The Effect Of Artificial Intelligence In Smart Decision-Making In The UAE Government

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ABSTRACT

Advances in technology and computing power have offered organisations a new tool to improve efficiency, reduce costs and support decision making to improve performance. Artificial Intelligence is that tool that processes data with high accuracy and aims to simulate the intelligence processes which are done in the human mind. Due to its potential in processing huge amounts of data in a very short period of time, AI has implications in decision making in every sphere of business, Government and society. Several studies have proven the effectiveness of using Artificial Intelligence in making decisions. This study therefore aims to investigate the effectiveness of using Artificial Intelligence in Smart Decision making in UAE Government to improve service quality, increase transaction efficiency, reduce costs and increase revenue. To fulfil the aims and objectives of the study a qualitative approach is adopted and data will be collected through a semi-structured set of interview questions to study the perceptions of decision makers in the UAE Government about AI Adoption and its effectiveness and impact on decision making. A sample size of 40 decision makers in UAE Government is being targeted with greater emphasis on decision makers from many UAE Government Departments, which have pioneered AI adoption, the Dubai Smart Government, Abu Dhabi Police, Dubai Electricity & Water Authority (DEWA), Ministry of Education and Dubai Future. The data collected will be thematically analysed as well as using AI Natural Language Processing algorithms to identify keywords and relationships and the findings will be presented. The study and its findings has implications on Government, Corporates, academia as well as on society.

Keywords: Artificial Intelligence, Decision Making, UAE, Dubai, RTA, DEWA, Smart Government, Economy, Efficiency, Cost reduction, Revenue,.

ملخص البحث:

أتاحت التطورات في التكنولوجيا وقوة الحوسبة للمؤسسات أداة جديدة لتحسين الكفاءة وخفض التكاليف ودعم اتخاذ القرار لتحسين الأداء. الذكاء الاصطناعي هو تلك الأداة التي تعالج البيانات بدقة عالية وتهدف إلى محاكاة عمليات الذكاء التي تتم في العقل البشري. نظرًا لإمكانياته في معالجة كميات هائلة من البيانات في فترة زمنية قصيرة جدًا ، فإن للذكاء الاصطناعي آثاره في صنع القرار في كل مجال من مجالات الأعمال والحكومة والمجتمع. أثبتت العديد من الدراسات فعالية استخدام الذكاء الاصطناعي في اتخاذ القرارات. لذلك تهدف هذه الدراسة إلى التحقيق في فعالية استخدام الذكاء الاصطناعي في صنع القرار الذكي في حكومة الإمارات العربية المتحدة لتحسين جودة الخدمة وزيادة كفاءة المعاملات وتقليل التكاليف وزيادة الإيرادات. لتحقيق أهداف وغايات الدراسة ، تم اعتماد نهج نوعي وسيتم جمع البيانات من خلال مجموعة شبه منظمة من أسئلة المقابلة لدراسة تصورات صناع القرار في حكومة الإمارات حول تبني الذكاء الاصطناعي وفعاليته وتأثيره على اتخاذ القرار. . يتم استهداف عينة من 40 من صانعي القرار في حكومة الإمارات مع التركيز بشكل أكبر على صانعي القرار من العديد من الدوائر الحكومية في دولة الإمارات العربية المتحدة ، والتي كانت رائدة في تبني الذكاء الاصطناعي ، وحكومة دبي الذكية ، وشرطة أبوظبي ، وهيئة كهرباء ومياه دبي (ديوا) ، والوزارة. التعليم ومستقبل دبي. سيتم تحليل البيانات التي تم جمعها بشكل موضوعي بالإضافة إلى استخدام خوارزميات AI Natural Language Processing لتحديد الكلمات الرئيسية والعلاقات وسيتم تقديم النتائج. الدراسة ونتائجها لها آثار على الحكومة والشركات والأوساط الأكاديمية وكذلك على المجتمع.

الكلمات المفتاحية: الذكاء الاصطناعي ، اتخاذ القرار ، هيئة الطرق والمواصلات ، هيئة كهرباء ومياه دبي ، الحكومة الذكية ، الاقتصاد.

1. Introduction

Artificial intelligence is a universal field that fits all directions. Hassan (2001) defined artificial intelligence as a study of how to guide the computer to perform things better. Rezanov (2013) clarified that artificial intelligence aims to enable the computer to simulate the intelligence processes which are done in the human mind. In this way the computer can solve problems and make decisions in a logical and orderly manner and the same way of the human mind thinking, in addition to represent the accounting programs for a specific field and improve the basic relationship between its elements.

Naseef (2008) pointed out that artificial intelligence is a process that involves the use of computers to perform high quality and efficient tasks that require very high and advanced human mental abilities. In general, artificial intelligence aims to understand the processes of mind, how people think when making decisions to solve a problem and translate it to equivalent computer processes (Poola, 2017), increase the computer system's ability to solve problems (Janssen and Wichrowski, 2012), and make decisions in a logical and orderly manner, by reference to many different evidentiary processes which has fueled this program (Lindgren, 2017).

Decision-making is an important and multifaceted issue (Poola, 2017; Lindgren, 2017). It is defined as the contribution of workers and employees to decision-making, the creation of goals for work and commitment to implement those decisions to achieve the goals (Zureiq, 2001).

Phillips-Wren and Jain (2008) stated that it as a choice between two or more alternatives by following several steps, including; recognizing and defining the problem, identifying and analyzing existing alternatives, selecting the most effective alternative to achieving and implementing the objectives of the organization.

Despite the huge benefits resulting from using artificial intelligence applications to make accurate decisions, data processing and decision-making across smart applications is an intangible process for customers; this increases the risks and challenges that may arise from the application of this technology. Essani and Jabere (2016) clarified that the inability of personnel control of hardware, and problems associated with information protection and security are among these challenges. Chitturu et al. (2017) also noted that transparency is another challenge when using artificial intelligence.

Past studies have proven the effectiveness of utilising Artificial Intelligence in making decisions (Saleh, 2009; Naseef, 2010; Claudé and Combe, 2018). Saleh (2009) in her study which aimed at studying the relationship between artificial intelligence applications and decision making quality, concluded that increasing the system's ability in decision-making leads to increasing the quality of decision making, which would help in the development of decision-making and increase its importance.

On the other hand, Claudé and Combe (2018) stated that the adoption of artificial intelligence in institutions is facing a problem and non-acceptance, and this calls for the need to increase awareness of the importance of using artificial intelligence as a means of assisting in the adoption of administrative decisions in various institutions and organizations. The difference between the results of the previous studies confirms the need to study denies or proves the findings of the previous studies, and so the current study seeks to investigate the effectiveness of using artificial intelligence in making smart decision in UAE government.

2. Problem statement

Despite the importance of the subject of the current study, the number of studies that aimed to examine the effectiveness of utilising Artificial Intelligence in making smart decisions in government sector are considered limited (Walport and Sedwill, 2016; Mehr, 2017). The researcher has faced a difficulty in finding studies related to this field, nor has he found any study aimed to examine the effectiveness of utilising Artificial Intelligence in making smart decisions in UAE Government particularly. Most of the previous studies were devoted to studying the role of artificial intelligence in making decisions in the banking, financial, economy, construction and health institutions (Naseef, 2010; Boman et al., 2013; Essani and Jabere, 2016; Claudé and Combe, 2018), and without focusing mainly on the aspects that the current study trying to cover, including; cost (government expenditure, economic revenue), quality level, time required for action and decisions, safety level.

Moreover, and through reviewing a set of previous studies aimed at uncovering the relationship between innovation and strategic renewal, the researcher observed a difference in the results of previous studies. Some studies have found that decision-making based on applications of artificial intelligence would improve the quality of services provided (Saleh, 2009; Naseef, 2010), while others have denied the important influence of artificial intelligence on the decision-making process, where Claudé and Combe (2018) clarified that human mental abilities are more efficient in decision-making and problem solving more than using the artificial intelligence, while others have denied the existence of a relationship. All these facts confirm the need for theoretical literature to a modern study supporting this aspect and filling the gap in the previous theoretical literature.

3. Aims and Objectives of the research

The aim of this study is to investigate the effectiveness of using Artificial Intelligence in Smart Decision making in UAE Government to improve service quality, increase transaction efficiency and reduce costs and increase revenue. The objectives of the study can be summarized in the following points:

1- study the development and use of Artificial Intelligence in Decision Making in UAE Government;
2- identify the key challenges and activities in which AI applications are adopted for decision making in the UAE Government;
3- understand the impact of AI adoption on Operational efficiency and Organisational Excellence in UAE Government;
4- analyse the impact of AI adoption on financial performance;
5- analyse the relationship between AI Adoption and Customer Satisfaction

4. Research Questions

The problem of the current study can be summarized in the following questions:

1. Has the adoption of Artificial Intelligence improved decision making in UAE government?
2. What is the impact of adopting artificial intelligence in improving operational efficiency and quality of service delivery?
3. What is the impact of adopting artificial intelligence in reducing UAE government's expenditure?
4. Does the adoption of Artificial Intelligence in making smart decisions in UAE government increase economic revenue?

5. Research Hypothesis

As a qualitative study, it is not statistically possible to prove the null and alternative hypotheses set for the study. Hence hypotheses are set that will be accepted or rejected based on qualitative analysis. The following hypothesis are set for the study:

1. Lack of skilled data scientists is posing challenges in adopting artificial intelligence in making smart decisions in UAE government.
2. Use of artificial intelligence in making smart decisions improves efficiency and quality of Government services;
3. Adopting artificial intelligence to make smart decisions reduces government expenditure and increase economic revenue; and the use of artificial intelligence in making smart decisions decreases the time required for decisions making.

6. Literature Reviews:

6.1 Artificial Intelligence

Hancock (2017) prepared a study to determine the important of artificial intelligence applications in government fields can be highlighted in cases where there is a large amount of data but there are not enough people to accomplish it or there are no individuals with the appropriate competence and experience to accomplish them.

Eggers et al (2015) also shows that artificial intelligence plays a major role in providing services to citizens and reducing costs. In this regard, David Eaves, a lecturer in public policy and program manager of Digital@HKS at Harvard Kennedy School, shown that the automation of government processes can provide large sums to the government, where it can save between 96.7 million and 1.2 billion hours annually, with potential savings between $3.3 billion and $41.1 billion, respectively.

Gou and Li, (2018) also conducted a study about the utilization of artificial intelligence applications in governments is constrained by many factors, the most important of which are the limited government resources and the level of human creativity, as well as the level of confidence in the government. However, artificial intelligence applications provide many opportunities for governments that can reduce the level of administrative burdens and increase business control. Also, Zhang and Dafoe, (2019) point about the use of artificial intelligence in government services can help to overcome limited resources and exploit them appropriately, as well as controlling complex tasks or under complex conditions such as limited resources and time.

Horvitz (2016) mentioned about the artificial intelligence applications have been used to provide services to citizens in five basic categories; answering questions, filling out and searching documents, routing requests, translation, and drafting documents. Employing these applications can help raise the efficiency of government work, while providing time to the citizens and using this time to consolidate relations between employees and citizens. Zhang and Dafoe (2019) argued that despite the opportunities and benefits offered by artificial intelligence applications to governments, they may not be able to overcome some of the problems facing government services, and may worsen matters, especially with regard to the issue of privacy and data confidentiality.

Another study generated by (Mehr, 2017) for the important problems that may result from the application of artificial intelligence in governments is to increase the unemployment rate due to the abandonment of large numbers of employees. In this regard, governments must strive to avoid these two dangers, which are moral hazard and unemployment, and strive to increase the number of employees and increase the confidence of citizens in these services.

6.2 Decision making:

Oliveira (2007) stressed that decision-making process is the basic manifestation of leadership, because the manager achieves the objectives of the organization mediated by others through a series of decisions to achieve the goals set.

The decision-making process is one of the most important topics that have different views in its definition, depending on the different interpretations of the writers and researchers, as well as the differences in their scientific, philosophical, ideological and social backgrounds Oliveira (2007). Saleh (2009) defined decision making as the contribution of workers and staff to decision-making, the creation of work objectives and the commitment to implement those decisions to achieve the objectives.

Moreover, Uzonwanne (2016) prepared a study to stated that the adoption of any decision passes through the stages or steps are known and agreed, and the only difference is in the skill to carry out these steps, and the availability of information that serves each stage, and the existence of an effective communication system that leads to understanding and interacting with different matters in favor of the organization. Stankevich (2016) indicated in their study that aimed to pointed out that the effective management requires a good organization of the decision-making process in a rational manner, and when the decision is reasonable, it is chosen for the best possible means to achieve the objective. Sousa & Yu (2014) argued that the successful decisions are characterized by a premise and reasonableness, and the right choice of the most likely possibilities.

6.3 Artificial intelligence and Decision Making

Phillips-Wren (2012) emphasized that a comprehensive understanding of the decision-making process enables the effective use of artificial intelligence and its use in the decision-making process.

Boman et al. (2013) indicated in their study that aimed to pointed out that artificial intelligence increases the computer system's ability to solve problems, make decisions in a logical and orderly manner, by referring to many of the various reasoning processes that have fed this program. Artificial intelligence systems use human knowledge stored in the form of facts and theories in a virtual container called the 'Knowledge Base'.

Moreover, Claudé and Combe (2018) prepared a study to detect the impact of using artificial intelligence in the development of organizational decision-making in knowledge-intensive companies. The study found that the effective application of artificial intelligence in organizational decision-making would help companies make smart decisions.

On the other hand, the study concluded that artificial intelligence is not used to make an independent decision; it is used to support the decision-making process. The results also confirm that, while artificial intelligence is considered an effective tool through which effective decisions can be made, human capacity is more effective and important when dealing with complex situations where uncertainty increases.

6.4 Artificial Intelligence in the United Arab Emirates

(Majid, 2018) mentioned about the UAE Vice President, Prime Minister and Ruler of Dubai His Highness Sheikh Mohammed bin Rashid Al Maktoum has launched the UAE's Artificial Intelligence Strategy, the first large project within the UAE 2017, which represents the new wave after the Smart Government. (Al-Arabi, 2018) also conducted a study about the UAE government allocated an independent ministry to the UAE's Artificial Intelligence Strategy in 2017, not only to improve the performance of projects and its positive economic repercussions, but to reduce the number of expatriate workers and to adjust the imbalance in the labor market and population structure.

Another study generated by (Majid, 2018) for the Artificial intelligence provides large economic opportunities to many economic sectors in the country. It has the ability to make huge profits with the application of its uses and reliance on its information and accurate advice, as well as it has positive effects in reducing dependence on the human element and employment, which raises the quality of products and reduce spending. According to that; UAE has endeavored to promote the development and acceleration of the application of artificial intelligence applications at all levels of government and private, not only to improve the performance of enterprises, but also to reduce the number of foreign workers and modify the structure of the labor market and demographics.

(Majid, 2018) mentioned It is necessary to create awareness among the leaders of institutions, managers and employees in government agencies about the importance of artificial intelligence and its uses to facilitate the adoption of this technology in the work and development of services in those entities. In addition to create task forces by the executive directors of innovation in government institutions to study the opportunities and challenges facing them in developing their services and electronic systems based on artificial intelligence techniques, and plans to implement them and find solutions to the challenges that will face them.

## 7.	Research methodology:

7.1 Research Methods

This study adopts a Qualitative Approach to discover what people working in the Government think about AI Adoption and its effectiveness. In the quantitative approach, objective and fact based scientific approaches are adopted to make statistically valid generalizations about a given phenomenon which can be replicated by other researchers in similar settings. Quantitative studies involve surveys and experimental designs and use statistical tools to improve the accuracy of findings.

So that the design of the interview questions for the study is relied upon based on a comprehensive literature review

7.2 Sample Size

The Government of UAE consists of more than 200 departments separated on the 7 emirates of the UAE providing a range of Government Services. However, not all of them are actively engaged in the adoption of AI. Few departments such as the Dubai Smart Government, Dubai Future, Ministry of Interior, Ministry of Education, Emirates Credit Insurance, Roads and Transport Authority (RTA) and Dubai Electricity and Water Authority (DEWA) have taken a lead, hence our focus will be these departments and our sample will involve more senior level managers from these organisations along with others. A list of participants along with their background and area of work will be prepared and then invitations to participate will sent out with aiming to interview 40 people.

7.3 Data Collection Procedures

A semi-structured set of interview questions will be designed to collect data from key officials in the UAE Government who are involved in the implementation of Artificial Intelligence Initiatives.

7.4 Methods and techniques for Analysing Data

As this study is on the phenomenon of AI, efforts will be made to adopt an AI powered tool to analyse text to identify keywords, word associations, tone and sentiment analysis to guide in the overall thematic analysis.

The role of the researcher is to be an independent observer of phenomenon being studied. Even though the researcher has some background understanding of AI in the UAE, every effort will be made to ensure that the researcher's views do not take prominence in drawing conclusions from the study. This will help in eliminating bias.

8.   Discuss the results

As part of this study a quantitative survey was conducted and questionnaires were administered randomly to customers of various Governments Departments who have been availing a range of Government services. The survey was hosted on Survey Monkey and the survey link was sent out to an email list of customers availing Government services. The lists were obtained from various Government departments with due permissions only for the purpose of this survey.

Approximately 700 potential respondents were reached, however only 268 duly filled in responses were received, which are included in this analysis. The response rate was approximately 40%.

The survey questionnaire included 12 variables based on insights gained from the extensive literature review conducted to study customer experience. Of the 12 variables three were related to demographics while the other 9 variables were focused on measuring the level of awareness about AI and the impact of Government AI adoption on customer experience.

The questionnaire used a combination of Yes & No responses as well as a 5 point Liker scale where 1=Strongly Disagree, 2= Disagree, 3 = Neither Agree nor Disagree, 4= Agree, 5= Strongly Agree.

The data gathered from the survey was then organised in multiple ways for better analysis and entered into SPSS version 21. Firstly descriptive statistics were computed which are presented in tables 1-5 below. The descriptive statistics which included information on the frequencies, the percentage of agreement or disagreement with the statements on the questionnaire, mean and standard deviation provide a quick snapshot of the perceptions of the respondents about their experience with Government service delivery.

The Mean score, for 6 statements on the questionnaire, related to Customer Service Experience were between 4.1 – 4.3 which indicate that respondents perceive the adoption of AI has improved customer service experience. In terms of standard deviation, with the exception of two statements, across all the statements on the questionnaire there was no significant deviation from the mean and mostly ranging from S.D .599 to .916.

The S.D. was over 1.0 indicating a significant deviation from the mean and indicates a difference of opinion among the respondents due to the number of years of experience in dealing with Government services. There are respondents who have been dealing with Government for 15-20 years and then there some who are dealing for the last 5 years. Some of the respondents may notice a difference in the way services are delivered.

9. STATISTICAL TESTS

9.1 Reliability Analysis

The reliability of the measurement scale items and data collected for the study is very important as it ensures internal consistency. Researchers use various approaches to ensure reliability and one of the most widely used approaches is the Cronbach Alpha. This approach also estimates internal consistency of items included in the scale and determines whether the scale has a homogeneous structure or not .The reliability analysis was conducted for all the variables in the data set. The result of reliability analysis for the overall scale is presented below.

Table 1:Cronbach Alpha

Cronbach's Alpha	N of Items
.711	12

Cronbach Alpha value of .711 indicates there is high reliability and internal consistency in the data gathered and the scale items are homogenous.

9.2 DESCRIPTIVE STATISTICS

The descriptive statistics were followed by t-test for the full set of 12 questions, presented in table 1-6 below. Furthermore, the t-test was computed for AI awareness against age group and gender to study any significant variations.

9.3 Independent Sample T-test

This technique is used to test the null hypothesis that there is no significant difference in the two variances. If the value in the 'Sig.' column, which is denoted by the "p-value" is greater than 0.05 then the null hypothesis is accepted and the conclusion is that the variances are significantly different (Kerr et al, 2002, p.71).

Table 2: T-test: AI Awareness

Area	F	df	p-value
Age	0.14	239	.721
Gender	3.80	239	.253

The t-test was conducted to study the level of variance among respondent groups on AI awareness. Specially age group and gender were chosen to study the variance if any in their level of AI awareness. The results are shown in the table above and the higher p-values indicate that there is no significant difference in the means between the respondents of different age groups (p value - .721) as well as gender (p value = .253).

9.4 ANOVA

One-way ANOVA is employed to address research questions that focus on the difference in the means of one dependent variable and one independent variable with two or more levels (Keppel, 1991).

Table 3:ANOV AI Adoption Awareness

Area	F	Df	p-value
Interaction with Government Services	1.24	264	.290
Age Group	0.73	265	.930

Table 4: ANOVA AI Adoption in Customer Service

Area	F	Df	p-value
Interaction with Government Services	.718	264	.489
Age Group	0.67	265	.935

The ANOVA test conducted for this study and the results shown above does not show a significant variance as the (p value= .290; .930; .489; .935 are higher than 0.05) which indicates no significant variance in the level of awareness about AI adoption in Government service delivery among different groups of respondents.

9.5 CORRELATION TEST

The correlation test was run for the 8 key statements related to the AI adoption awareness as well as the impact of AI adoption on customer experience .

Positive correlation was found between Ai adoption awareness and awareness about governments departments using AI to improve customer services (p value = .000); Customer Support and help desk response is faster and satisfactory (p value = .041); Transactions at any of the Dubai Government Touch Points is easy (p value = .001); Based on past transactions have you received Personalized Service (p value = .029); Has the Identity establishment process simplified (p value = .003) and how do you rate the Overall Customer Experience and Satisfaction (p value = .002).

Similarly, positive correlation was found between awareness about governments departments using AI to improve customer services and Customer Service Improvement in the last 1 year indicated by the p value = .002; Customer Support and help desk response is faster and satisfactory (p value = .013); Transactions at any of the Dubai Government Touch Points is easy (p value = .011); Has the Identity establishment process simplified (p value = .002) and how do you rate the Overall Customer Experience and Satisfaction (p value = .000).

Strong correlation was indicated between Customer Service in the last 1year had improved significantly and all the 6 customer experience statements Customer Support and help desk response is faster and satisfactory (p value = .000); Transactions at any of the Dubai Government Touch Points is easy (p value = .000); Based on past transactions have you received Personalized Service (p value = .000); Has the Identity establishment process simplified (p value = .000) and how do you rate the Overall Customer Experience and Satisfaction (p value = .000).

10.   Conclusion:

Artificial Intelligence represents the most important outcome of the Fourth Industrial revolution due to its multiple uses in the fields Military, industrial, economic, technical, medical, educational, and service applications. The United Arab Emirates used to not wait for the future, but enter it, compete for its technologies, anticipate its challenges, develop successful solutions for them, and this explains the state's trend towards investing in activating the technologies of the fourth generation of the industrial revolution, on top of which is artificial intelligence to achieve its ambitious development goals, not considering it as an ambitious future. Deprived of its perception and the eradication of illiteracy, and the dependence of many economic sectors such as health, education, services and other vital sectors on it, in addition to the great economic opportunities that it provides to many of the country's economic sectors, its ability to achieve huge profits with the application of its uses and reliance on the accurate information and advice it provides.

As this study came with the aim of verifying the effectiveness of using artificial intelligence in smart decision-making in the Dubai government to improve service quality, increase transaction efficiency, reduce costs and increase revenues, as the qualitative approach was adopted and data will be collected through a semi-structured set of interview questions. After conducting the study and applying it to the required sample and conducting the required tests the present study involving 268 customers of Government services in Dubai indicates high awareness (75-85%) about the use of AI in government service delivery as well for improving customer service. The adoption of AI in Government service delivery was found to positively correlate with customer satisfaction and improved customer experience outcomes.

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