

Hierarchical Structure of Small–Medium Enterprise Accidents Contributing to Legal Proceedings Resulting in Judicial Verdicts Using Interpretive Structural Modeling

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Abstract

Aim: The present study aims to identify and model factors influencing accidents in small–medium enterprises based on judicial orders. **Methods:** This study was conducted in two primary phases. The first phase involved analyzing legal documents related to work-related accidents to extract factors influencing accidents in SMEs. In the second phase, interpretive structural modeling (ISM) was employed to hierarchically model these factors and understand their relationships using ISM Excel base software. Ten experts from various Iranian universities and industrial companies participated in the study, contributing to the completion of matrices used in the ISM model. **Results:** In this study, 10 primary factors contributing to accident occurrences in SMEs were identified and categorized into three main groups: Individual factors related to the incident (comprising five subfactors), organizational factors (comprising three subfactors), and conditional factors (comprising two subfactors). The subsequent phase involved modeling the identified factors using the ISM technique. The results revealed that three factors – training, equipment-related factors, and hazardous processes or harsh environments – were placed at level 2, designating them as the key factors influencing accidents. **Conclusion:** The current research demonstrates that in SMEs, conditional and organizational factors like equipment shortcomings, hazardous processes, and insufficient training for workers are key factors in accident occurrences within these systems. Consequently, by controlling these factors, improvements in their safety conditions can be pursued.

Keywords: Accident, interpretive structural modeling, small- and medium-sized enterprises

INTRODUCTION

The growth and development of industries have resulted in both positive and negative outcomes, with one significant negative consequence being the occurrence of workplace accidents.^[1] According to the International Labor Organization (ILO), approximately 2.3 million individuals lose their lives due to work-related accidents annually. In 2019, Europe experienced over 2 million serious accidents and 3425 fatal accidents.^[2] In addition, occupational accident injuries were estimated to be the second leading cause of disability in developing countries and the third leading cause of death and disability globally in 2020. Furthermore, injuries from workplace accidents accounted for 12% of the burden of diseases and had the highest mortality rate from unintentional accidents worldwide. Consequently, preventing industrial accidents has become the primary safety priority in the industry today.^[3] Numerous factors contribute to

the incidence of workplace accidents, encompassing personal, occupational, environmental, organizational, and familial issues.^[4] Many of these factors are latent, and their impact on accident occurrence is challenging to discern. Occupational accidents represent a significant hazard to life. From a safety standpoint, an accident is an unintended event resulting from one or more failures that have an adverse impact on the system, product, equipment, or personnel.^[5] Analyzing

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and modeling the causes of occupational accidents is crucial for prevention programs. A study investigating the causes of occupational accidents in Iran's chemical industry revealed that out of 30 significant factors, 21 played a major role in these accidents. Accident statistics in various countries indicate that the distribution of accidents among at-risk individuals is not uniform, highlighting the human factor as the most significant contributor to occupational accidents.^[6] However, other studies have identified numerous individual factors, lifestyle choices, and work environment conditions as influential factors in the risk of occupational accidents, such as age, smoking, alcohol consumption, physical stress, and the complexity of work.^[7] The expansion of industry, increased use of tools and machinery, noncompliance with construction principles, and lack of familiarity with proper tool usage contribute to accident occurrence. Proper training reduces human accidents and errors, subsequently lowering costs, increasing production, and enhancing product quality. Occupational accidents pose a threat to the lives of numerous individuals in both developing and developed countries annually.^[8]

The findings of a research study revealed that occupational accidents rank as the third leading cause of mortality globally and the second leading cause of death in Iran, following traffic accidents.^[9] Each year, millions of occupational accidents occur worldwide, resulting in fatalities as well as temporary or permanent disabilities. These accidents are a significant contributor to labor loss and the reduction of working hours.^[10] According to a report by the ILO in 2017, there were approximately 374 million occupational accidents, leading to nearly 2.78 million worker fatalities.^[11] Furthermore, ILO statistics indicate that approximately 250 million occupational accidents occur annually worldwide, with a death rate of 14 per 100,000 accidents.^[12] Fatal occupational accident rates in developing countries are 3–4 times higher than those in industrialized nations.^[13] In the European Union, nearly 4000 individuals succumb to occupational accidents each year, while approximately 4 million sustain injuries.^[14] The identification of causes and factors influencing accident occurrences is crucial in preventing their recurrence. This necessitates the recognition of the most significant and impactful causes to implement effective management and engineering measures. In Iran, as in other countries, a similar pattern of occupational accidents is observed.^[15] According to a report from the Ministry of Labor, Cooperation, and Social Welfare, there were 297 reported deaths due to occupational accidents in Tehran province by the end of October 2015, representing a 5.3% increase from the previous year.^[16] Without a comprehensive understanding of the various causes and consequences of accidents, managers will be unable to make informed decisions to effectively manage and prevent accidents.^[17]

To identify and eliminate the causes of accidents, it is essential to utilize a model or methods that can identify and analyze the primary and root causes of accidents. This is a crucial step in controlling the occurrence of accidents, developing improvement plans, and implementing corrective actions.^[18] The process of inspecting, investigating, and determining

the causes and factors of accidents, as well as assessing the extent of negligence involved, requires a specialized legal and technical approach within the country's legal system. While research has been conducted on the causes of occupational and nonoccupational accidents in various industries, there has been a lack of comparison of accident causes and negligence factors from different legal, judicial, and technical perspectives.^[16] Therefore, it is important to conduct an analysis of documentary information and research in this area to compare the opinions of labor inspectors and justice official experts. On the other hand, the context of accidents contributing to justice sentences is a prime example of a complex system, where the factors contributing to them have not been thoroughly understood. Previous studies have either focused on identifying the factors affecting accidents contributing to justice sentences through qualitative research or modeling the relationships between these factors using previous data.^[16] Therefore, there is a need for a comprehensive study to identify the factors affecting accidents contributing to justice sentences and to understand their most significant relationships, which can assist justice experts and researchers in decision-making. This study first identified the factors contributing to the accidents resulting in judiciary sentences in Iranian industrial settings through qualitative research, considering the cultural, social, and economic structure of Iran. It then examined the relationship between these factors. Given that many industries in Iran, particularly in the Markazi Province, consist of small and medium enterprises that have been relatively understudied, this research aims to identify the factors leading to accidents resulting in judicial sentences in these Iranian small–medium enterprises (SMEs). The study seeks to analyze the potential relationships among these factors using the interpretive structural modeling (ISM) technique.

MATERIALS AND METHODS

Study design

The present study is a descriptive study that was conducted in 2023 to identify and model the factors affecting the occurrence of accidents in small–medium enterprises based on the cases leading to the issuance of judicial orders in the Markazi Province of Iran. The collection of information and completion of checklists were carried out through the research team's visit to the accident site and the examination of pertinent files within the judicial authorities. Hence, the investigation unfolded in two stages: initially extracting primary factors contributing to the accidents with legal consequences from relevant documents, and subsequently employing multi-criteria prioritization based on expert opinions.

Determining main contributing factors in small–medium enterprise accidents

This stage was allocated to extracting all main causes of accidents that contributed to small–medium enterprises to be sentenced by the justice. In this study, based on referral files to official judicial experts in the field of work-related incidents, a total of 85 cases

of work-related accidents (all available cases) that occurred in small–medium enterprises were selected and examined in 1-, 3-, 5-, and 7-member violation assessment committees. These cases were investigated from 2015 to the end of 2023. Data from the investigation files of these occupational accidents were collected by a group of experts with at least 10-year experience of inspecting occupational accidents and working as judiciary experts. The extracted factors were then classified based on the main causes of accidents distinguished by judiciary experts.

Interpretive structural modeling

The ISM methodology was initially developed to address complex problems. Essentially, ISM is an analytical technique that allows individuals or groups to establish a structure for all existing relationships among various elements. ISM is a well-recognized approach for identifying relationships between specific components that define a problem or an issue. This method has gained increasing popularity among researchers for illustrating the interconnections between different aspects related to the subject. The ISM process begins with the identification of relevant variables pertaining to the problem or issue. Subsequently, a contextual relationship is selected, and a structural self-interaction matrix (SSIM) is generated based on pair-wise comparisons of the variables. Following this, the SSIM is transformed into a reachability matrix (RM), and its transferability is evaluated. Once the pass embedding is completed, a matrix model is obtained, and the elements are partitioned to derive a structural model known as ISM.^[18,19] The primary objective of this model is to leverage the expertise of professionals, analyze complex system issues, and subsequently construct a multilevel structural model.^[18]

Methodology and development of interpretive structural modeling model

The steps involved in the ISM method for establishing hierarchical relationships are as follows:

Identification of factors and the relationships between them

At this stage, the factors impacting the studied system are identified. The ISM model suggests incorporating expert opinions to discern the relationship among the extracted factors. Thus, for this study, 10 experts with at least 10-year experience of inspecting occupational accidents and working as judiciary experts were engaged to ascertain the underlying relationship between the main factors contributing to accidents resulting in judiciary sentences in Iranian small–medium enterprises (Central province) and analyze their potential relationships using the ISM technique.

Structural self-interaction matrix

An SSIM was constructed for the factors, illustrating the pair-wise relationships between them. As per the ISM literature, four numbers (1, -1, 2, and 0) are utilized to indicate the relationships between the elements and “i” (row) and “j” (column) in the SSIM development process. These four numbers are as follows:^[18]

- 1 → Dimension “i” leads to dimension “j”
- -1 → Dimension “j” leads to dimension “i”
- 0 → Dimensions “i” and “j” are unrelated
- 2 → Dimension “i” and dimension “j” lead to each other.

Initial reachability matrix

In this step, an RM is created from SSIM and converted into a binary matrix by replacing 1, -1, 2, and 0 with 0 and 1 as appropriate, which is known as the RM. The rules for this conversion are as follows: in each row, the number 1 should replace the numbers 1 and 2, and the number 0 should replace the numbers -1 and 0.^[18,19]

The final reachability matrix

The final RM is derived by applying multiplicative relationships between the elements. The multiplication relationship indicates that if component i leads to j and component j leads to k, then it can be inferred that i leads to k, often represented by *1 in the initial RM. In addition, the level of dependence and influence of each component is determined. The influence power represents the degree of impact on other goals, calculated for each component from the sum of the numbers in each row of the final RM, while the degree of dependence indicates the influence of other components, obtained for each component from the sum of the numbers in each column of the matrix. The final result provides the levels of the components. According to the final RM, components with significant dependencies are positioned at the top of the map, while those with high influence are situated at the lowest level.^[19]

Determining the relations and leveling of the components

In this stage, the received set and the preliminary set for each variable are extracted from the final RM. The received set for a specific variable includes the variable itself along with other variables that contributed to its formation (in simpler terms, all components with a 1 in the row corresponding to the desired component), while the preliminary set for a specific variable includes the variable itself along with other variables that played a role in its creation (in simpler terms, all components with a 1 in the column corresponding to the desired component). Subsequently, the intersection of these two sets for each variable is determined. Variables that have the same elements in their received set and preliminary set are considered top-level variables in the ISM hierarchy, indicating that these variables do not contribute to the creation of any other variables. Once the highest-level variable is identified, it is removed from the list of other variables. This iterative process continues until the level of all variables is established. The identified levels will be used in the construction of the final ISM model.^[18]

Matrix cross-reference multiplication applied to a classification analysis

This method offers a visual representation of variables based on their influence and dependence on structural-interpretive

modeling. By considering the degree of dependence and influence of variables, a coordinate system can be established and divided into four equal parts. The reference to various categories of factors is as follows:^[18,19]

The first category comprises “autonomous variables” where these components demonstrate a weak force of dependence as well as a weak force of influence. These components typically operate independently within the system, with minimal impact on other components and limited and insignificant connections with other components.

The second group includes “dependent variables” that have a relatively weak influencing force but are more dependent compared to other elements.

The third group consists of “linked variables” which have a strong influencing force and a high level of dependence. These variables are dynamic and any action taken on them not only directly impacts other elements but can also result in feedback affecting the variable itself.

The fourth group is labeled as “independent variables” which have a strong influence but a weak dependence. These variables are crucial components, and changing them can impact the other variables.

The rationale for employing the ISM method with matrix cross-reference multiplication applied to classification (MICMAC) diagrams lies in its ability to provide a clear visual representation of the driving and dependence power of variables. This graphical approach enhances the understanding of interrelationships among factors, allowing for a more nuanced and comprehensive analysis of the complex network of variables in the study.^[20]

Software

The ISM steps were calculated using custom Excel software developed by the researchers involved in this study.

RESULTS

Main contributing factors in small–medium enterprise accidents

Table 1 shows the factors affecting the accidents occurrence in small–medium enterprises. Ten main causes were determined to be modeled by the ISM technique, including five individual items (willingness to commit violations, mistakes, cognitive factors, behavioral/personality factors, and physical strength), three organizational items (incomplete/inadequate instructions, Inadequate planning/supervision, and training), equipment-related item, and hazardous process/harsh environment item.

Interpretive structural modeling analysis

Structural self-interaction matrix

The SSIM, illustrated in Table 2, originates from the pair-wise assessments of criteria given by the involved industrial specialists.

Table 1: Main detected contributing factors in small–medium enterprise accidents

Factors category	Subfactors	Symbol
Individual factors	Willingness to commit violations	A
	Mistakes	B
	Cognitive factors	C
	Behavioral or personality factors	D
	Physical power	E
Organizational factors	Incomplete or inadequate procedures	F
	Inadequate planning and supervision	G
	Training level	H
Conditional factors	Equipment-related factors	I
	Hazardous process or harsh environment	J

Table 2: Interpretive structural modeling matrices

	A	B	C	D	E	F	G	H	I	J
Structural self-interaction matrix										
A	-	2	2	2	2	2	2	-1	-1	-1
B	2	-	2	-1	-1	-1	-1	-1	-1	-1
C	2	2	-	-1	-1	-1	-1	-1	-1	-1
D	2	1	1	-	0	0	-1	-1	-1	-1
E	2	1	1	0	-	-1	-1	-1	-1	-1
F	2	1	1	0	1	-	2	2	2	2
G	2	1	1	1	1	2	-	2	2	2
H	1	1	1	1	1	2	2	-	1	1
I	1	1	1	1	1	2	2	-1	-	1
J	1	1	1	1	1	2	2	-1	-1	-
Initial RM										
A	1	1	1	1	1	1	1	0	0	0
B	1	1	1	0	0	0	0	0	0	0
C	1	1	1	0	0	0	0	0	0	0
D	1	1	1	1	0	0	0	0	0	0
E	1	1	1	0	1	0	0	0	0	0
F	1	1	1	0	1	1	1	1	1	1
G	1	1	1	1	1	1	1	1	1	1
H	1	1	1	1	1	1	1	1	1	1
I	1	1	1	1	1	1	1	0	1	1
J	1	1	1	1	1	1	1	0	0	1
Final RM and the driving/dependence power of factors										
A	1	1	1	1	1	1	1	1*	1*	1*
B	1	1	1	1*	1*	1*	1*	0	0	0
C	1	1	1	1*	1*	1*	1*	0	0	0
D	1	1	1	1	1*	1*	1*	0	0	0
E	1	1	1	1*	1	1*	1*	0	0	0
F	1	1	1	1*	1	1	1	1	1	1
G	1	1	1	1	1	1	1	1	1	1
H	1	1	1	1	1	1	1	1	1	1
I	1	1	1	1	1	1	1	1*	1	1
J	1	1	1	1	1	1	1	1*	1*	1

*Final RM values obtained by incorporating the transitivity. RM: Reachability matrix

Initial reachability matrix

During this stage, an RM is created based on the SSIM and transformed into a binary matrix by substituting 1, -1, 2, and 0 with 0 and 1 according to the following rules: in each row, the

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number 1 replaces the numbers 1 and 2, whereas the number 0 replaces the numbers – 1 and 0. This resulting matrix is displayed in Table 2.

The final reachability matrix

Through the ISM approach, the final RM was deduced from the initial RM [Table 2]. This matrix illustrates the driving forces and interdependencies among each accident-contributing factor. Utilizing this matrix, the factors were classified into two hierarchical levels, as depicted in Table 3.

As shown in Figure 1, three factors including training, equipment-related factors, and hazardous process or harsh environment were recognized as the main factors affecting accidents in small–medium enterprises.

Matrix cross-reference multiplication applied to a classification analysis

The results of the MICMAC analysis are depicted in a four-part matrix in Figure 2. On observing the boundary lines (both axes at 6), it becomes evident that all influencing factors in small–medium enterprises belong to the category of linked variables. This classification implies that the examined factors demonstrate robust interconnections, wherein changes in one factor result in interactive and multilevel effects on other

factors, including the factor itself. Alterations in one factor are anticipated to influence other factors, suggesting that the studied factors, sharing a common nature of affecting accidents, operate as a fully interactive system in accident-related factors.

DISCUSSION

The province of Markazi is one of Iran’s industrial provinces, and its small- and medium-sized enterprises (SMEs) host a substantial number of businesses that play a vital role in the economic growth and prosperity of the region. Consequently, the present study was undertaken to identify and model the factors influencing work-related accidents in the Markazi Province between 2015 and 2023. For this purpose, an initial examination was conducted on 85 case documents related to work-related incidents, revealing 10 primary factors contributing to accident occurrences in SMEs. These factors were categorized into three main groups: individual factors related to the incident (comprising five sub-factors), organizational factors (comprising three sub-factors), and conditional factors (comprising two sub-factors). In the subsequent phase of modeling the identified factors leading to accidents, the ISM technique was employed. This technique involves grading the factors based on their importance and impact on the occurrence of incidents. According to the results, three factors – training, equipment-related factors, and hazardous processes or harsh environments – were placed at level 2, establishing them as the key factors influencing accidents in this study. In addition, the MICMAC diagram indicated that all identified factors in the study were linked variables, signifying that all factors interact with each other and exhibit a high degree of mutual influence.

In a study conducted by Khorasane *et al.*^[21] to identify the causes of accidents in micro-enterprises’ workplaces, the main factors were categorized into six general groups: personal factors, unsafe acts, unsafe work environment, technical elements, environmental elements, and management, comprising a total of 16 subfactors (key factors leading to accidents). In that particular study, “improper use of tools and equipment” was identified as the most significant factor contributing to accidents, and overall, factors related to equipment and tools were recognized as the primary contributors to accidents. Therefore, based on the results of the present study and the study by Khorasane *et al.*,^[21] it can

Table 3: Level partition-iteration 1 and 2

	Reachability set (Ri)	Antecedent set (Si)	Intersection set (Ri ∩ Si)	Level
Level partition-iteration 1				
A	ABCDEFGHIJ	ABCDEFGHIJ	ABCDEFGHIJ	1
B	ABCDEFG	ABCDEFGHIJ	ABCDEFG	1
C	ABCDEFG	ABCDEFGHIJ	ABCDEFG	1
D	ABCDEFG	ABCDEFGHIJ	ABCDEFG	1
E	ABCDEFG	ABCDEFGHIJ	ABCDEFG	1
F	ABCDEFGHIJ	ABCDEFGHIJ	ABCDEFGHIJ	1
G	ABCDEFGHIJ	ABCDEFGHIJ	ABCDEFGHIJ	1
H	ABCDEFGHIJ	AFGHIJ	AFGHIJ	-
I	ABCDEFGHIJ	AFGHIJ	AFGHIJ	-
J	ABCDEFGHIJ	AFGHIJ	AFGHIJ	-
Level partition-iteration 2				
H	HIJ	HIJ	HIJ	2
I	HIJ	HIJ	HIJ	2
J	HIJ	HIJ	HIJ	2

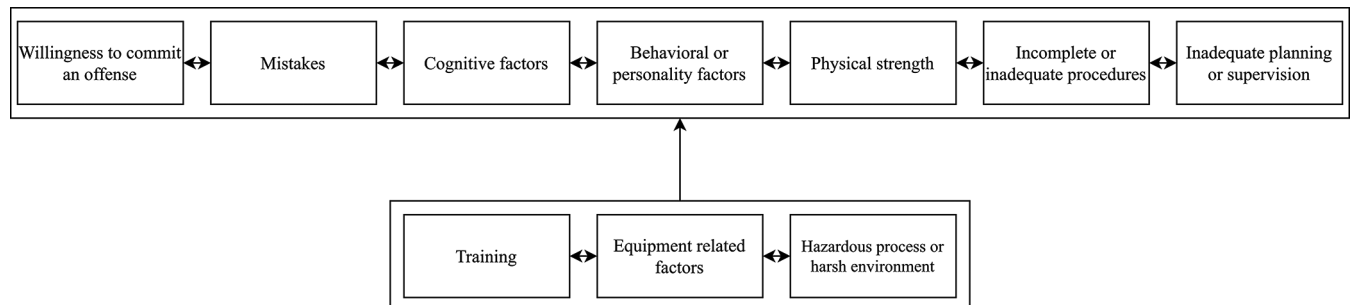


Figure 1: Hierarchical interpretive structural modeling model of main contributing factors in small–medium enterprise accidents

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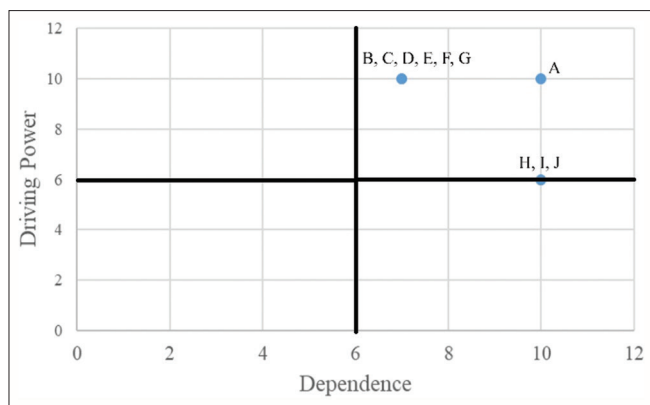


Figure 2: Matrix cross-reference multiplication applied to a classification analysis to determine the status of main contributing factors in small-medium enterprise accidents

be asserted that the inappropriate and outdated use of tools lacking up-to-date technology and proper safeguard is among the most significant causes of accidents in SMEs. In another study carried out by Apsari and Purnomo,^[22] it can be deduced that factors affecting workplace safety include the physical and social work environment, job stress, and work productivity. At the same time, factors significantly influencing occupational health consist of the physical work environment, social work environment, and work-related stress. In the current study, the factor “hazardous process or harsh environment” has also been identified as one of the three main factors influencing accidents. Therefore, based on the findings of these two studies, it can be stated that another challenge in SMEs is the inappropriate and disorderly physical environment, such as the lack of adherence to 5S principles in these systems, which could potentially lead to disasters.

Another critical factor identified in the present study was training. In line with this, Bragatto *et al.*^[23] highlighted in their research on small enterprises and their major hazards that inadequate training is a significant risk factor in such systems. In addition, Tejamaya *et al.*,^[24] in their study on safety management systems in micro, small, and medium enterprises, considered the lack of proper training implementation as a risk factor contributing to the weaknesses in management systems. Furthermore, Hadjimanolis *et al.*^[25] and Saat *et al.*,^[26] in their study on safety performance in SMEs, also stated that safety performance is positively related to training. Therefore, it can be stated that employee training plays a crucial role in enhancing awareness about safety and health issues. When employees are well-informed, they can effectively address safety concerns and exercise greater caution while performing their duties. Training is indispensable for keeping employees focused and prepared in the execution of their responsibilities.

According to the results of ISM modeling, individual factors leading to accidents in SME systems were placed at the second level of importance compared to other factors. These factors included willingness to commit violations, mistakes, cognitive factors, behavioral or personality factors, and physical power.

In this regard, Osman *et al.*,^[27] in a study they conducted on safety behavior in small-medium enterprises, stated that safety behavior plays an important role in predicting employee safety. Furthermore, in another study conducted by Rahlin *et al.*^[28] on Malaysian Manufacturing Small Enterprises, they showed that there is a positive correlation between the probability of accidents and individual characteristics of people (such as age, gender, education, and length of services). In addition, Zulkifly *et al.*,^[29] in a research they conducted for the purpose of leadership and behavior toward organizational safety performance in SMEs, stated that safety behavior has a significant effect on the organization’s safety performance.

Another factor that was identified and introduced in the present study was the organizational factors affecting the occurrence of accidents, including incomplete or inadequate procedures and inadequate planning and supervision. These factors, like individual factors, were at the second level of importance compared to other factors. Clear safety procedures, when consistently enforced through regular inspections, compel employees to work safely by establishing standards for behavior and safety systems. Based on this, Subramaniam *et al.*,^[30] in a study they conducted on Safety Management Practices and Safety Compliance in SMEs, acknowledged that safety rules and procedures are one of the important and influential factors on safety performance. Lu and Yang^[31] also stated in their study that standard operational procedures are one of the important and influential factors in people’s safety culture. On the other hand, Li *et al.*’s^[32] study on work safety behavior in micro and small enterprises concluded that scientific supervision and effective support from government safety supervision departments enhance the quality of work safety services provided by service agencies across multiple dimensions. Besides that, Hon *et al.*^[33] identified challenges in performing accurate safety supervision as a risk factor in implementing safety practices.

The factors influencing the occurrence of accidents in the present study were identified based on a thorough examination of referral documents to official judicial experts in the field of work-related incidents in the Markazi Province, Iran. Therefore, one of the limitations of the current study is the absence of a review of previous studies in this area. Another limitation is the lack of utilizing precise weighting techniques for factors, which would significantly contribute to prioritizing them. Hence, it is recommended that future studies not only conduct a detailed examination of referral files in various provincial centers but also extract influential factors on accidents in SMEs through a comprehensive review of existing studies. In addition, incorporating other decision-making techniques for precise prioritization and weighting of factors is suggested.

CONCLUSION

This study was conducted to identify accidents in small and medium enterprises (SMEs) that led to judicial sentences. Based on the study, 10 key factors influencing the

occurrence of accidents in these systems were identified and determined. Through modeling using the ISM technique, three factors – training, equipment-related factors, and hazardous processes or harsh environments – were found to have the most significant impact on accident occurrences. Given that these factors are components of organizational management factors as well as unsafe conditions in SMEs, there are various reasons for their significance in these systems. Considering that SMEs in Iran often rely on outdated technologies and face various uncontrolled hazards in their processes, the importance of these factors in these systems has been elevated. On the other hand, considering the absence of a unified and organized management structure in SMEs, organizational and managerial issues such as inadequate and improper worker training or their lack of access to suitable and sufficient work procedures may not be surprising. To mitigate accidents in SMEs, several control measures are recommended: enhancing training programs to include comprehensive occupational health and safety initiatives and regular equipment and process familiarization courses; upgrading equipment and work tools to enhance safety and conducting regular maintenance to prevent malfunctions; developing and implementing comprehensive work standards and procedures; fostering a safety culture through training, informational campaigns, and safety meetings; and incorporating advanced technologies and safer work processes to create a secure working environment.

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Ethics code

This study received approval from the Ethics Committee of Isfahan University of Medical Sciences under the reference number IR.MUI.RESEARCH.REC.1401.147.

Conflicts of interest

There are no conflicts of interest.

Authors' contributions

Majid Faraji: Data curation, Investigation, Visualization, Writing original draft; Reza Esmaeili: Formal analysis, Methodology, Validation, Visualization, Writing original draft, Writing review and editing; Masoud Rismanchian: Conceptualization, Methodology, Supervision, Writing review and editing; Mahnaz Shakerian: Conceptualization, Formal analysis, Methodology, Project administration, Supervision, Validation, Writing review and editing;

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