

Impact and Perception of Generative AI and Related Automation Tools in the Gulf Region

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Abstract

Our world is changing at an unprecedented pace with the rapid rise of Web 3.0, and Artificial Intelligence (AI) based technologies, like Robotics, Meta-verse, and others. These are poised to change how we conduct business and live our lives. Generative-AI (Gen-AI) comes as a most recent addition and can be automated to identify patterns across enormous sets of language-based data and generate new content. According to a recent, widely referenced, analysis report from a reputed firm [2], Generative AI has already caused 12 million occupational shifts worldwide, and is even poised to cause more upheaval in future job markets. More than 50% of the recent occupational shifts are found in industries like food services, customer service, office support, design and production [2]. We see industry wide disruption, with many companies making use of such AI technologies and autonomous robotics (including cars): Amazon is putting robots in its warehouses [3] and is promoting robots for home care [3]. AI-enabled Machine Learning models are also being used to enhance the retail/consumer experience. This occupation displacement shall not be limited to low-wage labor, however. A recent economics study by a prominent Stanford economist [9], has found that the high-end job market shall be most affected by the use of AI. This paper examines the impact of this global change on the job markets in the Middle East region, i.e., in countries like the UAE, Bahrain, and KSA, where a strong E-Government presence is already in place [6], and where the use of modern technologies is accepted and encouraged. These countries have integrated many AI technologies, such as face-recognition, 3D Printing, Augmented Reality, Industrial Automation and many others, into administrative and retail activities [7]. We believe that both the Government and the General Public would be receptive to the introduction of Generative AI and autonomous robotics-based tools across different industry and service sectors.

I. INTRODUCTION

The Gen-AI technologies are expected to transform the traditional industries in an unprecedented pace and movement, characterized by new technology like AI/Generative AI, Robotics, the Meta-verse, and other such platforms – they are poised to change how we conduct business and live our lives [1]. Generative AI comes as the most recent addition to this collection of these modern new technology tools; it can be automated to identify patterns across enormous sets of language-based data and generate new content [2]. The emergence of Generative AI is the beginning of a new era in the domain of content generation like images, music, videos etc. According to a recent, widely referenced, analysis report from a reputed firm [2], Generative AI has already caused 12 million occupational shifts worldwide and is even poised to cause more upheaval in future job markets. More than 50% of the recent occupational shifts are found in industries like food services, customer service, office support, and production [2]. We see industry-wide disruption, with many companies making use of such AI technologies and autonomous robotics (including cars): Amazon is putting robots in its warehouses [4] and is promoting robots for home care [4]. AI-enabled Machine Learning models are also being used to enhance the retail/consumer experience (find sources for this). This occupation displacement shall not be limited to low-wage labor, however. a recent economics study by a prominent Stanford economist [8], has found that the high-end job market shall be most affected by the use of AI. The public and private owned institutions the Middle-Eastern countries and especially United Arab Emirates (UAE) have an interest not only on how the new or old generation cope with the advanced AI Technologies, but also on how prepared people are to act in shorter or longer distance futures.

In this paper we propose to examine the impact of this global change on the job markets in the Middle East region, in countries like the UAE, Bahrain, and KSA, where a strong E-Government presence is already in place [5], and where the use of modern technologies are accepted and encouraged. These countries have integrated many AI technologies, such as face-recognition, 3D Printing, Augmented Reality, and many others, into administrative and retail activities [6]. We believe that both the Government and the General Public would be receptive to the introduction of Generative AI and autonomous robotics-based tools across different industry and service sectors. We are most interested in determining the general public's preparedness and perception of these Generative AI and automation tools. In fact, we conduct a survey targeting multiple segments of the populations, in the Gulf region, for the purpose of finding answers linked the the understanding, perception and readiness of the populations to the upcoming job market change. The results are analyzed using appropriate formal methods [7].

II. PAPER STRUCTURE

The paper provides an introduction to challenges that the current job market shall face the full introduction of AI/Gen-AI tools, and discusses their impact on industries such as Information Technology (IT), healthcare, finance, Government services and trade, followed by a literature survey section. Then we introduce our research design and methodology and design. This is followed by a section exposing and analysing our results. The last section provides a conclusion and some future perspectives.

III. LITERATURE REVIEW

The introduction of AI/Generative AI into our world today has marked significant changes in multiple industries, changing the fabric of society. It has affected the way we interact with the world around us. The rapid progression of such programs, focused on the ability of computers to perform subtle, non-routine, cognitive tasks has the potential to affect the workforce and labor markets around the world. Despite such progress, the implementation of any potential use cases with AI has remained abstract; until the rise of Generative Pre-trained Transformers (GPTs) – Interfaces that connect Generative AI Models with the end-user [9]. We look at John Keynes and his work on technological unemployment [12]. In previous industrial revolutions, advancements in technology led to widespread job loss. However, it also led to significant increases in productivity, along with the creation of new jobs and new industries, which far outweigh the associated disadvantages. We now stand at a similar juncture with the rise in AI/generative AI.

Looking at workers with varying degrees of experience in different jobs, we see a complex perception [3] of the incoming changes – despite acknowledging their capabilities to adapt and adopt new technologies, there is some uncertainty and concern surrounding the extent to which AI will change the labor market [11]. The European perception of generative AI study shows a positive correlation between AI's anticipated impact on the way of life in the next 20 years and the perceived displacement of jobs caused by AI technology and automation [22]. The "Bristows" 2018 report on Artificial Intelligence: Public perception, attitude and trust [23] shows the public understanding of generative-AI is broad, but not deep, expectations are very high and young people are more confident and optimistic about the use of AI/Generative AI in work as well as life.

IV. IMPACTS OF AI AND GENERATIVE AI ON JOBS

We should briefly introduce AI and Gen-AI, compare both and give examples of new applications and then distill major studies about their impacts on job markets, across the world.

AI refers to the simulation of the human intelligence processes by machines and computer systems. These processes encompass a range of activities such as learning, reasoning, problem-solving, and generalising. Gen-AI is a sub-field of AI capable of generating new data, content, or outputs via derivations from input data, or so-called prompts. Unlike traditional AI systems which primarily analyse and interpret data, generative AI systems are capable of creating and producing new data (and thus Generate data,) such as texts, images and videos.

There has been significant advancements in Gen-AI, with the adaptation of the technology skyrocketing due to releases of majorly popular software such as Bard, DALL-E, GPT-4 and Sora that allow the generation of content with almost indistinguishable authenticity to a human [14]. For example, GPT-4 provides users with the ability of inputting both images and texts as prompts, through the use of a multi-modal model "exhibiting human-level performance on various professional and academic benchmarks" [15]. Another model, Sora, is capable of producing high quality videos from multiple different camera angles as well as video manipulations, which could have major effects on not just film and movie industries, but on any jobs in any fields involving video production [16]. The ease of access, accuracy and performance of recent developments of Gen-AI are often shockingly surprising to the general public, and has led to both doubts and praise for the future of AI.

The effects of Gen-AI are often described as either augmentation, or automation. Augmentation refers to the collaboration between human and machines, while automation is the act of substituting machines for humans in tasks. Although these are not completely perfect indicators and measurements for the impact of generative AI [17], we believe they are sufficient characterizations, for the purposes of this paper. According to a paper published by the International Labour Organisation (ILO) [18], clerical support workers are at the highest risk for automation. These types of jobs include repetitive tasks and often follow a specific set of rules, guidelines and patterns, allowing AI to be programmed to execute these tasks, efficiently, and without human guidance. Such effects can already be seen from the increased usage of ChatGPT and the GPT models from OpenAI, with tasks such as summarizing, formatting, organizing becoming significantly simplified. On the other hand, the analysis from the ILO also concludes that jobs fields such as technicians, professionals, associate professions and service/sales workers have a high potential for augmentation due to the intrinsically routine and repetitive tasks which do exist in such fields. This presents an area where AI could excel at, freeing up human workers to focus on higher-value tasks which require more problem-solving, creativity, and critical thinking.

For example, ADNOC fuel stations in the United Arab Emirates are launching and testing a robotic arm to refuel vehicles,

which could replace a sizable amount of human workers and staff [19]. The company states that "Fuel stations will use the robot to support the existing staff, boost productivity and reduce wait time", suggesting future augmentation for the occupation of fuel station attendants. Although it may be able to completely render human staff redundant at refuelling vehicles, processes such as customer service and safety checks are still far from being automated. Few government offices in UAE use Gen-AI based agents to provide polices and procedures of their customers, which was previously done by service providers. This is also an indication that the impact and challenges of AI/Gen-AI is not only the job market/displacement but also on the business-to-business (B2B) type business models.

V. METHODOLOGY AND RESEARCH DESIGN

This study's methodology is based on two tools, a survey and a model for analysing the survey results. To measure the impact and perception of AI and generative AI, we have employed a survey of 14 questions which are used as a basis for our experiment and research. These questions were asked of 100 participants, all of whom reside in Gulf countries, since our research is also limited to Gulf countries. Furthermore, study targeted participants who are either students and/or currently active on the job market, since those represent the segments of population most interested in our study.

Our model for analysing the survey results, is based on the structural equation modelling (SEM) approach [24], [25]. SEM is a statistical technique used for modeling and analysing complex relationships between numerous variables. It is a multivariate method that combines factor analysis and multiple regression analysis. In this method each of the survey questions is an "observed" variables, which is directly measured by the data provided by the survey's respondent's. The observed variables have a direct affect on the so-called latent variables. The latent variables are actually those that we are interested in measuring, but cannot actually measure directly. The SEM approach consist of three steps. In the first step a model is built relating the measurable variables to the latent variables. The second step involves actually conducting the survey and accumulating the results for the measurable variable. The third step involves computing various correlations of these variables using multiple regression techniques. The results and values of these correlation provide a basis for validating the constructed model and gives directions for the desired research analysis.

TABLE I
SURVEY QUESTIONS OR OBSERVED VARIABLES.

Observed Variables	Question
Q1	On a scale from 1 (not familiar) to 5 (very familiar), rate your knowledge of Generative AI or AI technologies.
Q2	On a scale from 1 (negative) to 5 (very positive), how do you perceive the impact of Generative AI on your work?
Q3	On a scale from 1 (negative) to 5 (very positive), how do you perceive concerns about the impact of AI on your work?
Q4	On a scale from 1 (unlikely) to 5 (very likely), how likely are you to use Generative AI or AI in your work?
Q5	Rank the following according to your concerns about Generative AI
Q6	On a scale from 1 (strongly disagree) to 5 (strongly agree), do you believe Generative AI or AI will creates new job opportunities?
Q7	On a scale from 1 (not prepared) to 5 (very prepared), how prepared is your work domain for integrating Generative AI?
Q8	Rank the following skills from most necessary to least necessary for enabling effective work with Generative AI or AI?
Q9	Do you think you possess the skills needed to work with Generative AI or AI?
Q10	If you think you don't have above skills, how willing are you to learn necessary skills , from 1 (unlikely) to 5 (very likely)?
Q11	On a scale from 1 (strongly disagree) to 5 (strongly agree), rate the effectiveness of public institutions in up-skilling programs to assist individuals to better adapt to AI integration with the Labor Market.
Q12	Rate the depth of introduction of generative AI and AI in your geographical area 1 (no introduction) to 5 (deep introduction)

The observed variables of our study, i.e., the survey questions, are given in Table V. Questions are numbered 1 through 12. They consist of both qualitative and quantitative questions. Questions 5 and 8 are qualitative questions, as they do not ask the participant for a number reflecting some sort of an appreciation, but a rank of some choices. The results of the qualitative questions cannot be integrated directly, and needed to be quantized using well-known techniques [20], before being integrated into our SEM model computation. Quantizing involves essentially decomposing a question into multiple variables.

Table V gives our hypothesis, i.e., how our latent variables, which are the target of our study, are linked to the survey question. The table shows that we are measuring three variables. The first latent variable shows the extent of support by public institutions given to the introduction of AI in various departments in way to improve productivity of job replacement. This variable, according to our hypothesis, is supported by Questions 11 and 12 (see Table V). The second latent variable deals with how the public perceives AI or Generative AI tools and impacts, positively or negatively. This variable is supported by Questions 2, 3, 6 and quantified versions, a and b, of question 5. The third and last latent variable deals with how the public is prepared for dealing with AI/Generative AI tools and impacts. This variable is supported by Questions 1, 4, 7, 9 and quantified versions, a, b, c and d, of question 8.

TABLE II
LATENT OR MEASURED VARIABLES.

Latent Variables	Definition	Corresponding Questions
Government Support	The effectiveness of government policies and actions related to the introduction AI	Q11 + Q12
Perception	The public perception of AI and generative AI	Q2 + Q3 + Q6 + Q5a + Q5b
Preparedness	The public's view on their own preparedness to utilize and deploy generative AI	Q1 + Q4 + Q5c + Q7 + Q8a + Q8b + Q8c + Q8d + Q9 + Q10

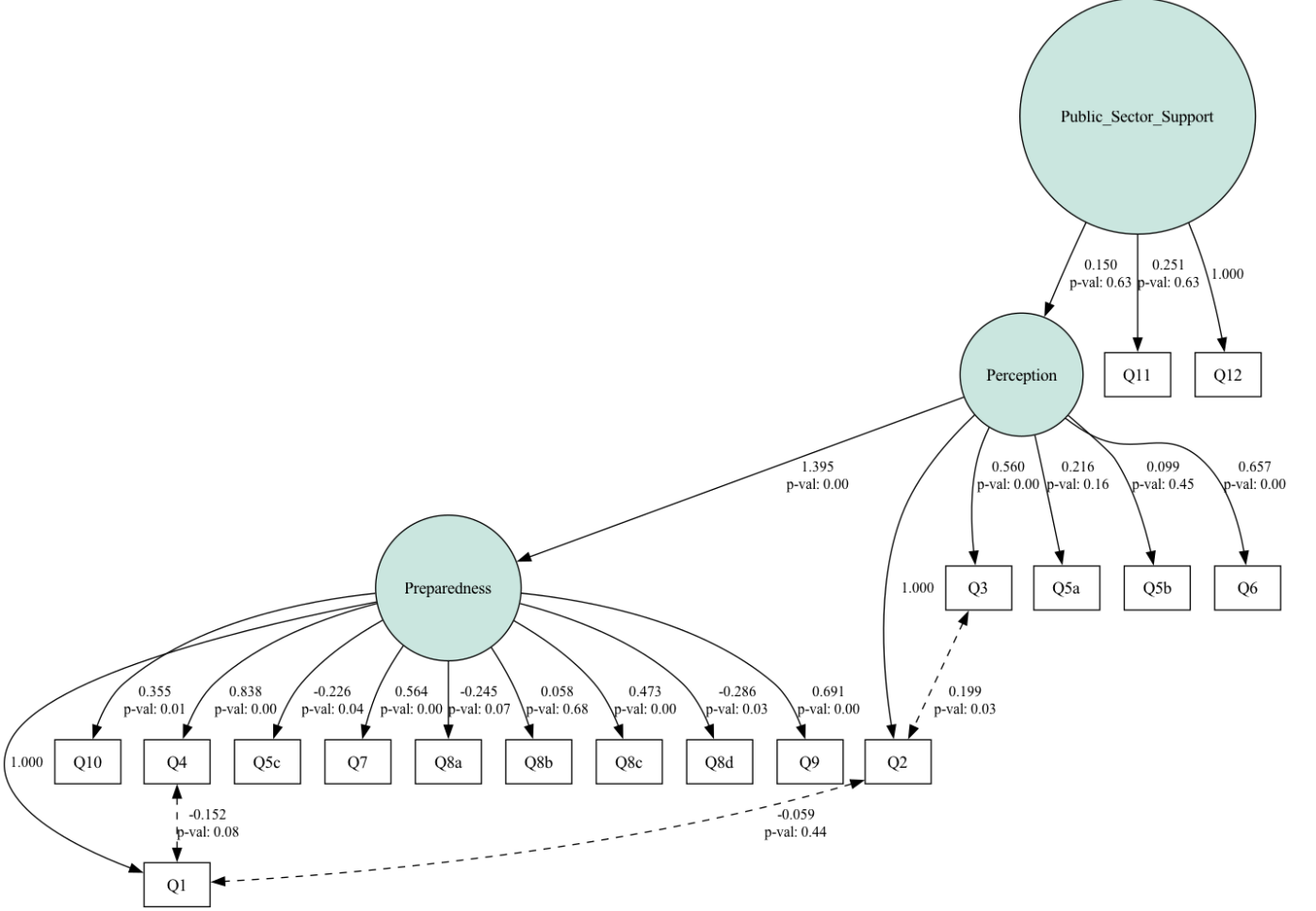


Fig. 1. Graphical Representation of SEM Model

A graphical representation of our SEM model is given in FigureV. As discussed above, it shows our first three hypothesis, indicating how our measured variables, derived from the question results, link to the latent variables. It also shows two other hypothesis. Our fourth hypothesis postulates that the first latent variable, indicating support from public institutions, has an impact on the second latent variable, public perception. The fifth hypothesis states that Perception, is also impacted by preparedness.

VI. RESULTS AND DISCUSSION

This section gives the results of the survey, interprets and analyses them. However, it start by commenting on the validity of the hypotheses we stated in the previous section. This validity is important since it shows the importance of the survey questions we asked in measuring our target latent variables or questions. The validity or lack of it is based on the correlation provided by the computations made based on the SEM model [21].

The following results were obtained using SEMOPY, Python-based library used for generating and analysing SEM models [21]. We have:

H_0 : There is no significant correlation between the two latent variables:

H_1 : There is significant between the two latent variables....

We are testing at a significance level of 15%, as such, results with p-values below 0.15 will reject the null hypothesis, suggesting that there is sufficient evidence to indicate significant correlation between the two test variables.

TABLE III
SEM RESULTS

Standardized Paths	Path Coefficients	P-Value	Conclusion
Perception \rightarrow <i>Preparedness</i>	1.395	0.00	Supported
Public Sector Support \rightarrow <i>Perception</i>	0.150	0.63	Not Supported

A major point of discussion is the general public's opinion regarding AI. From table V, we can see that Perception has been dealt with in our survey using several questions. Q5 and Q8 were the questions that had significance, with p-values less than 0.15. The positive path coefficient of Q8 suggests a strong correlation between better perceptions and the belief that Gen-AI or AI will create new job opportunities due to the advanced technologies and tools that being developed in AI/Generative, automation and healthcare. We can infer from this that people generally have very strong opinions on the impacts of AI on jobs depending on their stance and perception of AI, and that the topic of job modifications may be a large concern for people. Q5 solidifies the fact that people perceive the impacts of AI on their work depending on their perception. The extremely strong correlation between Perception and Preparedness displays one of the core reasons of people's perceptions on AI. People who have a better perception are almost certain to be more prepared to utilize AI in work and improve productivity. This shows that with more knowledge regarding AI and how it works, people tend to have more positive views and are less pessimistic regarding its effects. This is a strong indicator that concerns about AI and Gen-AI stem somewhat from a lack of preparedness to face the challenges imposed by these new technologies.

Looking at table III, we see that "Public Sector Support" has no correlation to "Perception", and mostly likely has no significant correlation to "Preparedness" either. One reason for this could be the relative freshness of the adaption by the public sector of AI based technologies. Although there are some efforts in the public sector related to educating and spreading awareness of the benefits and negatives of AI, it seems that most people still don't recognise these attempts and campaigns as noteworthy or useful to them. To the general public, ethical issues are one of the biggest concerns that people have. Surprisingly, the concerns regarding the efficiency and accuracy of work done have no correlations to "Perception".

We can also, from our rankings question, Q10, relates to "Preparedness", that technical AI knowledge and knowledge about programming, produce higher indicators of less preparation due to the negative path coefficient of -0.286 and -0.245, respectively. This is correct as there is no need to have an in depth technical knowledge about AI or programming to use these tools. However, it is important to note that the path coefficient is relatively low compared to other variables, which indicate that knowledge of AI and Gen-AI technologies and how they work, is necessary to some and needs to be extended to the general public, to take advantage of it. This can suggest that there is a weaker correlation, perhaps demonstrating that some segments of the general public are categorised as being prepared, but don't necessarily understand what is mostly needed to effectively utilize Fen-AI and AI. This highlights a potential lack of comprehensive knowledge of these fields, at least from an experienced user perspective. When people develop a better perception, alongside a good degree of preparedness, they would be better positioned to deal with upcoming AI/Gen-AI impacts on jobs and society. Q11 and Q12 are great indicators of whether people are willing to learn and adapt to the changes.

VII. CONCLUSION

We are most interested in determining the general public's preparedness and perception of these Generative AI and automation tools. Our study targeting multiple segments of the populations, in the Gulf region, for the purpose of finding answers linked the understanding, perception and readiness of the populations to the upcoming job market change. The results are analysed using appropriate formal methods. Since AI/Generative AI is continuously evolving technology, the challenges are to study its impact on people perception and preparedness. Our study reveled, the human perception on the impact and future of AI/Generative AI technology in people work and lives mostly depend on their understanding of how it works amd many of them believes an in-depth understand not required. Given the accelerated development of AI/Generative AI, it is very likely that tools and technologies will increase their presence in work and also day-to-day life and peoples attitude towards preparation is expected to change. The questions we asked in the study about preparedness include technical AI knowledge and knowledge about programming as well. The study results shows people are less prepared due to fact that most of the institutions and industries in the field of design, architecture, manufacturing, healthcare and sports are not directly involve in the design and development

of AI/Generative AI tools, rather end users only. This leads us to make new proposal to introduce new courses or programs in school and university level that will benefit the society to be better prepared to face the challenges and impact of AI in work and life. We expect the large scale IT and manufacturing industries in UAE must come forward to fund the research and development activities in the AI/Generative AI, is one way to increase the awareness in the design and development of AI/Generative AI technologies in UAE.

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