

## **Enablers & Barriers to AI Adopting in Public Services**

**العوامل المساعدة و المعوقات لعملية تبني الذكاء الاصطناعي في الخدمات العامة**

**by**

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## **ABSTRACT**

With the new route many organizations in the UAE are taking, Artificial Intelligence has become one of the trendiest approaches to adopt in the region. Companies are competing to become smart and fully automated, services provided have been shifted to be served using smart systems and applications that saved both organizations and customers a lot of time. Thus, this dissertation will selectively investigate and discuss the enablers and barriers of AI adoption in public services. It aims to show the relationship between AI adoption and services' quality, additionally, it will discuss the popular factors that can enable and prevent organizations to adopting AI from discussion of combination of both secondary and primary data. Consequently, from the interviews conducted with different organizations who are already using AI systems and applications, many themes and topics have emerged that discuss the benefits of AI and what kind of challenges organizations dealt or dealing with in order to shift to automation. Last of all, a set of practices that are considered crucial but overlooked by many organizations will be represented to discuss its importance when taking the first steps to AI adoption.

## ملخص

مع لجوء الكثير من المؤسسات في الإمارات العربية المتحدة للنزوء لطريق الذكاء الاصطناعي فقد أصبح هذا الأسلوب الأكثر رواجاً في المنطقة، حيث تتنافس الشركات فيما بينها لتصبح أكثر ذكاءً وأتمتة، وتحول خدماتها لتصبح متوفرة على الأنظمة والتطبيقات الذكية، الأمر الذي وفر الكثير من الوقت على المؤسسات والعملاء . ولهذا ، فإن هذا البحث سوف يبحث ويناقش بشكل إنتقائي ماهي المعوقات والعوامل المساعدة في اعتماد أسلوب الذكاء الاصطناعي في تقديم الخدمات العامة. وسوف نحاول أن نبين طبيعة العلاقة ما بين اعتماد الذكاء الاصطناعي ونوعية الخدمات المقدمة، بالإضافة إلى أن البحث سوف يناقش أهم العوامل التي تساعده أو تعيق المؤسسات في إعتماد الذكاء الاصطناعي من خلال مناقشة بعض البيانات الرئيسية والثانوية. وفيما بعد من خلال المقابلات التي أجريت مع عدد من المؤسسات الحكومية والخاصة الذين يستخدمون الذكاء الاصطناعي وتطبيقاته، ظهرت الكثير من المواضيع والنقاط التي تناقض فوائد الذكاء الاصطناعي وماهي التحديات التي واجهت المؤسسات في عملية التحول الى الأتمتة. أخيراً وليس آخرأ، سوف نشرح بعض الممارسات التي تعتبر هامة ولكنها لم تُراعى بشكل جيد من قبل المؤسسات خلال الخطوات الأولى لعملية تحول الخدمات للذكاء الاصطناعي وتطبيقاته.

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# Chapter One: Introduction

## 1.1 Introduction

Over the last few years, Artificial Intelligence (AI) adoption has become a prominent subject around the UAE. With the benefits AI systems and tools can offer, many organizations globally and locally have changed their route and switched their services provided to be automated and digitized using many smart and advanced systems and technologies. Furthermore, with the switch to AI, many big companies have witnessed a huge difference in the quality of services provided to their customers such as the well-known company Uber, who have started their ride services and delivery business using a smart application that can identify the customer's location, detect the nearest available driver and indicate the pickup duration, as well as the trip duration along with the cost. These kinds of AI adoption have improved the excellence of organizations 'services that increased the work productivity and the satisfaction of customers. Even though AI adoption can be valuable, there are still many enablers and barriers that can empower or prevent a company from switching their route to cope with the digital era. Thus, this dissertation will cover some of the main and popular enablers and barriers in adopting AI that will be well researched based on previous articles, journals and experiences. As well as, these factors will be discussed to investigate how they are relatable to the public services provided locally, and how these factors might enable or stop some organizations in adopting AI.

## 1.2 Theoretical background

The urge of involving Artificial Intelligence (AI) in the community's everyday lives was studied and researched years ago. Nowadays, people and organizations find it important to adopt AI to ease and speed up the process of services offered, the adoption of AI plays an essential role in improving and advancing the quality of services and products being served to the public as involving AI and smart technologies saves time and money, increases productivity and quality, creates new job opportunities and increases skills and talents. According to Marcus, Rossi & Veloso (2016), Alan Turing who created a test that then called "the Turing test" was one of the first to question if machines and computers can think as humans, he started the intelligence era by

testing and seeing if people can recognize whether a person or a computer is answering their questions. He was the first to introduce such a theory that centers on computers being as intelligent as humans are and can act and do tasks that are usually performed by people. This theory then has ignited the curiosity of other researchers, which with time has encouraged many scientists, engineers and top people to invest and develop real machines that are intelligent and can think like humans do as well.

Nowadays, organizations and companies are shifting to be more digital when it comes to the public services they are offering. As it is stated by Beck (2017), lately, many companies are aware of the benefits of AI and how it creates business value, so they are investing more in buying and creating AI technologies and smart tools that can upgrade the level of company's performance and value. As it is beneficial to adopt AI, there are still challenges and barriers that stop a company from adopting AI or succeeding in the AI adoption such as employees' skills, who might not be able to cope with the digital transformation and budget that is one of the fundamental elements to AI adoption process as it is considered expensive to buy, create and develop smart technologies and tools. In order to succeed in implementing AI within a company or an organization, these institutions need to focus on the common barriers and enablers of AI adoption within their work environment and to have a clear strategy on how and why AI would benefit the company and the public services its offering.

The Government of the United Arab Emirates, as well, is following the lead of many big countries who have succeeded in implementing AI and becoming smarter. Locally, governments are already in the process of transforming their public services to be smart and digital using AI technologies and tools. With the transformation occurring, companies and organizations should have a clear view of the enablers and challenges of converting to AI before taking any step further. From the research that has been undertaken, some researchers are not clear of these enablers and barriers, or they might have discussed it but very briefly. Thus, this dissertation paper will focus on the barriers and enablers to AI adoption in public services locally. It will present experiences and journals from different parts of the world and compare it to what is happening in the UAE, moreover, interviews from different workplaces will be discussed and analyzed to know in-depth the most important enablers and barriers that will result in having a clear idea of these enablers and barriers that organizations can go back to and review before AI adoption.

### 1.3 Research Aim, Objectives and Research Questions

Accordingly, the aim of this dissertation will be to inspect the enablers and barriers of AI adoption and excellence of public services, besides to investigate those factors that enable and prevent AI implementation in those public services. The aim will be reached following the below objectives:

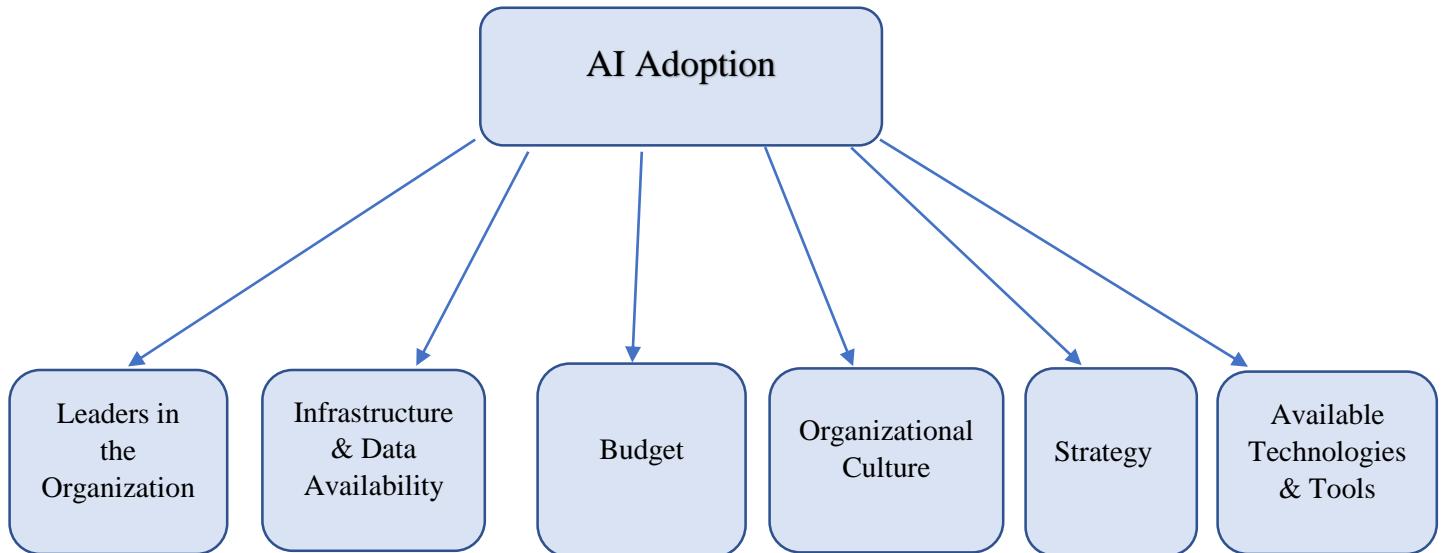
1. To critically address the impact of Artificial Intelligence in public services.
2. To evaluate the barriers and enablers of AI based on the previous studies.
3. To investigate the adoption of AI in organizations located in the UAE.
4. To examine the researched barriers and enablers and relate them to organizations that provide public services within the UAE.
5. Propose the best practices to increase the success of AI adoption in the UAE

Moreover, the dissertation will fulfill the below research questions:

1. What is the impact of AI in public services in general?
2. What are the enablers and barriers that might empower or stop companies from adopting AI?
3. How well is the UAE in adopting AI?
4. What is considered an enabler or a barrier in adopting AI around UAE work environment?
5. What are the best practices to follow in order to adopt AI successfully?

### 1.4 Conceptual framework

This study will focus on how some factors can prevent or enable AI adoption in public services. Many studies have shown that some factors can affect AI applications globally and locally. Below is a conceptual framework that shows the dependent variable which is AI Adoption, as well as the independent variables, which are the factors that can act as a barrier or an enabler in the adoption of AI.



*Diagram 1, "AI Adoption Variables"*

## 1.5 Dissertation Structure

The dissertation is structured as the following:

1. Chapter One: Introduction
2. Chapter Two: Literature Review
3. Chapter Three: Enablers & Barriers
4. Chapter Four: Methodology
5. Chapter Five: Results, Findings & Analysis
6. Chapter Six: Discussion
7. Chapter Seven: Conclusion & Recommendation

## Chapter Two: Literature Review

### 2.1 Definition of AI

Artificial Intelligence has become a widely popular topic that many governments worldwide are trying to make the best of it. Artificial Intelligence (AI) helped many governments to change the way they work, perform and progressed their achievements to a higher level, involving AI technologies to everyday life and work have assisted in many aspects such as saving time, money and lowering human errors.

According to Russell (2014), Artificial Intelligence definition can be classified into four approaches which are to think as human, to think rationally, to behave like human and lastly is to act in the most rational way. Machines and objects which are supported with AI technologies are expected to be having a mind to think like humans and in a rational way where they can understand and reason a certain input and then act and produce results accordingly. It is basically the art of creating technologies that can behave like people and are intelligent enough to make a decision.

AI is fundamentally machines or computers that can stimulate the human intelligence by following the perceiving, reasoning and acting processes. AI can either be weak or strong, a weak AI is when a system is created and computed to do a particular task such Siri in Apple, whereas Strong AI is when these machines can fully perform as humans without any external involvement, it means it can act, think and learn throughout its life such as robots (Margaret Rouse 2019).

### 2.2 History of AI

It all begun in 1950 when the computer pioneer and a man who published papers on Artificial Intelligence Alan Turing has asked a question in a lecture “Can Computers think?” and had conducted an experiment to prove that machines or computers are somehow intelligent. The experiment which called “the imitation game” had included three units which are an interrogator, a human and a machine. The interrogator was separated from the human and the machine and had to send questions to both and from their responses and the way they communicate with him/her, he/she should tell whether he/she is communicating with a real person or a computer. If the

interrogator was unable to answer and distinguish who is who, then it means that machines have some level of intelligence and are able to think (Luger & Chakrabarti 2017).

It was phenomenal that Turing could predict the future of machines ability to think, but on the other hand one can argue that there has been no valid proof of a computer passing the imitation test. As BBC stated, in 1990, Hugh Loebne, a New Yorker businessman had set a prize that reached \$100,00 for anyone who would create a computer or a machine that would pass the imitation game or what it is also called the Turing test. Unfortunately, many machines were not that intelligent at that time but that was a trigger for AI researchers to experiment and build many machines that can nowadays think as human, and an example of that is the winning of Deep Blue, a chess-computer player, against the world champ Gary Kasparov at chess competition in 1997 (Prof Noel Sharkey 2012).

Thus, one can agree with Alan Turing that machines can think as human, even if it took years to finally prove that (Martin Childs 2011). Nonetheless, individuals can argue about how machines cannot completely think, reason and behave as humans in every aspect of life because those computers or machines are being built to do a certain type of job and cannot perform any additional task except for the ones that its computed and programmed for, so their intelligence is very limited. There are many articles and movies about self-learning machines or robots and how it can learn throughout its lifetime but again there is no convincing and real example that proves this point. Moreover, the human brain is created in a very unique complicated way which is impossible for a human-being to create such a mind to a machine or a robot.

As Daniel Goss Stated, machines and robots lack emotional intelligence, the engineers who are building and coding those computers to do certain tasks have neglected to develop machines that have empathy, feelings, self-awareness and can understand and discriminate between facts and fictions. In the article, the writer is arguing about if we as humans are empowering machines to perform tasks that originally accomplished by people, then why neglecting the emotional intelligence side of those machines (Gross 2017). And this is another prove that machines and computers have a limited intelligence.

An important thing to mention which plays a huge part in AI systems and application is Internet of Things. Internet of Thing “IoT” is basically the connection of multiple devices that are

connected to a network or a Wi-Fi and this can be smartphones, headphones, machines, cars and anything that can be connected to the internet (Jacob Morgan 2014).

With the help of IoT, AI systems can work efficiently and effectively since these systems and applications can benefit from the data shared and connected from various devices. An example of that is smart cities and clouds, China has successfully built a smart city called ET City Brain, developed with the cooperation of Alibaba Cloud, where data gathered from cameras, sensors and devices have helped with the reduction of traffic. These data are being analyzed by the system developed by Alibaba Cloud and then results are shown to drivers where are the most traffic routes or which routes to take instead. Thus, one can observe that AI and IoT are relatable and work together for the most accurate results (Kubara 2019).

### 2.3 AI in Government & Public Services

In recent times, Artificial Intelligence has gained consideration and became an important subject to develop and involve in governments and workplace. These technologies that involve AI have changed the way tasks done in a work environment which lead to a better work flow and productivity. Additionally, it has an impact on the economy since it led to cutting costs and saved big companies a lot of cash, thus, many companies and governments are investing in AI (Wirtz, Weyerer & Geyer 2019).

With the rising competition of going more digital and being advanced, governments and companies should be aware of the fast evolution of technologies and tools of AI and should not neglect the importance of investing on these tools, R&D researches and technologies that have a huge benefit on the final result of AI involvement. Moreover, companies have the responsibility to train their employees and leaders on updated programs and AI tools in order to expand their capabilities on adopting these technologies (Jacques Bughin, Eric Hazan, Sree Ramaswamy, Michael Chui, Tera Allas, Peter Dahlström, Nicolaus Henke 2017).

One of the best existing companies globally that has succeeded in operating using advanced technologies only and AI in their whole service processes is Uber. The American company is a ride services company that offers people a delivery from one point to another, food delivery and many more services that can all be done by using Uber application on your smartphone. The company is based on using data and self-learning technologies in its processes. Once a ride request

is placed and location is detected by the application, the customer can check the availability of the nearby drivers, how far they are, type of the car they are offering as well as details about the driver. Additionally, the application work on self-estimation for both the fare and the customer's trip duration, and if there are additional fares because of for example congested roads, it will inform you before booking the ride (Koetsier 2018).

It is one of the easiest and fastest technologies that have been created and found using AI that have saved lots of time, money and created jobs for people who are qualified and licensed to be drivers by using their own car. Hence, it is noticeable that there is a relationship between AI involvement in public services and the change of the quality and productivity in the mentioned field.

Another public services' field that has benefited from AI technologies is education. In recent years, there have been many changes in the interactive learning technologies used among educators and students from all ages, some courses have been converted online without the interaction of a human tutor, textbooks have been replaced by smart tablets that include educational applications and tools.

Educational tools and interactive technologies have been changed since the involvement of AI; one example of the change is in the neurosurgery field. Many advanced universities involved "VR 3D *Oculus Surgical Theater*", which includes a virtual stimulation of the brain and brain tumours removal surgery's processes (Maud Chassignol, Aleksandr Khoroshavin, Alexandra Klimova 2018).

VR 3D Surgical Theatre which is a virtual model brain is used as well to inform and explain to patients about their tumours in more detailed way, showing of the location of the tumour in precision and how the surgery will be done and which are the areas that are going to be affected by the surgery. Another advantage of using this technology, is that it allows doctors to have a clearer view of the blood vessels, brain nerves and tissues which ease the visualization of the most detailed parts in a human's brain. Thus, as it is explained, the technology is helping doctors, students and even patients to have a clear image of what is going on in the human's brain, and as *the Head of a Neurosurgery at Children's National Health System* said, "*Technology such as Surgical Theater's represents a quantum leap for neurosurgeons, both in and out of the operating room,*" (*Surgeons View Detailed 3D VR Brain Models Using Surgical Theater n.d.*).



*Figure 1, “3D VR Surgical Theater”*

By including such advanced technologies in the learning process and as it is mentioned in the example discussed above, students can have a clear and precise picture of what is supposed to be done in the actual.

Locally, in 2017, the UAE Government has conducted the UAE Artificial Intelligence Strategy which aims to develop and invest on AI technologies in various public services which are education, transportation, health services, space, sustainable energy, environment, traffic, technology and water.

The AI strategy that is considered one of a kind regionally and is planned to be achieved on the United Arab Emirates Centennial which will be in 2017 aims to:

1. Advance the performance of the government in all sectors and levels.
2. Overcome future challenges by creating effectual solutions.
3. Be the first country regionally that invests in new AI technologies.
4. Develop a new market that will have a positive impact on the economy (*UAE Strategy for Artificial Intelligence 2017*).

Government institutions and organizations have already started working on new strategies to fulfill the UAE AI strategy by advancing the technologies used in their services and go more digital and innovative in various fields. Dubai has become one of the enthusiastic emirates that has engaged AI technologies in many discussed sectors above. Since Dubai is already planning to be a smart city by the year of 2021, the Emirate of Dubai has already digitalized most of their services in many fields and one of them is transportation. Before even setting goals for 2021, Dubai have launched one of the longest self-driven trains in the world, which operating using artificial intelligence technology only. Additionally, Roads and Transport Authority has already introduced a driverless vehicle at Gitex 2018 which will be distributed among Emirate of Dubai in the near future. Moreover, self-services kiosks and robots are being used in RTA, their new robot, Mahboub, can answer any request and offer the customer up to 90% of RTA services without the need of any human interaction between the robot and the customer. In addition, an AI-operating security and efficiency system called “*Al Raqeeb*” is installed in public buses which its core mission is detecting any unusual sign by the driver, the system comes with a device that is fixed in front of the driver to sense any sign of illness or tiredness by the bus driver, if there is any, these signals then are being transmitted to the main control room of the RTA and in case any detection was found accurate, immediate actions will be taken. Cooperating AI systems and devices in RTA have shown a noticeable reduction in cost, traffic and accidents by public transportations (Shafaat Shahbandari 2018).

Another example of implementing AI in the UAE is the face recognition cameras used by Dubai police. As it is stated by Gulf News, AI technologies have helped the Criminal Department in Dubai police tracking criminals. With the face recognition technology in the security cameras installed around Dubai, Dubai police has succeeded to capture around 319 suspects in 2018 (Ali Al Shouk 2019).

From the research done on how AI contributed in public services, one can see that the government and the public have benefited from the advanced technologies used in the services offered, AI has helped in saving time and cost in self-service kiosks for an instance. Also, it contributes in providing a safe environment for people living in the city when using the public buses that can track the drivers’ statues to the security cameras that are advanced to detect criminals by using the face recognition technology.

## 2.4 Benefits of AI Adoption

Artificial Intelligence has been one of the most discussed subjects in the late 80s and the beginning of the 90s. Many companies at that time, especially technology and software companies, have started holding conferences and forums to discuss how could AI increase the possibility of managing information and data in the organization. In 1991, several early users and developers of AI technologies and systems gathered in the *American Association for Artificial Intelligence Conference* (AAAI) to discuss how it benefited them. As stated by *Stuart J.Brown*, who was one of the users of AI, AI systems used in his field had helped him to use based-reasoning techniques to propose a new engineering-design changes for *seawolf class submarines* (Jean S.Bozman 1991).

Many companies are now adopting AI in their daily work and services offered since it became an advantage to the adopters economically and socially, as well as helping them to build up a better reputation by becoming more digital. Thus, to have a better advantage of AI tools, the organization should have a complete data since all those systems that work on the AI technology are trained and made based on the company's data, so having a complete data can guarantee the company on having reliable and efficient results.

AI systems and technologies are either used to solve a problem or aid in making decisions for the user. One of the advantages of AI applications and systems, that it helps people who are using those applications to make faster decisions, for the reason of accuracy in data collecting, screening, analyzing and processing and finally decision making. For example, using the search engines such as Google has facilitated the process of data collecting about certain topics, once a person types a topic, many data from different sources are being collected and shown in a second. Another example of making decisions with the help of AI is traffic sensors and detectors that are being generated from cars, or it might be from a program the car is using, and an integrated system that has been built within the infrastructure of the car or other algorithm used in the traffic sensors. These detections help users of traffic sensors to be aware of the traffic they might face in the searched location like the traffic warning appears in Google Map (Easa Said 2012).

Another advantage of AI is avoiding errors. If the applications are programmed precisely and properly, a chance of a machine or a computer to make mistakes is almost zero compared to human errors. In addition, AI can be used to do routine tasks, by using more machines and application to

get services completed, it first saves cost, since less human effort is used during the process, as well as increasing productivity within the company. By allowing these machines to do the routine jobs and tasks that are usually done by humans, companies can have more time to focus on other important elements developed within the organization and invest more in their employees to train and develop their skills, and an example of this is the mentioned RTA self-service kiosks and robots that can help you with up to 90% of the RTA services (*Artificial Intelligence: The Advantages and Disadvantages* 2019).

An addition benefit of using AI in companies is that AI can work continuously without a need for break. The human productively usually lasts for 8-10 hours whereas these machines that involve AI can operate nonstop as long as there is availability if a power. Moreover, these machines can take risk more than humans, if there is a need for exploration of, for instance, a deep ocean or a space, human usually send machines that operates with the help of AI technology to help them explore a certain phenomenon or a situation (Natalie Regoli 2019).

## 2.5 Drawbacks of AI Adoption

Everything has its merits and flows; AI does too, has its disadvantage and can have a negative impact on the society. One of the biggest fears that many people are afraid of AI technology is job reduction. As discussed in the research done above, there are jobs have been replaced by AI robots and technologies such as the self-service kiosks and receptions that can serve people without the need of a human interaction. With this recent problem many people who are working in repetitive tasks positions or are not qualified enough and can perform simple tasks have higher risk of being replaced by those intelligent machines.

Furthermore, the development of AI technologies and robots can be costly. With the competition between big companies in investing more on AI machines, small companies as well will have to step ahead and involve these technologies in their workplace but creating these AI systems and machines cost a lot of money, it can be a good investment but it is not for small companies. In addition, as smart and intelligent these technologies can be, it lacks one important factor in many jobs and decision-making processes which is empathy. Many scientist and researchers discussed the possibility of teaching AI technologies to have empathy when making important decision, but if one will think it over logically, those machines and systems are programmed by humans, even

if a machine excel of self-learning traits, it still will make analytical decision without empathy which is needed in many situations in life (Natalie Regoli 2019).

As stated by Team (2019), robot managers can take over of the current human bosses. IBM which is a technology corporation is using it is IBM Watson as a robot boss. The IBM Watson checks the employee performance based on his/her previous projects, recent projects, tasks completed and accordingly, the robot Watson will decide whether or not the employee is worthy of a pay rise or a promotion. Using such systems and robots to evaluate employees within a company can be unfair since these systems will only analyse what is in the system without evaluating the employee's efforts and spirit in completing the tasks or projects, also it will not be able to consider the reason of the inability taking more projects or not completing a certain number of tasks.

As it shown from the research done from various resources, AI has its advantages and disadvantages and it is all about balancing of the usage of these advanced technologies, an organization should think on ways of how to involve AI technologies to do certain public services without threatening employees' future job opportunities or by creating new job opportunities in the market.

## Chapter Three: Enablers & Barriers

### 3.1 Enablers

For the right adaptation of AI among organizations, there are factors that help to enable implementing these technologies in a work environment. One of the crucial factors that facilitate the possibility of implementation of AI in a workplace is leaders within the organization. Leaders play a huge part in directing the company's vision and in setting strategies that will help the company to grow bigger and better. When a leader is determined to change a company's current status and upgrade the technologies used within the services provided, then employees will be encouraged to follow the leader. By having the right leaders in the right positions of a company, adaptation of AI will be easier and more investments, of course within the budget of a company, can be decided. Investments on AI by the leaders can be on R&D researches, data scientist and IT employee, training and tools that enable AI.

Another enabler that the lack of it, AI technology would not be possible to exist or work properly is the accessibility to data and algorithms. Data plays a huge part in building AI systems and technologies. For a system to learn, it needs to be fed the right and beneficial amount of data that can be analysed, categorized and trained using algorithms because algorithm on itself is not intelligent. By assuring the quality of these two elements, an organization can have an accurate and stable system that can makes decisions critically. Thus, a combination of useful and precise data, algorithms and systems, AI can be developed and shaped. Thus, again, investments on the right people, tools and machines will make it possible to use the data in the most efficient and effective way (Philipp Gerbert, Martin Reeves, Sebastian Steinhauser 2017).

Besides leadership and proper use of data and algorithms, budget availability plays a huge rule in AI. As it was explained earlier in the drawbacks of AI section that the price tag of AI can be a challenge for small companies since having a big budget has a huge impact on the quality of AI tools and systems. But for big government and companies, budget is a core source to step on the adaptation of AI, big companies invest their time on AI people and data scientist, tools and training, as well as pilots to examine the quality of the system developed and adjust it if any changes are required (Raghav Bharadwaj 2019).

An organization needs to invest on its employees who are developing and making it possible to implement AI in the services an organization provide. A constant training is crucial for those people for the reason of that AI tools, systems and technologies are on a continuous update and some rules about privacy and legalisation are changing throughout time and a company should be aware of them during the process of developing these advanced systems.

Another important factor to successfully use AI applications and technologies is the infrastructure. For the organization to have an AI environment, as mentioned before, data is one of the enablers to do so, also data storage, companies should know the amount of data they are willing to store and that is too depends on the level of AI they would like to use, is it high level of AI or low. Thus, organizations should know the source of data and how AI applications will be able to use it. Additionally, compute resources play a huge part of the AI infrastructure, an organization should be aware of what they are using is it CPUs or GPUs or both, data processing and data access. Also, Internet of Things “IoT” plays a huge part in AI infrastructure, IoT comprises of collecting and analysing data from various resources, this includes devices, vehicles, locations, sensor devices and assets that are connected to the internet. For a company to use IoT in the most efficient way, it needs AI to make a use out of the gathered and analysed data (Violino 2018).

As the findings in the literature above show, the common enablers found from different resources are:

1. Leaders within the organization
2. Organization's infrastructure
3. Budget
4. Data availability

### 3.2 Barriers

As there are many factors that enable an organization to implement AI, barriers and challenges are still exist and do stop many companies from implementing AI. According to Intelligent Automation Network (2019), one of the biggest challenges for many organizations that have been

there for many years is resistance to change. Many organizations are against the idea of automation, or even if they are with, they would not put an effort to change the work environment and services processes that are offered to both internal and external customers. If the people, who are in charge of running the organization, are not willing to change their beliefs of involving AI within the organization system, then AI implementation will be impossible since it all depends on the culture the top people spreads with their employees, who are usually managers and leaders. The reason for top managers and leader resisting the AI idea is lacking of AI technology skills which lead to slow adaptation of new technologies. Usually, governments that provide public services tend to have a weak culture, where the adaptation of new things are not done as quick as it is in the private sectors, since they tend to take risks even of those risks will change the quality of how well the organization will operate.

Another challenge is AI technologies that enables the implementation of AI, this includes: AI safety, the quality of the available data and systems, specialist people and expertise. AI safety which mean the safety of AI applications, systems and data plays a huge role in the AI implementation but unfortunately some institutions that provides public services fail to provide safety to those elements which lead to a poor processing of the data. Also, poor quality data will lead to untrusted results when using the AI systems and technologies. Another barrier in the successful implementation of AI technologies are people who are willing to work within this field, some organizations find it difficult to find specialists and expertise to work in the innovation and AI field, whereas other smaller companies struggle with the budgeting since hiring those people can be expensive (Wirtz, Weyerer & Geyer 2019).

In many organizations, lack of a clear strategy to AI adoption is one of the challenges faced. When a company start involving AI technologies without setting a strategic goal to the adoption of these technologies then it would a waste of time and money only. To gain the most advantage of AI involvement within an organization, AI technologies and systems developed within the company should align the business objectives of an organization to fit within the company's vision, mission and strategic development plans but unfortunately many organizations fail to meet that point, instead they just apply AI without having a clear idea how beneficial this system will be two or five years later, additionally how it will add value to their strategic business plans (Marr 2019).

According to the research done, the common barriers to AI that many businesses and organizations face when thinking of adopting AI are:

1. Organizational culture
2. Availability of AI technologies that enable implementation of AI
3. Lack of clear strategy

## Chapter Four: Methodology

### 4.1 Research Design

In any kind of research that is being investigated, there are two different research methods a researcher must follow to collect the necessary data regarding a specific topic, which then can be analysed and discussed. The first research method is qualitative research which it aims to collecting non-numerical data based on investigation about a certain topic with number of people or a community. It usually helps the researcher to have a wider view about the inspected topic since it can give answers to questions that cannot be asked in the quantitative research method. Some examples of this kind of research are interviews, observations, focus groups and audio/video recordings.

On the contrary comes the quantitative research method, which it resulted data is a numerical and structured. This kind of research will give the researchers numbers about a specific study, it will answer the “how much?” and “how many?” kind of questions. Quantitative research can be done by surveys, metrics, reports of the markets or by experiments (Pickell 2019).

For this research, the suitable method is qualitative data and specifically interviews. Since this research about enablers and barriers of AI in services, interview was the ideal method to use in order to find more about those factors. It is a topic that needs exploration and investigation with various number of public organizations and with conducting an interview, the researcher will be able to have a fully understanding of how and why the factors mentioned in the interview questions (interview questions will be displayed later on) are affecting on the public services. Additionally, by interviewing people who work on this field or uses AI technologies, more knowledge can be explored and discussed.

### 4.2 Participants and Sample Size

The selection of participants for this research paper was based on the technologies and practices the organization uses to provide better public services for the internal and external customers. The government and semi-government organizations who responded positively to the interview request offers public services with the involvement of AI systems and technologies to help them work

effectively and efficiently, also to facilitate those services and make it accessible for the customers at any time of the week. Some examples given by some organizations are based on the services the company provides for their internal customers who are the employees and others are based on services that are provided to their external customers who are the buyers, suppliers and users. But both examples are discussing the importance of AI involvement in public services and explaining some of the enablers and barriers that a company might face when implementing new advanced technologies into their work routine.

The research paper will display seven different point of views from seven different organizations who are operating differently in various fields, some of them are government institutions and others are semi-government. This type of variety will expand the researcher's and the reader's knowledge about the investigated study. Below is the list of the interviewed organizations:

1. Abu Dhabi Customs
2. Consumer Protection – Dubai
3. Dubai Islamic Bank
4. Dubai Police
5. Emirates Global Aluminium
6. HSBC
7. Directorate of Human Resources – Sharjah

#### 4.3 Data Confidentiality

The data collected from the mentioned organizations was for the purpose of this research only and it was explained clearly during each interview and interviewers are fine with it since all given examples and discussions are general and services are being provided already. Nonetheless, it was agreed that all documents from the interview will be used for this research paper only.

#### 4.4 Results Validity

The results that will be presented later in this dissertation will be based on both primary and secondary data collection. In chapter three, the literature review had discussed a theory and present

examples that explains how AI has been part of providing better public services and what are the enablers and barriers that many global companies have faced. Whereas the primary data that was collected from the conducted interviews has given some points discussed in the literature review a stronger and valid argument since it is all has been done and are being done in the real world within the UAE organizations.

Therefore, the content from the collected data will be analysed and discussed accordingly and tables will be given to compare between participants' opinions regarding the discussed topic which will give the reader a clear view of their beliefs and how will they be operating with the advanced AI technologies.

#### 4.5 Interview Questions Sample

The interview questions were designed based on the dissertation topic and on research done about the investigated case. The answers to these questions will give the researcher more knowledge about AI enablers and challenges faced within the chosen organizations and might be able to address more issues since all of these organizations have started using AI systems and technologies.

Below is the list of the interview questions:

1. *Your thought on Artificial Intelligence adoption in organizations.*
2. *How AI adoption has changed the services offered by the organization you work for? kindly provide an example.*
3. *There are many enablers and barriers when implementing AI, below are some of the factors I found out while doing the research, from your point of view, how these are relatable to the AI adoption, kindly comment on each:*
  - A. *Enablers (factors that enable the company to implement AI in their public services):*
    - *Leaders within an organization*
    - *Organization's infrastructure*

- *Budget*
- *Availability of Data*

*B. Barriers (factors that prevent a company from implementing AI successfully):*

- *Organizational culture*
  - *Availability of AI technologies that enable implementation of AI*
  - *Lack of clear strategy*
4. *In addition to the factors mentioned in question 3, do you have more factors that might enable or prevent an organization from adopting AI? If yes, kindly mention.*
5. *Do you think that lack of noticeable changes of the quality of services involving AI systems can be considered as a barrier and would affect the adoption of AI technologies?*
6. *Do employees have gained more trust on those systems and technologies to their tasks and make decisions? If yes/no, kindly explain.*
7. *Many researchers are arguing about AI robots replacing humans to offer services, what are your thoughts on this? And to what extend it is true?*

## Chapter Five: Results, Findings & Analysis

### 5.1 Introduction

This chapter will present results found from the interviews conducted for this dissertation. The interviewees' point of view has added more knowledge since all of them are engaged with using and developing AI systems and tools and experienced results in the services each provides. The interviewees' selected in different fields of public sector and each one of them will present different idea based on the work environment, routine and type of services it offers. Thus, having a variety of experienced people will help with supporting the researched points that can be considered as enablers and barriers to AI application in public services.

### 5.2 Interviewees' Profile

The researcher had interviewed seven employees from seven different organizations. Each one of them is working in a different field and has a different job titles but all of them are involved with AI systems and tools. In "Table 1" the interviewees' profile is presented:

Organization / Company	Name	Job Title
Abu Dhabi Customs	Participant 1	Senior Customs Controller
Consumer Protection - Dubai	Participant 2	Service Points Manager
Dubai Islamic Bank	Participant 3	Supervisor of LC Payments, Wakalah and Morabaha Transactions
Directorate of Human Resources	Participant 4	Recruitment Coordinator
Emirates Global Aluminium	Participant 5	Senior System Analyst
HSBC	Participant 6	Regional Head of Innovation, MENAT
Dubai Police	Participant 7	Deputy Director General Manager of Artificial Intelligence Department

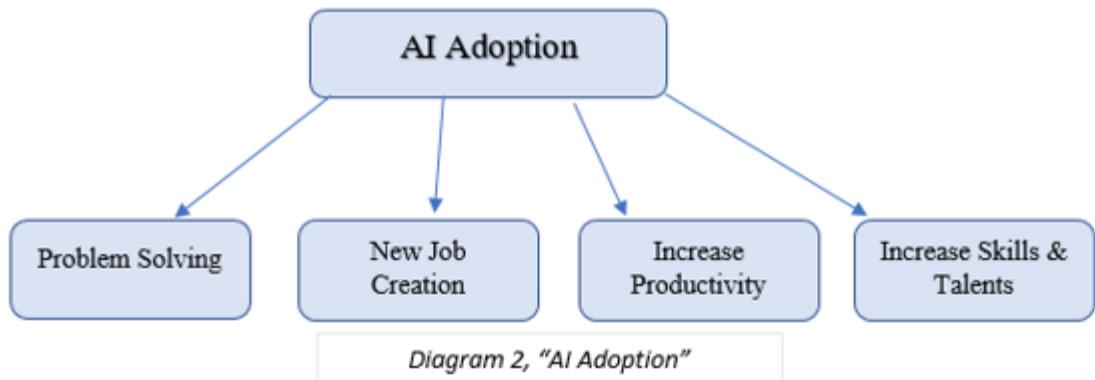
Table 1, "Interviewees' Profile"

## 5.3 Data Analysis

### **Question one:**

The first question in the interview is the general idea of adopting AI in organizations. All of the interviewees agreed that Artificial Intelligence is a great step for organizations and companies to perform better and to upgrade the services offered in order to go beyond expectations of customers whether internal or external customers. Participant 6, Head of Innovation in HSBC, stated that “*A modern innovation is essential and helps organizations excel by increasing talents and skills. AI has a wide scope capability such as object detection, audio and conversational analytics that help in chatbots, ability to identify topics in texts, data modelling*” and continued that these abilities are important in the digital era so organizations can keep up with the updated emerging tools and technologies to meet the customer’s expectations. Similar opinion was presented by Participant 4, Recruitment Coordinator in Directorate of Human Resources in Sharjah, who believes that “*the involvement of AI tools and systems have helped facilitating processes of tasks that were being done manually which resulted in saving time, money and using the employees who were doing those kind of tasks in a more challenging position within the organization*”. Likewise, Participant 2, Service Point Manager in Consumer Protection-Dubai, strongly have confidence in AI systems, since one development of an application has made a tremendous change on the services offered. As detailed by participant 2 “*Before when we used the traditional way to receive complaints from customers, we usually received 400 a day. But when we switched to using a system, now we receive 900 a day since it is faster and easier*”. While Participant 5, Senior System Analyst in Emirates Global Aluminium, has emphasized on the importance of AI adoption in the UAE and how it will have a positive impact on the economy and humanity as it will improve the quality of life and will create new job opportunities for next generations. While participant 7, Deputy Director General Manager of Artificial Intelligence Department, stated that “*AI adoption in our workplace has made a huge difference in work productivity and efficiency, it provided a faster and easier ways for people to finish their transaction without the need to visit the police station. In addition, it increased job opportunities, when we switched some routine tasks with machines and systems to do it, lots of new job positions were created for employees which made helped to unleash their*

*skills and creativity". While Participants 1 & 2 has agreed that "AI is beneficial for all kind of businesses, it saves the company lots of time, effort and the environment as well".*



To sum it up, the diagram above shows the topics emerged from question one regarding AI Adoption. Participants mentioned how AI adoption have solved problems and improved services in their organization. Also, many agreed that with the adoption of AI and smart systems, new jobs were created instead of the jobs that needed repetitive processes, as well as, many skills and outstanding talents are shifted to be used in other big projects which increased the productivity in the work environment. So, as the findings show that AI adoption participate in upgrading the services' level provided by organization and it creates new opportunities and jobs for many.

### **Question two:**

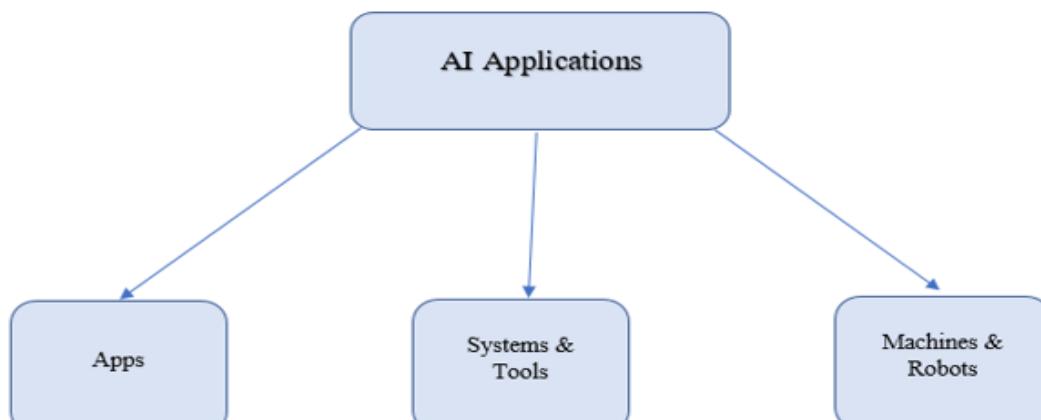
Following the interviewees' knowledge of AI and public services, the researcher had asked them about how it changed the services provided by their organizations and how AI systems had facilitated the services offered. Participant 1 had agreed on how AI has helped the services provided to their employees internally has been eased using the HR department application (AD DOF App). She continued then that "*the app has made it easier for employees to have an access to their records, using the application, employees can check their attendance record, apply for insurance, apply all their annual leaves and certificates such as salary, bank or job certificate, as well as check any permission and management status. At the past, all these processes where done manually using papers and some of them would take more time but using this application has made a huge different of the efficiency of workflow*" as stated by her.

Another great example of AI adoption was given by Participant 7 from Dubai Police. As declared by him is that “*Dubai Police are always keeping up with the new technologies and smart tools that involve AI in order to use them in their processes because in the recent years Dubai Police have replaced some tasks and services that were being accomplished manually with smart machines, systems and apps that have resulted in a positive impact. One of the achievements of Dubai Police when it comes to AI is their main application, the application was developed where people can report a crime, an accident using the application. For example, if a two people had a car accident, there is no need for a police to come, all they have to is apply an online form using the Dubai Police App and upload pictures of the accidents, once that is done a report from police will be sent to the persons involved in order to fix their car accordingly*”. Besides the application, Dubai Police has launched Smart Police Stations (SPS), where people can get in a finish their own transactions needed and get reports without any human interaction, it is a station that is equipped with systems and machines without any employees. As had been added by Participant 7, robots are their next target in Dubai Police, “*in 2017, Dubai Police has launched its first robot police that can detect faces, help people with general questions in malls and offer you services*”. The robot is still under development since it needs to be fed more data in order to act and answer in the most accurate way. As stated by Participant 7 “*Dubai Police aims to have 25% of their employees to be robots by the year of 2071*”. Likewise, Consumer Protection in Dubai has succeeded in implementing AI systems within the provided services. As explained by Participant 2 “*the organization has developed its award-winning application. The application has helped people to submit their complaint regarding any shop or product that goes against the Consumer Laws and Regulation in Dubai, whether it is the condition of a product or the price of it. If a person has a complaint against a product he/she bought, he/she can submit the complaint against the seller using the application and once it is submitted, the person will have to answer few questions and directly certified document signed by Consumer Protection will be sent to that person against the seller to get his/her rights back without the need of visiting the main office or interacting with any employee. These processes take no more than five minutes including the report preparation*”.

Continuing with the interview question regarding AI adoption examples is using Emirates ID to confirm your interview attendance. As per the discussion with Participant 4 from Directorate of Human Resources in Sharjah, “*a manual process was replaced with a machine. Before the implementation of the smart machine, interviewees used to verify their attendance using a schedule*

*that was being ticked by an employee, after that the employee would direct the interviewee to the hall where an interview is conducted but by replacing an employee with the smart machine, the processes became faster. Now, once the interviewee enters the main office, he/she should swipe their Emirates ID in the machine and then directly he gets a paper with the hall number from the machine. After that a confirmation will be sent directly to the recruitment team with the name of the interviewee and hall number”.*

Another great example was provided by Participant 6 who works at HSBC. “*HSBC started using Robotic Process Automation (RPA) when opening a bank account. For a customer to open an account, it would normally takes up to four days using the traditional way but when the bank developed and switched to the RPA technology, customers and users are able to open their account at the same day, with the help of RPA technology, the bank can identify the user, validate his/her submitted details and documents, set up the account and initiate documentation and debit card delivery*”. Moreover, Participant 5 shared their experience with AI adoption and added “*As I work in an industry relying predominantly on its plants and factories, AI plays a huge part in advancing our ways of manufacturing and selling aluminium. Safety scanners are being used throughout all plants to ensure safety measures are met and that every equipment is properly inspected.*” Lastly, as added by participant 3, “*in Dubai Islamic Bank we have a DIP Application which helps customers to do a lot of transactions without the need to visit a branch, they can transfer money, pay bills to various governmental organizations such as DEWA and update their documents*”.



*Diagram 3, “AI Applications”*

According to the participants regarding how AI was applied in their organizations, and as it shows in the diagram above, there are many applications of AI in many organizations. AI can be involved in developing smart apps to help with providing and facilitating services to customers, as it was applied in Dubai Consumer Protection and Dubai Islamic Bank. Additionally, it can be built in systems and tools to make them smart to respond automatically. Moreover, as it is considered another level of using AI, AI can be involved in machines and robots which in many cases it can do the job perfectly and without any human intervention, as it was mentioned by a participant in Dubai Police where they launched a police robot and a participant from Emirates Global Aluminium. Thus, there are many ways to implement AI, it can be through systems, applications or machines or robots.

### **Question three:**

Moving on to the third question of the interview where the researcher asked about the AI enablers and barriers in public services. There were a list of the enablers and barriers that have been found while researching and reading different articles and journals, each interviewee had to comment on each and how relatable each mentioned point to AI applicator in public services. Below tables will present each enabler and barrier along with each response from interviewees or some based on their knowledge.

#### **Enablers:**

1. Leaders within an organization

Interviewee	Do you think leaders are the main reason of enabling AI within the organization?
<b>Participant 2</b>	As stated by Participant 2 “one of the reasons we have succeeded with our app system is the leaders of our organization. They had a vision and set up teams that can lead the project. They are very supportive and enthusiastic, and they are always push us to do our best.”
<b>Participant 7</b>	“When you have leaders, who believe in you and are there to guide you and direct you, then anything is possible.”
<b>Participant 6</b>	Participant 6 believes that “when the work environment is innovative and people who are in charge are always updated, then digitization and AI is possible”.
<b>Participant 4</b>	Participant 4 commented that “if leaders are aware of AI and already using it, then employees will be encouraged to develop systems and use them as well. She

	confirmed that leaders are the main enablers of AI application within any organization”.
<b>Participant 3</b>	Participant 3 agreed strongly on this point, since “leaders are the ones who lead the organization based on a vision. So, if the leader would do something, the rest will follow his/her lead”.
<b>Participant 1</b>	According to Participant 1, “leaders are the enablers of AI because if leaders where to implement AI and would like to invest on the systems they are going to develop, then they have to make sure that employees go through an orientation and attend workshops to encourage them to use these new smart tools”.
<b>Participant 5</b>	Similarly, Participant 5 thinks that “it is the role of a leader to encourage employees of the company to develop and be aware of what AI systems and tools could impact positively on the company’s services and processes”.

*Table 2, Enabler no.1*

## 2. Organization's infrastructure

<b>Interviewee</b>	<b>Is the infrastructure of an organization is considered as one of the enablers?</b>
<b>Participant 2</b>	“It is one of the first steps to check before applying AI is whether the infrastructure is built in a way that supports smart systems and can absorb a ton of data.”
<b>Participant 6</b>	“infrastructure plays a main role in applying AI. Thus, changing the traditional method of business to more digitized with AI adoption, and to rely more on technological devices, as well as innovative softwares that support the development of AI systems.”
<b>Participant 3</b>	“ it is important for a company to have an infrastructure where tools and data cloud are available.”
<b>Participant 1</b>	“A well-built infrastructure is important to enable smart tools and systems to operate properly without facing errors.”
<b>Participant 5</b>	As commented by Participant 5, “infrastructure plays a main role in implementing AI because without the necessary tools and systems, it would be impossible to apply AI. Thus, it is very important for a company to assess their current capabilities, tools and resources to determine the ability to adopt AI.”
<b>Participant 4</b>	“if the processes in that specific organization could actually be turned into a system to ease the processes rather than making them more complicated”.
<b>Participant 7</b>	“infrastructure is as important as leadership, without it there would not be a possibility to build smart systems.”

*Table 3, enabler no.2*

### 3. Budget

Interviewee	Is budget of an organization is considered as one of the enablers?
<b>Participant 1</b>	“Management should guarantee that they provide the budget in order to purchase new systems and technologies, as well as supporting systems”.
<b>Participant 2</b>	“budget is very important for such big projects; our organization have planned the budget two years ahead before the date launch.”
<b>Participant 3</b>	“organizations who would like to adopt AI should reconsider the budget available, as buying these tools and programs are not cheap and require a lot of investments.”
<b>Participant 4</b>	“AI adoption requires a lot of budget, as it is not cheap and many updates and maintenance are needed throughout the adoption”.
<b>Participant 5</b>	“in technology, overall, bringing any new system or a tool to an organization is costly and AI is no exception as many of these new technologies are just emerging and very exclusive to the big companies such as IBM and Google”.
<b>Participant 6</b>	As participant 6 commented, “initial cost to AI adoption will be expensive due to training, implementation, pilot study, etc, but it will reduce costs in the long run, Budget would need to be allocated for AI due to its vast applicability.”
<b>Participant 7</b>	“investing on technologies is costly, organizations should plan a head in order to adopt AI, because without a good amount of budget, AI systems and tools’ quality would differ according to how much a company is putting”

*Table 4, enabler no.3*

### 4. Availability of Data

Interviewee	How important is data availability to enable AI adoption?
Participant 1	“having a big amount of data that are safely kept is very crucial in order to build systems that can work according to the data available, as well as updating these data to avoid any errors that might result later on using AI systems and tools.”
Participant 2	“Data is very important in order to build a system, and as it comes to our smart application, the organization keen to keep the application data updated consistently, additionally, new languages, rules and regulations are being added

	every now and then in order for customers to have accurate results when using the application”.
Participant 3	“Data availability is the key for any smart tool and system to work, so yes, it is very important enabler”.
Participant 4	“Yes, it is very important, as it is what really builds a system that works effectively”.
Participant 5	“as long as a company maintain its data in regular and efficient way, they will be able to optimize their services and algorithms to build a good system”.
Participant 6	“Wide range of data availability is important in AI adoption, Self-learned Machines would need to understand what type of data is being utilized to ease when interacting with customers, for example, detecting and extracting customers’ details from scanned documents.”
Participant 7	“Data availability is essential enabler, as those systems and technologies are working based on the quality and accuracy of the available data. If the system being used was not being fed a good quality of data, then result might not be right or precise”.

*Table 5, enabler no.4*

As it is found from the results of the interview, leaders within any organization, data availability, organization’s infrastructure and budget are very crucial factors that play a huge part in AI Adoption. With leaders who believe in the power of AI adoption and how it can add a value and benefit the organization’s services, there will be a huge possibility to AI adoption because with leaders who believe in change, there will be always improvements. Additionally, the organization’s infrastructure which is considered another important enabler, in order to adopt AI, organizations should be prepared by owning a good built in systems and machines that are smart enough to save, analyse and respond to the given input, also this will be done with the data availability that play an important rule to give accurate and satisfied outputs. Lastly, AI adoption can be expensive so having a budget to cover all required necessities is important in order to buy, update and maintain all these systems and infrastructure.

### **Barriers:**

#### 1. Organizational Culture

Participant 1 and Participant 4 expressed the same opinion regarding organizational culture as a challenge. Both think that “*it all depends on the mindset of the management leading the organization. If the culture of the company is weak, then it would be very difficult to accept change and would refuse to use any new trend or emerged technologies which will lead to no possibility of implementing AI systems*”. While Participant 2 continued that “*when the management and employees are resistant to change, it would be challenging to apply AI systems and tools as it requires a lot of development, awareness and training, but if the team was open to new challenges and changes, it would make it easier to accept AI. Thus, many organizations in the UAE are still not using AI systems in their public services because it involves a lot of changes, processes and steps that need to be taken by the management and employees*”. While Participant 3 claimed that “*it is not a challenge as many organizations are capable of changing the culture within so I do not consider it as a barrier, as long as there are leaders who believe in the power of AI*”. Sharing the same point of view, Participant 5 commented on this point saying “*a workplace that recognizes change and champions will always have employees that are ready and available when it happens.*” In addition, as added by Participant 7, “*culture is easy to change as long as there is a good management team who accept challenges and changes and are there to motivate their employees to do so as well*”. Despite the fact many participants are not considering it a barrier, Participant 6 stated that “*organizational culture is very hard to change in some companies and government organizations, so it can be a barrier if the top management did not support the Adoption of AI*”.

#### 2. Availability of AI technologies that enable the implementation of AI.

Participant 7 had fully support that lack of AI technologies within any organization is a barrier that would stop a company or an organization from implementing AI, he continued that “*when you do not have the tools and software to develop your own AI application or to support a device with intelligent systems, then it would be impossible to succeed*”. While Participant 2 believes that “*it can be a challenge for some companies during the first stages of implementing AI but once one starts with commitment and determination, then it will not be a barrier anymore*”. Participant 5, as well, had agreed and she commented “*even though Artificial Intelligence have been around for*

*decades, the industry in the UAE is relatively small and considered exclusive to few of big companies in the field of technology nowadays. Hence, with the steps the UAE takes to involve AI and to be smart, many companies are now evolving in the country and focus on R&D”.*

Participant 1 & 6 say that “*availability of AI technology is a barrier to many small or medium organizations as it is related to available budget, lack of skills, talents and resources because if a company has enough budget, it will be able to invest more on AI technologies and on employment of people who are skilled enough to use these technologies on the right way*”. Similar point of view was added by Participant 4 who commented, “*many government organizations do not invest in AI technologies and systems, which makes it hard for employees to develop programs, applications or systems that can be smart and considered as an artificial intelligent machines or systems*”. Added by Participant 6, “*the issue with many companies is that they do not see the importance of AI technologies role and what value it will be adding to the services provided to their customers, that is why many companies are able to buy and invest on these technologies but are not aware of AI*”.

### 3. Lack of clear strategy

All interviewees agreed that lack of clear strategy in any project or step that a company or any organization would like to take will result in failure. Participant 5 pointed out that “*it is important to not implement AI because it is a new trend for the reason that if an organization is unsure of how AI technologies would serve them, then it will end up on using it impractically*”. Therefore, she insisted on the importance of conducting a research with consultants who can help a company to see how far they can go by involving AI to their services, as well as to align it with the organization’s strategy. In the same way, continued Participant 2 who stated that “*having a clear strategy in any kind of project, whether it is a small or a big one, is crucial because lack of a clear stated strategy will result in random projects that can never serve the organization’s vision*”. As continued by Participant 6, “*many companies might be having a goal, but not a clear breakdown in terms of actions and steps that need to be taken in order to implement AI in the right path*”. And so does Participant 7 who shares the same point view and have mentioned that “*you should always start with a strategy, for an example the Smart Police Stations (SPS) project. They had a strategy to expand SPS in as many areas as possible around Dubai, first they started with one and now,*

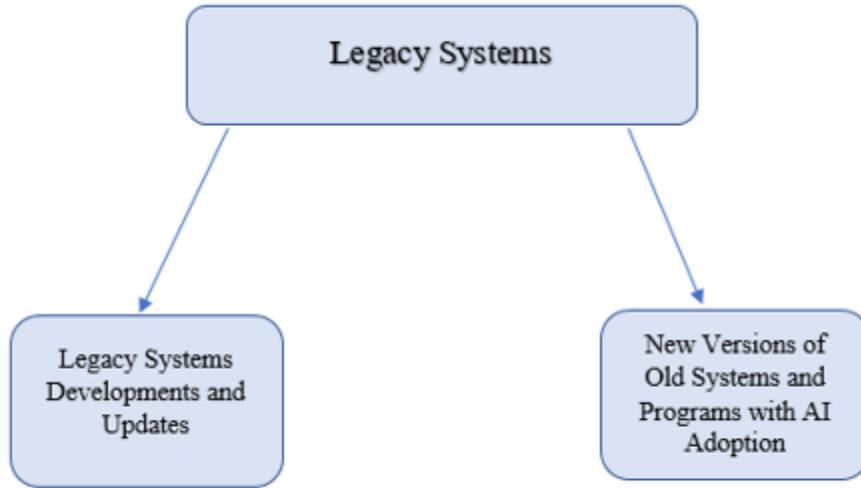
*with the help of a clear vision and strategy, they expanded it in many locations Also, the services that the station will provide was planned ahead in a way that it will serve Dubai Police AI vision”.*

Similarly, Participant 1 & 4 agreed that “*lack of clear strategy will result in random work being accomplished without a specific goal*”, added by Participant 3, “*many organizations use tools and technologies without having a clear idea of how it will add up to their AI adoption strategy, that is why many organizations fail to build good systems and applications*”.

As the results show, lack of strategy on how AI adoption will benefit the organization will result in failure because many organizations adopt AI randomly, there is no specific direction on to which service AI should be implemented and how it is going to support the organization’s AI strategy. Thus, the adoption will usually show no result of improvement in services. Same goes to the organizational culture that can be a barrier to many organizations, if the organization culture is weak and it resists change then AI adoption will be impossible or difficult to be considered. Moreover, lack of the necessary technologies that make it possible for AI systems to operate will result in no possibility of AI adoption.

#### **Question Four**

In question four, the researcher asked for any additional factors that might be considered as an enabler or a barrier, most participants did not add any additional point except for Participant 5, a Senior System Analyst in Emirates Global Aluminium. Participant 5 has pointed out that “*not updating legacy systems can be considered as a barrier. She continued that it means the current communication tools such as mails and productivity centres*”. She added that, “*it is important for companies who are going smart to update their old systems and not necessarily upgrade them or change them because some legacy systems that are being used for decades can be updated to better versions that can serve the digitization era*”.



*Diagram 4, "Legacy Systems"*

Additional barrier has arisen from an answer that was given by Participant 5 who has added legacy systems as a barrier. As the diagram above represents, there are many old and legacy systems and programs that are very effective and can be developed and involve advance AI to their features and still benefit organizations. Updates and AI involvements can be added to these legacy systems in order to operate in an advanced and smart way.

### **Question Five**

Following with question five where it was asked if the lack of noticeable changes of the services' quality that involves AI systems can be considered as a barrier. Many different arguments where involves in this question, some agreed that lack of noticeable changes using AI can be considered as barrier such as Participant 6 who agreed and commented that "*many companies can ignore developing and investing in AI systems because they do not trust machines and systems to do their work, thus they rely on humans for a measured quality management*". Whereas Participant 1 and 3 disagreed and insisted that AI technologies plays a huge role in improving the quality of services provided by the organization and involving smart tools can result in increase of work efficiency and effectiveness, a great example was given by Participant 1 which is the e-gate that Dubai and

Abu Dhabi airports have developed, where one can enter the gate by scanning his/her Emirates ID without the need of the passport and the wait in the queue line to get your passport stamped. While Participant 5 had a neutral opinion and commented that “*implementing AI might not be easy task and should be researched properly before a company decides that it is the route they would like to follow because if risks and possibilities were calculated well and employees, data, systems and algorithms can work all together to deliver the best result for company's services*”. The same opinion was given by participant 2 who stated that, “*with good R&D and clear vision if the AI adoption, a company can notice a huge difference in the services by provided by the organization*”. So does Participant 4 & 7 who agreed that some companies do not notice a huge difference in the implementation of AI because of the lack of pilot study and vision to which service AI tools and technologies would be implemented.

Thus, as the views of the participants show that some companies cannot see a noticeable changes in the provided services and this itself can be considered as a barrier because even with the implementation of AI there is no change in the quality of tasks performed but this can be due to lack of pilot study that can enable companies to have a full picture of how a certain adoption of AI system can be a benefit to a specific service.

### **Question Six:**

In this part, participants were asked whether or not employees trust those systems and technologies to do their tasks and make decisions. Participant 1had agreed strongly and commented on how employees gained trust on advanced technologies within their work environment since, as she says, “*it helped with organizing the workflow and increase the amount of data that can be saved in the system, as well as decreased the human mistakes and errors*”. Similar view was shared by Participant 2, who works in Consumer Protection, who remarked the positive respond they got from employees when they launched their application and how employees themselves have started using the application since it is easier and accurate. Whereas Participant 3 has disagreed and stated that, “*people are still not gained enough trust when it comes to AI tools and smart systems because most of them are still need more development regarding the accuracy of the results and the duration of a process when serving customers*”. While Participant 4 continued with the positive respond that “*employees were happy when we included the new machine that scans the interviewees' Emirates ID to tell them who came and at which time without the need to do it*

*manually.*" Participant 5 has commented, "*if a good change management is carried throughout the organization and employees can see the benefits of the new system without having any of their work and benefits compensated, an organization can give the trust of their employees and successfully implement technologies*". While Participant 6 positively agreed and stated, "*yes, higher accuracy and efficiency were noticed when the company has adopted AI systems and tools*". Continuing with Participant 7 who commented "*employees, at first, were afraid of those new smart systems but once it was adopted, they became positive about it and are always coming up with new ideas to develop the current systems and programs utilized*".

As the outcomes of question six show, many people are trusting AI technologies to do specific tasks and this due to the noticeable changes it made in certain services provided. The inclusion of these systems in certain services has made employees and customers more satisfied since these smart technologies and systems have fastened the process of some services which resulted in accomplishing more in less time, also it reduced the error in tasks and has expanded opportunities to employees to do different tasks that requires more skills and creativity. There are few people who might not gained trust to these machines and it is due to the lack of knowledge of how AI systems can perform and help them achieve more, additionally, it can be due to the unfamiliarity of how to use these systems and machines, also, it can be due to the fear of more errors if these systems were implemented without intensive research.

### **Question seven:**

The last question was about a topic that many researchers argued and still arguing about, it is whether or not robots will be replacing humans to deliver services to people and the community. All participants shared the same point of view and all believe that robots can be beneficial but it can never replace human skills. Participant 1 commented that "*robots can be a replacement to humans in some tasks but the need of humans to control the robot is important since it requires management in some tasks to be safe*". The same goes to Participant 2 who insisted that "*humans' skills are irreplaceable but robots can be used as an object to work alongside with humans in tasks that are considered a routine which will give employees more time to be creative in different positions and services*". In addition, Participant 3 & 4 has agreed to some extent, as stated by Participant 4 "*it is true, because it can be seen in the manufacturing factories where robotic machines are working without the intervention of humans*", and then she continued that "*however,*

*these robots need controlling and monitoring and here the organization cannot dispense human role in management*”, similarly was mentioned by Participant 3 who stated that robots can replace humans in some tasks but not all of them. Whereas Participant 5 had argued that “*some jobs have to be fully automated and performed by robots. She then continued that many of human labour jobs are unsafe, especially in the third world countries such as Indonesia and Bangladesh where some factories employ their people to work long working hours in a very unsafe working conditions where they are exposed to dangerous machines and deadly chemicals, thus in this kind of jobs and conditions, companies need to go fully digital and develop machines and robots to do these kind of jobs*”. However, as commented by Participant 6 who claimed that “*AI adoption will create more jobs than it will displace. While workers may need to upskill or reskill themselves, so they will have greater opportunities in future job market, for example, if someone is performing a repetitive job such as manually checking signatures on cheques, their task can be switched to a robot while they transfer their skills into higher functioning role and to be more productive in the workforce*”. Similar opinion was shared by Participant 7 who believes that robots can replace humans in tasks that are considered routine and humans can use their skills to do more creative jobs.

As the results of the participants’ responses show advanced AI machines such as robots can replace employees in certain kind of services such as tasks that are repetitive or that are considered dangerous for humans to be around like being exposed to harmful chemicals and heat. But that does not mean that human roles can be replaced fully since these robots and machines need maintenance and control that can only be done with the human intervention. Also, with robots replacing humans in certain services, it opens up chances for employees to upgrade and upskill themselves in order to cope with the new era of technology that created new jobs and opportunities. Thus, robots cannot fully replace humans, it is all about working together in order to come up with the best results.

## Chapter Six: Discussion

### 6.1 Introduction

After the research done in chapter two and three, many highlighted enabler and barrier were declared when organizations start adopting AI. An organization should be aware of which AI tool and system will be adopted along with for which purpose and to which service in order to succeed because if there was no clear strategy of the AI adoption, any company will end up with random projects that are not serving the purpose of AI. Therefore, this chapter will discuss and connect the results from the interviews to the theories and studies found in chapter two, the existing literatures.

### 6.2 Enablers

#### 6.2.1 Leadership in the Organization

As it was presented in chapter five, the interview results, many organizations in the UAE who provide public services are combining traditional methods with modern and trending methods to satisfy their internal and external customers. From the interpretation of the interview results, one can see that many employees who work in different fields that provide public services are aware of the importance of AI involvement in order to increase work efficiency and productivity. The results show that there are enablers in the UAE that can allow many companies to implement AI within the region. All participants of the interviews has agreed that leaders of the organization play a crucial role in adopting AI, which confirms the findings of a study published by Philipp Gerbert, Martin Reeves, Sebastian Steinhauser (2017) ,that was discussed earlier in chapter three, and it does state that having leaders in the right positions who are updated and aware of the digitization era evolvement will ease the process of adopting AI tools and systems since leaders consider the core of any company and organization and are the visionary people who can lead the team to better and brighter future.

Moreover, many companies have the budget and the skills to advance their services but one can agree that with no vision from the top managers and leaders, there will be no development in the organization's status for the reason of those top people are the one who are always making the choice of which route to take and the rest of the team will follow accordingly.

### 6.2.2 Budget

As stated by Raghav Bharadwaj (2019), availability of a budget considers a key element in AI adoption, since AI is all about investing in tools, machines, systems, people, maintenance and training, thus, having enough budget is crucial in order to enable AI adoption within an organization. The findings of this study confirm the outcomes of the interview. Participants of the interview assure that having the budget is important in order to automate organization's services because those machines and systems can cost a lot of money at first, additionally, employing skilled people and training them all comes under the availability of budget. As it was discussed with Participant 2 regarding their smart application, Consumer Protection has been planning for this application for two years before launching it, it costs them a lot since a lot of AI systems and employments were required, also maintaining it requires a budget itself. Thus, it is crucial for companies to allot the amount of the yearly company's budget to Artificial Intelligence R&D, developments and systems because a good amount of investment will result in employment of expertise, investment in machines and advanced systems as well as maintenance and developments.

### 6.2.3 Organizational Infrastructure

Likewise, the organization's infrastructure is considered very essential enablers in adopting AI. In chapter three, the researcher discussed the importance of these two as lack of them will decrease the chance of AI application possibility. As it was mentioned in chapter three, AI works where data is available because data and infrastructure are the main engine for AI to operate. As Participant 6 stated in the results section, organization's infrastructure is important in order to adopt AI, thus organizations who are going to step ahead and involve AI should be aware of transforming the traditional methods with more reliable and innovative software and technologies. With the good built-in systems and machines, adopting AI will be easier for companies who are already equipped with infrastructure where a big amount of data can be kept and protected, as well as being processed in a very immaculate way.

The findings of this study confirm the results discussed by the researcher Violino (2018) in chapter three, where it debated the importance of infrastructure in any AI adoption as it plays a significant role in whether an organization is ready to adopt AI or not.

#### 6.2.4 Data Availability

Along with the infrastructure, data is essential to building and adopting any AI system or tool. In the findings chapter, all participants agreed that data and algorithms are the core of Artificial Intelligence, for the reason of that AI is all about a system or a machine making a decision without the intervention of a human being, depending only on the data fed to the system. Participant 5 highlights a good point for the availability of data, as she insisted that as long as companies maintain good amount of data and update them regularly then these AI systems that are being built within the organization infrastructure will result in good systems and applications. Accordingly, having a good system and clouds to keep company's data with the help of good built infrastructure will affect positively on the quality of results produced by the smart systems and machines.

A positive correlation was found between the findings results and the study done by Philipp Gerbet, Martin Reeves, Sebastian Steinhauser (2017), were they explained that for an AI system to learn, it needs to be fed a good amount of data that can assist in the decision-making process, and the precise the data, the better the results one can get from a system or a machine.

### 6.3 Barriers

#### 6.3.1 Organizational Culture

Moving on to the barriers, results discussed in the report published by Intelligent Automation Network (2019), organizational culture can stop the company from implementing AI. As it published and discussed earlier in chapter three, many companies are against the idea of AI and automation and some are just resistant to change and would not like to keep up with what is trending and beneficial to the company. The results of the interviews have showed a similar opinion to what was published in the report mentioned. Many participants agreed that culture of the organization can be seen as a barrier, as was stated by Participant 1 that the mindset of the management plays a role in changing the culture of the organization, additionally where they come from and their background. She argues and anyone can argue that many manager are resisted to

change and would not allow new smart systems to be applied in the organization, thus one can see that there are many organizations around the UAE are still following the traditional old method of providing public services, not all of them but some still do and the reason might be the background those people leading the organization came from and the weak culture they built within work environment that do not allow employees to be creative and innovative when it comes to developing the services provided.

### 6.3.2 Availability of AI Technologies

Availability of AI tools and technologies is another barrier that was discussed in both the research and the interviews. Results show that lack of tools and systems will make companies have zero chance in implementing AI. In the interview analysis chapter, Participant 5 has highlighted a very good point and mentioned that the AI industry in the UAE is still small since it considers new and at its early stages, thus organizations within the UAE should venture more in AI, as it does recently, in order to expand the industry. Interestingly, the results found is related to what Wirtz, Weyerer & Geyer (2019) believe, where they discussed that those systems and tools are crucial in implementing AI, as well as the people who are going to work alongside with these systems and tools. Thus, it is obvious that lack of these tools and smart technologies will be challenging to many companies for the reason that without these tools it would be tough to develop systems and automated services, as well as to keep up with the automation era.

### 6.3.3 Lack of Clear Strategy

All these barriers can be resolved and prevented with having a clear strategy because not having one will be considered as one of the main barriers. From the outcomes of the interviews, participants agree that having a clear strategy of how a company can employ AI systems and technologies is the first step that has to be taken. As Participants 6 & 7 addressed in the interview discussions chapter, companies can have a goal to apply AI but lack of a clear strategy and an achievable breakdown of the processes that should have been undertaken can stop them from doing it. One can agree on that argument because without a clear vision and strategy of how beneficial these tools can be to the services provided by the organization, applying them will result in random projects and would be a waste of time and money. The findings of the interviews and research done confirm a point discussed by Marr (2019) in the literature review chapter, where he

mentioned that adopting AI just because it is a trend, without having a clear statement on how it will benefit the company and add value to the services provided will result in waste of time, money and effort made by employees in order to build and operate these smart systems.

Thus, lack of clear strategy on when and how AI tools will be implemented can cause companies and organizations a failure to succeed, loss of budget and inaccuracy in the purpose of using these smart applications and technologies.

#### 6.4 Summery

To sum up, Alan Turning theory was valid to some extent that machines are able to do human tasks, also it can be done without any human intervention. But still all these machines and tools need monitoring and controlling that should be done by humans and so does robots because all these self-learning machines and robots can be unsafe if left alone, it needs maintenance, controlling and updating to work properly and all these steps should be done by humans. Many organizations have added value to the services provided to their customers when they switched them to be performed by smart systems and tools, it increased the productivity, created new jobs, transferred new skills and talents to departments that needed more human involvements, moreover, it helped to provide and facilitate many services to customers by using one source only.

## Chapter Seven: Conclusion & Recommendations

### 7.1 Conclusion & Recommendations

This dissertation paper sets out to determine the enablers and barriers to AI adoption in public services. It discussed the definition of AI in general and how beneficial it can be to organizations, employees and customers, as well as, how wide it has expanded in the UAE. Many organizations who provide public services around the UAE has succeeded in implementing smart tools and technologies to facilitate and ease services to the public. Although, AI market is still not big in the UAE, many companies are now in the process of automating and digitizing their services but there are still barriers that stop UAE organizations from doing so. However, many enablers are available in organizations that ease the process of adopting AI but need to be studied, prepared and examined in order to step ahead successfully, and most importantly, it needs a good management team and leaders.

In order for organizations to switch to AI successfully and according to the findings presented earlier in the research paper, there are few actions and recommendations that need to be considered before the AI transformation of a service:

1. Identify the issues in particular services that can be solved by involving AI

Organizations who would like to adopt AI, the first step that should be taken is to identify and explore how AI can be implemented in available services to increase the performance and productivity to the organization and the customers. Importantly, organizations and companies should identify problems in an existing service and then use some cases and studies that involve how AI can solve them and add value to them.

With the AI approach that organizations in the UAE are trying to adopt, many forget to study the reason behind AI and how AI adoption can solve problems existing in particular service which sometimes lead to less noticeable results in the quality of a service provided, thus, with having a clear strategy of how AI can benefit the company, one can apply it successfully after R&D and pilot studies being completed.

## 2. Employ experts that can develop and build a whole smart system

Organizations who are ready to adopt AI and with the availability of AI technologies, should employ experts who are willing to develop and integrate systems and technologies, and are capable of developing pilot cases and studies in a short term of time so AI can be applied in a right way. With the help of experts, an organization can develop a balanced AI system that can serve the organization's AI strategy in improving services. As well as, employees within the organization can be trained by those experts who can hold workshops to introduce AI, the purpose of AI and how it can help solving a specific problem in a particular service. Also, employees will be trained on how to use these systems and how to store data that help in benefiting the processing of AI system results.

To conclude, these steps were followed in the dissertation in order to achieve the objectives below:

### *1. To critically address the impact of Artificial Intelligence in public services.*

In accomplishing to the first objective, a secondary data was represented in the literature review chapter, where the researcher has defined artificial intelligence and examples and cases were discussed from different articles and journals from different resources.

### *2. To evaluate the barriers and enablers of AI based on the previous studies.*

In order to achieve the second objective of the dissertation, the most common barriers and enablers of AI adoption were specified based on secondary data from articles. All factors that might stop or empower the adoption of AI were discussed in details, additionally, their impact positively and negatively when deciding to implement AI in any organization.

### *3. To investigate the adoption of AI in organizations in the UAE.*

In order to accomplish the third objective, this research paper introduced a primary data, qualitative data in specific, that was collected by interviewing seven different organizations that are operating in the UAE and started to involve AI in their systems. Every one of the participants discussed their experience with AI adoption within their organization and how it has helped with improving the services provided to their employees along with their customers. Moreover, examples are presented and discussed in order to clarify the role of AI in facilitating the workflow.

*4. To examine the researched barriers and enablers and relate them to organization that provides public services in the UAE.*

In accomplishing to this objective, the researched enablers and barrier from chapter three were discussed with the interviewees. Each factor was investigated and discussed with every participant in order to relate to which extent it is true to the results found in the research done. Each opinion was presented and related in both the analysis and discussion parts.

*5. Propose the best practices to increase the success of AI adoption in the UAE.*

In order to achieve this objective, a couple of simple yet very crucial recommendations is given on order to implement AI correctly when organizations deciding to step ahead and shift to the AI era adoption. These recommendations are considered important in order to have a clear strategy and team that can help benefit the organization and serve it better when adopting AI and involve it to their services.

## 7.2 Research Contribution

The research had discussed the importance of Artificial Intelligence to organizations who are providing public services and it shows the important role AI plays in order to offer more effective and efficient services. Many government organizations have started adopting AI locally, but due to certain enablers and barriers, some can succeed while others might find it challenging due to few factors that can prevent them from adopting it such as budget, organizational culture and available technologies. Thus, this research will help individuals or organizations to focus on the common factors that can act as an enabler or a barrier when it comes to adopting AI, with being aware of these factors, organizations can at first set an AI strategy on how and where AI should be involved and what values it will add to a certain services provided, and then work accordingly with the AI adoption process with being aware of what should be changed. This research study discusses and outlines the most common enablers and barriers that any organization should know about in order to apply AI using the right approach.

### 7.3 Research Limitation

During the research done for this dissertation, there are few limitations found and might impacted the findings of the research. The first limitation is sample size, it was planned to have 15 to 20 participants from different organizations in the UAE but due to difficult access and scheduling with some organizations, the research ended up with 7 participants only. The second limitation is lack of detailed barriers and enablers of AI adoption. While doing the research of the most common factors of barriers and enablers of AI, there was not many journals and studies that discuss these factors in details, there are few that were found and are general but not many are relatable to AI barriers and enablers in Public Services. Finally, the last limitation of this research study is lack of AI adoption in other emirates. One can notice that most of the participants are from Dubai since Dubai are focusing more on AI in public services while other emirates are not completely aware of AI and how beneficial it can be. Thus, the findings are mostly relatable to AI adoption in public services in Dubai not in the UAE generally, although there are two participants from Sharjah and Abu Dhabi.

### 7.4 Further Study

Regardless the results of the research and the limitations, future research could continue to explore in details the adoption of AI in the UAE and the existing enablers and barriers in selected organization located in different emirates so results can be more accurate on how the UAE in keeping up with the new digital era and what are the difficulties that other organizations in other emirates like Um Al-Quwain and Ras Al-Khaima are dealing with, as well as to discuss the UAE Artificial Intelligence Strategy 2031 and how well prepared organizations in different emirates to accomplish this vision.

## References

- Ali Al Shouk. (2019). *How Dubai's AI Cameras Helped Arrest 319 Suspects Last Year*. *Gulf UAE* [online]. Available at: <https://gulfnews.com/uae/how-dubais-ai-cameras-helped-arrest-319-suspects-last-year-1.62750675>.
- Artificial Intelligence: The Advantages and Disadvantages*. (2019). *Arrk Group* [online]. Available at: <https://www.arrkgroup.com/thought-leadership/artificial-intelligence-the-advantages-and-disadvantages/>.
- Beck, M. (2017). Navigating the AI Opportunity. *MIT Sloan Management Review*.
- Easa Said, E. I. V. (2012). *Artificial Intelligence Applications to Critical Transportation Issues*. The National Academeis.
- Gross, D. (2017). Why Artificial Intelligence Needs Some Emotional Intelligence. PwC Network.
- Jacob Morgan. (2014). *A Simple Explanation Of 'The Internet Of Things'*. *Forbes* [online]. Available at: <https://www.forbes.com/sites/jacobmorgan/2014/05/13/simple-explanation-internet-things-that-anyone-can-understand/#53125d7a1d0>.
- Jacques Bughin, Eric Hazan,Sree Ramaswamy, Michael Chui, Tera Allas, Peter Dahlström, Nicolaus Henke, M. T. (2017). *Artificial Intelligence The Next Digital Frontier?*
- Jean S.Bozman. (1991). Business Wise Up to Potential Benefits of AI. *Computer World*, 22 July.
- Koetsier, J. (2018). *Uber Might Be The First AI-First Company, Which Is Why They 'Don't Even Think About It Anymore'*. *Forbes* [online]. Available at: <https://www.forbes.com/sites/johnkoetsier/2018/08/22/uber-might-be-the-first-ai-first-company-which-is-why-they-dont-even-think-about-it-anymore/#4e3753e25b62>.
- Kubara, K. (2019). *Artificial Intelligence Meets the Internet of Things. Towards Data Science* [online]. Available at: <https://towardsdatascience.com/artificial-intelligence-meets-the-internet-of-things-a38a46210860>.
- Luger, G. F. & Chakrabarti, C. (2017). From Alan Turing to modern AI: practical solutions and an implicit epistemic stance. *AI and Society*. Springer London, vol. 32(3), pp. 321–338.
- Marcus, G., Rossi, F. & Veloso, M. (2016). Beyond the Turing Test. *AI Magazine*,

pp. 3–4.

Margaret Rouse. (2019). AI (Artificial Intelligence). *TechTarget* [online]. Available at: <https://searchenterpriseai.techtarget.com/definition/AI-Artificial-Intelligence>.

Marr, B. (2019). The 4 Biggest Barriers To AI Adoption Every Business Needs To Tackle. *Forbes*, February [online]. Available at: <https://www.forbes.com/sites/bernardmarr/2019/02/25/the-4-biggest-barriers-to-ai-adoption-every-business-needs-to-tackle/#15229c322731>.

Martin Childs. (2011). *John McCarthy: Computer scientist known as the father of AI*. *Independent.co.uk* [online]. Available at: <https://www.independent.co.uk/news/obituaries/john-mccarthy-computer-scientist-known-as-the-father-of-ai-6255307.html>.

Maud Chassignol, Aleksandr Khoroshavin, Alexandra Klimova, A. B. (2018). Artificial Intelligence Trends in Education: A Narrative Overview. *Science Direct*.

Natalie Regoli. (2019). *16 Artificial Intelligence Pros and Cons*. VITTANA.org [online]. Available at: <https://vittana.org/16-artificial-intelligence-pros-and-cons>.

Philipp Gerbert, Martin Reeves, Sebastian Steinhauser, P. R. (2017). *Is Your Business Ready For Artificial Intelligence?* The Boston Consulting Group.

Pickell, D. (2019). *Qualitative vs Quantitative Data – What's the Difference?* [online]. Available at: <https://learn.g2.com/qualitative-vs-quantitative-data> .

Prof Noel Sharkey. (2012). *Alan Turing: The experiment that shaped artificial intelligence*. BBC [online]. Available at: <https://www.bbc.com/news/technology-18475646>.

Raghav Bharadwaj. (2019). *AI in Government – Current AI Projects in the Public Sector*. Emerj.com [online]. Available at: <https://emerj.com/ai-sector-overviews/ai-government-current-ai-projects-public-sector/>.

Russell, S. J. (2014). *Artificial intelligence : a modern approach*. 3rd Editio. UK: Pearson Education.

Shafaat Shahbandari. (2018). *On the AI Highway*. Gulf UAE [online]. Available at: <https://gulfnews.com/uae/transport/on-the-ai-highway-1.2297256>.

*Surgeons View Detailed 3D VR Brain Models Using Surgical Theater*. (n.d.). Reality Technologies [online]. Available at: <https://www.realitytechnologies.com/surgeons-view-detailed-3d-vr-brain-models-using-surgical-theater/>.

Team, I. P. (2019). What are the Pros and Cons of AI? *itpro.co.uk* [online]. Available at: <https://www.itpro.co.uk/machine-learning/31708/what-are-the-pros-and-cons-of-ai>.

*UAE Strategy for Artificial Intelligence.* (2017). *Government.ae* [online]. Available at: <https://government.ae/en/about-the-uae/strategies-initiatives-and-awards/federal-governments-strategies-and-plans/uae-strategy-for-artificial-intelligence>.

Violino, B. (2018). *Designing and Building Artificial Intelligence Infrastructure.* *TechTarget* [online]. Available at: <https://searchenterpriseai.techtarget.com/feature/Designing-and-building-artificial-intelligence-infrastructure>.

Wirtz, B. W., Weyerer, J. C. & Geyer, C. (2019). Artificial Intelligence and the Public Sector—Applications and Challenges. *International Journal of Public Administration*. Routledge, vol. 42(7), pp. 596–615.