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Alignment of Safety Management System with Business Strategy to Promote Safety Performance in Construction Field

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ABSTRACT

This study examines the integration of safety management systems (SMS) and business strategy to improve safety performance in the construction industry in the Middle East. This study employs a deductive pragmatic approach to investigate the correlation between SMS and business strategies and their influence on safety outcomes. This study explores numerous factors that contribute to the successful alignment of the safety management system and business strategy. These factors encompass strategic initiatives, business risk management, strategic objectives, and strategic key performance indicators. This study highlights the significance of integrating SMS into business strategy to enhance safety outcomes, operational excellence, and overall organizational performance. Overcoming challenges such as resistance to change, insufficient safety awareness, and limited resources are essential for achieving optimal alignment. Organizations should consider implementing safety management systems (SMS) in accordance with their business strategies. It is important to effectively integrate safety objectives at all levels of the organization and align safety risk management with business risks. Additionally, organizations should prioritize worker safety in their strategic initiatives. Safety regulation adherence is crucial. This study enhances existing knowledge on safety management in the construction industry, highlighting the significance of aligning it with business strategy.

1. INTRODUCTION

Construction is a high-risk industry, especially in the Middle East. Safety for workers is ensured through the existence of rigorous and well-integrated safety management systems (SMS) being in sync with the whole business strategy (BS) of the organization. The SMS are the protocols to proactively address workplace health and safety issues in a way to minimize the risks by means of planning, implementation and monitoring (Jazayeri and Dadi, 2017; Dentch 2018). However, the process of aligning SMS with BS business strategy, which involves a company's long-term objectives, resource allocation, and risk management, is complex. For any organization to achieve organizational goals and also at the same time maintaining a safe work environment, it is crucial that SMS be aligned with BS. This study is an exploration of the alignment of strategic safety initiatives and risk management in the Middle Eastern construction field, examining the effect of both on organizational performance.

As an inherently hazardous work involving a complex and multi layered operation, construction demands safety performance and operational efficiency which can be achieved through the integration of SMS-BS (Safety management System and Business Strategy). PDCA (Plan-Do-Check-Act) is a continuous

improvement model that allows organizations to manage safety risks utilizing the PDCA cycle and for an SMS can be developed using the ISO 45001 standard to develop safety risk assessment tools, likely using a risk matrix, and specifying SMS requirements for hazard identification, incident investigation, and corrective actions (Dentch, 2018). However, aligning with BS has its difficulties including divergent priorities, insufficient resources, absence of leadership support as well as corporate resistance (Krupskyi & Kuzmytska, 2020). The effective integration also involves trade between business and safety goals at the cost of adjustment to resource allocation, training of staff, and performance monitoring. The below figure is showing how PDCA is implemented and what elements are particularly used accordingly:

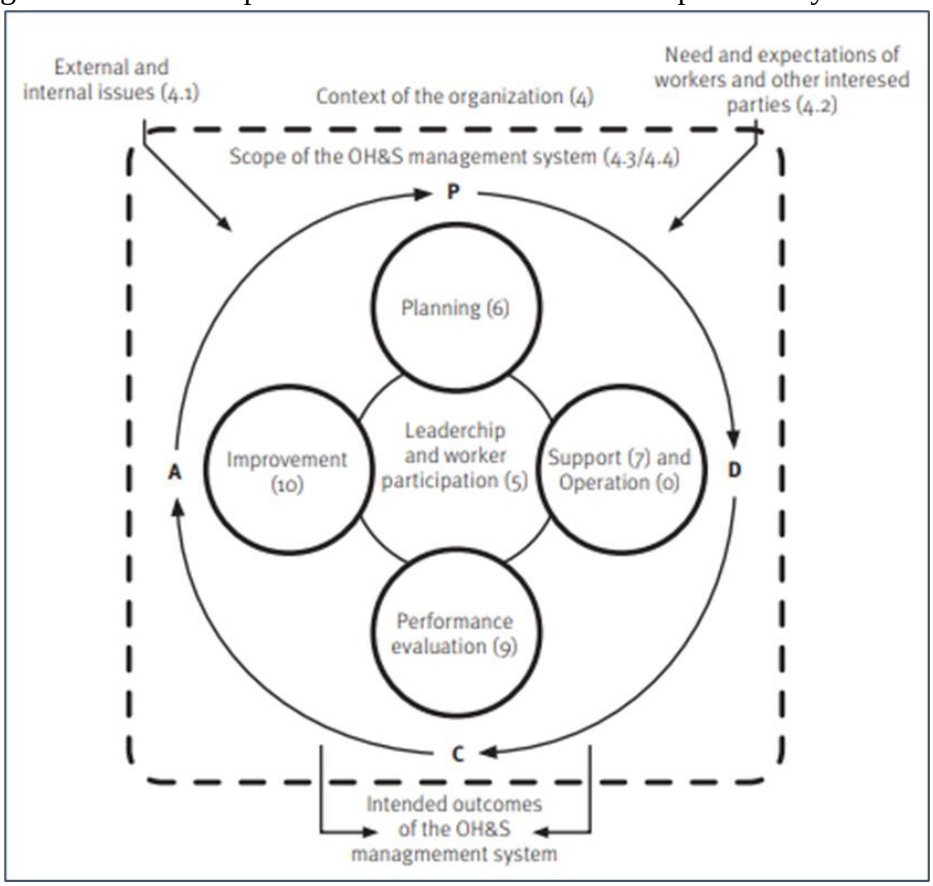

Figure 1. ISO 45001 PDCA (Plan-Do-Check-Act)

A business strategy, broadly defined, sets an organization's long-term direction by determining resource allocation, including finances, technology, and personnel, to meet evolving market demands (Mccarthy, 2000). In the construction industry, a strategic focus on safety management not only reduces incidents but also enhances productivity, operational efficiency, and stakeholder satisfaction (Barbosa, de Oliveira, & Santos, 2018). By embedding safety objectives within the corporate culture, companies encourage employee engagement and ownership of safety practices, aligning individual responsibilities with the broader organizational direction (Whealan-George, 2013). This alignment becomes a source of competitive advantage, as it allows companies to achieve operational excellence while adhering to regulatory standards and safety compliance (Farida & Setiawan, 2022). Below figure is defining and explaining with relevant elements to illustrate how strategy is overviewed and implemented overall:

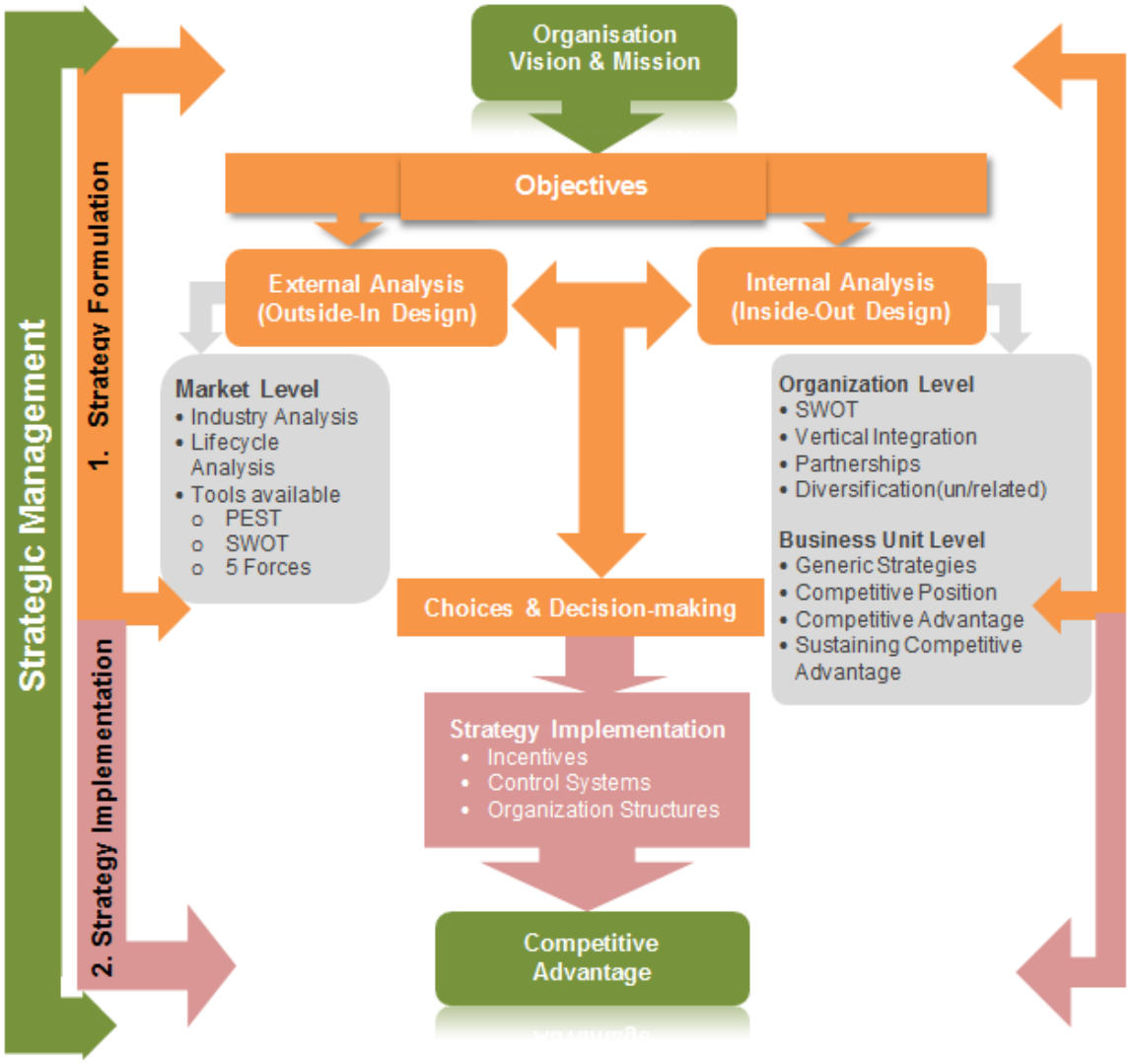

Figure 2. Strategy Formulation and Implementation Overview.

The Gunduz & Simsek Framework for strategic safety management aligns safety practices with corporate objectives, emphasizing balanced scorecards and quality function deployment as tools for enhancing safety performance (Gunduz & Simsek, 2011). This framework underscores the value of SMS-BS integration as a proactive approach to managing construction risks, especially in dynamic environments where rapid decision-making is essential. For instance, SMS components such as hazard identification, risk assessment, and mitigation are foundational to safety strategies, enabling companies to prevent accidents and control risks (Lee, Jung, Yoon, & Byeon, 2019). In this context, safety key performance indicators (KPIs) become critical as they allow companies to measure the effectiveness of their SMS, contributing to the strategic objectives of the business. The figure below is given to show graphical representation of Gunduz & Simsek Framework, like what factors are used at all three stages of strategy:

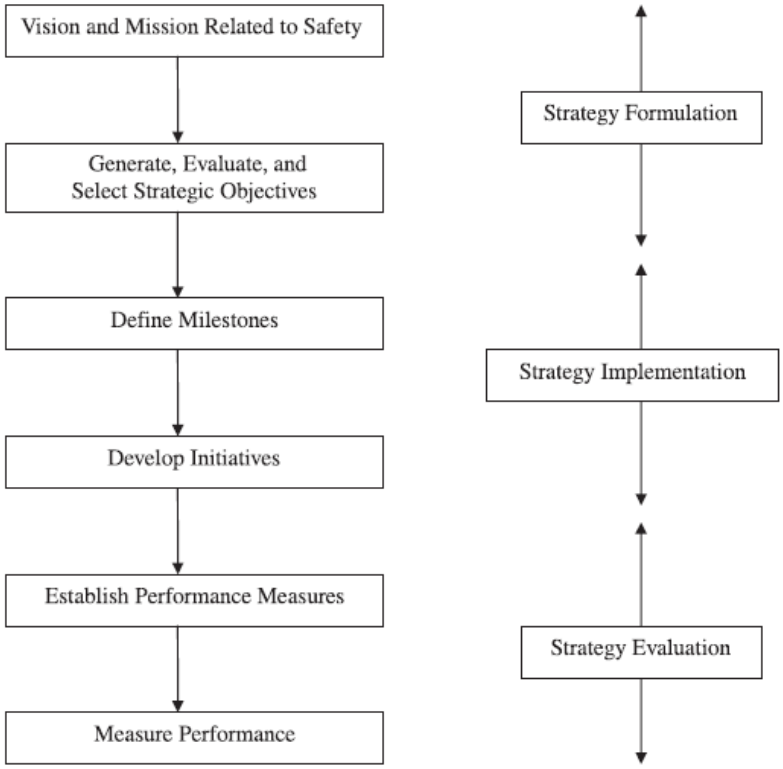

Figure 3. Gunduz & Simsek Safety Management Framework.

Challenges in SMS & Business Strategy Alignment

While SMS alignment with BS can enhance safety performance, several challenges often impede this process. Conflicting priorities between operational efficiency and safety requirements can lead to insufficient attention to SMS integration (Krupskyi & Kuzmytska, 2020). Additionally, limited resources, particularly in small and medium enterprises (SMEs) within the construction sector, restrict their ability to allocate finances toward comprehensive safety measures. Another critical factor is leadership support; without strong senior management advocacy, SMS initiatives will likely not have the requisite authority and resource support necessary for effective implementation. Besides, SMS-BS alignment is further complicated by organizational opposition to change and inefficient integration methods that could later affect the overall safety culture and safety practice commitment (Alidrisi & Mohamed, 2022).

In high risk organizations such as construction, alignment of SMS with BS is critical to alleviate risk. SWOT (Strengths, Weaknesses, Opportunities, and Threats) and PESTEL (Political, Economic, Social, Technological, Environmental, and Legal) are tools that support strategic planning by helping us to assess what external and internal factors are influencing our safety and business goals (Hughes, Kornberger, MacKay, & O'Brien, 2023). SWOT and PESTEL can help to conduct structured conversations around the business environment and to identify critical factors impacting the SMS-BS alignment, which helps enhances the organization's ability to cope with market and regulatory changes. Furthermore, KPIs and methodology such as ANOVA (Analysis of Variance) facilitate performance monitoring of SMS by quantitatively gauging the effect of SMS on business results, so that safety measures conform to strategic organization objectives (Rashid, Hadikusumo, & Chowdhury, 2023).

Objective of the Study

This research aims at studying the determinants leading to SMS-BS alignment in the Middle Eastern construction industry. The objective of this study will be to ascertain whether safety management practices have a relationship with business strategies and whether the strategic initiatives, risk management, and operational controls that make them up, enhance the safety performance of a business. Furthermore, this research will also explore key challenges like resource constraint, gap in leadership and organizational resistance to SMS–BS alignment and suggest ways to overcome these barriers. This study presents insights of construction firms on how they can attain operational excellence by incorporating of safety management in their business strategies, through a survey of industry professionals.

Significance of the Study

The model proposed in this research for SMS-BS alignment contributes to the construction industry by providing a model that considers the unique constrains associated with the Middle Eastern context. This study finds that greater levels of integration of the SMS into business planning may yield benefits to both levels of safety outcomes and business success. Given this, the results of this research are very valuable for the parties in the construction field, including policy makers, safety managers, and organisational executives, as they operate in the context of reconciling safety management with the organisational goals. The goal of this study is ultimately aimed at building a safety culture within construction firms, where environments of both safety and productivity are valued. In addition to creating healthier employees, this alignment results in an organization that can better compete and withstand the pressure of a highly regulated and increasingly challenging industry.

2. MATERIALS AND METHODS

This study explores the relationship between Safety Management Systems (SMS) and Business Strategy (BS) in the Middle Eastern construction industry and how both systems impact total safety performance. The objective is to assess the degree of alignment between SMS and BS, and to identify the factors affecting such alignment. The study uses a deductive methodology, that is, a research method that moves from the general theoretical principles to the specific empirical observations to achieve this. With the method here, it is possible to reason logically using well known principles and frameworks to evaluate concrete data and reach conclusions (Hughes, Kornberger, MacKay, & O'Brien, 2023). This deductive approach starts with a general understanding of the SMS and BS alignment in safety performance, which allows the study to investigate specific outcomes particular to the Middle Eastern construction firms.

The research design is quantitative and monomethod with a cross-sectional survey distributed to construction industry professionals in various Middle Eastern countries. The survey was conducted using the Survey Monkey platform with the survey responses selected from a sample of 400 participants who represent a diverse position and sector in construction, including safety management, technical management, business management, and other construction specific fields. Primarily, safety management professionals concern themselves with safety implementation and oversight and making sure that an organization is in compliance with industry standards. The practical and technical aspects of construction operations are classed under technical management whereas business management, to the extent that it concerns administration and strategic planning in the construction firms, is viewed as contrast.

Questionnaire Design and Data Collection

A structured questionnaire containing 42 items in sections demographically, professional roles and perceptions regarding SMS-BS alignment was utilized in the study. To assess a range of safety management and business strategy alignment aspects, a carefully chosen questionnaire was prepared, based on a combination of Likert-scale questions, multiple choice questions and open ended questions. Likert-scale questions were used to measure the levels of agreement or disagreement of participants with statements regarding SMS and BS alignment in order to gain a nuanced understanding of participants' views. Questions posed in the survey focused around what challenges exist in the alignment of SMS and BS, what strategic initiatives were recognized, what objectives and associated metrics (i.e. Key Performance Indicators, KPIs) are used, and how risk management is performed to support strategy.

Factor such as Employment Sector, Organizational Role, years of experience, Company size were used to categorize each response in order to conduct a thorough analysis of trends across different demographic and organizational groups. The sample included individuals from the Saudi Arabia construction industry (51%), Egypt (33%), or other Middle Eastern countries (16%). This is as a result of high demand for construction in regions where safety management is highly emphasized.

Statistical Analysis and Data Processing

In this study, several statistical methods were used that included frequency and proportion analysis, graphical representations (charts), Pearson correlation coefficients and regression analysis. Mean values and standard deviations were calculated to see how participants in general perceived SMS and BS. Inferential statistical techniques such as linear regression, multiple regression and Analysis of Variance (ANOVA) were used to explore relationships among variables and test the hypotheses of the study. Statistics were used for instance Pearson correlation coefficients were used to determine the strength and direction of relationship between SMS, BS and other independent variables, such as strategic initiatives and risk management.

The study hypothesizes differences in SMS-BS alignment based on country, industry sector, and organization type. These hypotheses include the following:

1. Business strategy significantly impacts the effectiveness of safety management systems.
2. Variations exist in SMS-BS alignment across different Middle Eastern nations.
3. SMS-BS alignment differs by construction industry sector.
4. SMS-BS alignment varies depending on the organizational classification within the construction sector.

A deductive approach was used to analyze the collected data and verify these hypotheses to support the conclusions for congruity with safety management and business strategy integration principles. The statistical analysis results serve as a foundation for analyzing the reasons that influence both SMS-BS alignment, and those are the p-values and correlation coefficients.

Sample Characteristics

The survey sample for this study includes individuals from a variety of roles within the construction sector, with a significant representation in safety-related positions. Specifically, 68% of participants work in safety management. Another 13% of participants are employed in technical management roles, while 12% work in sectors outside of safety and technical areas. Additionally, 8% are involved in business management, adding a strategic perspective to the overall sample. In terms of job hierarchy, the sample is

well-distributed across multiple levels, enhancing the reliability of the study's findings. Managers make up the largest proportion at 37%, followed by supervisors at 24%, directors at 15%, and senior managers at 14%. The experience levels of the participants are also diverse, allowing for a broad perspective on SMS and business strategy alignment. About 33% of the respondents have accumulated 10 to 15 years of professional experience, while 29% have 15 to 20 years. Notably, 21% of participants have more than 20 years of experience, indicating a substantial level of expertise within the sample. Regarding organization size, a significant portion of respondents (64%) are employed in large companies with a workforce ranging from 1,001 to 10,000 employees.

3. RESULTS AND DISCUSSION

This study examines the correlation between safety management systems and business strategies in the construction industry of the Middle East. The results indicate a significant and positive relationship between the safety management system and business strategy, as evidenced by a Pearson's correlation coefficient of 0.796. The analysis shows a strong and statistically significant correlation (r = 0.698) between the safety management system and objectives and key performance indicators (KPIs). The study found a strong and significant positive correlation (r = 0.697) between the safety management system and business risk management. The study finds a significant correlation between business strategy and safety management systems. The independent factors explain around 63% of the variability in the safety management system.

Table 1. The correlation matrix of the main dimensions.

		Safety Management System	Business strategy	Strategic Initiatives	Objectives & KPIs	Risk Management
Safety Management System	Pearson Correlation	1	.796**	.723**	.698**	.697**
	Sig.		0.000	0.000	0.000	0.000
Business strategy	Pearson Correlation	.796**	1	.959**	.840**	.759**
	Sig.	0.000		0.000	0.000	0.000
Strategic Initiatives	Pearson Correlation	.723**	.959**	1	.708**	.596**
	Sig.	0.000	0.000		0.000	0.000
Objectives & KPIs	Pearson Correlation	.698**	.840**	.708**	1	.614**
	Sig.	0.000	0.000	0.000		0.000
Risk Management	Pearson Correlation	.697**	.759**	.596**	.614**	1
	Sig.	0.000	0.000	0.000	0.000	

The study demonstrates a noteworthy influence of business strategy on safety management systems. The p-value of 0.000 is below the significance level of 0.05, suggesting a statistically significant effect. The independent variable, strategic initiatives, has a coefficient of 0.765, suggesting that a one-unit increase in this variable is associated with a corresponding increase of 0.765 units in the dependent variable, safety management system. The correlation coefficient (R) is 0.812, indicating a strong relationship between the

independent factors and the dependent variable, the safety management system. The coefficient of determination (R square) is 0.659, suggesting that approximately 66% of the observed variations in the safety management system can be explained by the independent factors. The p-value for the association between strategic initiatives and safety management systems is 0.000, indicating a statistically significant effect. The coefficients for objectives and KPIs are statistically significant ($p < 0.05$) with a value of 0.000. The p-value for the association between business risk management and safety management systems is < 0.05, indicating a statistically significant effect. The study proposes a model for alignment of business strategy and safety management system as shown in figure 4.

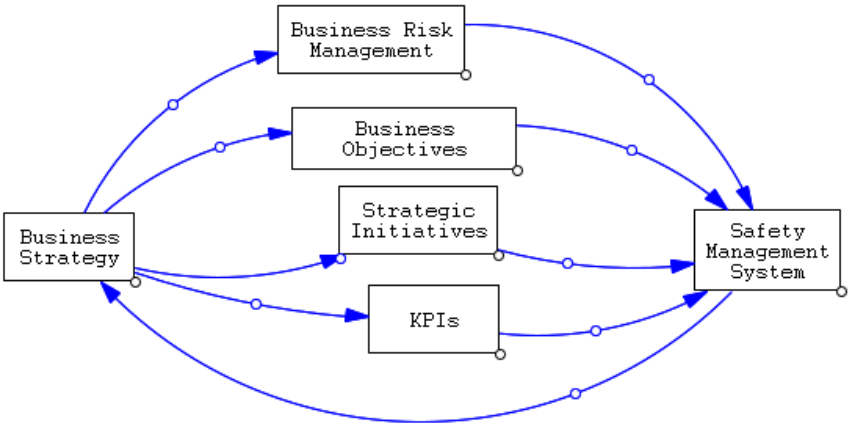

Figure 4. Research proposed model.

This study examined the correlation between business strategy and safety management systems in various countries and industries. ANOVA was used to test the hypothesis. The study found significant variations in business strategy among different countries. Saudi Arabia had the highest average score of 46.11 for business strategy and 46.23 for safety management systems. Oil and gas companies had the highest average scores of 47.57 for business strategy and 46.04 for safety management systems. This suggests that these companies prioritize the integration of business strategy and safety management systems to maximize operational benefits.

There was no significant difference in business strategy among construction companies based on their type. The p-value of 0.504, which is greater than the significance level of 0.05, suggests that there is no statistically significant difference in the safety management system across different types of companies in the construction industry. This indicates that the alignment between the safety management system and business strategy is not influenced by the type of company in the construction sector.

The study indicates that the majority of participants, 51%, are employed in Saudi Arabia, followed by 33% in Egypt, and the remaining 16% in different international locations. 68% of individuals are actively involved in safety management, while 13% are engaged in technical management. Only 8% of individuals are dedicated to business management. 37% of individuals hold manager-level positions, 24% hold supervisor-level positions, 15% hold director-level positions, and 14% hold senior manager-level positions. 33% of individuals possess a professional background spanning 10 to 15 years, whereas 29% have accumulated 15 to 20 years of experience. The majority (64%) of participants work in organizations with a workforce size of 1001 to 10,000 personnel, while a smaller proportion (18%) work in organizations with a workforce size ranging from 501 to 1000 individuals. The construction industry employs 44% of

the sample, with 38% working as main contractors, 33% as employers or clients, and 15% as project management consultants. The sample consists of 7% supervision consultants and 3% subcontractors. The research indicates that Saudi Arabian organizations tend to align their safety management systems with their business plans, whereas Egyptian organizations tend to align their business strategy with their safety management systems.

4. CONCLUSIONS

Aligning safety management systems with company strategy necessitates a comprehensive approach that incorporates safety objectives, performance indicators, and risk management techniques into the overall strategy planning and implementation process. Adhering to safety management regulations enhances a company's reputation and promotes the formation of strategic partnerships.

Alignment success relies on leadership commitment, efficient communication, employee engagement, and the smooth integration of safety objectives and key performance indicators (KPIs) with organizational objectives and KPIs. Overcoming obstacles such as resistance to change, lack of awareness, and resource limitations necessitates proactive leadership, efficient communication strategies, continuous training, and resource allocation.

The research results suggest that organizations should create safety management systems that are in line with their business strategy and propose the utilization of the alignment model shown in figure 5. This ensures safety objectives are integrated throughout the organization, aligns the safety risk and opportunity register with the business SWOT analysis and risk register, and harmonizes safety risk management with overall business risks. Safety plans should promote workers' ownership and involvement, and safety resources should be integrated into the business resource planning process. Safety, legal, and contractual requirements must be taken into account in the business SWOT analysis to mitigate the risk of legal action.

Including safety in vision and mission statements highlights its significance to all stakeholders, both internal and external. Leaders should actively promote a safety culture and encourage employee involvement through regular communication, training programs, and recognition. Effective communication between safety and operational teams is vital for the successful implementation and ongoing monitoring of safety measures.

Integrating safety into an organization's vision and mission statements is vital for promoting a secure work environment, improving productivity, and satisfying stakeholder expectations. Construction companies should prioritize safety resources in their strategic resource allocation to ensure a secure work environment. Senior executives and leaders should exhibit commitment to safety by supporting and approving safety initiatives, conveying safety expectations, and actively participating in safety actions. Employee involvement is crucial for improving safety performance, and comprehensive safety training programs are required. Safety is vital in project planning and design, and fostering a culture of learning is necessary for ongoing improvement. Construction firms can improve safety outcomes by integrating safety considerations into strategic decision-making, allocating resources for employee engagement and training, and promoting a culture of collaboration and continuous learning. Future research should prioritize longitudinal studies, case studies from Middle Eastern construction companies, and investigation of emerging technologies such as artificial intelligence, Internet of Things, and data analytics

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