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THE EFFECTIVENESS OF ARTIFICIAL INTELLIGENCE ON THE WORKFORCES IN SAUDI ARABIA ORGANISATIONS

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Abstract

Artificial intelligence (AI) has swiftly permeated various sectors, impacting human activities such as transportation, production, and manufacturing. This study assesses the potential influence of AI on employment in Saudi Arabia, utilizing a quantitative cross-sectional approach with a sample of 300 employees from diverse sectors. Employing inferential and descriptive statistics, the research indicates a positive moderate effect of AI on future employment. The findings provide valuable insights for research and development (R&D) and managerial decisions, aiding in navigating the labour market landscape.

Keywords: *Effectiveness, artificial intelligence, workforces, organisations, environment*

1. INTRODUCTION

The global economic downturn, exacerbated by the COVID-19 pandemic, has resulted in a surge in the unemployment rate, and this trend is expected to continue dramatically in the coming years (Jackson et al., 2020). The implementation of cost-effective automated solutions by R&D managers has also played a role in the heightened unemployment rate (Ren et al., 2020). Scholars assert that technology's impact is multifaceted, affecting factors such as labour demand, employment levels, and wages. Some researchers argue that technological advancements enhance innovation capabilities, products, and processes, ultimately leading to increased job opportunities, as noted by Schumpeter (2017).

In a similar vein, Liso and Leoncini (2011) support this perspective, contending that technology has heightened the demand for skilled workers, consequently raising wage levels for qualified personnel. Conversely, other researchers posit that the rise in technology and innovation has resulted in increased unemployment levels, impacting labour performance and profitability (Feldmann, 2013; Acemoglu and Restrepo, 2020). The rapid technological growth in Saudi Arabia spans both private and public sectors, drawing the attention of stakeholders, including businesses and academics, eager to analyse its repercussions.

In developing countries, organisations adopt technology accessible to their low-skilled workers (Acemoglu and Autor, 2011), potentially leading to a reduction in labour demand. Saudi Arabia's significant investments in innovations to support Vision 2030 have sparked debates about the potential replacement of human labour by artificial intelligence, thereby affecting employment in the country (Lane and Saint-Martin, 2021; Magnani, 2022; Aghion et al., 2023). The advancing role of artificial intelligence in workplaces globally has significant implications. Research indicates that advanced AI has the potential to replace numerous jobs in the near future (Li and Du, 2017).

This is attributed to AI technology enabling the development of machines with cognitive capabilities capable of performing both routine and non-routine tasks across various industries. Considering prior research on the impact of technology on efficiency and productivity in organisations, this study aims to explore additional effects of AI on employment in the future in Saudi Arabia, an aspect not thoroughly examined in previous research. The central question guiding this research is: To what extent will AI impact employment in the future?

2. Literature Review:

2.1 Research Objectives:

This study aims to examine the effectiveness of artificial intelligence on the organisational environment and employment in Saudi Arabia.

2.2 Artificial Intelligence

Organisations increasingly utilize innovative technologies like artificial intelligence (AI) to enhance employee awareness, thereby boosting performance and efficiency in products and work processes (Korteling et al., 2021). John McCarthy posits from a social order perspective that the current system will undergo change, and the breakdown of social order poses a threat to society. AI has profound economic and social implications, exerting a transformative impact on human life (Russell and Norvig, 2016). Allen and Chan (2017) assert that AI serves as a disruptive technology across all industries in the global market. Organisations, particularly large firms, invest substantial sums in research and development to adapt to the evolving market structure and maintain technological expertise.

The capital-intensive nature of this new technology enhances productivity and overall profitability (Russell and Norvig, 2016). AI's reliability, particularly in decision-making and problem-solving, has led to its widespread application in various organisations. However, the fixed scale of production in AI may subsequently reduce the demand for labour, as organisations shift towards using more advanced machines in their day-to-day operations (Allen and Chan, 2017). While the service industry faces fewer threats from AI compared to the manufacturing sector, the latter witnesses a continuous decrease in the number of employees, contributing to rising unemployment globally (Goldin and Katz, 2008; Autor et al., 2015).

Conversely, adopting AI presents opportunities for employment in various sectors, as noted by Li and Du (2017). The application of new technology in production and service provision can reduce production costs, enhance productivity, and positively impact the economy, fostering social progress. AI's implementation can lead to the creation of new industries and markets, such as Industry 4.0, thereby generating more job opportunities (Dopico et al., 2016). Russell and Norvig (2016) suggest that the emergence of new industries will gradually replace older sectors, demanding new and skilled employees, thus shaping new market orientations, and broadening the market (Wang and Siau, 2019).

Given AI's impact on market structure, coping with this new technology requires sophisticated training and development programs for employees to master it, ultimately creating a conducive working environment (Ford, 2015).

2.3 Technological Innovation

Grounded in Schumpeter's concept of innovation, characterised as a continuous replacement of industrial mutations with newer, more effective ones, the resulting creation of a new economic structure is termed creative destruction (Tierney et al., 2020). Schumpeter (2017) contends that technological breakthroughs should only be considered innovations if they

not only fail to generate profits but also introduce competition in the market, fostering economic and social development. Two primary types of innovations—product and process—exist, with product innovation establishing a positive relationship between technological changes and employment (Vivarelli, 2014; McAfee and Brynjolfsson, 2016). Conversely, process innovation has a negative impact on the labour market, leading to the replacement of the workforce with new machines (Gruetzemacher and Whittlestone, 2022).

The adoption of innovative processes in organisations, as noted by Vivarelli (2014), involves increasing the number of machines, replacing the workforce with new equipment. While this enhances production and efficiency, it simultaneously reduces the number of employees, contributing to increased unemployment. An alternate perspective posits that the implications for employment lie in the requirement of new skills and talents for the new markets created by adopting new technology, with certain job types facing high risks while others remain at a lower risk (Autor et al., 2015). John Maynard Keynes' concept of technological unemployment (1930) refers to unemployment resulting from the introduction of new technology and innovative machines that substitute human labour in the economy.

Li and Du (2017) assert that as technological advancement continues, employees become apprehensive about their ability to handle the new system or uncertainty regarding the potential replacement by artificial intelligence (AI). Several researchers, including Russell and Norvig (2016) and Piva and Vivarelli (2005), have investigated the term "technological unemployment." While Russell and Norvig found no long-run effect of AI on unemployment, Piva and Vivarelli discovered that fast technological change has a positive short-run effect, influencing the level of employment and productivity (Yang, 2022).

Examining historical stages of industrialisation reveals a gradual replacement of human labour, particularly in technical and manufacturing sectors. Despite the social order perspective suggesting implications, similar patterns prior to AI emerge. However, there is no compelling evidence to assert that AI will have comparable impacts in the future. Consequently, the question of whether AI causes unemployment remains open.

2.4 Market Orientation

Scholars have extensively examined market orientation, concentrating on understanding customer and competitor orientations. However, there is a gap that necessitates further exploration of market knowledge competencies concerning customers and competitors' competencies (Ozkaya et al., 2015). Despite organisations often prioritizing customer value and implementing the marketing concept, it is crucial to acknowledge that specific departments within the organisation may play a more substantial role in delivering customer value (Crick, 2021).

The cultural and behavioural perspective of market orientation is shaped by gathering information to comprehend customer and competitor behaviours (Dwyer, 2022). It is vital for organisations to grasp international customers and competitors, fostering sustainable competitive advantages and adaptability to environmental changes (Fernandes, 2020). Understanding cultural distance can also enhance organisations' financial performance (Papadas et al., 2019). Additionally, research by Novari (2020) indicates that market orientation positively influences employees' performance, including customer satisfaction.

Moreover, Sukoco (2022) discovered a positive influence of transformational leadership on market orientation (both customer and competitor orientations), particularly when market orientation mediates the relationship between transformational leadership and organisational performance. Leite and Rua (2022) also identified a positive relationship between transformational leadership and organisational performance, with market orientation playing a mediating role. Calisir et al. (2016) established a connection between market orientation and organisational performance.

3. Research Methodology:

3.1 Research Tool and Study Sample:

The primary objective of the current research is to investigate the impact of Artificial Intelligence (IA) on employment within the specific context of Saudi Arabia. A quantitative research method was deemed appropriate for this study, focusing on full-time employees within the Information Technology (IT) sector. Data collection took place from July to November 2023, employing a questionnaire developed specifically for this study and administered through online Google Forms. Previous research employing a quantitative approach was leveraged to establish the credibility and validity of the measurement instrument utilised in this study.

The research sample was drawn from the IT sector, targeting full-time employees. The data collection instruments, comprising two distinct components, were amalgamated into a comprehensive survey questionnaire (see Supplementary Materials). The first section of the questionnaire was designed to elicit information on participants' personal characteristics and experiences. In contrast, the second section aimed to gauge personal perceptions and attitudes toward artificial intelligence and its potential impact on unemployment.

To maintain the integrity of the research, the survey questions were crafted to ensure confidentiality and clarity. A convenience sampling technique was adopted to select participants, and a total of more than 300 questionnaires were

distributed. Subsequently, 110 completed questionnaires were returned and deemed eligible for data analysis. Based on this sample size, the researchers concluded that the data obtained was sufficient for meaningful statistical analysis.

4. Results:

4.1 Descriptive Statistics

Table 1 displays the demographic profile of the employee participants engaged in the study, providing insights into their backgrounds and experiences. The study reveals a gender distribution, with (66%) being male and (34%) female, reflecting a positive shift towards increased women empowerment in Saudi Arabia compared to lower participation rates in the past. Concerning decision-making responsibilities, half of the participants assert that management bears the responsibility, as they are instrumental in decisions related to technology adoption. Additionally, (27.2%) believe it falls under the purview of the IT department, while (22.7%) consider it a shared responsibility between both groups.

Table 1.1 Characteristics of employee participants and experiences (N=110)

Characteristic	**Title**	**Frequency** ***Total=110***	**Percentage** ***100%***
Gender	Male	60	66
	Female	50	34
Responsible to adopt IA	Management	55	50
	IT Department	30	27.2
	Management and IT Department	25	22.7
Knowledge of IA	Limited	12	11
	Some knowledge	34	31
	Expert	64	58
	No Knowledge	0	0
Experience of IA	< than a year	7	6.3
	1-5 years	78	78
	6-9 years	25	25
	> 10 years	0	0
IA in the Organisation	Yes	87	79
	No?	0	0
	Process of implementation	23	21

The participants predominantly possess expertise or some knowledge about AI, with (58%) and (31%), respectively. Regarding professional experience, (6.3%) of respondents have been in their current roles for less than one year, (78%) for 1-5 years, and (25%) for 6-9 years, with no respondents having tenure exceeding 10 years. Moreover, (79%) of participants observed a growing utilisation of AI in their organisations, while (21%) believed their organisations were in the process of implementing AI.

These findings align with the conclusions drawn by Schumpeter (2017) and Wang and Siau (2019), indicating the widespread acknowledgment of the growth and advancement of automation in organisations globally. The results underscore that a substantial proportion of companies in Saudi Arabia have either embraced AI or are in the execution phase, playing a pivotal role in ensuring long-term viability.

4.2 Reliability Statistics

Table 1.2 underscores the pivotal role of reliability statistics in advancing this examination, serving as a pilot test for inspection. This statistical measure operates by meticulously assessing the inner consistency among variables. Comprising two main components with 20 items, the calculated Cronbach's Alpha value (> 0.713) signifies high internal reliability, rendering it conducive for further investigation.

Table 1.2 Reliability Statistics

Cronbach's Alpha	# of Items
.713	20

Participants were queried about the motivations driving their organisations to adopt AI, with table 1.3 presenting their responses. Notably, (20%) believe AI adoption enhances efficiency, while a larger share (23.7%) is motivated by increased productivity. Additionally, (19.1%) highlight cost-effectiveness, and (11.8%) are driven by the prospect of improved consistency. These findings align with research by Russell and Norvig (2016) and Ford (2015), indicating a prevalent reliance on technology in modern organisations to boost productivity, potentially attributed to expanding business clientele. The emphasis on efficiency, accuracy, and cost-effectiveness also echoes Thornton's work (2015), emphasizing technology's role in enhancing service quality.

Table: 1.3 Organisations adopted AI (N=110)

Characteristic	***Total=110***	**Percentage *100%***
Efficiency/accuracy	22	20
Cost effective	21	19.1
Increased productivity	26	23.7
Improved consistency	13	11.8
None	5	4.5
Didn't consider	7	6.4
Not applicable	4	3.6
Not sure	2	1.8
Not yet implemented	5	4.5
Not using it	3	2.8
They have not	2	1.8

The majority of respondents (74.6%) express a positive view, advocating the embracement of AI, while a minority (5.4%) harbour fears, with (20%) remaining uncertain. This aligns with Thornton's (2015) observation that a significant portion of organisations (56%) are planning to automate practices.

In terms of the perceived impact on employment, (74.6%) of respondents are optimistic that AI will significantly aid employees rather than replace them, while (20%) remain unsure, and (5.4%) express pessimism. This optimism corresponds with Allen and Chan's (2017) findings, indicating a prevailing belief that automation complements rather than replaces employees. This positive outlook appears linked to the lack of belief in technological unemployment, as suggested by Beaudry et al. (2016).

Assessing the broader impact of AI on overall employment in the industry, (72%) foresee a mostly positive effect, (16%) anticipate a predominantly negative impact, and 12% remain uncertain. These findings align with claims by Canova et al. (2013) emphasizing the benefits of AI technology. The alignment with the goals of Saudi Vision 2030, emphasizing investment in manufacturing and automation for future job opportunities, is also evident, supported by Liso and Leoncini's (2011) argument about increased demand for skilled workers. However, some researchers, such as Feldmann (2013) and Goyal and Aneja (2020), argue that increased technology and innovation may lead to higher unemployment.

Regarding the anticipated job opportunities resulting from AI, (72%) of respondents predict an increase, (16%) expect a decrease, (4%) envision an equilibrium, and (8%) are uncertain. These findings resonate with Martech's (2011) comparative study on robotics in the US and Germany, suggesting that technology and AI bring forth specific job opportunities. Consistency is observed with the works of Bessen (2015), Beaudry et al. (2016), Autor (2015), and Dopico et al. (2016).

Concerning future job opportunities within their organisations, (74%) believe they will increase, (10%) anticipate a decrease, (12%) expect them to remain the same, and (4%) are uncertain. These findings align with Beaudry et al.'s (2016) assertion that advanced automation will positively impact employment levels in the future.

Table: 1.4 Organisations experienced Al (N=110)

Characteristic	***Total=110***	**Percentage *100%***
Experienced based cognitive processing	21	19.1
Soft skills such as social intelligence	36	32.7
Cognitive flexibility	16	14.5
Complex problem solving	25	22.7
Technological skills	12	11

Table 1.4 shows that participants were asked to identify the most beneficial skills, with (32.7%) favouring social intelligence, (22.7%) choosing complex problem-solving, (19.1%) prioritizing experienced-based cognitive processing skills, (14.5%) opting for cognitive flexibility, and 11% selecting technological skills. These results support Brynjolfsson and McAfee's (2011) emphasis on training and education, underscoring the importance of providing the right skills for individuals in the context of modern technologies.

5. Discussion, Conclusion and Future Research

The findings of this study explore the intricate relationship between AI and its impact on employment within the context of Saudi Arabia. The results illuminate a discernible connection and consequential impact among all variables, revealing a positively moderated influence of artificial intelligence on employment. The implications suggest that organisations stand to gain significant advantages from the strategic application of AI, fostering technological innovation that aligns with organisational goals while concurrently enhancing employees' skill sets.

Evidently, the study underscores the potential benefits reaped by organisations leveraging AI, emphasizing its capacity to contribute to organisational objectives and bolster the competencies of the workforce. However, a notable revelation emerges, indicating a deficiency in the efforts of decision-makers to elevate employees' proficiency and understanding of AI. This shortfall bears consequences, as a lack of investment in enhancing employees' AI-related skills may lead to adverse effects on organisational productivity and efficiency.

In light of these findings, future research endeavours could be enriched by incorporating larger and more diverse segments within the study population. This expanded scope would contribute to the validation and refinement of the existing findings, offering a more comprehensive understanding of the nuanced dynamics between AI and employment in the Saudi context. Furthermore, there is a crucial call for organisational leaders to emphasize employee education and training modules geared towards AI literacy. Establishing guidelines for management to proactively shape the organisational environment and cultivate a culture of continuous learning stands as a valuable outcome, ensuring that the workforce remains adept in navigating the evolving landscape of AI technologies. Through such strategic interventions, organisations can not only harness the potential benefits of AI but also fortify their human capital, fostering a harmonious synergy between technological advancement and workforce capabilities.

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