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**ARTIFICIAL INTELLIGENCE IN GLOBAL RETAIL SERVICE**

**A Finnish Perspective**

**Thesis**

**CENTRIA UNIVERSITY OF APPLIED SCIENCES**

**Business Management**

**October 2019**

**ABSTRACT**

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<b>Degree programme</b> Business Management		
<b>Name of thesis</b> ARTIFICIAL INTELLIGENCE IN GLOBAL RETAIL SERVICE. A Finnish Perspective		
<b>Language Instructor</b> Eija Torkinlampi		<b>Pages</b> 34 + 2
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<p>Artificial Intelligence is a broad topic which encompasses the applications, software and devices which can perform roles and solve problems in sensible way. With AI, it is possible today with just a voice to issue command to a computer device to perform certain functions and such is done immediately. AI has grown to become a huge part of retail services today.</p> <p>The aim of this thesis was to examine the role of AI in retail service. Since it is difficult to examine at large the role played by AI in global scale, this thesis was focused on the topic from the Finnish perspective. Finland is one of the pioneers in the use of artificial intelligence and was thus chosen to examine the role which AI played in the retail sector among other sectors of the Finnish economy.</p> <p>The theoretical framework was divided into two sections. In the first section, the role of AI in the operation of three prominent Finnish companies was discussed. These companies are Elisa - a telecommunication giant, OP - a Finnish bank with a huge customer base, and KONE – a Finnish engineering company. In the second part of the theoretical framework, questionnaire was sent to the students of Centria University of Applied Sciences. The aim was to provide an opportunity to examine the success of AI adoption in public services such as transport, to compare the current place of AI in Finnish economy compared to the rest of the world and generally the customers’ experience when they visit a shopping mall.</p> <p>In conclusion, the research showed that AI played a huge role in retail services in Finland. It also showed that AI adoption in retail sector is well developed compared to other countries represented in the survey.</p>		

<p><b>Key words</b> Algorithm, Artificial Intelligence (AI), Electronic Marketplace, Programming, Retail Services.</p>
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## **CONCEPT DEFINITIONS**

**Algorithm:** a process or set of rules to be followed in calculations or other problem-solving operation especially by a computer.

**Artificial Intelligence (AI):** The theory and development of computer systems that is able to perform tasks normally requiring human intelligence, such as visual perception, speech recognition, decision-making, and translation between languages.

**Programming:** the process of writing computer programs.

**Retail Services:** is the process of selling consumer goods or services to customers through multiple channels of distribution to earn a profit. For example, supermarkets.

**SAP:** Systems, Applications and Products is an enterprise resource planning and a data management program.

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## 1 INTRODUCTION

Artificial Intelligence (AI) is a common phrase in modern time used to describe how machine can function as well as perform roles similar to those which can be done by humans. However, this is a narrow view of the topic. AI is a broad topic which encompasses the applications, software and devices which can perform roles and solve problems in sensible way. With AI, it is possible today with just a voice to issue command to a computer device to perform certain functions and such is done immediately. It is equally possible to walk into a cashier-less shops and perform transactions effortlessly. All these seemed impossible few years back, but the development achieved the use of AI, these are now things of reality. To this end, this thesis is aimed at exploring the roles which AI has played in modern times especially since the rapid development of intelligent computers which are able to handle difficult tasks and contain large volume of information. Specifically, it focuses on the roles which machines can and have been performing similar to that which used to be done by human.

The development of internet towards the end of the 20th century has eased communication and made data and information sharing simpler than in the past. This has facilitated the rising growth in the capacity of computer machine to learn information which in turn eases human transactions. With AI, it is possible to analyze huge volume of data coming from purchase history as well as prediction of market rises and fall in foreign exchange trading. AI has also seen growth in a lot of sectors from health where surgeries are automated to transport through the advent of driverless cars. It is even believed that in the nearest future, AI could help track stock level in home and order replacements where necessary. The retail sector is not left behind. From online shopping to machine-controlled delivery programme, retail services have increased by leaps and bounds each year.

While explaining a brief history of the artificial intelligence, I shall also attempt to discuss the relationship between AI and other concepts in retail services, since it is pertinent to clarify some of the ambiguities that may be attached with the topic. In this light, the significance of AI to retail service especially from a Finnish perspective will be dealt with. The purpose of this is to examine some of the roles which AI has played in shaping the economy of Finland in relation to the retail sector. By doing so, this will ensure that the successes as well as existing challenges in the field of AI as adapted to retail services are thoroughly examined.

The aim of this thesis is to examine the place of AI in retail service. Since it is difficult to examine at large the role played by AI in global scale, I will be looking at the topic from the Finnish perspective. Finland is one of the pioneers in the use of artificial intelligence and thus it is necessary in line with the objective of this research to take a cursory look at the role which AI has played in the retail sector among other sectors of the Finnish economy. Therefore, Finland has been chosen as the case study for this research. Specifically, the retail sector in the Finnish economy which is currently undergoing tremendous development will be explored with a view to understanding the level of development at present and aspired development in the coming years. It is believed that by exploring the use of AI in the Finnish retail service, this will serve as reference point for other countries which are yet to imbibe the methods to see the potentials which AI can bring in their economic development. Besides, it is relevant to also examine the potential development which AI could bring to the Finnish economy while dealing with the challenges by AI to some low-end employment especially in the retail sector.

This thesis has set to use some of the existing literatures in the field of AI to explain key concepts ranging from algorithm, process/machine learning to programming. These topics will be explained for the reader to have a grasp knowledge of these topics and to also clear some of the ambiguities attached to these topics. Since Finland has been chosen as the case study, relevant material to the topic will be applied which include the publication by the Finnish ministry of economic affairs and employment which examine the present state of AI development in the country and prospects for the future. Other relevant materials will also be adequately consulted in the writing process. It is the belief of the author that this work will serve as reference for future writers seeking to understand the relationship between AI and retail services.

Although AI is not a new topic in the present age, there are few existing materials which center on AI and retail service. Thus, this constitutes primarily one of the limitations to the research. This thesis will not go in-depth to the scientific aspect of AI such as the procedures of writing code or software development since it is confined to the business inter-relationship between AI and retail services. However, concepts in AI relative to the discussion of the topic will be explained.

To this end, this study will apply both paper and electronic materials in forms of existing researches, publications, articles, journals among other reliable scholarly works while writing the research. As a methodology of this thesis, questionnaire shall be administered to students of Centria University of Applied Sciences. The objective is to present a set of questions from which the respondents can share their experience of how they view the role which AI has played in the Finnish economy from their retailers'

viewpoint. The questionnaire shall be collated with the use of a Google form and similarly results from the questionnaire will be collated to by a Google form. The results from the questionnaire will be discussed in order to set a conclusion for the research. It is the author's belief that by examining the Finnish perspective of AI in retail service, this thesis will set a precedent through which the development of AI in business can be measured as well as enable retail software developers access some of the shortcomings of their retail services. In other words, will give opportunity to project the future for AI development in business.



## 2 CONCEPTS IN ARTIFICIAL INTELLIGENCE

The phrase “artificial intelligence” is a complex word in modern era used to describe a lot of things. Thus, it is a herculean task to put up a group of specific word to define what in strict term what the term mean. Although the term does not mean just anything but on the other hand, it can be used to classify certain processes or action which is complex and puzzling. Therefore, it is not uncommon to find out instances where AI embeds other terms such as algorithm, robotics, automation among others. In this light, it necessary to explain some of the concepts which are relevant to the subject of this thesis. I will also attempt to discuss other subtopics which are relevant and connect to the main topic including electronic market as well as retail services.

### 2.1 Artificial Intelligence

The topic is a combination of two words ‘artificial’ and ‘intelligence’. While the former has a clear-cut meaning relevant to the topic, the latter has a broad definition which can have a wide range of definition. According to Merriam Webster dictionary (Merriam-Webster 2019), artificial can be defined as lacking in natural or spontaneous quality. This can be further defined in reference to the topic as lacking the natural ability of human characteristics. Intelligence on the other hand has been defined as it relates to the topic as:

- a. the ability to learn or understand or to deal with new or trying situations,
- b. the act of understanding,
- c. the ability to perform computer functions.

The ability of a computer to comprehend (understand) has been debatable, therefore only ‘a’ and ‘c’ are definitions relevant to the topic since AI refers to unnatural ability (artificial) of a computer to learn, deal and perform (intelligence) computer functions.

According to Pwc and Microsoft (2017, 8) in broad terms, AI refers to systems or applications that make decisions and take action without being explicitly programmed to do so, based on data collected, usage analysis, and other observations. AI is not one universal technology, rather it is an umbrella term that includes multiple technologies such as machine learning, deep learning, computer vision, and natural language processing (NLP) that, individually or in combination, add intelligence to applications. It is clear from the definition above that the topic does not have a single definition, rather is combines series



similar to human ability to resolve issues either a mathematical problem or the prediction of future market performance. In order to achieve this, there is a process involved which takes us to the next topic that needs to be defined, algorithm.

## **2.2 Algorithm**

Algorithm is a word which cannot be alienated for AI. In plain terms, it refers to a procedure for solving a mathematical problem (as of finding the greatest common divisor) in a finite number of steps that frequently involves repetition of an operation. (Merriam-Webster 2019). Algorithm serves as the base for AI since it helps to create a procedure from which the problems which AI intends to solve can be achieved. Brian McGuire (2006, 21) discusses AI as a subject with broad intellectual challenges of its own. It is not limited to specific applications or certain biological structures. It requires combined basic research in cognition, statistics, algorithms, linguistics, neurosciences and much more.

## **2.3 Electronic marketplace**

Electronic marketplace is another component relevant to the discussion of artificial intelligence in global retail service. According to Derek Leebeart, in *The Future of Electronic Marketplace*, he writes that,

Electronic commerce has been building up for several decades through money transfers between banks and through the modestly efficient transactions between vendor and supplier made possible by electronic data interchange (EDI). But the marketplace as it is now taking shape is pushing outward from big routinizing institutions toward individual consumers, endlessly compounding the numbers and types of transactions (Leebeart 1998, 4.)

From two words, electronic and marketplace, the term refers to non-conventional or virtual market which is made available with the use of internet or mobile device or a computer. As at now, it is possible to order a product at the comfort of one's room in one part of the world to another part of the world instantaneously. For instance, a buyer can order a product from China via an online marketplace such as AliExpress or from the United States of America via Amazon. Similarly, one can order food from a nearby restaurant and have it delivered home almost immediately. This is made possible via electronic marketplace. It is projected that by 2020, 5 billion people will enter the middle class and come online,

while 50 billion devices will be connected to the Internet of Things, creating a digital network of virtually everything. (SAP 2017, 3)

Leebeart (1998, 12) writes further that, the electronic marketplace is, at one end, a new overall broadcasting tool, the ultimate town crier. At the other end are to be found tremendous opportunities for targeting highly defined groups. This new marketplace rewards the capacity to mine sophisticated databases in order to identify buying patterns, demographic data, credit ratings, popular Internet chat rooms, zip code correlations, and voting habits.

## **2.4 Retail Service**

In the opening words of *AI: The Promise of a Great Future for Retailers*,

the retail sector is arguably in a massive state of flux and business transformation. The entire sector is attempting to cope with fast-changing customer shopping habits and the shift of emphasis from the high-street to the web. This has seen giants of the retail sector announcing store closures that reflect moving consumer demands while others have changed their supply chains to become more Web-centric (Infosys 2017, 4.)

Retail is the lower part of supply chain which deals with the satisfaction of customer need. A retail service can be performed by a shopping outlet. With the advent of AI, there has been a huge shift from the traditional outlet-based store serving as a retail outlet to more of online-based sector. The closure of blockbuster which is a leading business outfit in the lending of movies and audio contents and the rise of Netflix which is web based is a testament to the random shift of retail-based company to the new trend.

Today, retail and consumer products organizations primarily use intelligent automation to perform discrete internal processes that rely on existing rich-data sets, such as demand forecasting and customer intelligence. According to Microsoft, (IBM Institute for Business Value 2019, 3) within the next three years, executives plan to incorporate intelligent automation into more complex processes that require broader sets of data, external collaboration and additional system integrations



FIGURE 2. Projection of intelligent automation across the value chain by 2021. (adapted from IBM Institute for Business Value 2019, 3)

### **3 BRIEF HISTORY OF AI**

In order to understand the inter-relationship with business at large and retail service in specific term, it is significant to look at the history of AI. This is relevant especially when looking at how vast topics under AI have been now today. The application of AI applies to nearly all aspects in which computer is used nowadays. For this reason, it is an important part of this research to go down the memory lane of how AI have become an intrinsic part of our daily life. By doing this, it is believed that the history will set a backdrop through which the application of AI to business and most especially retail can be clearly examined.

#### **3.1 Origin of the term**

In the year 1956, the first academic conference was held on the topic where the term ‘artificial intelligence’ was coined by John McCarthy to describe the existing notion of machine capability to think like human. However, Smith in *The History of Artificial Intelligence* believes that the history of the topic dates even back. While the term was coined in 1956 by John McCarthy, the notion as regards whether machine can actually think has been on for decades. Smith (2006, 4) writes that the journey to understand whether machines can think has been pre-existing before 1956. According to Chris, it is difficult to deny the ability of computer to process. However, it is unknown to many people if a machine can think. Thus, the exact meaning of think is important because there has been some strong opposition as to whether or not this notion is even possible. One of this notion as to whether computer’s ability to process logic is the same as thinking is put forward in what is known as the “Chinese-room” argument.

This argument suggests that: in a scenario where someone is locked in a room, where they were passed notes in Chinese. And while using an entire library of rules and look-up tables they would be able to produce valid responses in Chinese, but would they really ‘understand’ the language? The argument is that since computers would always be applying rote fact lookup they could never ‘understand’ a subject. Even though the term has been traced to have been coined in 1956, what seems to have been a recurrent argument in lots of papers, journals, researches and article is the verification and an establishment of machine being able to think. It is very relevant, before examining the term: artificial intelligence is to first attempt to decipher what exactly intelligence is in the first place. And in other to do this, it is significant to ask what is meant when we say a person, animal or thing is intelligent? According to Warwick,

In fact, everyone has a different concept based on their own experiences and views, dependent on what they think is important and what is not. This can easily change – what may be deemed to be intelligent at one time and place may not be so deemed later or elsewhere (Warwick 2011, 13).

### 3.2 Classical AI

From the advent of computer system, there has been attempts to compare the human brain with the computers. This is what generated the motive behind classical AI: an attempt to simulate the computer system to think and perform roles that can be carried out through intelligence by human. In an attempt to achieve this the first set of practice that were employed is what is referred to as “classical AI”.

According to Warwick Kevin in his book: *Artificial Intelligence: The Basics*, he describes how the desire to directly compare AI with human intelligence led to the basis for classical AI. In his work, he (Warwick 2011, 31) writes that as computers began to appear on the scene and the concept of AI was born in the 1950s and 1960s, consequently, the desire arose to directly compare AI with human intelligence. And along the comparison came a basic ground rule that human intelligence was as good as intelligence got, in some cases to the extent of believing that human intelligence was the only form of intelligence.

Classical AI was the initial approaches to AI which was primarily focused on top-down methods and this resulted into the first stages of the subject. This approach considered the use of statements that combine IF and THEN. For instance, in generating a line of instruction to the computer the classical approach can assume that if a patient is coughing and sneezing, then the patient has flu. The conclusions are however deduced for instance from medical expert who give their professional advice of what the symptom(s) might indicate. Although this approach has its own challenges but the limitation to this thesis will not allowed for an in-depth review.

However, it should be noted that a further subcategory of this is the expert system. The expert system is what Smith (2006, 12) discusses as computer programs which is aimed at modelling human expertise in one or more specific knowledge areas. It often consists of three primary components which include a knowledge database including facts and rules representing human knowledge and experience. Secondly, an inference engine which processes consultation and determines how inferences are being made, and lastly an input/output interface for interactions with the user.

### 3.3 Modern AI

The classical AI approach is able to work effectively when it involves a field where there are set of rules and principles which leads to a result. This is the case of the medical example used previously. However, one thing common with human intelligence is the ability to relate with daily experiences and being able to draw conclusion from it. Since there are not hard and fixed rules about human experience, the classical AI approach does not work out in this case, hence the emergence of the modern AI approach.

In order to understand how modern AI approach works, it is necessary to understand briefly how the human brain functions. As explained by Warwick (2011, 89) in a typical human brain, the basic component is a nerve cell which is also called a neuron and there are about 100 billion of these. Each of these neurons is very small usually being 2–30 micrometers in diameter (one-thousandth of the size of a small coin). The neurons are joined to form an extremely complex network, each neuron having upwards of 10,000 connections. Each neuron consists of a cell body with a nucleus at its centre. Several fibres, called dendrites, stimulate the cell body with signals from other neurons.

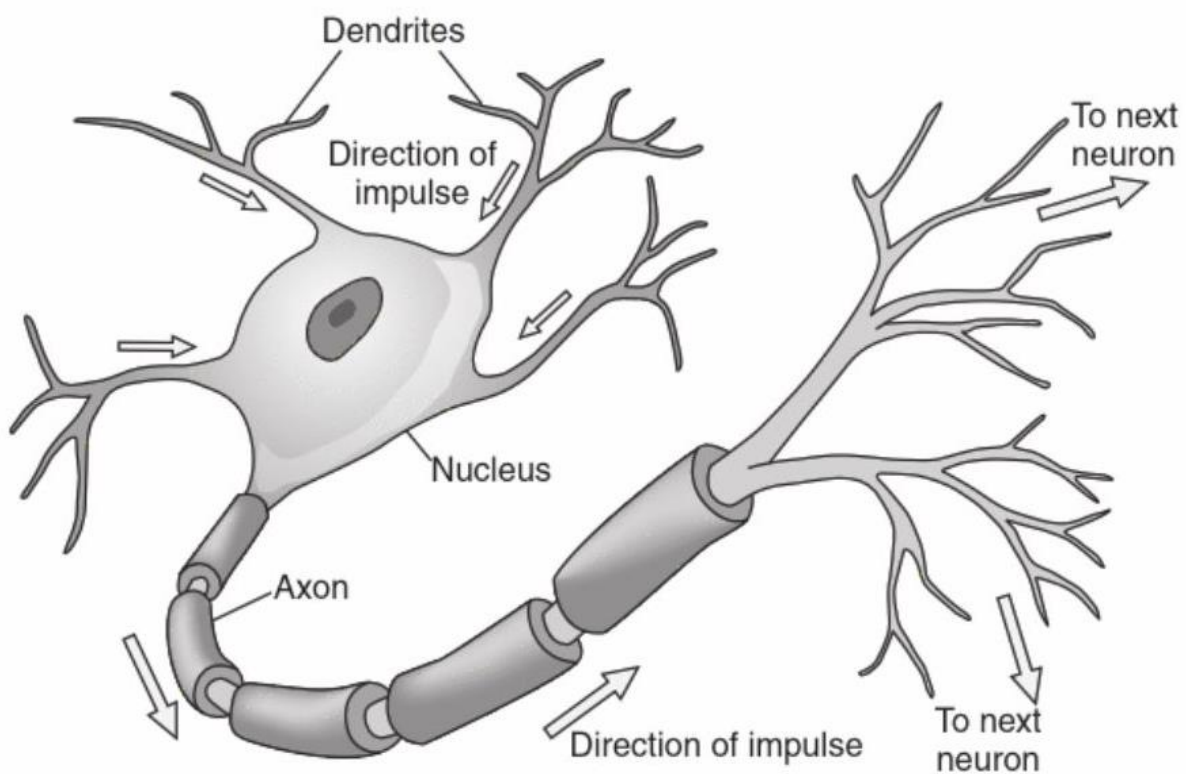


Figure 3. Picture of a neuron (adapted from Warwick 2011, 91)



The brain produces a consequent reaction to each experience from the human. This form human brain complexity is what is applied in the modern AI which is aimed at employing technological means to realize some of the characteristics of the original biological version of the human brain. An example of this is the Artificial Neural Network (ANN), which have been found to be extremely powerful and versatile AI tools. It can make decisions on for instance identifying forged signatures, recognizing, understanding speech as well as spotting devious behavior in credit card usage.

### **3.4 Robotics**

Robotics is another field in AI which includes the fusion on intelligence with robots. Over time, the development in robots have seen the use of sensors which acts like that in human to make machine perform roles similar to human. The opening remark to the book Artificial Intelligence and Robotics describes the role of robotics in AI as an attempt to amplify human potentials and increase productivity which leads to the move from simple reasoning towards human-like cognitive abilities. And in order to understand the impact of AI, it is crucial to draw lessons from the past successes as well as failures. (Perez, Deligianni, Ravi & Yang, 2017)

This field of AI has recorded success in the development of driverless cars, the use of robot exoskeleton, which is use to assist a complete paralysed person, the use of 3D printing which controls itself among other successes. Perez et al further explain the role of robotics as: another important application of AI in robotics is for the task of perception. Robots can sense the environment by means of integrated sensors or computer vision. In the last decade, computer systems have improved the quality of both sensing and vision. (Perez et al, 2017, 24)

## **4 SIGNIFICANCE OF ARTIFICIAL INTELLIGENCE IN FINLAND RETAIL SERVICES**

This chapter serves as the theoretical framework of the thesis. It is divided into two parts. The first part describes the role of AI in business and a connection between Finland and AI. The second part of this chapter is subdivided into two. The first being a review of some selected Finnish companies' use of AI as reported by existing publications, papers and articles. The essence of this is to present the impact of AI from corporate perspective in Finland. The review of three Finnish companies which includes KONE, OP and Elisa will be done in this part. The other subdivision presents the report of a survey on people's perspective of AI in Finland. In the second subdivision, a survey will be conducted on the topic via the distribution of questionnaire to the students of Centria University of Applied Sciences.

### **4.1 Role of AI in Business**

It is a fact that AI has come to stay. It has perforated every fabric of human existence and the retail sector is not exemption. AI has brought about revolutionize the transport, health care and working life in general. Although AI is not a new technology but the trends of research, availability of computational capacity and the recent ease of data transfer via the internet has never been seen from its inception of AI in the 1950s. According to the publication of the ministry of economic affairs and employment (2017, 15), from the inception of AI, the related expertise has also been developed in Finland especially as professor Teuvo Kohonen is renowned as a pioneer for his contribution to the field in Finland and worldwide.

However, it must be noted that there are some certainties and threats associated with the current development of AI being majorly the fear of loss of jobs. What must be noted that the role of AI is not to completely wipe of the presence of human as a factor of production but the synergy of automation which is intended to be carried out to assist in the performance of duties and responsibilities. In the words of PwC & Microsoft (2017, 12) the presence of AI will be significant in the transformation and definition of work in the future as well as productivity, coming with huge and massive amount of opportunities. In fact, it is expected that globally, AI will boost global Gross Domestic Production (GDP) by 14% or €13,000 billion by 2030. This is to stay that in the process of business revolution with AI, there is a strong possibility to increase globally production which inversely will generate more employment.

Currently, the application of AI in business has been effective in the forecasting, optimizing, marketing and the promotion of user experience along the value chain of production. According to McKinsey report (2017, 6), the investment in artificial intelligence is growing rapidly and mostly dominated by tech giants such as Google and Baidu. For instance, in 2016, it is estimated globally that tech giants spent between \$20 billion to \$30 billion AI with higher percentage of the sum nearing 90% on Research and Development (R&D). Generally, the investment on AI has been private and public inclusive. Both companies and countries has been actively participating. The Finnish ministry of economic affairs and employment explained in its publication (2017, 19) that the past few years has seen several governmental initiatives established to support the private and public sector in the utilization of the benefits offered by AI.

#### **4.1.1 AI in Finland**

In the previous section, the role played in the development of AI has been briefly stated. For the purpose of this section, it is relevant to state according to PwC & Microsoft (2017, 14), that in January 2018, Business Finland announced the new AI Business program, which is targeted at offering funding of up to €160 million for Finnish businesses' AI initiatives during the next four years. This is one of the relevant questions as to why this study choses to base its case study on Finnish.

Unlike the United States of America and China which are the leading countries in the development of AI, Europe does not have a uniform AI strategy. But the member states of the European Union (EU), which Finland is one of, have stated many measures to support the growth of AI and digital business. One of this is what Finland did. Since it is no news that in the future, AI will command the greatest impact on how work is done and utilized. This therefore means that employees must learn how to work with AI. Finns are regarded as highly educated and known to view technology in a positive way. Thus, the attempt by the government is one aimed at boosting the competitive advantage of Finland to other countries.

#### **4.1.2 The significance of AI from companies' viewpoint**

To understand the impact of AI in retail businesses in Finland, this section will be based on the review of three renowned Finnish companies.

### 4.1.3 KONE

Kone is a global leader in the business of elevator, escalator and automatic doors with a dedication to making the world's cities better places to live. According to the company's webpage [kone.com](http://kone.com) (2019), the story of the company begins in the year 1910, when a machine repair shop in Helsinki became known as KONE, which is a Finnish word for "machine". In more than a century later, the company is widely recognized in its mission of enabling the smooth flow of urban life where millions of people are involved across the world. Among some of the company's products are automatic doors, elevators, escalators and solutions for the maintenance and modernization of its products.

Artificial intelligence plays a crucial role in the day-to-day activities of the company. PwC & Microsoft reported in its paper that:

KONE launched 24/7 Connected Services in February 2017. KONE uses an IoT (Internet of Things) platform and AI capabilities to monitor and predict the condition of elevator and escalator sensor data. (PwC & Microsoft, 2017, 17)

With this, the company can identify the usage pattern among other important data such as the condition and probable fault of its product. With AI, Kone can better predict when it is very likely for a breakdown to occur and with its 24/7 connected service offer servicing when and where necessary. Result of this is an improvement in reliability which enhances better user experience.

Additionally, technicians as well as customers can relate to the visual information sourced via data from the elevators and escalators through online applications and tools. PwC & Microsoft (2017, 17) explains that Kone through the implementation of AI has been able to provide more information to its customer through monitoring of safety and condition of the equipment.

### 4.1.4 Elisa

Elisa is a telecommunication giant which is focused on Information and Communication Technology (ICT) and renders online services. It serves over 2.8 million customers both in Finland, Estonia and the world at large. As stated in the company's website [elisa.fi](http://elisa.fi) (2019), in the 135-year history of the company the utilization of new technologies and ways of working has always been a source of interest for the company. Thus, the application of artificial intelligence has played a major role in the ways of working,

management and tools applied by the company. In a bid to tough competition of the telecommunication market especially as it is in Finland, the company adopted, and AI assisted marketing strategy referred to as telemarketing. This tool helps the company to effectively target prospective customers and existing customer in terms of relevant sales offers.

PwC & Microsoft (2017, 25) discusses the use of machine learning and advanced analytics in other to improve the quality in telemarketing toward current and prospective customers. The company's machine learning algorithms helps in identifying the most promising targets and timing for a successful outbound offer. This is achieved through the continuous leaning of successes and failures over a period leading to more accuracy of prediction. The success of telemarketing aided by AI is also connected naturally to an increase in revenue. Elisa can understand the needs of the customer as it relates to their preferences and motivation. Consequently, it can determine the right time to make sales offers to such customers.

#### **4.1.5 OP**

Coined from the Finnish work *osuuspankki* which means "cooperative bank". The financial group boasts of having over 1.4 million customer-owners according to the company's web page (OP 2019). The company is the largest financial group in Finland. Towards the development of new products as well as services and technology, Op financial group invests annually over €400 million.

One of the business activities of the company is the handling of insurance claims every year. The role of AI in the company if describe in the paper titled "uncovering AI in Finland: 2018 field guide to AI by PwC & Microsoft (2017, 27) as the use of automation helping in order to find efficiencies in the streamlining and speeding up the insurance claims process. The utilization of machine learning and AI Is considered as the next steps to improve balance between risk, customer experience and operational efficiency. OP applies the use of AI in other to identify basic claim applications processing that can be automated so that the complex cases of claim application can be left to be handled by human thus reducing the workload. Also, the company applies the use of AI in the detection of fraud since AI is able to spot irregularities from larger datasets better than human. This subsequently helps to save a lot of manual work and it is very efficient.

## 4.2 Findings on the Questionnaire

The questionnaire is administered to students of Centria University of Applied Science. The questions were prepared with the use of google forms and similarly analyzed through it. The survey was sent to students through the school email on 27<sup>th</sup> of October 2019 and closed on 12<sup>th</sup> of November 2019. At the end of the survey, the total number of respondents is 55 and the questions were aimed at getting the perspective of students on AI in retail services in Finland. In the following paragraphs, I will be extracting and discussing some of the results from the survey.

### 1. Gender

55 responses

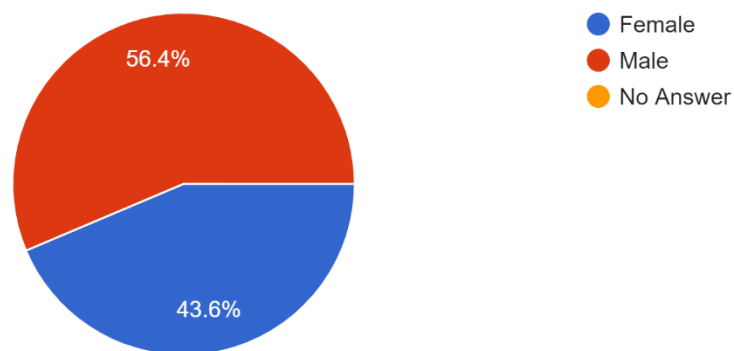


FIGURE 4. Gender.

The first question requests for the gender of the respondents. At the end of the survey, 56.4% representing 31 of the respondents are male with 43.6% representing 24 are female. Respondents were also given a choice not to indicate their gender but none of the respondent indicated such.

## 2. Age Group

55 responses

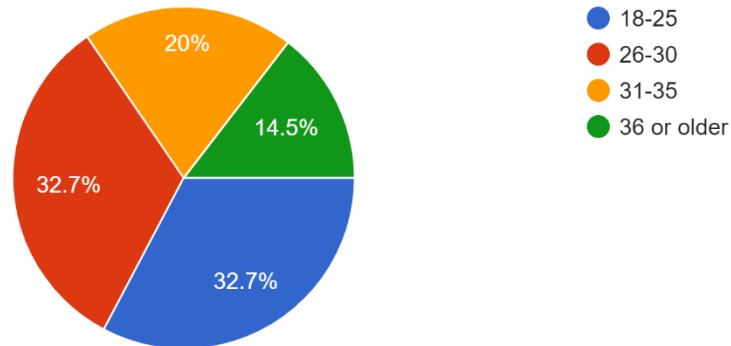


FIGURE 5. Age group.

On the age group of the respondents, 32.7% representing 18 of the respondents are within the age bracket of 18-25 years, 32.7% representing 18 indicated the age bracket of 26-30, 20% representing 11 of the respondents are within the age of 31-35 while 14.5% representing 8 are 36 years or older.

## 3. Country of Origin

55 responses

TABLE 1. Country of origin.

Country	Respondents
Bangladesh	3
Cameroon	7
Finland	7
Kenya	1
Moldova	1
Morocco	1
Nepal	4
Nigeria	20
Pakistan	2
Russia	3
Turkey	1
Vietnam	5

From the table (TABLE 1), it indicates that 12 countries were represented in the survey. However, Nigeria has the highest number of respondents having a total of 12 respondents followed by Finland and Cameroon both having a total of 7 respondents. Respondents from Vietnam has 5 respondents while Nepal has 4. Both Bangladesh and Russia have 3 respondents while Pakistan has 2 respondents. Turkey, Morocco, Moldova and Kenya have 1 respondent each.

#### 4. How familiar are you with the topic: Artificial Intelligence (AI)?

55 responses

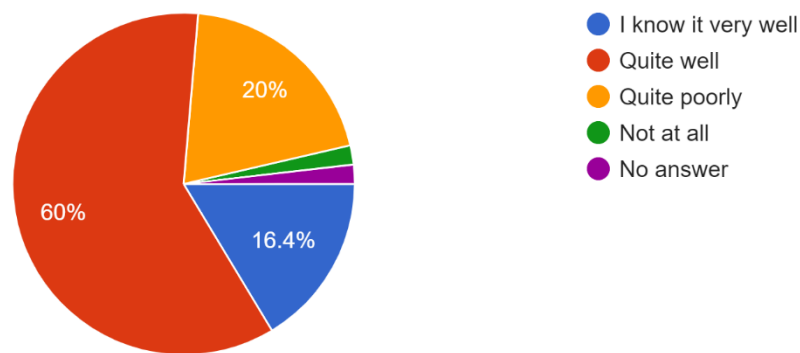


FIGURE 6. Familiarity with AI.

The respondents were asked how familiar they are with the topic. 60% representing 33 respondents indicated that they know the topic quite well, 20% representing 11 respondents indicated that they know the topic quite poorly, 16.4% representing 9 respondents indicate that they know the topic very well, while one respondent each indicated either not knowing the topic at all or choose not to providing any answer.



### 5. AI has made my life easier?

55 responses

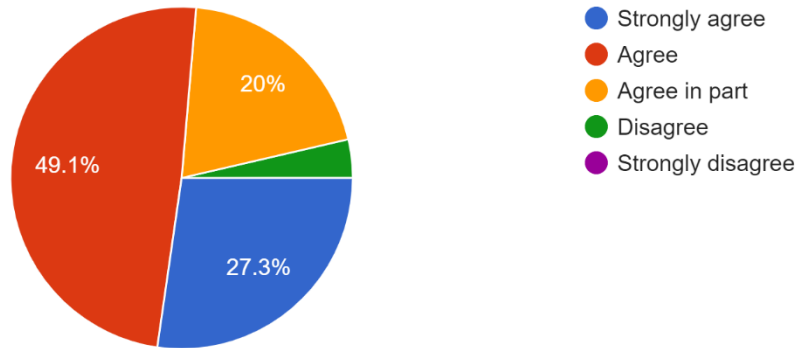


FIGURE 7. AI making life easier.

On this question, 49.1% representing 27 of the respondents agree that with the question that AI has made their life easier, 27.3% representing 15 respondents strongly agree that AI has made their life easier, 20% representing 11 respondents agree in part, 3.6% representing 2 respondents disagree that AI has made their life easier.

### 6. My skills in AI are:

55 responses

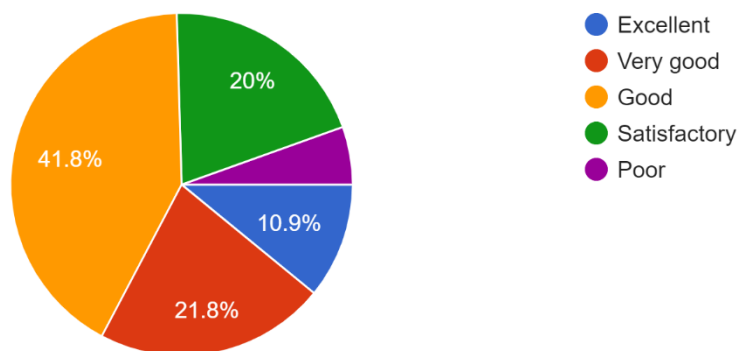


FIGURE 8. Skills in AI.

Respondents were asked about their skills in AI. From the results 41.8% representing 23 respondents indicated that their skill in AI is good, 21.8% representing 12 respondents indicated that their skill in AI is very good. 20% of the respondents representing 11 respondents indicated satisfactory, 10.9% representing 6 respondents indicated that their skills in AI is excellent, while 5.5% representing 3 respondents indicated that their skills in AI is poor.

## 7. Do you intend to improve your skills in AI?

55 responses

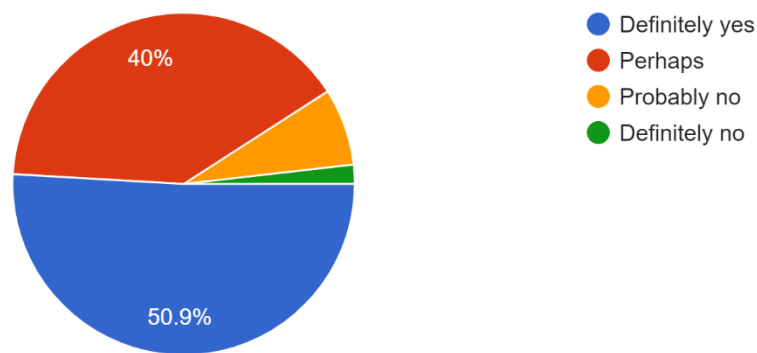


FIGURE 9. Improving skills in AI.

On this question, the respondents were asked if they intend to improve their skill in AI, 50.9% representing 28 respondents indicated with definitely yes, 40% representing 22 respondents indicated with perhaps, 7.3% representing 4 respondents answered with probably no, 1.8% representing 1 respondent answered with definitely no.

## 8. Please specify the reason(s) for your answer to question '7'.

55 responses

TABLE 2. Reasons to improve skills in AI

Reasons to improve skills in AI	Frequency
There is a lot to learn in AI	14
It's futuristic and have a lot of different possibilities	13

Artificial intelligence makes life easier and enjoyable	12
Because now a days the world is moving to AI gradually and AI is inevitable	5
It's very lucrative	3
To compete	2
Others	6

Respondents were asked to provide the reasons why they intend to improve their skills in AI. From the results, some of the reasons provided by the respondents are very similar and therefore are grouped together as seen in the table above (TABLE 2). The most common reason provided is that there is a lot to learn in AI which is immediately followed by the fact that AI is futuristic and inevitable. Other reasons provided are listed in the table (TABLE 2) in an order of how often they appear in the results.

## 9. How would you consider the use of AI in your daily life?

55 responses

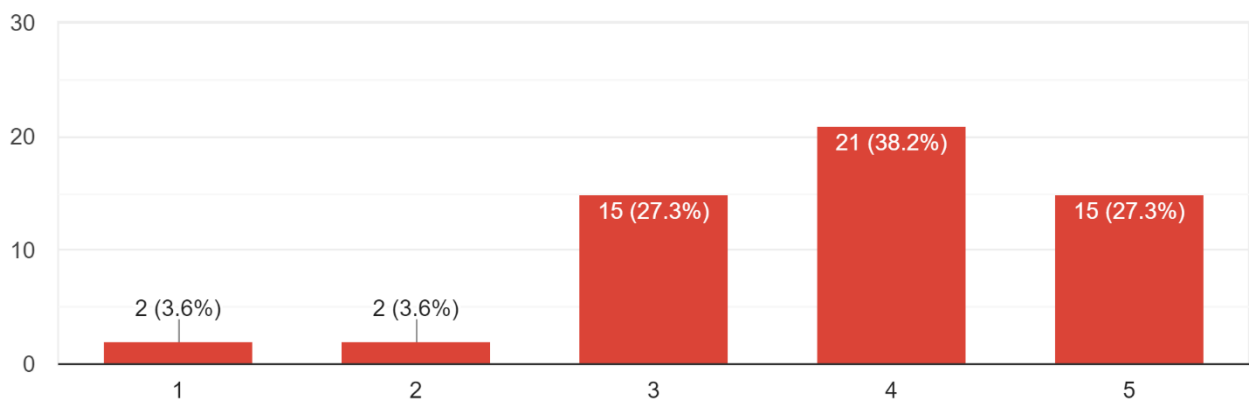


FIGURE 10. Use of AI in daily life.

Respondents were requested to score their use of AI in their daily life. On this question, respondents can choose from 1-5, 5 is the highest score possible when the respondents totally agree with the statements, while 1 is the least when the respondents least agree with the statements. 38.2% representing 21 respondents indicated with the score 4, 27.3% indicated with the score 5 and 3, 3.6% indicated with the score 2 and 1.

## 10. The presence of interactive screens and devices at Finnish shopping malls?

55 responses

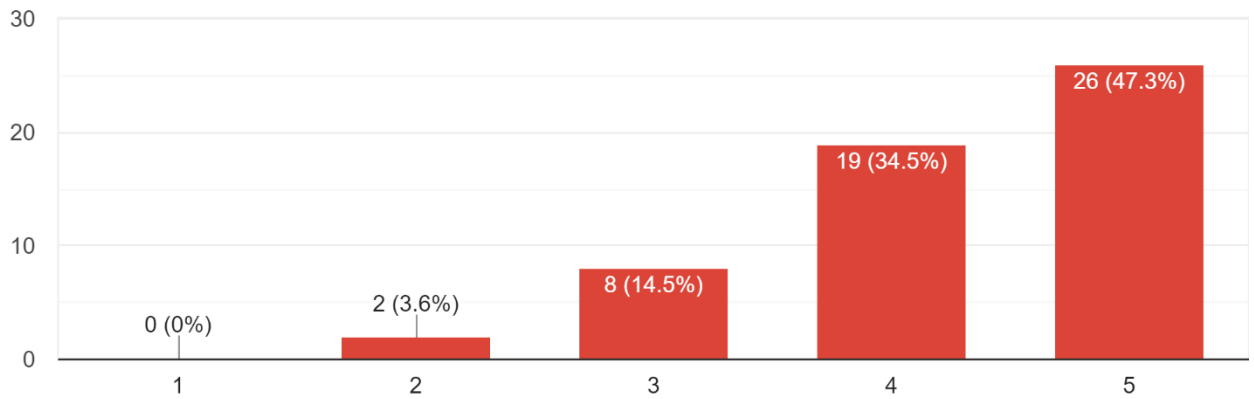


FIGURE 11. AI tools in Finnish shopping mall.

On this question, respondents were asked to score the presence of interactive screens and devices at the Finnish shopping malls. 47.3% representing 26 respondents indicated with the score 5, 34.5% representing 19 respondents indicated with the score 4, 14.5% representing 8 respondents selected the score 3 while 3.6% indicated with the score 2 and no respondent selected the score 1.

## 11. The relevance of mobile applications in public services such as transportation?

55 responses

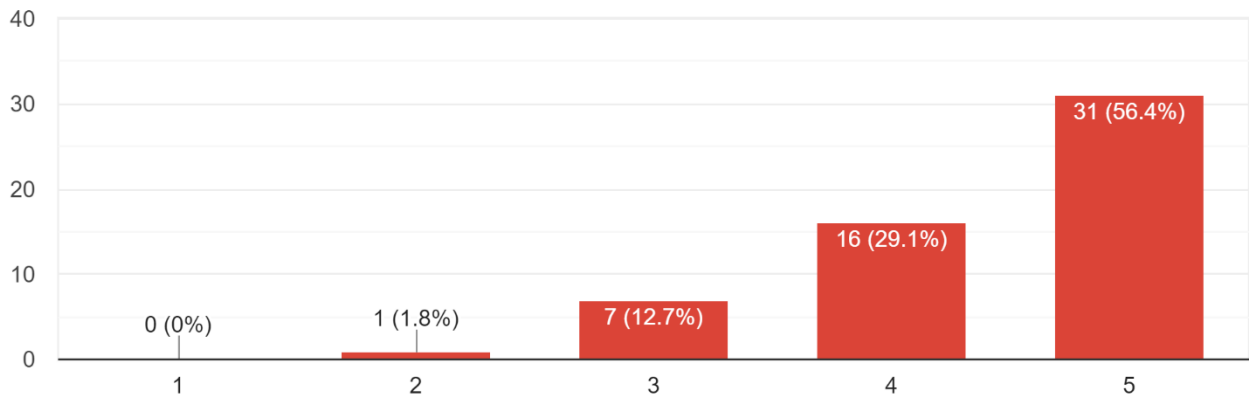


FIGURE 12. Relevance of AI in transportation.

On this question, 56.4% representing 31 respondents selected the score 5, 29.1% representing 16 respondents selected the score 4, 12.7% representing 7 respondents selected the 3, 1.8% representing 1 respondent selected the score 1 while no respondent selected score 0.

## 12. The effectiveness of cashier-less services (self service) at shopping mall checkouts?

55 responses

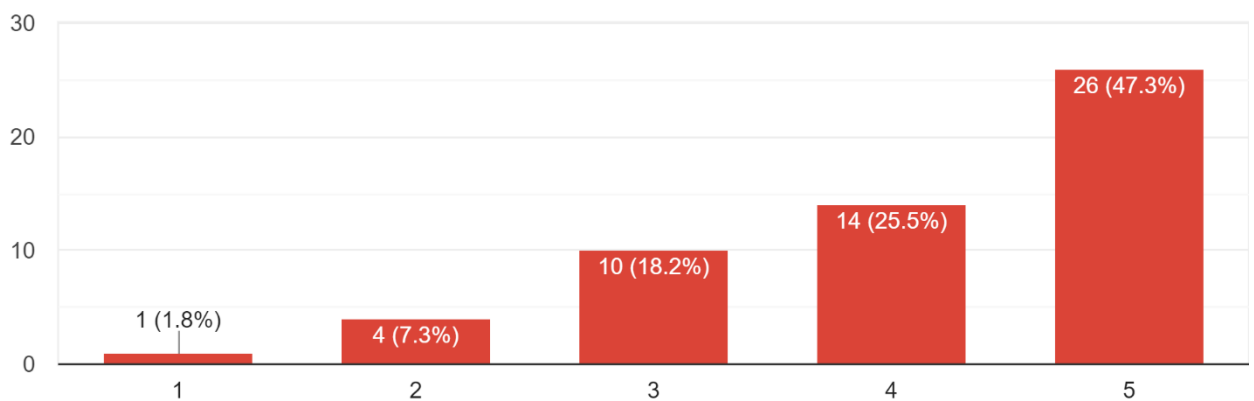


FIGURE 13. Cashierless service at shopping malls.

From the result, 47.3% representing 26 respondents selected the score 5, 25.5% representing 14 respondents selected score 4, 18.2% representing 10 respondents selected the score 3, 7.3% representing 4 respondents selected the score 2 while 1.8% indicating 1 respondent selected the score 1.

### 13. The relevance of personalized ads on social media platforms e.g. YouTube, Facebook?

55 responses

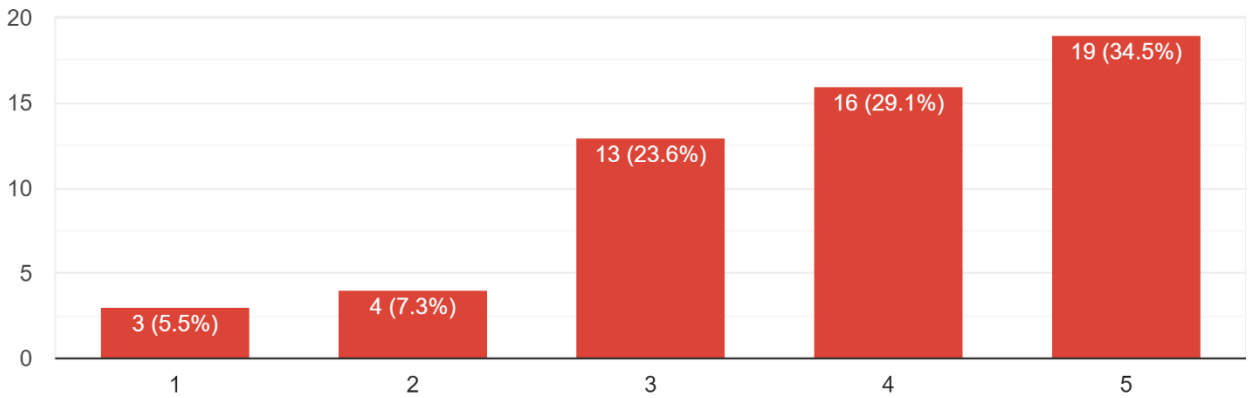


FIGURE 14. Personalized ads on social media platforms.

The respondents were asked to rate the relevance of personalized ads on social media platforms such as YouTube or Facebook. To this question, 34.5% representing 19 respondents selected the score 5, 29.1% representing 16 respondents selected the score 4, 23.6% representing 13 respondents selected the score 3, 7.3% representing 4 respondents selected the score 2 while 5.5% representing 3 respondents selected the score 1.

14. Have you bought any item through electronic marketplace (Facebook, eBay, Amazon etc.)?

55 responses

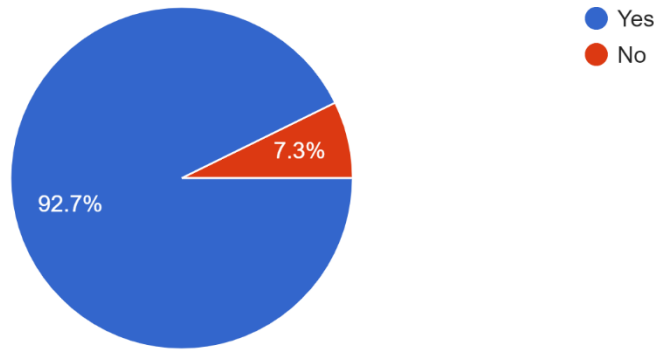


FIGURE 15. Question on electronic marketplace.

Respondents were asked if they had bought any item on electronic marketplace such as Facebook, eBay or Amazon. 92% of the respondents indicating 51 respondents indicated with yes while 7.3% representing 4 respondents indicated with no.

15. If your answer in question 14 is 'Yes', how would you rate the ease of finding such item?

55 responses

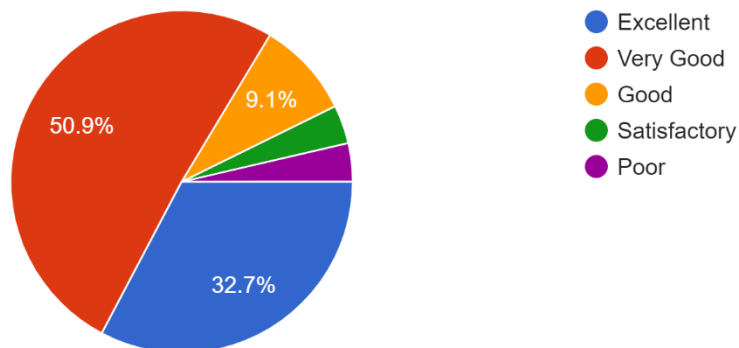


FIGURE 16. Further question on electronic marketplace.

This is a question in addition to question 14. In the case where the respondent selected yes in the previous question, the respondent is requested to rate the ease of finding such item on the electronic marketplace. From the result, 50.9% of the representing 28 respondents indicated with very good, 32.7% representing 18 respondents indicated with excellent, 9.1% representing 5 respondents indicated with 5, 3.6% representing 2 respondents indicated with both satisfactory and poor.

## 16. Compared to your native country or other countries in the world, how would you rate the use of AI in retail services in Finland?

55 responses

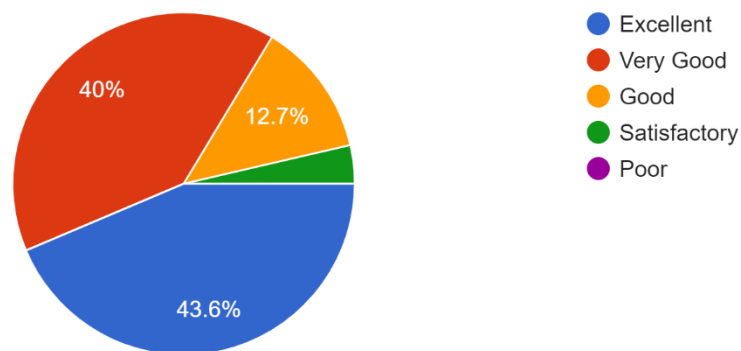


FIGURE 17. Comparison of AI in Finland with other countries.

This question required respondent to compare the use of AI in retail services in Finland to their native country or any other country. 43.6% representing 24 respondents rated it as excellent, 40% representing 22 respondents rated it as very good, 12.7% representing 7 respondents rated it as good, 3.6% representing 2 respondents rated it as satisfactory.



## 17. I am optimistic about changes AI might bring in the future.

55 responses

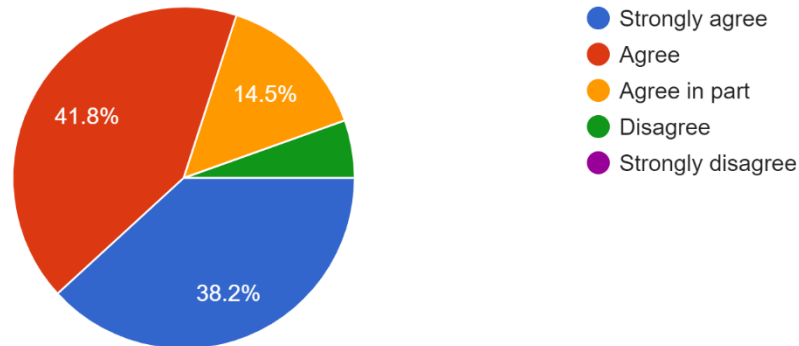


FIGURE 18. AI and the future.

Respondents were asked if they are optimistic about the changes that Ai might bring in the future. 41.8% representing 23 respondents agree, 38.2% representing 21 respondents strongly agree, 14.5% representing 8 respondents agree in part, while 5.5% representing 5 respondents disagree.

## 18. In which areas of your daily life would you like to see the application of AI in the future?

55 responses

TABLE 3. Areas of AI application in the future.

Desired areas of AI application in the future	Frequency
Transportation and travel guidance	13
Medical service and the health sector	9
Business and finance	8
Grocery store offering home delivery service	6
Software development	4
Others	4
A bit of everything	3
Driving	2

In the final question, respondents were asked to state areas where they would like the application of AI in the future. The answers given which are closely related are grouped together as seen in the table above (TABLE 3). Transportation has the highest number of occurrences from the result which is closely followed by health, business and finance. Other common areas stated in the responses are stated based on their number of occurrences indicated in the table (TABLE 3).

## 5 CONCLUSIONS

This thesis is based on AI in the retail services. And to analyze the topic more broadly, the Finnish sector have been chosen as the primary focus. It is the aim of this thesis to examine the present state of AI development in Finland with adequate reference to the retail sector. The purpose of this was to see the successes of AI in the retail sector as well as to also check some of the shortcomings in the development which could be improved on with time. The goal was to set a pretext for other countries who intend to adopt the application of AI in large scale into their economy since it provides an opportunity to examine some of the benefits and challenges of AI in an economic development. To achieve this, this thesis examined both private and public aspects of AI application into the economy.

As a methodology to this research, both qualitative and quantitative approaches were applied. In the qualitative approach to the research, I chose to discuss three prominent Finnish companies with long history of success and their recent adoption of AI into their daily operation which has further yielded tremendous success. This represents the private sector aspects of AI adoption. The goal was to examine the role of AI in retail services especially, from companies' perspective. These companies include OP, a Finnish bank with a huge customer base. The second being Elisa, a Finnish telecommunication giant and lastly KONE, a Finnish engineering company. The common feature of these three companies is that they are all goal driven and customer satisfaction oriented. As indicated from the result of the study, it was revealed that all three companies which are some of the early adopters of AI into their daily operation have recorded positive changes including the ease of their daily operations.

In the quantitative approach, a survey was conducted on the topic of the research. Questionnaire was sent to the students of Centria University of Applied Sciences. The goal is to provide an opportunity to examine the success or otherwise of AI adoption in public services such as transport, to compare the current place of AI in Finnish economy compared to the rest of the world and generally the customers' experience when they visit a shopping mall. At the end of the survey, 55 students from 12 different countries participated in the survey. The survey was prepared by Google forms and sent to the email of the students. Also, the result of the survey was analyzed by Google forms which will be discussed in the paragraph below. From the result of the questionnaire, it is shown that more than 90% of the respondents are at least familiar with the topic: AI. It thus suggests that AI is known among the students just as a large portion of them agree to AI making their life easier. The result also shows that most of the participants have some skills in AI and would also like to improve on their skills. There are however lots of

reasons why many of the respondents intend to improve their skills in AI but what appears to be the major reason is the fact that AI is inevitable and the future. The result further shows that the presence of AI tools is very common in Finnish shopping malls and that AI tools in transportation is near excellence. However, individual use of AI in daily activities still have room for improvement. The survey also suggests that the AI tools such as cashier-less service in the malls is gaining some ground and nearly all the respondents rate the use of AI in Finnish retail service as almost excellent when compared to their native countries. There are however some areas which could be improved on. One of these is the health sector, transportation and a possible well-developed home delivery of groceries with just a simple click on the internet.

This research has provided an opportunity to examine the role of AI in terms of its significance in retail services. Findings and results from the study have shown how AI can be improved on to create a better customer experience and a better world at large. Through the application of both qualitative and quantitative approaches as methodology applied, it has been possible to have a balanced view of the topic. The customers' assessment of AI in retail services is realized through the survey while the corporate sector is examined through the qualitative approach targeted at three major companies in Finland. It is impossible to claim that the research was conducted problem-free. However, some of the problems encountered in the research are minor. One of these problems was the ability to assess some vital documents of the companies which could have provided a more in-depth analysis of the company's progresses in the light of AI application. Another problem is the difficulty encountered during the administration of the questionnaire. Students' attitude to questionnaire was somewhat poor, perhaps because a lot of students would prefer to work on their phones than on a laptop. Thus, it would have been possible to receive more response if the link to the questionnaire could be sent directly to their phones via platforms such as WhatsApp or Facebook.

Since the objective of the research was to discover the perspective of the Finnish society in term of AI application in retail services, it can be concluded that the objectives set for the research have been fairly met. The results from the survey have clearly pointed out that AI is indispensable in retail and that a brighter future is possible with the advancement of AI. The result has also demonstrated that the respondents have strong faith in the future with AI and are willing to improve their skills in AI through learning more about the topic. For future researchers in the topic, this study will provide a background to the understanding of people and AI in Finland especially as it relates to business. It is clear that Finland has performed great in terms of a comparative analysis with other countries of the world as shown in the

survey result and as such future researchers can be confident to pick on Finland as a benchmark when discussing related topics.

In conclusion, this research has attempted to do justice to the topic and will act as a reliable source of reference for future researchers in the related topics. The diction applied is professional, simple and clear for the understanding of all readers. Adequate references have been included where necessary with a thorough avoidance of any act of plagiarism.

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## APPENDIX I

**Artificial Intelligence in Global Retail Service: A Finnish Perspective**

Artificial Intelligence (AI) is a common topic in modern time used to describe how a machine can function as well as perform roles such as those which can be done by a human. This survey is intended to capture the Finnish perspective of AI in retail services. Be assured that all the information appearing here-in will be kept confidential and the responses will be anonymous. Please spare a few minutes of your time to fill in the questionnaire. For further information please contact: Adewale Oyehan (NBMS16K), [Adewale.oyehan@centria.fi](mailto:Adewale.oyehan@centria.fi)

1. Gender
  - a. Male
  - b. Female
  - c. No Answer
  
2. Age Group
  - a. 18-25
  - b. 26-30
  - c. 31-35
  - d. 36 or older
  
3. Country of origin \_\_\_\_\_
  
4. How familiar are you with the topic: Artificial Intelligence (AI)?
  - a. I know it very well
  - b. Quite well
  - c. Quite poorly
  - d. Not at all
  - e. No answer
  
5. AI has made my life easier?
  - a. Strongly agree
  - b. Agree
  - c. Agree in part
  - d. Disagree
  - e. Strongly disagree
  
6. My skills in AI are:
  - a. Excellent
  - b. Very good
  - c. Good
  - d. Satisfactory
  - e. Poor
  
7. Do you intend to improve your skills in AI?
  - a. Definitely yes
  - b. Perhaps
  - c. Probably no
  - d. Definitely no
  
8. Please specify the reason(s) for your answer to question '7'.





## APPENDIX III

17. I am optimistic about changes AI might bring in the future.

a. Strongly agree      b. Agree      c. Agree in part      d. Disagree      e. Strongly disagree

18. In which areas of your daily life would you like to see the application of AI in the future?

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Thank you for your response.