

Research Article

Exploring The Role of Knowledge, Training and Skill on Employee Productivity Enhancement: Mediating Role of Employee Security

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Submitted: 13 January 2024 | Revised: 05 April 2024 | Accepted: 29 April 2024 | Published: 30 June 2024

Abstract: Employee safety plays a crucial role in the enhancement of employee productivity, which subsequently affects organisational performance. The objective of the current study was to examine the effects of employee safety knowledge, safety training, and employee safety skills on employee security. Additionally, the study explored the mediating role of employee security between employee safety knowledge, safety training, employee safety skills, and employee productivity. Furthermore, it investigated the moderating role of security awareness in the relationship between employee security and productivity. A cross-sectional research design employed for data collection. The target population comprised employees of petrochemical firms based in Saudi Arabia. Data gathered using a questionnaire developed from previous studies and analysed using SPSS. The study's results revealed that employee safety knowledge, safety training, and safety skills significantly affect employee security. Moreover, employee security found to have a positive and significant impact on productivity. Employee security also significantly mediates the relationship between the independent variables and productivity. Additionally, the moderating effect of security awareness on the relationship between employee security and productivity was significant. The study suggests that managers aiming to enhance employee productivity should focus on safety training, safety knowledge, safety skills, and employee safety awareness. Furthermore, the findings provide a roadmap for policymakers in Saudi Arabia to develop strategies for improving employee safety, which in turn could increase productivity.

Keywords: Employee Safety Training, Employee Safety Knowledge, Employee Safety Skill, Employee Security, Employee Safety Awareness.

1. Introduction

Workplace safety is a critical aspect of organisational management, playing a key role in protecting workers from potential hazards [1]. It is also essential for ensuring the well-being of employees. Organisations implement various measures to prevent illness, injuries, and accidents among their workers. Addressing health-related issues is crucial because employee health directly affects organisational productivity [2]. The health of workers influenced by several factors, including weak supervision, an unhealthy environment, limited training opportunities, first aid facilities, occupational hazards, diseases, accidents, and injuries. In today's dynamic business environment, many organisations neglect safety and health practices, which can hinder sustainable growth [3]. Researchers have identified various factors affecting workplace safety and security because these factors directly influence worker output, satisfaction, and efficiency. Safety considered one of the fundamental human needs. Without adequate safety and security at work, job satisfaction is likely to suffer. Working conditions are among the most significant factors contributing to employee safety and security.

Occupational safety and health encompass procedures, practices, and policies designed to protect employees from potential hazards and ensure their physical well-being [4]. Organisations that prioritise employee safety and health are committed to improving workplace conditions. They recognise the importance of maintaining a safe working environment. A culture of workplace safety benefits both employees and the organisation. When employees develop a positive perception of organisational safety systems, they are more likely to adhere to safety procedures and rules [5]. Employees who are motivated, skilled, and knowledgeable in safety practices are generally in better psychological and physical health, which enhances their performance. Furthermore, employee training can strengthen safety perceptions, skills, and knowledge [6].

Safety training provides crucial information about legal rights, risks, and hazards, enabling employees to perform their jobs safely and healthily. It is a fundamental legal requirement for organisations and a key criterion for those implementing safety management systems. The primary aim of training is to equip employees with the necessary safety skills and knowledge, thereby achieving occupational and operational

safety goals through appropriate safety behaviour [7]. In the petrochemical sector in Saudi Arabia, which serves global needs, it is imperative to focus on factors that enhance employee productivity and organisational performance by improving employee security. This study investigates the impact of employee safety training, safety knowledge, and safety skills on productivity, with a focus on the mediating role of employee security and the moderating role of employee security awareness.

2. Literature Review

2.1 Employee Security and Productivity

Literature defines employee productivity as the amount of output an employee produces within a specified period [8]. Some researchers have addressed the concept of employee security in this context. The origins of employee security closely related to issues of absenteeism. Conversely, productivity may diminished if employees take longer to complete their tasks. Various factors can contribute to employee loss, including psychological and physical issues [9]. The objective of employee security at the workplace is to create an environment that maintains the highest levels of social, mental, and physical well-being for employees [10]. The primary focus is to minimise and control hazards to ensure workplace safety. Implementing an employee security policy is crucial to protect personal safety, safeguard information, and foster a productive environment. Effective security measures help prevent unauthorised access to information, reduce fraud and theft, and enhance overall employee well-being. Secure workplaces attract potential workers and are more successful in retaining employees concerned about their physical and mental health.

Furthermore, security and safety protocols help minimise disruptions caused by various factors [11, 12]. Mental well-being also supported in organisations that are free from bullying, discrimination, and harassment. Scholars have noted several economic costs associated with workplace security measures. Workplace, accidents affect millions of individuals and in some cases have resulted in fatalities. Additionally,

employee performance can suffer due to inadequate safety protocols. Researchers have highlighted that the absence of employee safety programmes, such as insurance, emergency management, safety training, and ergonomic safety measures, negatively affects employee performance [13, 14]. In some industries, employee performance significantly reduced when workers feel insecure and unprotected from workplace incidents. Studies by Risman [15] and Bartol [16] provide evidence that employee security has a direct and significant impact on employee productivity. These studies revealed that employees feel more comfortable and safe in workplaces that offer necessary healthcare facilities. Furthermore, the research concluded that workplace security positively influences employee performance, with security measures leading to improved performance [17]. Therefore, it is hypothesised that.

H1: Employee Security has a positive effect on Employee Productivity.

2.2 Employee Safety Knowledge and Employee Security

Literature has defined employee safety knowledge as the awareness and understanding employees have regarding safety regulations, procedures, and protocols within an organisation [18]. This knowledge encompasses employees' understanding of workplace hazards, the correct use of safety equipment, and the steps required to prevent workplace accidents. Such awareness is crucial for creating an efficient, compliant, and secure workplace environment. Some studies have characterised safety knowledge as employees' ability to comprehend and apply safe operating instructions and procedures, supported by appropriate safety training [19]. It is essential for employees to be willing to exhibit safe behaviour, which reduces the likelihood of workplace accidents. Moreover, a safety culture at the workplace can be fostered by ensuring adherence to safety regulations, thereby enhancing employee productivity [11, 20]. An organisation's safety management system consists of a set of practices and policies designed positively influence employees' behaviour and attitudes towards unsafe acts and risks in the workplace [21].

Acquiring safety knowledge positively alters employees' attitudes, enabling them to better understand and adhere to organisational security procedures. This enhanced understanding fosters a culture of safety and shapes employees' attitudes towards safety protocols. Safety knowledge is a crucial tool for achieving both long-term and short-term workplace goals, benefiting both employees and organisations [22]. Employee performance influenced by their safety knowledge. An improved understanding of dangerous procedures and associated risks allows employees to adopt methods to prevent potential harm, thereby enhancing security. The implementation of an effective safety management system motivates employees by ensuring they are aware of hazards [23, 24]. A secure workplace environment fostered through a proper understanding of safety protocols, leading to a reduction in workplace accidents [23]. The study by Vinodkumar and Bhasi [25] also assessed the impact of safety knowledge on employee security and found a positive relationship between them. Similarly, the research by Mousavi [26] reported a positive effect of safety knowledge on employee security.

H2: Employee Safety Knowledge has a positive effect on Employee Security.

Employee security plays a crucial role in connecting employee knowledge with productivity. Workers are more likely to assimilate and apply knowledge effectively when they feel secure. The organisational environment is instrumental in learning safety protocols [27]. The application of safety knowledge helps reduce workplace accidents, which subsequently enhances employee productivity. Employees' confidence bolstered when they assured of their safety from potential hazards. Safety knowledge acquired through training provides essential practical insights that are critical for minimising workplace accidents. By reducing disruptions and accidents, employees' focus improves, and an organisational culture that promotes workplace security can be developed [28]. Therefore, employee security functions as a bridge between employee safety knowledge and employee productivity. Previous studies, such as those by Huang [29], have demonstrated the mediating role of employee security. Additionally, Risman [15] highlighted the significant impact of employee security on productivity. Based on this, we hypothesise that.

H3: Employee Security mediates between Employee safety knowledge and Employee Productivity.

2.3 Employee Safety Training and Employee Security

Employee safety training designed to equip employees with the skills and knowledge necessary to perform their tasks safely. Effective workplace

safety plans include guidelines and instructions for identifying potential hazards, reporting them, and managing them [30]. The technical training related to health and safety that organisations must provide evolves according to the sector in which they operate. Each company and sector has unique technical training requirements [31]. Additionally, safety training fosters a culture of safety within the organisation. Regular reminders and training on safety protocols make employees more proactive and vigilant in recognising and addressing potential risks, thereby enhancing workplace safety. Safety training encompasses various aspects, including stress management, manual handling, fire drills, first aid training, personal hygiene, and job orientation [32].

To foster safe work behaviour among employees, their work attitude is a critical factor. Safety training courses may vary for different industries, and each organisation has its own safety culture and expectations regarding safety behaviour. The provision of quality information and training on safety significantly contributes to higher employee motivation to adhere to safety practices. Management support is also crucial for the effective implementation of safety training initiatives. Sharma and Mishra [6] suggested that safety training enhances employees' knowledge acquisition. It is essential for ensuring health and safety within an organisation and should commence as soon as employees recruited. This proactive approach is important for reducing the likelihood of workplace accidents [33, 34]. Providing training on safety protocols is vital for improving employee security. It is equally important to implement additional security measures such as alarm systems, access control systems, and security cameras [22]. Effective safety training significantly affects employee security by minimising hazards and reducing the likelihood of injuries and accidents, thereby contributing to a safer work environment. These findings empirically supported by the studies of Mashia [35] and Sari [36], which highlight the positive effect of employee safety training on employee security.

H4: Employee Safety Training has a positive effect on Employee Security.

Employee training is crucial in shaping security behaviours, which subsequently affect employee productivity. Employees are more likely to engage in safety training in a secure work environment. Wang [37] emphasised the importance of implementing security protocols to enhance employee productivity. A secure work environment allows employees to focus more effectively on their tasks, leading to increased productivity. Organisations should incorporate security protocols into their daily routines. A stable work environment reduces risks for employees, making the workplace more efficient and effective. Moreover, a secure environment fosters trust between employees and employers, leading to smoother operations and enhanced performance [38, 39]. Thus, employee security serves as a bridge between employee safety training and productivity. Huang [40] highlighted the mediating role of employee security in their research. Additionally, Mandago and Anusu [17] reported a significant effect of safety training on employee security.

H5: Employee Security mediates between Employee Safety Training and Employee Productivity.

2.4 Employee Safety Skill and Employee Security

Employee skills are crucial for survival in a competitive marketplace, with the demand for skilled professionals continually rising. In particular, the role of safety professionals is of paramount importance compared to other professions. Organisations seek employees with safety, academic, participative, and occupational skills to thrive in a competitive environment [41]. Workplace safety encompasses the behaviours, attitudes, and knowledge required to maintain a healthy and safe working environment. These skills are essential for preventing workplace hazards, injuries, and accidents. Employees must be adept at taking appropriate actions during emergencies, understanding safety protocols and procedures, and recognising potential risks [42]. To develop safety skills among employees, a proactive approach is necessary, which involves promoting, implementing, and understanding safety measures within the organisation. A robust foundation of safety skills can be cultivated through various safety measures, staying informed, and maintaining a proactive mind-set. Safety skills affect numerous aspects of workplace safety. In which including incident investigation, education and training, behavioural safety, implementation of safety procedures, recognition of safety signs, confined space entry, fall prevention, chemical handling, electrical safety, manual handling, fire safety, hygiene and health, hazard reporting, equipment operation, personal protective equipment, communication skills, emergency response, risk assessment, feedback provision, continuous improvement, crisis management, and incident investigation [43, 44].

Employees can also acquire necessary skills through education, which enhances their ability to perform daily tasks efficiently and safely, contributing to overall employee security. By implementing physical

security measures, managers can create a secure and safe workplace environment. Measures such as access control systems and security cameras are part of this approach [45]. Safety skills encompass knowledge and information relevant to worker safety and performance. Previous studies have highlighted how safety skills contribute to personal growth and improved workplace safety and security. Skilled employees are crucial for the success of an organisation. Research by Muñoz-Comet and Arcarons [46] and Bayram [19] demonstrated that employees' skills, knowledge, and safety training are vital for reducing accidents and enhancing employee security. Additionally, Glesner [47] revealed a synergy between employee safety skills and employee security, showing that skilled employees contribute effectively to organisational safety measures. Increasing safety skills among employees can further enhance their security [48].

H6: Employee Safety Skill has a positive effect on Employee Security.

To cultivate an organisational environment that maximises productivity and maintains a stable work setting, prioritising employee security is essential. The implementation of security measures significantly reduces the likelihood of risks [49]. When employees feel secure, they focused on their tasks, which enhances both their productivity and that of the organisation. Additionally, the trust between the organisation and its employees strengthened through security measures, leading to increased employee loyalty. Moreover, developing employees' skills enhances their security and encourages them to perform their roles more efficiently [50]. Opportunities for skill development that address security issues are crucial for boosting productivity. A secure work environment, characterised by fewer injuries and accidents, positively influences employee performance, thereby maximising productivity. Enhanced employee security measures lead to increased confidence among employees, further improving their productivity [28, 51]. Huang [29] identified the mediating role of employee security in the relationship between safety climate and employee safety control. Furthermore, Glesner [47] highlighted a positive association between employee safety skills and employee security. Based on these findings, we hypothesise that.

H7: Employee Security mediates between Employee Safety Skills and

Productivity.

2.5 Security Awareness as Moderator

The security provision strategy of an organisation hinges on the physical security of its employees. Often, security breaches at the workplace result from human negligence and errors. Increasing security awareness among employees helps organisations ensure that staff remain vigilant regarding security hazards and breaches [28]. Furthermore, this awareness extends to recognising potential risks to assets, facilities, and employees at work [52]. Employee security relies on various measures designed to protect individuals, facilities, and physical assets from vandalism, theft, and potential harm. Implementing a comprehensive training programme is essential to equip workers with the necessary skills and knowledge to safeguard organisational assets. Cultivating an organisational culture of security awareness enhances resilience by reducing the likelihood of security incidents. Additionally, awareness plays a crucial role in preparing employees to respond effectively to accidents and potential risks. A security culture at the workplace helps in fostering safety awareness among employees [53]. When employees are aware of security risks, the probability of workplace accidents reduced. Conversely, security awareness positively affects employee productivity [54]. Increased awareness of potential risks contributes to developing a robust security culture, minimising errors, and improving employee vigilance concerning security issues. Studies by Risman [15] highlighted the relationship between employee security and productivity. However, inconsistencies in the relationship between security and productivity have been noted by Mandago and Anusu [17] and Bartol [16], indicating a need for a moderator to strengthen this relationship. Additionally, security awareness has identified as a moderator in studies by Alfalah [55]. This study therefore examines the role of security awareness as a moderator, hypothesising that.

H8: Security Awareness moderates among Employee Security and Productivity.

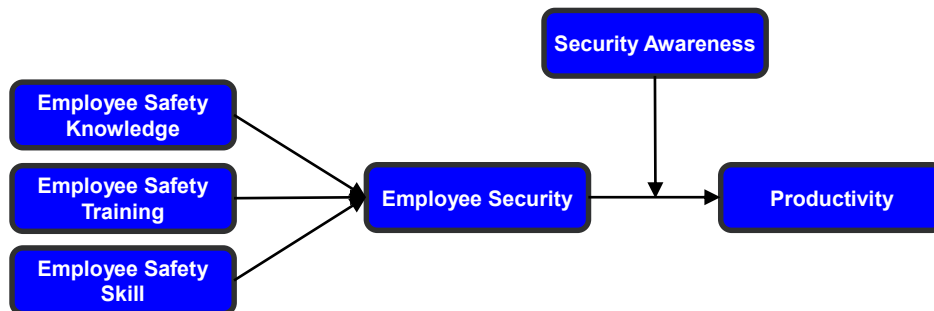


Figure 1: Framework.

3. Methodology

In this study, a quantitative research methodology employed for data collection. The target population comprised employees within the petrochemical sector in Saudi Arabia (KSA). To select samples from this population, a simple random sampling technique was utilised. This technique commonly applied in data collection when the total population is unknown [56]. Data collected using a questionnaire, with a survey methodology adopted for this purpose. The questionnaire divided into two sections: the first section addressed demographic characteristics, while the second section comprised questions related to the measurement items of the variables under study. The instrument disseminated to respondents via Google Forms and through direct distribution. The researcher contacted respondents multiple times, providing brief explanations about the study's concepts and objectives. To ensure confidentiality and privacy, the researcher obtained consent from respondents before requesting them to complete the survey. Respondents were encouraged to seek clarifications and further explanations as needed. Out of 350 distributed questionnaires, 270 returned.

3.1 Measurements

The hypothesised model in this study included six variables. The researcher employed well-established scales, each demonstrating robust reliability and validity in prior research. A five-point Likert scale was utilised for measuring all variables, ranging from 01 (strongly disagree) to 05 (strongly agree). Safety training assessed using a four-item scale developed

by Bayram [19]. Employee security evaluated with a four-item scale adapted from Tan [57]. Safety knowledge measured using a six-item scale from Bayram [19]. Safety skills gauged with a four-item scale provided by Bayram [58]. Employee productivity measured with an eleven-item scale, and security awareness assessed using a six-item scale from Shah [59].

3.2 Data Screening, Analysis and Demographics

Following the data collection, the researcher conducted data screening procedures to prepare the dataset for further analysis. Missing value analysis performed using SPSS, where missing values imputed with the mean of the respective variables. Questionnaires with more than 40 per cent missing values excluded from the dataset and outliers removed. Consequently, 235 responses deemed suitable for further analysis. SPSS, being an effective tool for analysing complex thematic models, employed for data analysis. Its capability to perform multiple tests simultaneously facilitated the comprehensive examination of the data. Understanding the demographics of respondents is crucial for uncovering underlying mechanisms and relationships, as well as for ensuring the transparency and integrity of the research findings. Additionally, demographic analysis provides a basis for other researchers critically evaluate the robustness of the study [60]. Regarding the demographic characteristics of the respondents, 20.4% were female and 79.6% were male. In terms of age distribution, 14% were between 16 and 24 years old, 29% were between 24 and 32 years old, 23.4% were between 40 and 48 years old, and 10.6% were over 48 years old. Concerning educational attainment, 43.3% of the respondents held an undergraduate degree, 40% were graduates, and 16.6% had completed postgraduate education.

Table 1: Demographic Characteristics.

| | Categories | Frequency | Percentage |
|-----------|---------------|-----------|------------|
| Gender | Female | 48 | 20.4% |
| | Male | 187 | 79.6% |
| Age | 16–24years | 33 | 14.0% |
| | 24– 32years | 68 | 29.0% |
| | 32– 40 years | 55 | 23.4% |
| | 40– 48 years | 54 | 23% |
| | > 48 years | 25 | 10.6% |
| Education | Undergraduate | 102 | 43.4% |
| | Graduate | 94 | 40.0% |
| | Postgraduate | 39 | 16.6% |

3.3 Correlation and Descriptive

In predictive analysis, understanding the correlation among variables enhances the effectiveness of forecasting. It facilitates comprehension of the interrelationships among the variables under study, thereby aiding in data structure analysis and interpretation. This, in turn, supports effective managerial decision-making based on data analytics [61]. Table 2 presents the correlations among the variables in the hypothesised model. The correlation between Safety Training (ST) and Employee Security (ES) is 0.32, significant at the 1% level. The correlation between ST and Safety Knowledge (SK) is 0.29, significant at the 5% level. The correlation between ST and Safety Skills (SS) is 0.31, significant at the 1% level. The correlation between ST and Safety Awareness (SA) is 0.40, significant at the 1% level. The correlation between ST and Productivity (PR) is 0.45, significant at the 1% level. The correlation between ES and SK is 0.39, significant at the 1% level. The correlation between ES and SA is 0.28, significant at the 1% level. The correlation between ES and PR is 0.45, significant at the 1% level. The correlation between SK and SS is 0.20, significant at the 1% level. The correlation between SK and SA is 0.46, significant at the 1% level. The correlation between SK and PR is 0.28, significant at the 5% level. The correlation between SS and SA is 0.30, significant at the 1% level. The correlation between SS and PR is 0.37, significant at the 1% level. Finally, the correlation between SA and PR is 0.38, significant at the 1% level.

Table 2: Correlation.

| | 1 | 2 | 3 | 4 | 5 | 6 |
|-----------|--------|--------|--------|--------|--------|---|
| ST | 1 | | | | | |
| ES | 0.32** | 1 | | | | |
| SK | 0.29* | 0.39** | 1 | | | |
| SS | 0.31** | 0.36** | 0.20** | 1 | | |
| SA | 0.40** | 0.28* | 0.46** | 0.28* | 1 | |
| PR | 0.45** | 0.30** | 0.51** | 0.37** | 0.38** | 1 |

*Significant at 5% **Significant at 1%

3.4 Factor Loading

The researcher conducted a confirmatory factor analysis (CFA) to determine the factor loadings and evaluate the degree to which each factor contributes to the variation in the dependent variable. CFA performed using AMOS software, which allowed for the computation of these loadings. The results presented in Table 3, demonstrating that all factors have loadings exceeding 0.60 [62]. According to Table 3, the factor loadings for all four items of Safety Training (ST) range from a minimum of 0.772 to 0.876, each exceeding the threshold of 0.60. Employee Security (ES), measured with a four-item scale, shows loadings between 0.708 and 0.839. Safety Knowledge (SK), assessed with a six-item scale, has factor loadings ranging from 0.645 to 0.891. Safety Skills (SS), measured with a six-item scale, exhibit loadings between 0.717 and 0.882. Safety Awareness (SA), evaluated using a six-item scale, has factor loadings between 0.784 and 0.865. Employee Productivity (PR), measured with an eleven-item scale, shows factor loadings ranging from 0.701 to 0.898. All variables demonstrate construct reliability greater than 0.70, and the average variance extracted (AVE) is above 0.50, indicating robust measurement properties [64].

Construct reliability ensures the consistency of results [63], while validity confirms that the designed questionnaire and scales measure what they are intended to measure. For accurate results, it is crucial to assess both the reliability and validity of the construct, as they are fundamental to the accuracy and quality of research. To establish the instrument's discriminant validity, the Average Variance Extracted (AVE) values on the diagonal of the table compared with the squared correlations below the diagonal. For discriminant validity to be established, the AVE values on the diagonal must be greater than the values below the diagonal [64]. Reliability is assessed using Cronbach's alpha, where a value greater than 0.70 indicates acceptable reliability

[65]. The data in the table demonstrates that all variables have Cronbach's alpha values exceeding 0.70, confirming that the data is reliable and suitable for further analysis.

Table 3: Factor Loadings, Average Variance Extracted and Construct Reliability.

| Measure | ST | ES | SK | SS | SA | PR | AVE | CR |
|------------------------------|------|------|------|------|------|------|------|------|
| Safety Training | | | | | | | 0.72 | 0.91 |
| ST1 | .876 | | | | | | | |
| ST2 | .860 | | | | | | | |
| ST3 | .875 | | | | | | | |
| ST4 | .772 | | | | | | | |
| Employee Security | | | | | | | 0.60 | 0.86 |
| ES1 | | .813 | | | | | | |
| ES2 | | .839 | | | | | | |
| ES3 | | .745 | | | | | | |
| ES4 | | .708 | | | | | | |
| Safety Knowledge | | | | | | | 0.61 | 0.90 |
| SK1 | | | .891 | | | | | |
| SK2 | | | .758 | | | | | |
| SK3 | | | .812 | | | | | |
| SK4 | | | .781 | | | | | |
| SK5 | | | .795 | | | | | |
| SK6 | | | .645 | | | | | |
| Safety Skill | | | | | | | 0.63 | 0.87 |
| SS1 | | | | .882 | | | | |
| SS2 | | | | .827 | | | | |
| SS3 | | | | .739 | | | | |
| SS4 | | | | .717 | | | | |
| Safety Awareness | | | | | | | 0.67 | 0.92 |
| SA1 | | | | | .784 | | | |
| SA2 | | | | | .848 | | | |
| SA3 | | | | | .835 | | | |
| SA4 | | | | | .786 | | | |
| SA5 | | | | | .799 | | | |
| SA6 | | | | | .865 | | | |
| Employee Productivity | | | | | | | 0.63 | 0.94 |
| PR1 | | | | | | .735 | | |
| PR2 | | | | | | .891 | | |
| PR3 | | | | | | .780 | | |
| PR4 | | | | | | .788 | | |
| PR5 | | | | | | .898 | | |
| PR6 | | | | | | .701 | | |
| PR7 | | | | | | .765 | | |
| PR8 | | | | | | .780 | | |
| PR9 | | | | | | .723 | | |
| PR10 | | | | | | .853 | | |
| PR11 | | | | | | .881 | | |

Table 4: Construct Reliability and Discriminant Validity.

| | 1 | 2 | 3 | 4 | 5 | 6 | α |
|-----------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| ST | 0.72 | | | | | | 0.89 |
| ES | 0.10** | 0.60 | | | | | 0.87 |
| SK | 0.08* | 0.15** | 0.61 | | | | 0.79 |
| SS | 0.09** | 0.13** | 0.04** | 0.63 | | | 0.88 |
| SA | 0.16** | 0.07* | 0.21** | 0.08* | 0.67 | | 0.80 |
| PR | 0.20** | 0.09** | 0.26** | 0.14** | 0.14** | 0.63 | 0.78 |

*Diagonals have the AVE and the Values below the Diagonal are the Squared Correlation

3.5 Hypothesis Testing

For the testing of the hypothesised model, the researcher utilised SPSS. The analysis conducted in two stages. In the first stage, all direct hypotheses were tested. This involved examining the direct effects of safety training, safety knowledge, and safety skill on employee security. Additionally, the direct effect of employee security on employee productivity assessed. In the second stage, the analysis focused on the indirect hypotheses, particularly the mediating role of employee security. This stage tested how employee security mediates the relationships between safety training, safety knowledge, safety skill, and employee productivity. Table 5 outlines the direct effects of the independent variables on the dependent variable. The effect of safety training on employee security found to be 0.36, which is significant at the 1% level, with a T-value of 9.16 and a p-value of 0.000. The direct effect of safety knowledge on employee security was 0.57, also significant at the 1% level, with a T-value of 9.83 and a p-value of 0.000. Safety skill had a significant effect on employee security, with a beta value of 0.47, significant at the 1% level, a T-value of 8.24, and a p-value of 0.000. Furthermore, employee security positively and significantly influenced employee productivity, with an effect size of 0.39, significant at the 1%

level, a T-value of 6.70, and a p-value of 0.000. Thus, all independent variables have a positive and significant effect on the dependent variable.

Table 5: Direct Effects.

| Independent Variable | Dependent Variable | Standardized β | Sig | T Value |
|----------------------|-----------------------|----------------------|-------|---------|
| Safety Training | | 0.36 | 0.000 | 9.16 |
| 1 Safety Knowledge | Employee Security | 0.57 | 0.000 | 9.83 |
| Safety Skill | | 0.47 | 0.000 | 8.24 |
| 2 Employee Security | Employee Productivity | 0.39 | 0.000 | 6.70 |

3.6 Indirect Effects

At this stage, the researcher examined the mediating role of employee security in the relationships between safety training and employee productivity, safety knowledge and employee productivity, and safety skill and employee productivity. Employee security found to be positively and significantly mediate the relationship between safety training and employee productivity, with a mediation magnitude of 0.14, significant at the 5% level, a p-value of 0.030, and a T-value of 5.23. Similarly, employee security positively and significantly mediated the relationship between safety knowledge and employee productivity, with a magnitude of 0.22, significant at the 1% level, a p-value of 0.000, and a T-value of 4.67. Additionally, employee security positively and significantly mediated the relationship between safety skill and employee productivity, with a magnitude of 0.18, significant at the 5% level, a T-value of 3.81, and a p-value of 0.041.

Table 6: Indirect Effects of Mediation on Job Performance.

| Independent Variable | Dependent Variable | Mediator | Standardized β | Sig | T Value |
|----------------------|-----------------------|-------------------|----------------------|-------|---------|
| Safety Training | | | 0.14 | 0.030 | 5.23 |
| 3 Safety Knowledge | Employee Productivity | Employee Security | 0.22 | 0.000 | 4.67 |
| Safety Skill | | | 0.18 | 0.041 | 3.81 |

3.7 Moderation Analysis

After testing for mediation, the researcher conducted a moderation analysis using the PROCESS macro developed by Hayes [66], which is an effective tool for calculating moderation effects. The analysis focused on the moderating role of security awareness in the relationship between employee security and employee productivity. The results indicate that security awareness significantly moderates the effect of employee security on employee productivity. At a low level of the moderator, the moderation effect of security awareness is 0.27, significant at the 1% level with a p-value of 0.000. The 95% confidence interval for this effect ranges from 0.1932 to 0.4558. At a high level of the moderator, the effect is 0.47, also significant at the 1% level with a p-value of 0.000, and the 95% confidence interval ranges from 0.3172 to 0.4558. Thus, the moderation effect of security awareness is both positive and significant.

Table 7: Moderation of Coercive Pressure.

| Independent Variable | Dependent Variable | Moderator | Effects | T-Value | P-Value | LLCI | ULCI |
|----------------------|-----------------------|------------------|---------|---------|---------|---------|--------|
| Employee Security | Employee Productivity | Low value of AW | 0.27 | 2.98 | 0.0000 | 0.19320 | 0.4558 |
| | | High Value of AW | 0.47 | 6.03 | 0.0000 | 0.31720 | 0.4558 |

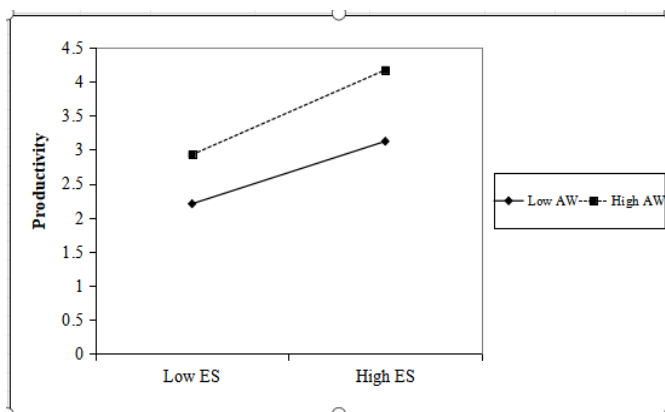


Figure 2: Moderation of Security Awareness on the Effect of Employee Security and Employee Productivity.

Table 9: Results Summary.

| S.no | Hypothesis | Type | Result |
|------|---|----------|-----------|
| 1 | Safety Training positively significantly effects the Employee Security | Direct | Supported |
| 2 | Safety Knowledge significantly positively affect the Employee Security | Direct | Supported |
| 3 | Safety Skill significantly positively affect the Employee Security | Direct | Supported |
| 4 | Employee Security significantly positively affects Employee Productivity | Direct | Supported |
| 5 | Employee Security positively significantly mediates the relationship between Safety Training and Employee Productivity | Indirect | Supported |
| 6 | Employee Security positively significantly mediates the relationship between Safety Knowledge and Employee Productivity | Indirect | Supported |
| 7 | Employee Security positively significantly mediates the relationship between Safety Skills and Employee Productivity | Indirect | Supported |
| 8 | Security Awareness positively and significantly moderates the effect of Employee Security on Employee Productivity | Indirect | Supported |

4. Discussion

Ensuring the safety of employees in the workplace is crucial for enhancing their productivity. When employees feel secure at work, they are more likely to focus on their tasks, leading to effective and efficient achievement of their goals. Employee safety affects both their personal and professional lives, making it a vital concern in all industries, including the petrochemical sector in KSA. Workers in this sector often engage in field activities where potential hazards and injuries are prevalent. Therefore, it is essential for firms to identify factors that can enhance both productivity and security. This study conducted to analyse the impact of employee safety knowledge, safety training, and safety skills on employee security and productivity. The study's findings reveal that employee security significantly affects productivity. Respondents reported receiving comprehensive information about their work sites, leading them to feel confident that their work environment is safe. They believe that the organisations have taken all necessary actions to ensure their security, and they do not perceive on-site work as risky or intimidating.

As a result, employees feel secure, which allows them to concentrate on their tasks and goals, ultimately improving their work quality and productivity. Respondents noted that the improved safety at the workplace has enhanced overall output, allowing them to work effectively even under less-than-ideal conditions. They also highlighted that their ability to meet deadlines and the quality of their work have improved, contributing to increased customer satisfaction. Additionally, employees feel well prepared to handle accidents, aligning with the findings of Mandago and Anusu [17]. The study further demonstrates that employee safety knowledge has a significant positive effect on employee security. Knowledge of safety helps employees recognise and address workplace hazards, enabling them to take appropriate security measures. Respondents indicated that they well informed about performing job activities safely, using equipment correctly, and maintaining organisational security. They also understand how to minimise the risk of accidents and trained in reporting protocols for incidents.

These findings are consistent with those reported by Ndubuisi [23]. Additionally, the study confirms that employee safety training positively affects employee security. This aligns with the results of Sari [36], as respondents reported receiving necessary safety training on technical and health issues. The training includes regular updates and special sessions to adapt tasks for safety. Employees also trained on safety measures and risks at the outset of their employment. The study also underscores the importance of employee safety skills in shaping employee security, a finding supported by Bayram [19]. Respondents demonstrated competence in performing risky tasks and handling dangerous situations, reflecting their extensive safety training. Safety management personnel are knowledgeable about workplace risks and precautions, and new employees well informed about safety protocols. Finally, the study supports the moderating role of security awareness and the mediating role of employee safety. Security awareness strengthens the relationship between employee security and productivity, confirming the results of Alfalah [55] and Huang [29]. The moderating role of security awareness highlights its importance in enhancing the effect of employee security on productivity.

5. Limitations and Future Studies

This study, like many empirical investigations, has certain limitations. Conducted within the context of the petrochemical industry in

KSA, the findings may not be fully generalizable to other sectors or geographic locations. Future research could benefit from applying a similar model to different contexts, such as service sectors like banking or higher education, to broaden the applicability of the findings. Additionally, the sample for this study obtained using a non-probability sampling technique. A key improvement for future research would be to utilise stratified sampling to enhance the representativeness and reliability of the sample. The current study also did not specify the method used to determine the sample size. Future studies should adopt appropriate techniques for sample size determination to ensure robust and reliable results. Data analysis in this study conducted using SPSS. To, potentially enhance the analytical depth; future research might consider using alternative tools such as Smart PLS 4. Furthermore, this study relied solely on quantitative methods for data collection and analysis. Employing a mixed-methods approach in future research could provide a more comprehensive understanding of the phenomena under study. The data for this study collected in KSA, and similar studies could be conducted in different countries, such as Malaysia, to compare results across different geographical contexts. Lastly, while this study discussed the moderating role of employee safety awareness in the latter part of the model, future research might explore its moderating role in the earlier stages of the model to provide additional insights.

6. Theoretical and Practical Implications

The present study offers significant theoretical and managerial implications. Theoretically, it underscores the often-overlooked mediating role of employee security, which has infrequently explored in previous research. Additionally, this study establishes a connection between productivity and employee safety aspects, whereas past studies have predominantly focused on various HR factors to enhance employee and organisational productivity. Notably, this study also pioneers in addressing the moderating role of employee safety awareness in the relationship between employee security and productivity a topic that has scarcely discussed in management literature. Furthermore, it is among the few studies to investigate employee safety knowledge as an independent variable, contributing to a deeper understanding of its impact. From a managerial perspective, the study highlights the crucial role of employee training and safety knowledge in safeguarding employees from accidents and hazards in the petrochemical industry. By emphasising factors that enhance employee security, organisations can significantly improve both employee and organisational productivity. These insights are particularly valuable for policymakers in KSA's petrochemical sector, as they provide a foundation for developing strategies aimed at ensuring employee safety and boosting productivity.

Acknowledgement

This work was supported through the Ambitious Funding track by the Deanship of Scientific Research, Vice Presidency for Graduate Studies and Scientific Research, King Faisal University, Saudi Arabia [Grant KFU242131].

The authors would like to acknowledge and thank Prince Sultan University for its facilities, support and incentives.

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Appendix 1

Table: Details of Items of Variables.

| S.# | Variables | Item | Reference Number |
|-----|-----------------------|--|------------------|
| 1 | Safety Training | <ol style="list-style-type: none"> 1. I have received comprehensive basic safety training covering regulations, health and technical issues 2. I receive safety training to renew and update my information at regular intervals 3. I receive special safety training in the case of change of workplace or task 4. I received training on risks and measures in my workplace when I started at work | [19] |
| 2 | Employee Security | <ol style="list-style-type: none"> 1. Site workers could not get hurt easily. 2. The work at the site is safe. 3. The work at the site is not risky. 4. The work at the site is not scary | [57] |
| 3 | Employee Productivity | <ol style="list-style-type: none"> 1. Employee's quality of work improves overtime with safety procedures. 2. Employees are able to work within the set deadlines. 3. Employees have steadily increased their personal output as they get the safer workplace. 4. Employees are able to work under less than perfect conditions. 5. Overtime we have been able to reduce service cycle time. 6. Employees provide suggestions to enhance their productivity. 7. Employees are eager to learn on ways of making themselves more productive and about safer workplace. 8. Overtime we have increased customer satisfaction with the quality productivity. 9. Employees are able to generate more than an hour's" worth of productivity of each hour with higher safety in workplace 10. Employees have a sense of what to do and when not to do during accidents 11. Employees are able to identify and give top attention to top priorities. | [59] |
| 4 | Safety Skill | <ol style="list-style-type: none"> 1. To what degree are your employees competent in what to do in the face of dangerous, risky, and emergency situations 2. To what degree are your employees trained on occupational safety issues about themselves 3. To what degree your safety management system personnel are knowledgeable about the hazards, risks and precautions to be taken 4. To what degree new entrants are informed about the dangers and risks in the workplace and the rules to be followed | [58] |
| 5 | Safety Knowledge | <ol style="list-style-type: none"> 1. I know how to perform my job in a safe manner 2. I know how to use safety equipment and standard work procedures 3. I know how to maintain or improve workplace health and safety 4. I know how to reduce the risk of accidents and incidents in the workplace 5. I know what are the hazards associated with my jobs and the necessary precautions to be taken while doing my job 6. I don't know what to do and whom to report if a potential hazard is noticed in my workplace | [19] |
| 6 | Employee Awareness | <ol style="list-style-type: none"> 1. Industry has safety policies to follow. 2. Organization has written safety policies that include environmental health and safety procedures and working conditions. 3. The organization's written health and safety policy or programs available to all employees? 4. You are aware of any accidents/ diseases that had occurred in your company for the past 12 months. 5. The organization have procedures for employees for reporting pains or other diseases in relation to the job processes. 6. The organization have an accident book or similar accident record system | [59] |