HUMAN RESOURCE MANAGEMENT AND TECHNOLOGY DEVELOPMENT IN ARTIFICIAL INTELLIGENCE ADOPTION IN THE UAE ENERGY SECTOR

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ABSTRACT:

Artificial Intelligence (AI) is proved a very effective technique in reducing complexity and making suitable quick decisions for achieving success. Artificial Intelligence is an emerging area and growing fast. It is used successfully in various fields. In UAE also, AI is being used in several sectors. Now the government of UAE has promoted AI in the energy sector to get the maximum of its benefits. Hence, this study evaluated various indicators that affect the promotion of AI in the energy section of the UAE. With the help of a questionnaire survey, 350 questionnaire forms were analyzed to prioritize the parameters affecting AI adoption. From the analysis results it was found that "Organization use AI to provide effective business innovation", "Organizations use AI to align with its business strategy", and "Organization use AI to improve the levels of production" are the key motivating factor to adopt AI. Significant parameters of AI technology include are; AI Technology is user friendly, AI Technology is able to improve the quality of the work and AI Technology fits well with the tasks involved; are reported as significant technological parameters to adopt AI. On the other hand, Referral person is required if facing difficulty with AI technology, and teammate support in using AI technology are essential parameters of the human resource management which affect AI adoption in the energy sector of the UAE. In addition, reliability and normality tests validated the data. Hence, these findings can be used to promote AI and understand the situation for making proper decisions.

1. INTRODUCTION

Artificial Intelligence (AI) is the branch of computer science in making computers behave like humans. AI technology is popularized due to robust databases and the high level of computing facilities. It has helped faster data processing and interpretation to perform routine and non-routine tasks successfully (Russell & Norvig, 2012; Brynjolfsson & Mitchell, 2017; Frey & Osborne, 2017). AI techniques are now widely used with beneficial effects such as reducing food waste in the hospitality industry (Pirani & Arafat, 2016). Recently, Artificial Intelligence (AI) technology has gotten intense attention in energy production

and has immense prospective for the future design of energy systems. AI technology assists in making the energy industry more secure and efficient by evaluating and analyzing the data. The UAE is also diverted to the adoption of AI at the governmental level. It has opened new venues for the new generation towards digitalization. With AI technology, the UAE government intended to provide effective and efficient public services to the citizens. Digitalise public services have evolved over three stages of development where it has successfully implemented the e-government (electronic government) services then transformed to mobile government (smart/m-government) platform. Recently, the UAE government has

shifted to artificial intelligence-enabled services. Hence, they established the Ministry of Artificial Intelligence. AI has become a core to any technological solutions that will be used for nearly all services and sectors, according to UAE AI vision and strategy for the next 15 years (Daleure, 2017).

According to UAE Minister of Artificial Intelligence, AI technology helps reshape the energy scene on a global scale. The contribution of AI to the UAE energy sector is reaching an estimated \$2.85 billion by 2020 (Antonopoulos *et al.*, 2020). AI data analysis and the Internet of Things are rising as major elements in forecasting and estimating the energy sector. With oil prices fluctuation, the interruption of these novel technologies will attain high returns on security, safety, and efficiency, facilitating the country to make accurate and faster decisions (Bag *et al.*, 2020). United Arab Emirates (UAE) is keen to exploit the benefits of AI in achieving its goals and aspiration for providing competent self-service technology government. UAE public sector has adopted AI technology in many of its services like in healthcare, security, business, and others; it is able to overcome the challenges in coordinating amongst ministries and agencies. Thus, it creates public trust with effective and efficient service delivery and avoids corruption (Cressey *et al.*, 1998). Using AI-based services, government agencies improve the work efficiency and user experience, reduce service costs, and relieve human workloads (Buell, Campbell, & Frei, 2010). Hence, the UAE government has promoted the adoption of AI in the energy; however, inspector. To adopt any technology in the field, it is essential to understand the factors affecting it. Hence, this study focused on prioritizing the factors human resource management factors affecting the adoption of AI in the energy sector of the UAE.

2. LITERATURE REVIEW

2.1 Artificial Intelligence

AI was formally coined around 1956 at a conference at the Dartmouth College, New Hampshire (McCarthy *et al.*, 2017). Colloquially, artificial intelligence applies when a machine imitates the cognitive functions and aspects associated with human minds, for instance, problem-solving and learning. Artificial Intelligence (AI) focuses on creating intelligent devices and programs. It mimics human consciousness and also tries to perform any possible human tasks. This means the ability of a programmable machine to think and learn, which emulates human realization. AI adoption has

become a vital portion of technology and processing industry advancement (Mao *et al.*, 2019).

The invention of Artificial Intelligence (AI) encountered a lot of optimism as many experts argue it is the answer to some of the most complex challenges of human existence. However, artificial intelligence is an ever-changing phenomenon that only includes technological innovations that demonstrate the same cognitive abilities seen in humans. Artificial intelligence is still an ambiguous concept used on different technological innovations crucial to humankind (Poola, 2017).

Artificial Intelligence (AI) domains are categorized based on the expectation to change the world with AI technology such as in transportation; people interaction; service robots; healthcare; education; public safety/security, and others. In the transportation domain, the general public expects the reliability and safety of AI systems. Autonomous vehicles or transportation are the way forward with the help of AI technology. After the autonomous transportations are made satisfactorily safe and robust, the public can accept and adjust them voluntarily (Russell *et al.*, 2015). AI dynamic approaches will utilize the limited resources in the transportation domain with data availability and extensive connectivity (Li *et al.*, 2018). Similarly, AI technology can model the communication and coordination between humans and machines by connecting humans and machines virtually (Kannan *et al.*, 2019). Nowadays, the internet of things (IoT) and cloud systems devices are becoming more widespread in AI social and economic dimensions. Moreover, object recognition, robotics, and data-driven product platforms are proliferating (Russell *et al.*, 2015; Kannan *et al.*, 2019).

2.2 Energy sector

Energy is one of the most fundamental elements to drive economic development. It is involved in almost all the production and consumption of goods and services in modern society (Strydom *et al.*, 2020). The energy sector involves a complex and inter-related network of companies or organizations in the production and distribution of energy to power the economy and facilitate production and transportation. The energy industry's performance helps to generate more revenue, reduce more costs, improve operational, explore activities, expand markets, and contribute to the national economy (Al-Damen 2017).

United Arab Emirates (UAE) energy depends considerably on oil & gas resources and is recognized as significant petroleum producers

around the world as cited by (Al Mansoori et. al. 2020). The energy sector is challenging, especially the market demand and supply of energy. UAE Government launched UAE Strategy for Artificial Intelligence (AI). Fluctuation and the dynamic of the current energy market make it challenging to meet all the energy demands. Hence, the UAE oil and gas sector is promoting the adoption of AI technology to make itself a global leader. AI can provide fast and intelligent automation as well as dynamic scalability to optimize the customers' purchase experience. Moreover, AI can accurately give computational facts and figures to offer clear and compelling evidence for the need for AI development and enhancement in the UAE energy sector (Nordrum, 2017).

3. RESEARCH METHODOLOGY

This paper focused on assessing the role of human resource management and technology factors on the adoption of AI technology in emery sector projects of the UAE. A strategic framework for carrying out this study is in figure 1.

Figure 1. Research Framework

Figure 1 depicts that AI Technology is adoption is dependent on human resource management and AI technology. This study assessed the role of the independent variable with the help of various parameters from a comprehensive literature review. From the review of the published literature, a total of 11 parameters of human resource management and nine parameters of AI technology availability were identified. In contrast, AI technology adoption level was measured by investigating nine indicators identified from literature. The current study utilized a quantitative method of data collection as a quantitative approach of data analysis is most valued to the investigator for finding significant outcomes from vast data. A questionnaire form was used for data reading. The advantage of the questionnaire includes the potential time and cost savings, and the elimination of interview bias (Lewis, 2015).

This study used the Likert scale as the assessment scales to target the audience. When responding to Likert scale questions, respondents will determine their level of disagreement or agreement on asymmetric disagrees or agrees on scale for a sequence of statements (Lee & Rha, 2016; Lewis,

2015). The Likert scale used for data collection was based n 5-points as 1 for strongly disagree, 2 for disagree, 3 for neutral, 4 for agree, and 5 for strongly agree. To analyze the data Statistical Package for Social Sciences (SPSS) was used. Researchers have largely used and accepted this software as a data analysis technique (Stevens, 2012).

Cronbach's alpha value of the data helped to determine the internal consistency of the data or the validity of the data (Amirrudin et al., 2020; Čaplová & Švábová, 2020). Data were analyzed with the help of the RII technique to prioritize the parameters as adopted by (Akhund et al. 2019). Also, the normality of the data was assessed as the data must comply with the normality assumption. (Tabachnick & Fidell, 2012) as abnormal data results in an error and can lead to making a wrong inference. Skewness and kurtosis methods are used to assess the normality of the data. (Pituch & Stevens, 2016) stated that the rule of thumb for establishing normality using the skewness and kurtosis criterion is to compare the computed values with a magnitude of ± 2 . Values that exceed this limit are considered to violate the normality assumption, while those that are less than 2 are considered to approximate a normal distribution.

4. RESULTS AND DISCUSSION

4.1 Demography of the Respondents

The survey was carried out through email, in person, LinkedIn, Facebook, Google form, and WhatsApp. As a result, 350 completed responses were received against 400 distributed forms, representing an 86.25% response rate, which is considered satisfactory (Pazzaglia et al., 2016). Before the data analysis, the respondents' demographic information was gathered, as summarized in table 1.

Items	Frequency	Percentage
Qualification		
Bachelor degree	175	50%
Master's degree	140	40%
PhD degree	35	10%
Working Experience		
Less than 5 years	87	25%
6 – 10 years	175	50%
11 – 15 years	35	10%
Above than 15 years	53	15%
Working Position		
Executive	175	50%
Senior executive/ Head of Department	140	40%
Managers	35	10%

Table 1. Respondent's demography

Table 1 depicts that 50% of respondent participating in this data collection process have obtained engineering degrees while 40% of the respondents are master degree holders and 10% of respondents have completed their Ph.D. These respondents have been working in the field for several years and hold either management or executive posts in their respective firms. This shows that the respondent has a good level of understanding and is suitable for providing a factual position regarding the investigated objectives. Data collected from these respondents were tested for consistency with the help of a reliability test. The reliability test validated the internal consistency and quality of the research instruments (Souza *et al.*, 2017, Daniel, 2010). Cronbach's alpha coefficient is widely used for testing reliability. Munir *et al.* (2019) suggested that the data is considered satisfactory if the Alpha value is more than 0.7, as cited by (Islam *et al.* 2020). In this study, Cronbach Alpha values for all the groups of the factors are shown in table 2.

Name of construct	Code of Construct	Number of items	Cronbach's alpha	Remark
AI technology adoption	AIE	9	0.744	Acceptable
Technology	AIT	9	0.881	Good
Human resources	HRM	11	0.795	Acceptable

Table 2. Reliability test of the survey data

Table 2 reveals that the Alpha value for all the three groups of parameters is above 0.7. Hence, the data is considered reliable and suitable for further analysis. Based on the respondents' perception, RII value was calculated to prioritize the parameters as presented in table 3.

Code	Attribute	Scale/Frequency					N	RII	Rank
		strongly disagree	disagree	neutral	agree	strongly agree			
AI Technology adoption in UAE									
AIE8	Organisation use AI to provide effective business innovation	17	39	111	110	73	350	0.705	1
AIE2	Organization use AI to align with its business strategy	34	54	75	79	108	350	0.699	2
AIE9	Organisation use AI to improve the levels of production	17	68	80	131	54	350	0.678	3
AIE1	Organisation authorised to implement AI Technology	17	78	90	94	71	350	0.671	4
AIE5	Organisation use AI for better coordination	18	78	87	108	59	350	0.664	5
AIE6	Organisation use AI increase’s ability to anticipate customers’ demand	16	89	78	122	45	350	0.652	6
AIE7	Organisation use AI to assists in predicting new market segments	42	54	105	94	55	350	0.638	7
AIE3	Organisation adopt AI in decision making	35	93	76	92	54	350	0.621	8
AIE4	Organisation use AI to improve communication	62	85	63	105	35	350	0.581	9

AI Technology [AIT]									
AIT7	AI Technology is user friendly	16	45	86	102	101	350	0.730	1
AIT3	AI Technology is able to improve the quality of the work	12	36	104	121	77	350	0.723	2
AIT8	AI Technology fits well with the tasks involved	22	68	61	91	108	350	0.711	3
AIT9	AI Technology is compatible with other systems	28	48	83	95	96	350	0.705	4
AIT1	AI Technology is useful for the given job	14	41	128	88	79	350	0.701	5
AIT4	AI Technology makes easier to carry out the tasks	15	66	90	99	80	350	0.693	6
AIT6	AI Technology makes data analysis easier	26	51	98	97	78	350	0.686	7
AIT5	AI Technology provides accurate information	25	57	109	102	57	350	0.662	8
AIT2	AI Technology able to perform the tasks faster	26	72	98	96	58	350	0.650	9
Human resources management [HRM]									
HRM6	Employee need training of using AI Technology	12	59	76	81	122	350	0.738	1
HRM7	Referral person is required if facing difficulty with AI Technology	7	67	67	120	89	350	0.724	2
HRM2	Teammate support in using AI Technology	12	64	89	101	84	350	0.703	3
HRM8	Employees should be given feedback about using AI Technology	6	73	76	126	69	350	0.702	4
HRM3	Enough resources to work using AI Technology	13	61	92	123	61	350	0.690	5
HRM9	Employees need time to implement AI Technology	20	62	90	112	66	350	0.681	6
HRM5	Employee require specific knowledge of AI Technology	22	74	84	94	76	350	0.673	7
HRM1	Management insists on using AI Technology	15	80	99	92	64	350	0.663	8
HRM1 1	Employees are willing to learn to use AI Technology	28	70	90	96	66	350	0.658	9

HRM4	Organization insists using AI Technology	29	53	117	90	61	350	0.658	9
HRM10	Organisation should make preparation to use AI Technology in future	13	83	116	81	57	350	0.649	10

Table 3. Respondent's demography

Table 3 shows that top three parameters in AI adoption category are "organisation use AI to provide effective business innovation", "organization use AI to align with its business strategy", and "organisation use AI to improve the levels of production". From technological availability, the top three of 9 investigate parameters are AI Technology is user friendly, AI Technology is able to improve the quality of the work and AI Technology fits well with the tasks involved. Similarly, we examined the parameters of human resource management for adoption of AI in energy section. Based on RII value top 3 parameters are employee need training of using AI technology, referral person is required if facing difficulty with AI technology and teammate support in using AI technology. Normality of the data was assessed by skewness and kurtosis of the data. It was calculated for all the groups of the parameters as in table 4.

	Skewness		Kurtosis	
	Statistic	Std. error	Statistic	Std. error
AIE	-0.342	0.130	-0.724	0.260
AIT	-0.239	0.130	-0.871	0.260
HRM	-0.277	0.130	-0.805	0.260

Table 4. Results of normality test

Table 4 reveals that all the groups of the parameters have skewness and kurtosis value in the range of ± 2 . It means that the data fulfills the normality assumption and is considered suitable to draw a conclusion.

5. CONCLUSION

Artificial intelligence (AI) technologies have shown increasing growth in various industry sectors such as education, healthcare, the environment, and others. AI-based technologies facilitate making decisions based on interactions with the environment. Thus, it is imperative to understand the factors affecting/influencing the AI

technology adoption from the user's perspective. Hence, this study assessed the parameters affecting AI adoption in the UAE energy sector. A total of 350 data samples were collected and analyzed statistically. From data analysis, it was realized that;

- The top three parameters are "Organization use AI to provide effective business innovation", "Organizations use AI to align with its business strategy", and "Organization use AI to improve the levels of production".
- Significant parameters of AI technology include are; AI Technology is user friendly, AI Technology is able to improve the quality of the work and AI Technology fits well with the tasks involved.
- Referral person is required if facing difficulty with AI technology and teammate support in using AI technology are essential parameters of the human resource management which affect AI adoption in energy sector of the UAE.

Reliability test validated the quality and internal consistency of the data. Normality of the data was assessed by skewness and kurtosis of the data. The findings of this study can be utilized as a visual tool to understand the factors affecting the adoption of Artificial Intelligence (AI) in the UAE energy sector by the energy players and the readiness to embrace artificial intelligence in the energy industry, which faces many challenges now ahead.

REFERENCES

- Akhund, M. A., Memon, A. H., Ali, T. H., Memon, N. A., & Kazi, S. (2019). Waste management in construction projects of pakistan. *Pakistan Journal of Science*, 71(4), 59.
- Al-Damen, R. A. (2017). The Impact of Total Quality Management on organizational performance Case of Jordan Oil Petroleum Company. *International Journal of Business and Social Science*, 8(1), 192-202
- Al Mansoori, F. T., Rahman I. A. & Kasim, R.

(2020). Deciding the Rank of Factors Affecting Abu Dhabi Oil & Gas Industry. *International Journal of Sustainable Construction Engineering and Technology*, 11(2), 133-139

Amirrudin, M., Nasution, K., & Supahar, S. (2020). Effect of Variability on Cronbach Alpha Reliability in Research Practice. *Jurnal Matematika, Statistika Dan Komputasi*, 17(2), 223-230. <https://doi.org/10.20956/jmsk.v17i2.11655>

Antonopoulos, I., Robu, V., Couraud, B., Kirli, D., Norbu, S., Kiprakis, A., Flynn, D., Elizondo-Gonzalez, S., & Wattam, S. (2020). Artificial intelligence and machine learning approaches to energy demand-side response: A systematic review. In *Renewable and Sustainable Energy Reviews*. <https://doi.org/10.1016/j.rser.2020.109899>

Bag, S., Pretorius, J. H. C., Gupta, S., & Dwivedi, Y. K. (2020). Role of institutional pressures and resources in the adoption of big data analytics powered artificial intelligence, sustainable manufacturing practices and circular economy capabilities. *Technological Forecasting and Social Change*. <https://doi.org/10.1016/j.techfore.2020.120420>

Brynjolfsson, E., & Mitchell, T. (2017). What can machine learning do? Workforce implications: Profound change is coming, but roles for humans remain. *Science*, 358(6370), 1530-1534. <https://doi.org/10.1126/science.aap8062>

Buell, R. W., Campbell, D., & Frei, F. X. (2010). Are self-service customers satisfied or stuck? *Production and Operations Management*, 19(6), 679-697. <https://doi.org/10.1111/j.1937-5956.2010.01151.x>

Čaplová, Z., & Švábová, P. (2020). IBM SPSS statistics. In *Statistics and Probability in Forensic Anthropology*, 343-352, <https://doi.org/10.1016/b978-0-12-815764-0.00027-7>

Cressey, P., Grint, K., & Woolgar, S. (1998). *The Machine at Work: Technology, Work and Organisation*. The British Journal of Sociology. <https://doi.org/10.2307/591331>

Daleure, G. (2017). *Economic Vision of the UAE. In Emiratization in the UAE Labor Market*, pp. 27-37, Springer Singapore. https://doi.org/10.1007/978-981-10-2765-9_3

Daniel, M. (2010). Introduction to quantitative research 1.1. *Doing Quantitative Research in Education with SPSS*.

Frey, C. B., & Osborne, M. A. (2017). The future of employment: How susceptible are jobs to computerisation? *Technological Forecasting and Social Change*, 114, 254-280. <https://doi.org/10.1016/j.techfore.2016.08.019>

Soomro, N. U. I., Memon, A. H., Memon, N. A. & K. R. Memon. (2020). Contractor's Selection Criteria in Construction Works in Pakistan. *Engineering, Technology & Applied Science Research*, 10(2), 5520-5523. <https://doi.org/10.48084/etasr.3334>

Kannan, K. N., Pamuru, V., & Rosokha, Y. (2019). Using Machine Learning for Modeling Human Behavior and Analyzing Friction in Generalized Second Price Auctions. *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.3315772>

Lee, J. M., & Rha, J. Y. (2016). Personalization-privacy paradox and consumer conflict with the use of location-based mobile commerce. *Computers in Human Behavior*. <https://doi.org/10.1016/j.chb.2016.05.056>

Lewis, S. (2015). Qualitative Inquiry and Research Design: Choosing Among Five Approaches. In *Health Promotion Practice*. <https://doi.org/10.1177/1524839915580941>

Li, C., Xie, C., Zhang, B., Chen, C., & Han, J. (2018). Deep Fisher discriminant learning for mobile hand gesture recognition. *Pattern Recognition*, 77, 276-288. <https://doi.org/10.1016/j.patcog.2017.12.023>

Mao, S., Wang, B., Tang, Y., & Qian, F. (2019). Opportunities and Challenges of Artificial Intelligence for Green Manufacturing in the Process Industry. In *Engineering*. <https://doi.org/10.1016/j.eng.2019.08.013>

McCarthy, S. M., Vayanos, P., & Tambe, M. (2017). Staying ahead of the game: Adaptive robust optimization for dynamic allocation of threat screening resources. *IJCAI International Joint Conference on Artificial Intelligence*, 0, 3770-3776. <https://doi.org/10.24963/ijcai.2017/527>

Munir, M. A., Zaheer, M. A., Haider, M., Rafique, M. Z., Rasool, M. A. & Amjad, M. S. (2019). Problems and barriers affecting total productive maintenance implementation. *Engineering, Technology & Applied Science Research*, 9(5), 4818-4823

Nordrum, A. (2017). Govern by blockchain dubai wants one platform to rule them all, while Illinois will try anything. *IEEE Spectrum*. <https://doi.org/10.1109/MSPEC.2017.8048841>

Pazzaglia, A. M., Stafford, E. T., & Rodriguez, S. M. (2016). Survey methods for educators: Analysis and reporting of survey data (part 3 of 3). In *Applied Research Methods*.

Pirani, S. I., & Arafat, H. A. (2016). Reduction of food waste generation in the hospitality industry. *Journal of Cleaner Production*, 132, 129–145. <https://doi.org/10.1016/j.jclepro.2015.07.146>

Pituch, K. A., & Stevens, J. P. (2016). *Applied multivariate statistics for the social sciences: Analyses with SAS and IBM's SPSS*. In Routledge.

Poola, I. (2017). How Artificial Intelligence in Impacting Real Life Every day. *International Journal of Advance Research and Development*.

Russel, S., & Norvig, P. (2012). Artificial intelligence—a modern approach 3rd Edition. In *The Knowledge Engineering Review*. <https://doi.org/10.1017/S0269888900007724>

Russell, S., Dewey, D., & Tegmark, M. (2015). Research priorities for robust and beneficial artificial intelligence. *AI Magazine*, 36(4), 105–114. <https://doi.org/10.1609/aimag.v36i4.2577>

Strydom, A., Musango, J. K., Currie, P. K. (2020). Connecting energy services, carriers and flows: rethinking household energy metabolism in Cape Town, South Africa, *Energy Res. Social Sci.*, 60, Article 101313

Stevens, J. P. (2012). *Applied Multivariate Statistics for the Social Sciences*. In *Applied Multivariate Statistics for the Social Sciences*. Routledge. <https://doi.org/10.4324/9780203843130>

Souza, D. C., Wegner, F., Costa, L. C. M., Chiavegato, L. D., & Lunardi, A. C. (2017). Measurement properties of the Human Activity Profile questionnaire in hospitalized patients. *Brazilian Journal of Physical Therapy*. <https://doi.org/10.1016/j.bjpt.2017.03.011>

Tabachnick, B. G., & Fidell, L. S. (2012). *Using multivariate statistics* (6th ed.). In New York: Harper and Row.