

Presenting a safety culture model and its impact on improving company performance and reducing employee error at Shazand Petrochemical Company

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ABSTRACT

Safety culture is a set of beliefs, perceptions, and values that employees share regarding risks within an organization, such as the workplace or society. The present study was conducted with the aim of evaluating safety culture and its impact on improving company performance and reducing employee error in Shazand Petrochemical Company. The present study was conducted in two qualitative and quantitative parts. In the qualitative part, 51 components for employee safety culture were first identified by the research literature. The statistical population in the qualitative part is university professors and managers and engineers of Shazand Petrochemical Company, of which 10 people were selected as a sample through purposive and snowball sampling. Then, the components were screened using the Delphi method and finally, in three stages, 41 components for employee safety culture were obtained. These components were categorized into 7 dimensions: individual, psychological, behavioral, situational (organizational), safety Climate, workplace, and participation. In the quantitative part, a questionnaire was designed with 41 questions for safety culture components, two questions for improving company performance, and two questions for reducing employee error. This part was conducted by structural equation modeling. The statistical population to answer the questions of the quantitative part questionnaire is the employees of Shazand Petrochemical Company. The sample size was obtained by random sampling and Cochran formula equal to 348 people. The results of structural equation modeling analysis showed that safety culture has a positive and significant effect on improving company performance and reducing employee error by 0.379 and 0.431, respectively.

KEYWORDS

company performance, employee error, petrochemical, Safety culture

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1. Introduction

Work-related accidents are an inseparable part of the industry, and this issue has been considered in terms of safety worldwide. These accidents affect the health of employees and cause damage to employees and employers by spending money and time [1]. For this reason, it is necessary to take measures to increase safety among industrial employees. To implement safety in industries, there must be a safety culture among employees [2].

Safety culture means a set of characteristics and attitudes in organizations and individuals that determine that safety issues are important as a fundamental priority [2]. Therefore, the risk of accidents is very high, given the high growth of production in the petrochemical industry [3]. Also, since the petrochemical industry is a high-risk industry for employees, paying attention to the issue of safety in this industry is very important. From these explanations, it can be inferred that implementing a safety culture for the petrochemical industry is one of the main concerns of managers and stakeholders in this industry [4]. Therefore, the purpose of the present study is to present a safety culture model and its impact on improving company performance and reducing employee error in Shazand Petrochemical Company.

2. Methodology

The present study is a mixed research (qualitative and quantitative). In the qualitative part, the components identified in the research literature for safety culture were screened using the Delphi method. In the quantitative part, the qualitative part model was tested by structural equation modeling with the partial least squares approach (PLS-SEM) and Smart PLS software.

The statistical population for answering the Delphi questionnaire questions is scientific experts (university professors) and empirical experts (managers and engineers of Shazand Petrochemical Company) who have at least 10 years of relevant work experience. The sample size was obtained by purposive and snowball sampling. According to this method, 10 people were selected to answer the Delphi questionnaire.

The statistical population for answering the questions of the quantitative section of the questionnaire is approximately 3728 employees of Shazand Petrochemical Company. The sample size was obtained by random sampling and the Cochran formula equal to 348 people.

In the qualitative part, the Delphi questionnaire (first stage) was designed with 50 questions based on the

components identified by the research literature. In the second and third stages, based on the removed and added components, the Delphi questionnaire consisted of 45 and 41 questions, respectively. The data collection tool in the quantitative part was a questionnaire designed from the results of the qualitative part.

3. Discussion and Results

In the first stage of Delphi, in the components of competence and control of the workforce, trust among employees, participation of subcontractors, increasing individual motivation, blame, effort in action, and the system of encouragement and punishment, the average value of the experts' opinions was less than 3.5, and therefore these components were eliminated from the research process. Also, the value of the Kendall agreement coefficient in this section was 0.481, which shows a small amount of agreement among the experts. In the first stage of Delphi, two components of honesty and accuracy were suggested by the experts. Therefore, the component of honesty was added to the psychological dimension and the component of accuracy to the behavioral dimension. Thus, in the subsequent stages of Delphi, these two components were also included in the analysis.

In the second stage, in the components of commitment, familiarity with psychological risks, work behavior and implementation of a paperless system, the average value of the experts' opinions was less than 3.5, and therefore these components were eliminated from the research process. Also, the value of the Kendall agreement coefficient in this section was obtained as 0.592, which shows the level of agreement of the experts as medium.

In the third stage, the average value of the experts' opinions in all components was more than 3.5. Also, the Kendall agreement coefficient in this section was 0.635, which indicates a relatively high level of agreement among the experts. Therefore, it can be said that the experts reached an agreement or consensus in the third stage of Delphi. Therefore, the Delphi stages are completed and the quantitative part is carried out with the final 41 components. These components were categorized into 7 dimensions, which are as described in Table 1.

Table 1. Final dimensions identified

Number	Dimensions
1	Individual
2	Mental
3	Behavioral

4	Situational (organizational)
5	Safety atmosphere
6	Work environment
7	Participation

In the quantitative section, a questionnaire was first designed from the final components of employee safety culture identified by the Delphi method. Then, the questionnaire, in addition to questions related to company performance and reducing employee error, was provided to the statistical sample in the quantitative section.

Validity and reliability were confirmed by the measurement model indicators. The validity of the model was also confirmed by the R-squared, Adjusted R-squared, and the value of Q^2 . According to the results of structural equation modeling, all factor loadings were higher than 0.3 and were significant at the 5 percent error level. Based on the results, safety culture has a positive and significant effect on improving company performance and reducing employee error by 0.379 and 0.431, respectively. In other words, safety culture leads to improving company performance and reducing employee error. These results are reported in Table 2.

Table 2. Results of Relationships Between Latent Variables in Structural Equation Modeling

Relationships	Path coefficient	t-statistic
Safety Culture→Improving Company Performance	0.379	2.226
Safety Culture→Reducing Employee Errors	0.431	3.740

4. Conclusions

In many companies or industrial facilities, creating this safety culture is a major challenge in the field of risk prevention and management. Safety culture refers to the values, attitudes, beliefs and behaviors of individuals regarding safety. Organizations with a high safety culture spread these throughout the actions that the organization takes. A high safety culture helps the organization to maintain safe operations. All members of the organization, including managers and employees, should attach importance to the safety culture. This can significantly reduce the risks of accidents. In organizations with a weak safety culture, accidents, especially near misses, are not reported or are not acted upon adequately, and instructions are not followed correctly.

Also, a safety culture leads to improved company performance and reduced employee error. If a petrochemical company has a high safety culture, this safety culture leads to reduced accidents and losses to the company, and as a result, the company's performance, including financial and commercial performance, will improve. Also, because safety culture increases employee safety and leads to a reduction in accidents, it also reduces employee error and reduces injuries to company employees.

5. References

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