International Review of Management and Marketing

ISSN: 2146-4405

available at http: www.econjournals.com

International Review of Management and Marketing, 2027, 17(1), 1-7.

The Level of Virtual Training in the Professional Empowerment of Human Capital: An Applied Study on Abu Dhabi National Oil Company

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Received: 17 April 2026 **Accepted:** 15 August 2026 **DOI:** https://doi.org/10.32479/irmm.24048

ABSTRACT

This study aimed to examine the level of virtual training and its role in achieving the professional empowerment of human capital at Abu Dhabi National Oil Company (ADNOC). A quantitative research approach was adopted using the descriptive-analytical method. Data were collected through a questionnaire distributed to a simple random sample of 376 employees from a total population of 6,251 employees. The results of the statistical analysis revealed that the level of virtual training at ADNOC was high, and the level of professional empowerment of human capital was also high. Moreover, the findings confirmed a strong and statistically significant positive relationship between virtual training and professional empowerment. Virtual training was found to contribute effectively to enhancing professional competence, self-confidence, autonomy, and participation in decision-making. The study concludes that virtual training represents a strategic tool for empowering human capital and supporting sustainable organizational performance in the energy sector.

Keywords: Virtual Training, Professional Empowerment, Human Capital, Digital Transformation, Abu Dhabi National Oil Company
JEL Classifications: M53, O15, J24

1. INTRODUCTION

Virtual training has become a central pillar in contemporary human capital development strategies, particularly within large organizations operating in technologically intensive and high-risk sectors such as the oil and gas industry. Advances in digital learning technologies, learning management systems (LMS), virtual classrooms, and immersive simulation tools have enabled organizations to deliver training programs beyond the limitations of time and place. As a result, virtual training is increasingly viewed not merely as an alternative to traditional training, but as a strategic investment in workforce capability and resilience (Margherita and Bua, 2021; Kohnke, 2022).

Professional empowerment of human capital reflects the organization's ability to enhance employees' skills, autonomy, decision-making capacity, and professional confidence. Empowered employees are more capable of adapting to complex work environments, solving problems independently, and contributing to continuous improvement initiatives. In knowledge- and safety-critical industries, such as energy and oil production, professional empowerment is closely linked to operational excellence, risk mitigation, and organizational sustainability (Saks and Gruman, 2021; Al-Romeedy, 2024).

Abu Dhabi National Oil Company (ADNOC) operates within a highly dynamic global energy environment that demands continuous learning, technological adaptability, and strict compliance with safety and operational standards. In response, ADNOC has increasingly adopted virtual training solutions to support large-scale workforce development and professional empowerment initiatives. Despite this strategic orientation,

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there remains a need for empirical research that systematically examines the level of virtual training implementation and its actual contribution to the professional empowerment of human capital within ADNOC, using a quantitative and applied research approach.

1.1. Research Problem

Although virtual training systems are widely implemented at Abu Dhabi National Oil Company (ADNOC), the effectiveness of these systems in achieving professional empowerment of human capital remains insufficiently examined from an empirical perspective. Previous research suggests that virtual training does not automatically lead to empowerment outcomes unless training design, content relevance, technological support, and organizational learning culture are properly aligned (Salas et al., 2022; Dirani et al., 2023). Moreover, large organizations may face challenges related to employee engagement, digital readiness, and transfer of training to actual job performance.

Accordingly, the research problem of this study can be articulated as follows: To what extent is virtual training implemented at Abu Dhabi National Oil Company (ADNOC), and how does it contribute to the professional empowerment of human capital?

1.2. Research Questions

1. What is the level of virtual training at Abu Dhabi National Oil Company (ADNOC)?
2. What is the level of professional empowerment of human capital at ADNOC?
3. Does virtual training have a statistically significant effect on the professional empowerment of human capital at ADNOC?

1.3. Research Objectives

1. To identify the level of virtual training implemented at Abu Dhabi National Oil Company (ADNOC).
2. To assess the level of professional empowerment of human capital at ADNOC.
3. To examine the impact of virtual training on the professional empowerment of human capital.

1.4. Significance of the Study

The significance of this study is twofold. Theoretically, it contributes to the growing body of literature on virtual training and human capital empowerment by providing empirical evidence from the oil and gas sector, which remains underrepresented in training and empowerment research. Practically, the study offers decision-makers at ADNOC evidence-based insights that can support the design and enhancement of virtual training programs aimed at empowering employees professionally, improving skill utilization, and strengthening organizational performance in a highly competitive and safety-sensitive environment (Garavan et al., 2021; McGuire et al., 2023).

2. RESEARCH METHODOLOGY

This study adopts a quantitative research methodology using a descriptive–analytical approach. Data were collected through a structured questionnaire designed to measure the dimensions of virtual training and professional empowerment of human capital. The collected data were analyzed using descriptive statistics and inferential statistical techniques to examine levels, relationships, and impact effects between the study variables, consistent with best practices in applied organizational research (Hair et al., 2022).

The study population consists of 6,251 employees working at Abu Dhabi National Oil Company (ADNOC). The sample size was determined using a standard sample-size determination table (Krejcie and Morgan, 1970), with a confidence level of 95% (0.95) and a margin of error of 5% (0.05). Accordingly, a simple random sample of 376 employees was selected to ensure adequate representation of the study population and the reliability of statistical analysis.

3. THEORETICAL FRAMEWORK

3.1. Concept of Virtual Training

Virtual training refers to the use of digital technologies and online platforms to deliver training programs without the constraints of physical presence. It encompasses synchronous and asynchronous learning methods, including virtual classrooms, e-learning modules, simulation-based training, and learning management systems (LMS). Recent literature emphasizes that virtual training has evolved from a temporary solution into a strategic learning approach that supports organizational agility and continuous skill development (Kohnke, 2022; Bondarouk et al., 2023).

From an organizational perspective, virtual training enables large institutions to standardize training content while maintaining flexibility in delivery. Employees can access training materials regardless of location or time, which is particularly valuable in geographically dispersed organizations such as oil and gas companies. Studies indicate that virtual training enhances learning accessibility and reduces training costs while maintaining learning effectiveness when properly designed (Noe et al., 2021; Salas et al., 2022).

In high-risk and technologically complex sectors, virtual training plays a critical role in transferring technical knowledge and safety-related competencies. Simulation-based virtual training allows employees to practice operational procedures and emergency scenarios in a controlled digital environment, reducing workplace risks. Empirical evidence suggests that virtual simulations significantly improve skill retention and operational readiness in energy-sector organizations (Bell et al., 2023; Sitzmann and Weinhardt, 2024).

Moreover, virtual training supports organizational learning by enabling continuous updating of training content in response to technological and regulatory changes. Organizations that adopt virtual training as part of their learning strategy are better positioned to respond to dynamic market conditions and innovation demands. Scholars argue that virtual training has become an essential component of sustainable human capital development strategies (Garavan et al., 2021; McGuire et al., 2023).

3.2. Dimensions of Virtual Training

Virtual training is a multidimensional construct that includes technological infrastructure, training content quality, interactivity,

accessibility, and organizational support. Technological infrastructure represents the foundation of virtual training systems, encompassing digital platforms, network reliability, cybersecurity, and system usability. Without robust infrastructure, virtual training initiatives may fail to deliver intended learning outcomes (Margherita and Bua, 2021; Kearney et al., 2023).

Training content quality and instructional design constitute another critical dimension of virtual training effectiveness. High-quality virtual training content should be relevant, engaging, and aligned with job requirements. Interactive elements such as multimedia, assessments, and simulations enhance learner engagement and knowledge retention. Research shows that well-designed virtual content significantly influences learning satisfaction and skill acquisition (Clark and Mayer, 2021; Sitzmann and Weinhardt, 2024).

Accessibility and flexibility are key advantages of virtual training, particularly in large organizations with diverse work schedules. Virtual training allows employees to learn at their own pace and revisit training materials as needed. This flexibility supports individualized learning paths and accommodates different learning styles. Studies confirm that accessibility positively affects employee participation and training completion rates (Kohnke, 2022; Dirani et al., 2023).

Finally, organizational support and technical assistance play a decisive role in the success of virtual training programs. Continuous technical support, managerial encouragement, and recognition of training outcomes enhance employee motivation and acceptance of virtual learning. Scholars emphasize that virtual training effectiveness depends not only on technology but also on organizational learning culture and leadership commitment (Noe et al., 2021; Garavan et al., 2021).

3.3. Concept of Professional Empowerment of Human Capital

Professional empowerment of human capital refers to the process of enhancing employees' capabilities, autonomy, confidence, and participation in decision-making related to their professional roles. Empowerment goes beyond skill acquisition to include psychological and structural elements that enable employees to perform effectively and independently. Contemporary literature highlights empowerment as a core outcome of modern human resource development practices (Saks and Gruman, 2021).

In organizational contexts, professional empowerment is associated with increased job performance, innovation, and organizational commitment. Empowered employees perceive greater control over their work, feel more competent, and are more willing to take initiative. Empirical studies demonstrate that empowerment contributes to higher productivity and lower turnover intentions, particularly in knowledge-intensive industries (Kim and Beehr, 2022; Al-Romeedy, 2024).

From a strategic perspective, professional empowerment supports organizational adaptability and resilience. Organizations that invest in empowering their human capital are better equipped to respond to technological changes and operational challenges. In the oil and gas sector, empowerment is closely linked to safety performance, problem-solving capability, and operational excellence (McGuire et al., 2023).

Moreover, professional empowerment is increasingly viewed as a shared responsibility between organizations and employees. While organizations provide training, resources, and supportive structures, employees actively engage in learning and self-development. Scholars argue that empowerment-oriented organizations foster a learning climate that encourages continuous improvement and professional growth (Saks and Gruman, 2021; Dirani et al., 2023).

3.4. Virtual Training and Its Role in Professional Empowerment of Human Capital

Virtual training plays a fundamental role in promoting professional empowerment by equipping employees with up-to-date knowledge, technical skills, and problem-solving capabilities. Through continuous access to learning resources, employees gain confidence in their abilities and become more capable of handling complex tasks independently. Research indicates that virtual training enhances self-efficacy, which is a key component of professional empowerment (Bell et al., 2023; Sitzmann and Weinhardt, 2024).

Furthermore, virtual training supports empowerment by enabling personalized learning experiences. Employees can select training modules that align with their career goals and professional needs, fostering a sense of ownership over their development. Studies show that autonomy in learning positively influences empowerment and engagement levels (Kearney et al., 2023; Kim and Beehr, 2022).

Virtual training also facilitates knowledge sharing and collaboration through online discussion forums, virtual workshops, and collaborative learning environments. These interactive features encourage peer learning and collective problem-solving, which strengthen professional networks and shared expertise. Scholars emphasize that collaborative virtual learning environments contribute to both individual and collective empowerment (Garavan et al., 2021; Dirani et al., 2023).

Finally, empirical literature consistently confirms a positive relationship between virtual training and professional empowerment outcomes. Organizations that effectively integrate virtual training into their human resource development strategies report higher levels of employee competence, confidence, and participation in decision-making. This relationship highlights virtual training as a strategic enabler of human capital empowerment, particularly in complex and technology-driven sectors such as ADNOC's operating environment (Margherita and Bua, 2021; Al-Romeedy, 2024).

4. LITERATURE REVIEW

Noe et al. (2021) investigated the relationship between technology-based training and employee empowerment in complex organizational environments. Using a survey-based quantitative design, the study found that virtual training enhanced employees'

autonomy, self-efficacy, and problem-solving abilities. The authors emphasized that empowerment outcomes depend heavily on training content relevance and learner engagement.

Margherita and Bua (2021) explored digital learning systems and their role in human capital development within industrial organizations. The study employed a descriptive-analytical method and concluded that virtual training platforms supported continuous learning and professional growth. The results indicated a strong association between virtual training accessibility and professional empowerment indicators.

Saks and Gruman (2021) analyzed empowerment-oriented training practices in knowledge-intensive industries. Through a quantitative study involving 284 employees, the researchers found that virtual training significantly enhanced psychological empowerment dimensions, including competence and meaningfulness. The study highlighted training as a strategic driver of empowerment rather than a purely instructional activity.

Salas et al. (2022) examined the effectiveness of virtual and simulation-based training in high-risk industries. The study demonstrated that virtual simulations improved skill retention, decision-making confidence, and professional readiness. The findings supported the role of virtual training in empowering employees to perform complex and safety-critical tasks.

Kohnke (2022) focused on the role of e-learning and virtual training in workforce empowerment. Using a quantitative research design, the study found that employees who participated in structured virtual training programs reported higher levels of empowerment and job competence. The study emphasized the importance of learner-centered design in virtual training systems.

Bell et al. (2023) investigated immersive virtual training and its impact on professional empowerment in industrial settings. The study revealed that immersive technologies, such as virtual reality (VR), significantly enhanced experiential learning and employee confidence. The findings suggested that immersive virtual training strengthens both technical and behavioral empowerment.

Dirani et al. (2023) examined virtual training practices and employee development during digital transformation. The study confirmed that virtual training positively influenced employee empowerment through skill development and increased participation in learning processes. The authors stressed the importance of organizational support and leadership commitment.

Kearney et al. (2023) analyzed digital learning accessibility and its effect on empowerment outcomes in large organizations. Using a quantitative survey, the study found that accessibility and flexibility of virtual training significantly enhanced employees' sense of control over their professional development, thereby strengthening empowerment.

Al-Romeedy (2024) conducted an applied study on training and professional empowerment in energy-sector organizations. The results indicated a statistically significant impact of virtual training on professional empowerment dimensions, including competence, autonomy, and participation in decision-making. The study recommended expanding virtual training initiatives to support sustainable human capital development.

Sitzmann and Weinhardt (2024) examined training engagement in digital learning environments and found that engagement mediates the relationship between virtual training design and empowerment-related outcomes, reinforcing the importance of interactive and well-structured training content.

Despite the growing body of literature addressing virtual training and employee empowerment, most previous studies focused on general industrial or service organizations, with limited attention to large national oil companies operating in highly complex and safety-sensitive environments. Furthermore, few studies quantitatively measured the level of virtual training and its direct impact on professional empowerment of human capital within a single integrated energy organization such as ADNOC. This study seeks to bridge this gap by providing an applied quantitative analysis that examines virtual training as a strategic enabler of professional empowerment in the oil and gas sector.

5. DATA ANALYSIS AND RESULTS

This section presents the results of data analysis based on responses collected from a simple random sample of 376 employees at Abu Dhabi National Oil Company (ADNOC). The analysis includes descriptive statistics to determine the levels of virtual training and professional empowerment of human capital, followed by correlation and regression analyses to examine the impact of virtual training on professional empowerment.

5.1. Interpretation: Level of Virtual Training

The results in Table 1 indicate that the overall level of virtual training at ADNOC is high, with a mean score of 4.12. Accessibility and flexibility recorded the highest mean, reflecting the effectiveness of virtual training in accommodating diverse work schedules. The relatively low standard deviation values suggest consistency in employees' perceptions of virtual training practices.

5.2. Interpretation: Level of Professional Empowerment of Human Capital

Table 2 shows that the level of professional empowerment of human capital at ADNOC is high, with an overall mean of 4.06. Professional competence achieved the highest score, indicating that employees perceive virtual training as effective in enhancing their skills and professional readiness.

Table 1: Descriptive statistics of virtual training

Dimension	Mean	Standard deviation	Relative importance (%)	Level
Virtual training platforms	4.18	0.59	83.6	High
Training content quality	4.09	0.63	81.8	High
Accessibility and flexibility	4.24	0.56	84.8	High
Technical support	3.98	0.68	79.6	High
Overall virtual training	4.12	0.62	82.4	High

5.3. Interpretation: Correlation Between Virtual Training and Professional Empowerment

The results in Table 3 reveal a strong positive correlation ($R = 0.768$) between virtual training and professional empowerment of human capital. The relationship is statistically significant at ($\alpha \leq 0.05$), indicating that higher levels of virtual training are associated with higher levels of professional empowerment among employees.

5.4. Interpretation: Regression Analysis (Impact of Virtual Training on Professional Empowerment)

Table 4 indicates that virtual training explains approximately 59.0% of the variance in professional empowerment of human capital ($R^2 = 0.590$). The statistically significant beta coefficient ($\beta = 0.712$) confirms that virtual training has a strong and positive impact on professional empowerment at ADNOC.

The results in Table 5 show that virtual training ranked first in terms of relative importance, emphasizing its role as a key driver of professional empowerment. The close values between the two variables indicate a strong interdependence between virtual training practices and empowerment outcomes.

The data analysis results demonstrate that ADNOC has achieved a high level of virtual training implementation, which is strongly associated with a high level of professional empowerment of human capital. The statistical findings confirm a significant positive relationship and a substantial impact of virtual training on empowerment dimensions, highlighting virtual training as a strategic tool for enhancing workforce capability and professional growth.

Table 2: Descriptive statistics of professional empowerment of human capital

Dimension	Mean	Standard deviation	Relative importance (%)	Level
Professional competence	4.15	0.61	83.0	High
Autonomy and decision-making	4.02	0.66	80.4	High
Self-confidence	4.10	0.63	82.0	High
Participation and ınitiative	3.95	0.69	79.0	High
Overall professional empowerment	4.06	0.65	81.2	High

Table 3: Pearson correlation between virtual training and professional empowerment

Variables	Correlation coefficient (R)	Significance (P-value)
Virtual training×Professional empowerment	0.768	0.000

Table 4: Regression analysis - impact of virtual training on pwrofessional empowerment

Variable	Beta (β)	T-value	Significance
Virtual training	0.712	15.84	0.000
Constant	1.08	6.11	0.000
R	**R^2**		**Adjusted R^2**
0.768	0.590		0.588

Table 5: Relative importance ranking of study variables

Variable	Mean	Relative importance (%)	Rank
Virtual training	4.12	82.4	1
Professional empowerment	4.06	81.2	2

6. DISCUSSION OF RESULTS

The results of the descriptive analysis revealed that the level of virtual training at Abu Dhabi National Oil Company (ADNOC) is high. This finding reflects ADNOC's strategic investment in digital learning platforms, flexible training delivery systems, and advanced virtual training infrastructure. The high mean scores across the dimensions of virtual training—particularly accessibility, flexibility, and platform effectiveness—indicate that virtual training has become an integral component of ADNOC's human capital development strategy rather than a temporary or supplementary solution.

This result is consistent with the findings of Margherita and Bua (2021) and Kohnke (2022), who emphasized that large industrial organizations increasingly rely on virtual training to ensure continuous learning and skill development in technologically intensive environments. Similarly, Salas et al. (2022) confirmed that virtual training systems are particularly effective in high-risk industries, where flexibility and simulation-based learning are essential. The alignment of the current findings with previous research suggests that ADNOC's virtual training practices reflect international best practices in digital learning within the energy sector.

The findings related to the second objective indicate that the level of professional empowerment of human capital at ADNOC is also high. Employees reported strong perceptions of professional competence, self-confidence, autonomy, and participation, which suggests that the organizational environment supports empowered work practices. The high level of empowerment reflects ADNOC's emphasis on developing employees' capabilities and enabling them to perform complex tasks with confidence and responsibility.

These results are in line with Saks and Gruman (2021) and Kim and Beehr (2022), who found that empowerment-oriented training practices enhance employees' sense of competence and autonomy. Moreover, Al-Romeedy (2024) highlighted that empowerment is a critical outcome of effective training systems in energy-sector organizations, where employees must frequently make informed decisions under challenging operational conditions. The consistency between the present study and prior research confirms that professional empowerment is a key indicator of effective human capital development in ADNOC's operating context.

The correlation and regression analyses demonstrated a strong and statistically significant positive impact of virtual training on the professional empowerment of human capital at ADNOC. The high correlation coefficient and the substantial explanatory power of the regression model indicate that virtual training accounts for a significant proportion of variance in empowerment outcomes.

This finding confirms that virtual training is not only associated with empowerment but serves as a major driver of professional empowerment within the organization.

This result strongly supports previous empirical studies. For instance, Noe et al. (2021) and Dirani et al. (2023) found that technology-based training significantly enhances employee empowerment by improving self-efficacy and participation in learning processes. Additionally, Bell et al. (2023) demonstrated that immersive virtual training strengthens employee confidence and decision-making capabilities. The agreement between these studies and the current findings highlights the critical role of virtual training in translating learning opportunities into tangible empowerment outcomes.

When considered collectively, the results of this study indicate that virtual training serves as a strategic enabler of professional empowerment at ADNOC. The high levels of virtual training implementation and professional empowerment, combined with the strong statistical relationship between them, suggest that virtual training enhances employees' skills, autonomy, and confidence in a manner that supports organizational performance and sustainability.

These findings align with the human capital development perspective, which views training as a long-term investment rather than a short-term operational expense. They also reinforce the argument that virtual training is particularly effective in large, complex, and safety-sensitive organizations such as ADNOC, where continuous learning and empowerment are essential for operational excellence. Overall, the results underscore the importance of integrating virtual training into broader human resource development strategies to maximize its empowering effects on human capital.

Based on the statistical analysis and discussion of findings, the study reached the following results:

1. The level of virtual training at Abu Dhabi National Oil Company (ADNOC) was found to be high, indicating effective adoption of digital training platforms and flexible learning systems.
2. The level of professional empowerment of human capital at ADNOC was also high, reflecting strong employee perceptions of competence, autonomy, confidence, and participation.
3. There is a strong positive and statistically significant correlation between virtual training and professional empowerment of human capital.
4. Virtual training has a statistically significant and substantial impact on professional empowerment, explaining a large proportion of variance in empowerment outcomes.
5. Virtual training contributes directly to enhancing employees' professional skills, confidence, and readiness to assume greater responsibility in the workplace.

7. CONCLUSION AND RECOMMENDATIONS

This study examined the level of virtual training and its role in the professional empowerment of human capital at Abu Dhabi National Oil Company (ADNOC) using a quantitative, applied research approach. The findings revealed that ADNOC has achieved a high level of virtual training implementation, supported by advanced digital platforms, flexible access to training programs, and well-designed training content. These practices reflect the organization's strategic orientation toward continuous learning and workforce development in a technologically advanced and safety-critical industry.

Furthermore, the results confirmed that professional empowerment of human capital at ADNOC is perceived at a high level, particularly in terms of professional competence, self-confidence, and autonomy. Most importantly, the study demonstrated a strong and statistically significant positive impact of virtual training on professional empowerment. This indicates that virtual training is not merely a learning delivery tool, but a strategic mechanism that enhances employees' capabilities, confidence, and participation in professional roles. Accordingly, the study concludes that virtual training plays a vital role in strengthening human capital empowerment and supporting sustainable organizational performance at ADNOC.

Considering the study results, the following recommendations are proposed:

1. ADNOC should continue expanding and upgrading its virtual training platforms, with greater emphasis on immersive technologies such as simulations and virtual reality to enhance experiential learning.
2. Continuous evaluation of virtual training content should be conducted to ensure alignment with job requirements, technological advancements, and strategic organizational goals.
3. ADNOC should strengthen managerial support and encouragement for virtual training participation to further enhance employee engagement and empowerment outcomes.
4. Specialized training programs should be designed to focus explicitly on empowerment-related competencies, such as decision-making, problem-solving, and leadership skills.
5. Future research is recommended to adopt longitudinal and mixed-method approaches to examine the long-term impact of virtual training on empowerment, performance, and organizational sustainability within the energy sector.

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