this user. To do so, for the first must pick a similarity metric (for example, dot product). Then, must set up the system to score each candidate item according to this similarity metric. Note that the recommendations are specific to this user, as the model did not use any information about other users.

2.2.2 Using Dot Product as a Similarity

A content-based recommender system recommends products according to how a user rated associated features of other products (Burke, 2002; Degemmis et al., 2004, as cited by Ochi, Rao, Takayama, & Nass, 2009). For example, if a user has rated Bermuda highly and New York City poorly on a travel destination website, a content-based recommender system could use characteristics of these places such as climate and population density to recommend the Bahamas and not Chicago.

Measure Consider the case where the user embedding and the app embedding are both binary vectors. Since $(x, y) = \sum_{i=1}^{d} x_i y_i$, a feature appearing in both x and y contributes a 1 to the sum. In other words(x,y) is the number of features that are active in both vectors simultaneously. A high dot product then indicates more common features, thus a higher similarity. Content-Based recommender system tries to guess the features or behavior of a consumen user given the item's features and reacts positively to :

Table 1 : Online Consumer Grouping

Product	Consumen 1	Consumen 2	Consumen 3	Consumen 4	Fashion	Food
Item 1	1	-	4	5	Yes	No
Item 2	5	4	1	2	No	Yes
Item 3	4	4	-	3	Yes	Yes
Item 4	2	2	4	4	No	Yes

The last two columns Action and Comedy Describe the Genres of the movies. Now, given these genres, we can know which users like which genre, as a result, we can obtain features corresponding to that particular user, depending on how he/she reacts to movies of that genre. Once, we know the likings of the user we can embed him/her in an embedding space using the feature vector generated and recommend him/her according to his/her choice. During recommendation, the similarity metrics (We will talk about it in a bit) are calculated from the item's feature vectors and the user's preferred feature vectors from his/her previous records. Then, the top few are recommended. Content-based filtering does not require other users' data during recommendations to one user.

2.3 Recommendation Cluster Analysis

Clustering is a domain of data mining which had been applied in a wide range of problems, among others, in pattern recognition, image processing, satistical data analysis and knowledge discovery (Kużelewska, 2013). The aim of cluster analysis is organising a collection of patterns (usually rep- resented as a vector of measurements, or a point in a multi-dimensional space) into clusters based on their similarity (Jain, Murty, & Flynn, 1999). Cluster analysis is the process of grouping objects together in a way that objects in one group are more similar than objects in other groups. An example would be identifying and grouping clients with similar booking activities on a travel portal. In the example, each group is called a cluster, and each member (data point) of the cluster behaves in a manner similar to its group members.

Partitioning Method: Suppose we are given a database of M objects, the partitioning method construct K partition of data. Each partition will represent a cluster and k≤m. It means that it will classify the data into k groups, which satisfy the following requirements. First each group contain at least one object and second each object must belong to exactly one group.

a. Hierarchical Method

   This method hierarchical decomposition of the given set of data objects how the hierarchical decomposition is formed based on that we can classify into two methods.

b. Agglomerative Approach

   This approach is also known as bottom-up approach. In this we start with each object forming a separate group. It keeps on merging the objects or groups that are close to one another. It keeps on doing so until all of the groups are merged into one or until the termination condition holds.

c. Divisive Approach

In the same cluster. In the continuous iteration, a cluster is split up into smaller clusters. It is down until each object in one cluster or the termination condition holds.

d. Density-based Method:

This method is based on the notion of density. The basic idea is to continue growing the given cluster as long as the density in the neighbourhood exceeds some threshold i.e. for each data point within a given cluster the radius of a given cluster has to contain at least a minimum number of points.

e. Grid-Based Method:

In this the objects together from a grid. The object space is quantized into finite number of cells that form a grid structure. The major advantage of this method is fast processing time. And it is dependent only on the number of cells in each dimension in the quantized space.

2.4 Collaborative Filtering Recommender System

Considering the type of input data as well as used methods, recommendation systems are divided into content-based, collaborative filtering (CF) and knowledge-based (Jannach et al., 2010) . Content-based recommendations (also called content-based filtering) base on attribute (characteristic) vectors of items created from text. The text is connected with the items, e.g. it is their description. In case of books, the item characteristics include its genre, topic or author. Knowledge-based approach is better for one-time user stores, e.g. selling cameras (people do not buy cameras often). The approach bases on tech- nical attributes of the items and user preferences. The attributes are often weighted.

Collaborative filtering techniques search similarities among users or items; however only archives of registered users behaviour are analysed. As an example, similar users have mostly the same products in their baskets and similar items are bought by the same customers. They can be

classified into model-based and memory-based methods. The first approach builds a model on the ratings, which is then used in generating recommendations. The other approach calculates recommendations by searching similar users or items in the whole archived data.

Recommender systems face many challenges and problems. They particularly concern the most effective and precise approach – collaborative fil- tering. CF systems base on past behaviour of users, which requires gathering some information about the visitors' preferences. The stored information is called a user model or user profile (Jannach et al., 2010). The user profile can be created by explicit information from a user or implicitly, e.g. recording the observed pages, watched videos, listened music or analysis of customer's basket. In case of a new visitor, without any recorded profile, an issue called cold-start problem appears.

One of the potent personalization technologies powering the adaptive web is collaborative filtering. Collaborative filtering (CF) is the process of filtering or evaluating items through the opinions of other people. CF technology brings together the opinions of large interconnected communities on the web, supporting filtering of substantial quantities of data. In this chapter we introduce the core concepts of collaborative filtering, its primary uses for users of the adaptive web, the theory and practice of CF algorithms, and design decisions regarding rating systems and acquisition of ratings. We also discuss how to evaluate CF systems, and the evolution of rich interaction interfaces. We close the chapter with discussions of the challenges of privacy particular to a CF recommendation service and important open research questions in the field.

2.5 E-Commerce

The definition of E-Commerce according to Laudon & Laudon (1998), E-Commerce is a process of buying and selling products electronically by

consumers and from company to company with computers as an intermediary for business transactions. Meanwhile, the definition of E-Commerce according to David Baum (1999, pp. 36-34), namely: E-Commerce is a collection of dynamic technologies, applications and business processes that connect companies, consumers, and communities through electronic transactions and electronic exchange of goods, services. , and information. Translated by Onno. W. Purbo: E-Commerce is a dynamic set of technologies, applications, and business processes that connect companies, consumers, and certain communities through electronic transactions and trade in goods, services, and information conducted electronically. Kotler, Wong & Saunders (2005), describe ecommerce as involving the two processes of buying and selling while using electronic means to achieve this, primarily the Internet. E-commerce is also the process of buying, selling, or exchanging products, services, and information via computer networks, including the internet (Turban and King, 2003). Chaffey (2002) on the other hand note that e-commerce goes beyond being an electronically mediated financial transaction between organizations and customers. It also includes non-financial transactions such as customer requests for further information (Ibid). In broader terms, ecommerce is the sharing of business information, maintaining business relationships, and conducting business transactions by means of telecommunications networks (Zwass, 1998). For the purpose of this research, Chaffey's definition will be adopted because it included both the financial and non-financial parts of e-commerce.

Global e-commerce sales amounted to more than $3.5 trilion dollars worldwide in 2019 and this number is expected to continue growing over the next few years, proving that e-commerce is an increasingly lucrative option for businesses. Of the total global sales in 2019, 14.2 % came from online purchases. That's is, more than $14 of every $100 spent on retail goods was over the internet. This figure is expected to continue increasing

and take a larger piece of the retail pie. By 2023, it is estiminated that total retail sales will hit more than $6.5 trillion, on which more than in every five dollars spent (22%) will be carried out online.

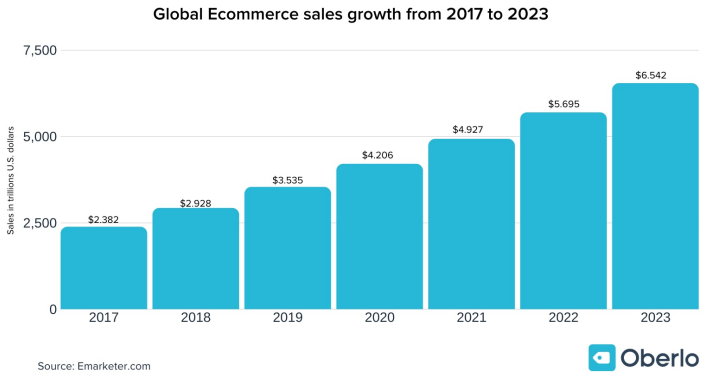

Figure 3 : Global E-Commerce sales growth from 2017-2023

(Source : Oberlo 2017)

The British research institute, Merchant Machine, has released a list of the ten countries with the fastest growing e-commerce in the world. Indonesia is the leadership in the ranks of these countries with a growth of 78% in 2018. The number of internet users in Indonesia, which is more than 100 million users, is one of the forces driving the growth of e-commerce. The average amount of money spent by Indonesians on online shopping sites is US $ 228 per person or around Rp. 3.19 million per person. About 17.7% of respondents spent their money on airplane tickets and booked hotels online. As much as 11.9% of respondents spend their money on clothing and footwear products. The third most popular category is health and beauty products chosen by 10% of respondents. Mexico is the second fastest growing e-commerce country with a growth of 59% in 2018. Meanwhile, the Philippines is in third place with e-commerce growth of 51%.

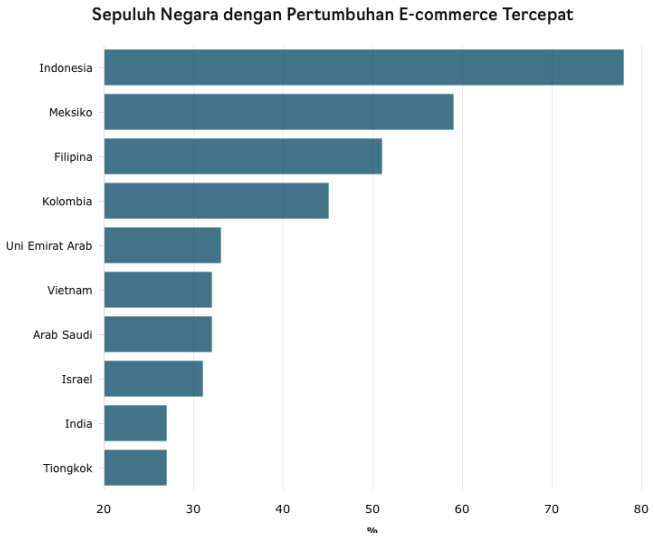

Figure 4 : 10 countries that use E-Commerce

(Source : New Gen Apps)

2.5.2 Types of E-Commerce

E-Commerce activities include many things, to distinguish E-Commerce is divided into 2 based on their characteristics:

1. Business to Business, its characteristics:
    - Trading partners who already know each other and between them have a longstanding relationship.
    - Data exchange is carried out repeatedly and periodically with a mutually agreed data format.
    - One of the perpetrators does not have to wait for their other colleagues to send data.
    - The model that is commonly used is peer to peer, where processing intelligence can be distributed across both businesses.
2. Business to Consumer, characteristics:
    - Open to the public, where information is disseminated publicly as well.
    - The service used is also general, so it can be used by many people.
    - Services used on request.

- Often a client-server approach is used. (Onno W. Purbo & Aang Arif. W; Getting to Know E-Commerce, pages 4-5)

2.5.2 Benefits of E-Commerce

1. For Consumers :
   - Consumers can shop more easily 24 hours a day throughout the year.
   - Consumers can see a wide selection of products that are considered the best at the most appropriate prices**.**
   - Consumers can buy products and services at an easier cost after making comparisons with various e-commerce.
2. For Business Owners :
   - Global Sales

     With the existence of E-commerce, it allows a company or business selectors to be able to sell the products they make to more consumers due to the nature of the web itself. In other words, the company can cover a wider market. For example, a shoe company in America or Australia can sell its products in Indonesia without having to open a new shop in Indonesia.
   - Reduction of Corporate Infrastructure

     With e-commerce, companies or business owners do not need to open many sales or distribution branches (however, in some cases, many e-commerce stores still open storage or production warehouses in various countries to facilitate consumers in shipping goods).
   - Reduce Company Costs / Increase Net Profits

     With the existence of E-commerce, business owners or companies do not need to pay excessive costs in providing many shops or buildings and many employees. This will increase profits by reducing the company's operating costs.

2.6 Consumer Behavior

Consumer behavior is strongly influenced by the circumstances and situations of the community layer where it develops and develops, this means that consumers come from the society or the environment that will bring different results, needs, and taste attitudes, so that decision making in the purchasing stage will be carried out by several factors. - the factors that influence consumer behavior according to Kolter in Asih Handayani (2017) consist of :

1. Cultural factors

   Cultural factors have a broad and deep influence on consumer behavior. Cultural factors consist of subcultural culture, social class
2. Social factors

   Apart from cultural factors, the behavior of a consumer is based on social factors such as family reference group and social status.
3. Personal factors

   Personal factors that contribute to behavior consist of age, work cycle stage and economic environment, and lifestyle, the concept of self-personality.
4. Psychological factors

   Choices are initiated by empathy for psychological factors, namely motivation, perception, learning, and beliefs and beliefs

According to Asih Handayani (2017), the study of consumer behavior is a study of how an individual makes decisions to allocate available resources (time, money, effort, and energy). This is because consumers have a variety of interesting things to study because it includes all individuals of various ages, cultural backgrounds, education, and socioeconomic conditions. So, it is important to study how consumers behave and what factors influence this behavior. According to Asih Handayani (2017) Consumer behavior is a study of how individuals and groups and organizations choose, buy, use and place goods or services, ideas or experiences to satisfy their wants and needs. According to Asih Handayani (2017), consumer behavior describes how individuals make decisions to

use their available resources (time, money, effort) in order to buy goods related to consumption. From the two definitions above, there are two important things, namely: (1) as a physical activity and (2) as a decision-making process based on the definitions mentioned above, it is concluded that consumer behavior is all the actions and psychological processes that drive these actions before buying. , when buying use spent products and services after doing the above or doing an evaluation.

2.6.2 Factors That Influence Consumer Behavior

Consumer behavior is very much influenced by the circumstances and situations of the layer of society where it is born and developed, this means that consumers come from the society or the environment who are located will have different assessments, needs, income, attitudes, so that decision making in the purchasing stage will be influenced by Several factors that influence consumer behavior according to Kolter in Asih Handayani (2017) consist of :

a) Cultural factors

   Cultural factors have a broad and deep influence on consumer behavior. Cultural factors consist of subcultural culture, social class

b) Social factors

   Apart from cultural factors, the behavior of a consumer is influenced by social factors such as family reference group and social status.

c) Personal factors

   Personal factors that contribute to behavior consist of age, work cycle stage and economic environment, and lifestyle, personality, self-concept.

d) Psychological factors

   The choice to buy a person is influenced by four main psychological factors, namely motivation, perception, learning, and beliefs and beliefs.

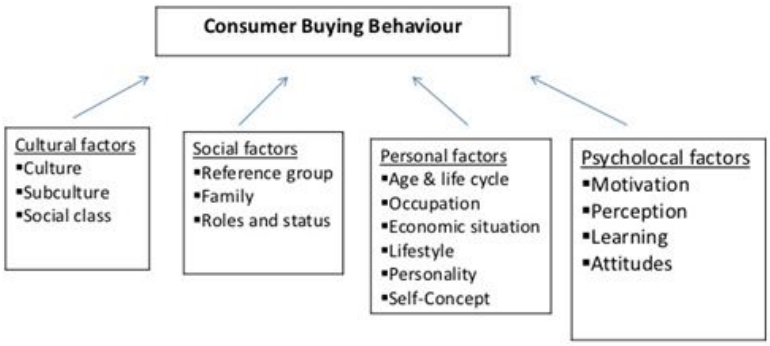

Figure 5: Consumer *Buying Behavior Conceptual*

2.7 Consumer Satisfaction

Satisfaction is a person's feeling of pleasure or disappointment that appears after comparing the performance (result) of the product in mind against the expected performance (or outcome). If the performance is below expectations then the customer is not satisfied. If the performance meets expectations, the customer is satisfied. If performance exceeds expectations, the customer is very satisfied or happy (Kotler 2006: 177). According to Kotler and Keller in Donni Jun Priansah (2017: p. 196). Stating that consumer satisfaction is a person's feeling of pleasure or disappointment that arises after comparing the expected performance (result) of the product against the expected performance (or outcome).

According to Lovelock and Wirtz (2011: 74) "Satisfaction is an attitude that is decided based on the experience gained. Satisfaction is an assessment of the characteristics or features of a product or service, or the product itself, which provides a level of consumer pleasure related to meeting consumer consumption needs. Customer satisfaction can be created through quality, service and value. The key to generating customer loyalty is providing high customer value.

According to (Zeithaml 2003: 162) there are four factors that influence customer perceptions and expectations, namely as follows:

a. What customers have heard from other customers (word of mouth communication). Where this is a potential factor that determines the customer's expectations. For example, a customer owns a company that is expected to provide high quality service based on recommendations from friends or neighbors.
b. Customer expectations are highly dependent on individual characteristics where personal needs (personnel needs).
c. Past experience in using services can also affect the level of customer expectations.
d. Communication with external parties (external communication) from service providers plays a key role in shaping customer expectations. Based on External Communication, the service provider company can provide messages directly or indirectly to its customers. An example of the effect of external communication is the price at which service costs play an important role in shaping customer expectations.

Thus, the possibility between customer expectations and the quality of service (service) received is that the customer will be happy if the quality of service received is better than expected. Customers become ordinary if the quality of service received is the same as expected. Customers become disappointed if the quality of service received is worse than expected.

According to Tse and Wilton (1988) in Tjiptono (2012: 311) customer satisfaction is a customer response to evaluating the perception of the difference between initial expectations before purchase (or other performance standards) and the actual performance of the product as perceived after using or consuming the product in question. Customer satisfaction is not an absolute concept, but rather relative or dependent on what customers expect. The operationalization of measuring customer

satisfaction can use a number of factors, such as expectations, importance, performance, and ideal factors (Tjiptono & Chandra, 2007: 137).

2.7.2 Customer Satisfaction Measurement Methods

According to Kotler, quoted from the Total Quality Management Book, there are several methods that can be used in measuring customer satisfaction, including (Tjiptono, 2003: 104) :

1. Complaints and suggestions system

   Customer-centered organizations (Customer Centered) provide ample opportunities for customers to submit suggestions and complaints. This information can provide a company with bright ideas and enable it to react responsively and quickly to solve problems that arise.

2. Ghost shopping

   One way to get a picture of customer satisfaction is to hire several people to act or act as potential buyers, then report their findings about the strengths and weaknesses of the company's and competitors' products based on their experience in purchasing these products. In addition, hot shoppers can also observe how to handle each complaint.

3. Lost customer analysis

   Companies should contact customers who have stopped buying or who have moved suppliers in order to understand why this is happening. Not only is the exit interview necessary, but monitoring the customer loss rate is also important, an increase in the customer loss rate shows the company's failure to satisfy its customers.

4. Customer satisfaction survey

   Generally, research on customer satisfaction is carried out by survey research, either by post, telephone or by direct interview. The company will get feedback and feedback directly from customers and also give a positive sign (signal) that the company pays attention to its customers.

2.7.3 Types of Customer Satisfaction Indicators

Divided into 2 types, namely functional and psychological. For more details, see the following brief explanation:

a. Functional: customer satisfaction from the function of using the product. For example: drinking because of thirst.
b. Psychological: customer satisfaction obtained is intangible / not physical. For example: feeling happy because you get an expensive game console that not many people have.

2.8 Previous Research

Table 2 Previous Research

No	Researcher Data	Tittle	Variable	Coclusion
1	Diana N. Bou-Ghanem Faculty of Business Administration, Beirut Arab University BAU, Beirut, Lebanon	Factors That Influence The Acceptance Of Artifical Intelligence Technology By The Consumer	1. Perfomance Expectancy 2. Effort Expectancy 3. Social Influence 4. Faciliting Conditions	Finally the Consumer Acceptance of Technology CAT model is briefed adding several factors to the TAM model. The common factor between these models are the perceived ease of use and perceived utilization that are part of the cognition

				features.
2	Dogan Gursoy, Oscar Hengxuan Chi, Lu Lu & Robin Nunkoo (2019)	Consumer Acceptance of Artifical Intelligence (AI) Device Use in Service Delivery	1. Social Influence 2. Hedonic Motivation 3. Anthropo - morphsim 4. Perfomance Expectancy 5. Perceived Effort Expectancy 6. Emotion	As discussed earlier, even though several studies have already in-vestigated different AI related topics, there is still not a comprehensive theoretical and conceptual framework that can be used to explain customers' attitude generation process toward the use AI devices and the most critical determinants of AI acceptance. In other words, there is still a lack of understanding of how customers

				AI device use acceptance willingness is generated or curbed by a battery of different antecedents in the service context. The AIDUA model proposed in this study can be used to explain customers' willingness to accept the use of AI devices or refuse to use AI devices during service encounters.
3	Int. J Econ Manag Sci (2017)	Artifical Intelligence – Consumer Industry Impact	1. Retail 2. Healt Care 3. Elder Care 4. Crime Investigation 5. Employmnet	It is true that artificial intelligence is a new trend in the 21st century making it necessary for people to accept and use it

				establish benefits. Even though the consumer of Artifical Intelligence find it intimidating, they are also embaracing its ability to make life easier.
4	Sulaiman Alsheibani, Yen Cheung, Chris Messom. (Monash University, 2018)	Artical Intelligence Adoption : AI-readiness at Firm Level	1. Relative Advantages 2. Compatibillity 3. Top Management 4. Organization Size 5. Resources 6. Competitive Pressure 7. Goverment Regulatory Issues	Recent emergence of AI in society has presented a number of challenges, particularly at firm level. From the theoretical side, this study will contribute to the IS body of knowledge through exploration of the innovation of technology adoption theory and by identifying factors affecting

				an organisation's readiness for AI. On the practical side, this study provides insight into AI adoption by helping organisations to be prepared and successful in implementing this 'old' but emerging technology.
5	Qian Zhang , Jie Lu & Yaochu Jin	Artifical Intelligence Recommender System	1. Knowledge Engineering 2. Reasoning 3. Planning 4. Commuinication 5. Perception	In this position paper, we review eight fields of AI, intro- duce their applications in recommender systems, discuss the open research issues, and give directions of possible future research on how AI techniques will be applied in recom- mender systems. This paper highlights

				how the recommender system can be enhanced by AI techniques and aims to pro- vide guidance for researchers and practitioners in the area of recommender systems.

2.9 Research Framework

This section represents a conceptual framework. As for this study, the conceptual framework is based on independent variables that have an impact on online consumer behavior.

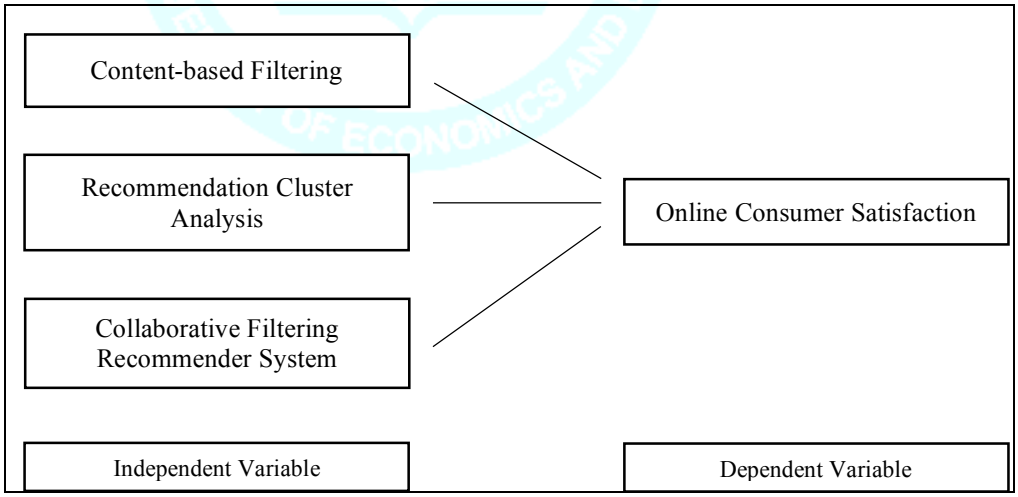

Figure 6 : Research Framework

The research framework shows the independent variable and dependent variable that will be examined during this research. The independent variable factors that impact on Online Consumer Behavior, which is Content-based Filtering, Recommendation Cluster Analysis and Collaborative Filtering Recommender System.

2.10 Hypothesis

According to Prof. Dr. S. Nasution, Hypothesis is a conjecture about what we observe in an effort to understand it. (Nasution: 2000). Zikmund (1997: 112), According to Zimund Hypothesis is a proposition or conjecture that has not been proven that it tentatively explains facts or phenomena, as well as possible answers to research questions. Quoted from: http://www.asikbelajar.com/

2.10.1 The impact of Content-based Filtering on Online Consumer Satisfaction.

Content-based filtering works on the principle that if you like a particular item, you will also like this other item. To make recommendations, algorithms use a profile of the customer's preferences and a description of an item (genre, product type, color, word length) to work out the similarity of items using cosine and Euclidean distances. The downside of content-based filtering is that the system is limited to recommending products or content similar to what the person is already buying or using. It can't go beyond this to recommend other types of products or content. For example, it couldn't recommend products beyond homeware if the customer had only brought homeware.

H1 : Content-based Filtering impact on Online Consumer Statisfaction

2.10.2 The impact of Recommendation Cluster Analysis on Online Consumer Satisfaction.

There are two approaches, which apply clustering in RS domain: *Cluster-based* and *Cluster-only* (Rongfei, Maozhong, & Chao, 2010). In both computation efficiency of systems increases as the clustering phase is per- formed off-line. The first approach is the most common one and focuses only on time efficiency improvement, which is application of clustering to find neighbourhood of active users. Further recommendation generation for them is performed by memory-based CF methods on part of input data forming identified the most similar cluster. Final precision of recommenda- tions can be lower in comparison with memory-based collaborative filtering.

H2 : Recommendation Cluster Analysis impact on Online Consumer Satifaction

2.10.3 The impact of Collaborative Filtering Recommender System on Online Consumer Satisfaction.

Collaborative filtering focuses on collecting and analyzing data on user behavior, activities, and preferences, to predict what a person will like, based on their similarity to other users. To plot and calculate these similarities, collaborative filtering uses a matrix style formula. An advantage of collaborative filtering is that it doesn't need to analyze or understand the content (products, films, books). It simply picks items to recommend based on what they know about the user.

H3 : Collaborative Filtering Recommender System impact on Online Consumer Satisfaction

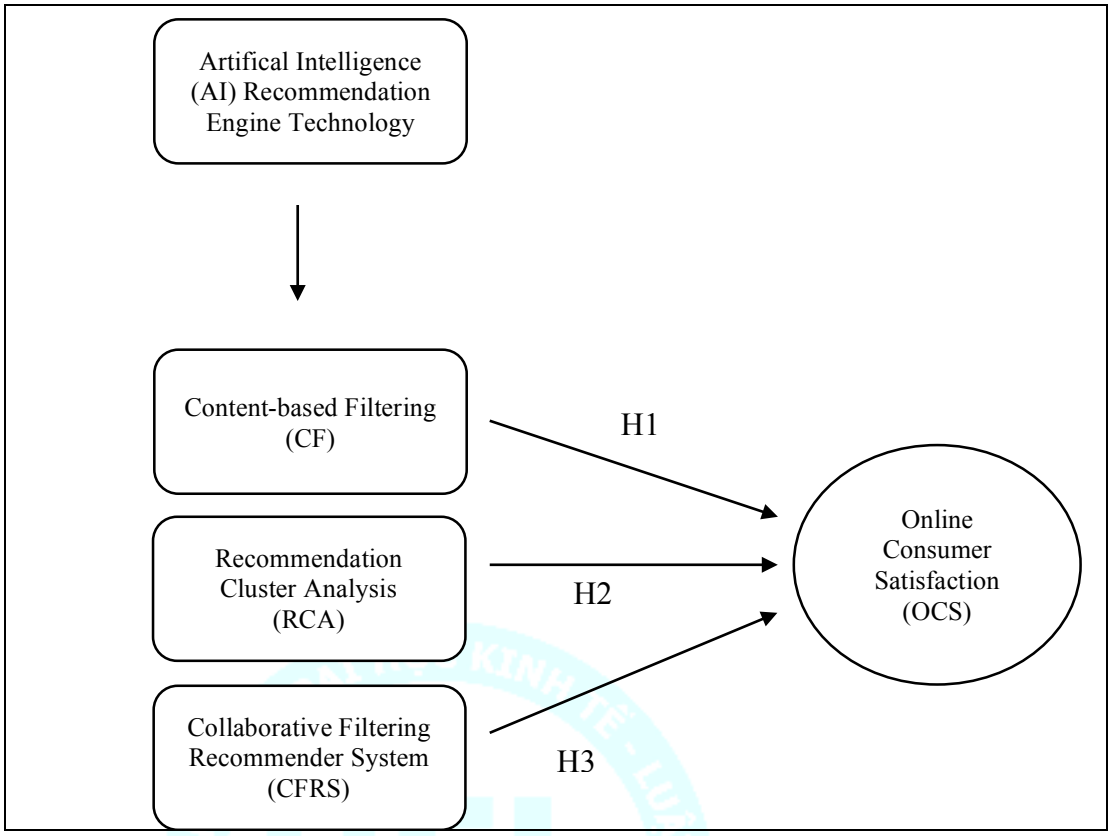

Figure 7 :Hypothesis Framework