

## Article

# Developing Proactive Compliance Mechanisms for Chinese International Construction Contractors: A PLS-SEM Analysis

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**Abstract:** The international construction contracting industry is facing increasingly stringent regulations and complex compliance risks, forcing contractors to reluctantly comply with regulations to cope with external pressure, intense competition, and turbulent markets. The existing research focuses on the passive compliance of contractors and sporadically identifies the driving factors, and lacks a detailed exploration of proactive compliance, which has created a research gap in regard to contractor compliance management, wherein changes to internal passive control and external environmental dynamics cannot be addressed. This study aims to promote proactive compliance by contractors by establishing a theoretical framework, containing factors related to stakeholder pressures, project complexity, and compliance values. This study involves 135 samples of international construction experience, utilizing the partial least squares structural equation modelling (PLS-SEM) technique for data analysis. The findings demonstrate a significant positive impact of stakeholder pressures ( $\beta = 0.328, p < 0.01$ ) and compliance values on the promotion of proactive compliance by contractors ( $\beta = 0.246, p < 0.01$ ). Moreover, the study reveals that project complexity further strengthens the relationship between stakeholder pressures and proactive compliance ( $\beta = 0.203, p < 0.05$ ). By deepening the understanding of the interactions between external pressures, internal control, and proactive compliance in regard to complex project attributes, this study offers a theoretical framework that integrates project level factors and organizational level factors. This study contributes guidance for contractors facing compliance challenges in the global context, enabling them to tackle increasing compliance pressures and risks, thereby facilitating the development of proactive compliance strategies in complex project environments and enhancing their competitiveness and sustainability.

**Keywords:** compliance values; international construction contractor; proactive compliance management; project complexity; stakeholder pressures



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## 1. Introduction

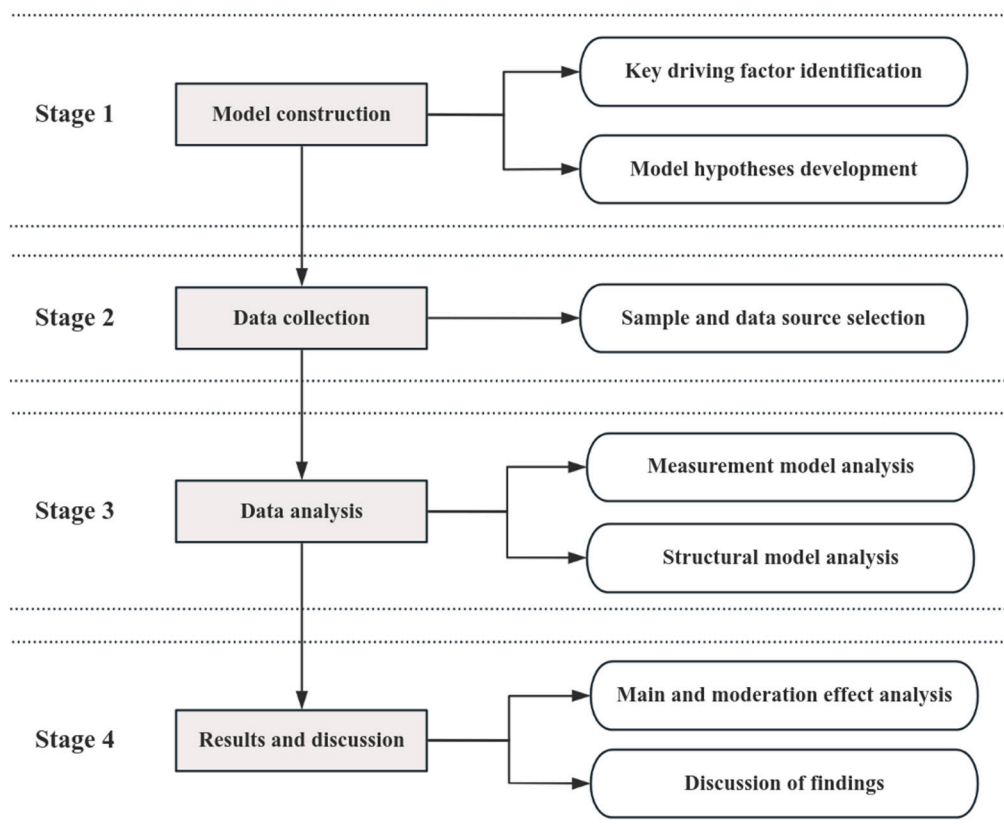
Due to escalating geopolitical conflicts, the international landscape has become increasingly complex. Furthermore, the intensification of global anti-corruption initiatives and the growing emphasis on sustainable development underscore the importance of compliance management [1,2]. In response, many countries have introduced stricter compliance regulations, including laws, guidelines, and standards, such as ISO 37301 [3], promulgated by international organizations. However, according to a World Bank report, 63 Chinese construction contractors faced financial and legal sanctions in 2022, due to fraud, corruption,

and other irregularities in their operations, leading to reputational damage and significant challenges in regard to their ability to maintain sustainable business practices [4,5].

The complexity of operating across various regulatory environments, coupled with the pressures from initiatives like the Belt and Road Initiative (BRI), exacerbates the compliance challenges for international contractors, particularly in China [6,7]. In this context, it is essential for international construction contractors to enhance their proactive compliance strategies in order to adapt to external pressures, intense competition, and dynamic markets [8]. The traditional reactive approach to compliance, primarily focused on addressing violations, such as fraud and corruption, is no longer sufficient [9–11]. The growing need for proactive compliance strategies has been acknowledged as essential for businesses in regard to managing risks and maintaining a competitive advantage in the international construction market.

Existing research has primarily focused on the causes of non-compliance, with less attention given to how contractors can develop proactive compliance strategies in response to the cross-border legal and enforcement standards they face [12–16]. Furthermore, the existing literature has largely overlooked the interaction between project-level factors and organizational-level pressures. Research in this area has typically concentrated on the operational impacts of compliance management systems, without addressing the broader strategic dimensions. International construction projects, especially those involving contractors, require adherence to multiple legal, cultural, and societal norms, across various regions [8,10]. The variety of stakeholders involved, which includes investors, clients, partners, and regulatory bodies, further complicates compliance, requiring contractors to manage a web of conflicting compliance standards [17]. The driving force behind proactive compliance stems not only from external regulatory pressures, but also from an organizational emphasis on integrity, transparency, and corporate responsibility. Despite this, existing research often overlooks the strategic role of proactive management in the design, implementation, and evolution of compliance structures and practices [18]. Much of the existing literature has focused on the operational impacts of compliance management systems at the corporate level [19], leaving a notable gap in the research regarding how contractors can respond to internal controls and the dynamic external pressures they face.

To address this gap, this study aims to explore the role of project complexity, stakeholder pressures, and compliance values in driving proactive compliance among international contractors. Rather than viewing compliance as a passive adherence to legal obligations, this study reconceptualizes compliance as a proactive, strategic response that enables contractors to anticipate and manage compliance risks effectively. By offering a theoretical model that integrates both project-level and organizational-level factors, this study deepens the understanding of how these factors influence proactive compliance management by contractors. The theoretical contribution of the study presents a model for understanding proactive compliance by international contractors in the context of complex project environments. By integrating both project-level and organizational-level factors, this study offers new insights into how contractors can more effectively manage compliance risks and develop strategies to navigate the complexities of global construction projects. This approach expands the theoretical landscape of compliance management, providing a novel perspective on contractor behavior and enhancing the understanding of proactive compliance in the international construction industry. The research framework is shown in Figure 1.



**Figure 1.** Research framework.

## 2. Literature Review and Theoretical Model Construction

### 2.1. Research on Contractor Compliance

Compliance is a multidimensional concept, encompassing adherence to rules, standards, laws, and requirements, as well as culture and values [20]. In recent years, the importance of compliance in project management has gained increasing recognition, as it is now considered a critical factor in determining project success, particularly for international construction contractors involved in cross-border operations [21,22]. These contractors must navigate conflicting legal standards and diverse stakeholder expectations, making compliance a strategic concern that goes beyond legal adherence [23,24]. Compliance has evolved beyond mere legal adherence and has become a strategic concern for construction firms [25,26]. As projects increasingly involve diverse stakeholders, contractors must not only comply with legal standards, but also consider the local culture and values to build trust and maintain positive relationships with stakeholders [27]. The shift from reactive to proactive compliance strategies reflects the growing recognition of the strategic role compliance plays in mitigating risks, building trust, and fostering sustainable practices [28,29]. Proactive compliance is defined as the active involvement of international construction contractors in identifying, assessing, and adhering to laws, regulations, industry standards, and ethical norms relevant to their operations, throughout the project lifecycle. In contrast, reactive compliance focuses on responding to regulatory changes or instances of non-compliance as they occur, without anticipating potential issues [30,31].

Proactive compliance not only helps contractors avoid legal sanctions and economic losses, but also enhances their reputation, brand image, customer relations, and market access [32,33]. Research indicates that companies adopting proactive compliance approaches, in regard to global competition, establish a positive corporate image, which is crucial for securing investor confidence, securing customer loyalty, and fostering trust between part-

ners [34]. Additionally, studies suggest that clear codes of conduct and robust compliance systems reduce internal conflicts, optimize decision-making processes, and enhance the project's operational efficiency [35,36]. In the competitive international market, proactive compliance enhances contractors' adaptability and resilience, allowing them to address compliance challenges more effectively and maintain a competitive advantage. To operationalize proactive compliance, this study draws on the existing literature to integrate key factors influencing compliance management into a tripartite framework of compliance drivers (Table 1). Specifically, we categorize compliance factors into three key dimensions: (1) stakeholder pressures, which demand cognitive prioritization of external demands; (2) compliance values, reflecting internalized strategic benefits; and (3) project complexity, which challenges cognitive resource allocation.

**Table 1.** Key factors influencing compliance management.

Factor	Literature Source	Category	Included in This Study
Competition-related factors	[37,38]	Stakeholder pressure	✓
Environmental standards	[39]	Stakeholder pressure	✓
Stakeholder management	[40]	Stakeholder pressure	×
Contractual obligations	[41]	Stakeholder pressure	✓
Demands of stakeholder groups	[26,42,43]	Stakeholder pressure	✓
Institutional mimesis	[32]	Stakeholder pressure	✓
Business–government relations	[26]	Stakeholder pressure	×
Level of institutional development	[44]	Stakeholder pressure	×
Regulatory ties	[45]	Stakeholder pressure	×
External pressures	[42]	Stakeholder pressure	✓
Organizational culture	[46]	Compliance value	✓
Shared vision	[47]	Compliance value	✓
Decision-maker awareness	[48]	Compliance value	✓
Core value	[49]	Compliance value	✓
Organization's integrity	[7]	Compliance value	✓
Competitive advantage	[50]	Compliance value	✓
Owners' personal commitment	[49]	Compliance value	✓
Environmental uncertainty	[51]	Project complexity	✓
Institutional environment	[52]	Project complexity	×
Institutional voids	[26]	Project complexity	✓
Technical complexity	[53,54]	Project complexity	✓
Institutional complexity	[55]	Project complexity	✓

## 2.2. Strategic Perspective on Proactive Compliance Management

Strategic cognition theory emphasizes how organizations strategically identify, interpret, and respond to the external environment to achieve their long-term objectives [56]. In the context of the challenges posed by a globalized business environment and the complexities of project dynamics, the establishment and optimization of compliance management mechanisms by international construction contractors also need to be rooted in this strategic cognition. By applying strategic cognition theory, a robust framework emerges that elucidates how international construction contractors can utilize cognitive processes to transform external pressures and internal values into proactive compliance actions, thereby effectively addressing complex compliance requirements.

## 2.3. Stakeholder Pressure and Compliance Management

Stakeholder pressure is a key factor influencing compliance management in international construction projects. Contractors face demands from a variety of stakeholders, including government agencies, clients, suppliers, and the general public. These pressures shape the way contractors approach compliance, often driving them toward more proactive

management strategies. Clients and owners also exert pressure, particularly in relation to contractual compliance. Contractors must meet specified contractual terms, including those related to legal standards, quality control, and timelines. A failure to meet these expectations can damage reputations and business relationships [57]. Furthermore, the public's and societal expectations, especially regarding environmental responsibility, add additional layers of pressure, encouraging contractors to integrate sustainability and ethical considerations into their compliance strategies. Finally, supply chain pressures further complicate compliance management. Contractors must ensure that their subcontractors and suppliers adhere to the same legal and ethical standards, reducing the risk of compliance failures and project disruptions [58,59]. In summary, stakeholder pressures are significant drivers of proactive compliance, urging contractors to establish comprehensive and effective compliance management systems.

#### *2.4. Values and Compliance Management*

Compliance values, or the organizational commitment to legal and ethical practices, guide contractors' approach to compliance management. These values are often communicated through mission statements, codes of conduct, and organizational policies. By aligning organizational culture with compliance values, contractors ensure that compliance is integrated into decision-making processes at all levels [60]. Research shows that firms with strong compliance values are better equipped to navigate complex regulatory environments and mitigate compliance risks. These values shape the cognitive frameworks of decision makers, helping them prioritize compliance during strategic decision making [61]. Furthermore, contractors with clearly defined compliance values tend to enhance their reputation and build trust with clients, stakeholders, and the public, which contributes to long-term business success [49]. The adoption of compliance values also helps contractors respond to the growing complexity of construction projects. In an environment marked by diverse regulatory requirements and operational challenges, a strong commitment to compliance can serve as a foundation for navigating potential risks and ensuring that all aspects of a project meet legal and ethical standards [34].

#### *2.5. Project Complexity and Compliance Management*

The complexity of international construction projects, stemming from technical, contractual, and legal factors, significantly impacts compliance management. Contractors face increased challenges when managing multiple legal systems, diverse project requirements, and a wide array of stakeholders. This complexity requires contractors to adopt more robust compliance mechanisms to ensure legal adherence and minimize risks. Multijurisdictional legal frameworks, for example, necessitate that contractors stay informed about varying laws and regulations across different countries. As Liu et al. [52] indicated, contractors involved in international projects must possess a high level of legal awareness and compliance management capabilities to effectively address these diverse requirements. The complexity of contract terms, supply chain dynamics, and technical specifications further complicates compliance management, making it imperative for contractors to adopt proactive strategies that address potential risks before they arise [54]. In addition, operational complexity, such as coordinating with subcontractors, managing supply chains, and maintaining quality control, requires contractors to continuously monitor compliance across all aspects of a project. The increasing complexity of construction projects, particularly international ones, calls for more sophisticated compliance management strategies that can proactively address risks and maintain regulatory adherence throughout the project lifecycle.

Based on the literature reviewed, this study proposes a theoretical framework to examine how stakeholder pressures, compliance values, and project complexity influence

proactive compliance management in international construction projects. The framework is grounded on strategic cognition theory, which suggests that contractors use cognitive processes to interpret external pressures and internal values, translating these into proactive compliance actions (see Figure 2).

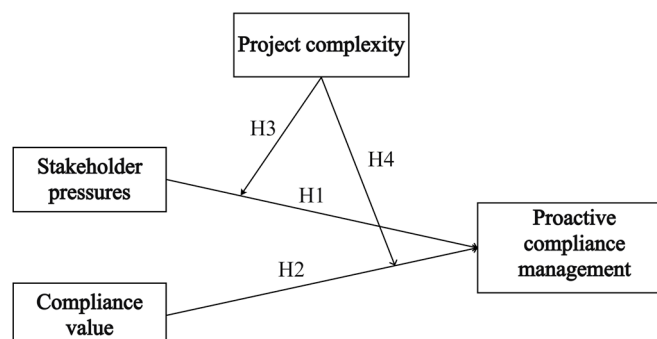


Figure 2. Theoretical model.

### 3. Hypothesis Development

#### 3.1. Stakeholder Pressures and Contractor Proactive Compliance

To ensure that contractors remain attuned to certain risks, global regulatory authorities, project developers, and clients hailing from developed nations are increasingly mandating adherence to internationally recognized standards on compliance management. For example, governments are concerned about legal and regulatory issues in regard to projects [62]. The media pay attention to health and safety issues during project construction [63]. The local community is sensitive to environmental impacts and economic improvements [39]. This heightened vigilance has culminated in the formulation of legislation and regulations pertaining to anti-corruption and anti-commercial bribery compliance, thereby intensifying the requisites for corporate compliance management [64].

Strategic cognition theory posits that organizations adapt to and respond to environmental changes through processes involving information gathering and strategic decision making [65]. Existing scholarship has identified the pivotal role of external stakeholder pressures in effectually propelling organizations towards the integration of sustainability management mechanisms within their operational frameworks [66,67]. Contractors recognize that adherence to globally recognized standards of compliance management not only serves to mitigate legal risks, but also plays a pivotal role in enhancing their corporate reputation and fostering trust among clients, thereby facilitating sustainable business growth [68,69]. Stakeholder pressures directly influence the strategic alignment of compliance management with external expectations [70,71]. This necessitates a continuous focus on stakeholder feedback and their evolving expectations, prompting contractors to make ongoing enhancements and optimizations to their compliance management systems in response to real-world scenarios. The ability to continually improve is essential for contractors to maintain a competitive edge in a complex and ever-changing external environment. Consequently, stakeholder pressures serve as a cognitive impetus for contractors, propelling them to adopt more proactive compliance management strategies. By actively identifying and proactively preventing compliance risks during project execution, contractors demonstrate a commitment to upholding ethical standards and regulatory requirements, thereby fostering a culture of compliance and risk mitigation within the organization. We believe that the possibilities presented by the use of proactive compliance strategies by international construction contractors will be expanded due to stakeholder pressures.



**H1.** *Stakeholder pressures positively affect the proactive compliance of international construction contractors.*

### 3.2. Compliance Values and Contractor Proactive Compliance

Values serve as a set of guiding principles adopted by senior managers to foster a shared comprehension of an organization's mission, and can be described as management control systems, utilized by the top management team, to cultivate a unified understanding of the organization's objectives among its stakeholders [60]. From the perspective of strategic cognition, the belief that issues aligned with an organization's core values and beliefs are granted priority is central [18]. Moreover, across various fields, researchers and practitioners have recognized that an organization's core values significantly influence its decision-making processes, behaviors, and management practices [72]. In a similar vein, Wijethilake and Lama [73] also found that the incorporation of sustainability concepts into a firm's core values positively impacts sustainable risk management.

Compliance values set forth a clear ethical baseline and a code of conduct for international construction contractors. Values such as integrity, quality, safety, and sustainability serve as guiding principles for making business decisions and implementing compliance management strategies. Proactive management policies, processes, and implementation measures, aligned with the contractor's core values, should be instilled within the organizational environment [74]. This alignment bridges the gap between compliance requirements and the organization's internal practices, often encapsulated within its culture and values-driven ethos [19,75]. This implies that compliance transcends mere adherence to regulations or policies, it embodies a fundamental ethical principle and behavioral compass that permeates every facet of the organization's operations and decision-making processes [76]. Based on these arguments, this study posits that:

**H2.** *Compliance values positively affect proactive compliance by international construction contractors.*

### 3.3. The Moderating Effect of Project Complexity

Under the influence of various complex factors, such as transnational, cross-cultural, and cross-organizational aspects, international construction projects typically face a range of challenges and uncertainties, including in relation to technology, management, law, and culture, and often come with a high level of uncertainty [77,78]. For example, a project may involve dealing with legal regulations regarding government approvals, land purchases, and environmental protection in multiple countries. Additionally, cooperation and coordination with contractors, suppliers, and employees from different countries is required to manage conflicting interests and cultural differences. Furthermore, technical standards, logistics, and cash flow issues need to be addressed. In this study, project complexity is defined as the complexity caused by various uncertainties and unpredictable factors that occur throughout the project lifecycle [54].

As the project unfolds, new demands and compliance risks may emerge. In response, the project team is compelled to comprehend, adapt, and meet the requisites of all the parties involved, while instituting and adjusting its compliance measures [77]. The escalating complexity and uncertainty inherent to the project environment can disproportionately augment the attention and influence exerted by external stakeholders [54]. As their comprehension of the potential risks stemming from the environmental intricacies of a substantial project deepens, they may begin to influence managers toward the adoption of more proactive strategies [79]. This serves the dual purpose of enhancing the organization's social legitimacy and facilitating improved anticipation of changes within the external landscape. Accordingly,

**H3.** *Project complexity moderates the positive relationship between stakeholder pressures and proactive compliance by international construction contractors, such that this relationship is stronger with higher levels of project complexity.*

Compliance values are the basic principles and value orientation that the organization adheres to during the implementation process of compliance management. In the face of complex projects, these core values may be challenged or abandoned because complexity creates pressures and conflicts of interest [80]. For example, in regard to a complex project with multiple stakeholders, multinational business activities, and a highly competitive environment, integrity and transparency may be threatened by bribery and anti-competitive practices, etc. [11]. Thus, project complexity may lead to a weakening or a loss of compliance values. However, proactive compliance management can respond to the complexity of a project through a range of measures and approaches and motivate organizations to follow compliance standards and core values when executing a project [81]. Proactive compliance management can include formulating clear compliance policies, establishing effective internal control mechanisms, strengthening training, and publicity, etc. [82]. Multinational construction companies respond to a complex business environment by establishing globally uniform compliance standards and processes, ensuring that all employees comply with the company's values and compliance requirements [83]. This approach can achieve compliance in a highly complex and multicultural context, and protect the reputation and interests of enterprises. Accordingly,

**H4.** *Project complexity moderates the positive relationship between the compliance values of and proactive compliance by international construction contractors, such that this relationship is stronger with higher levels of project complexity.*

## 4. Research Methodology

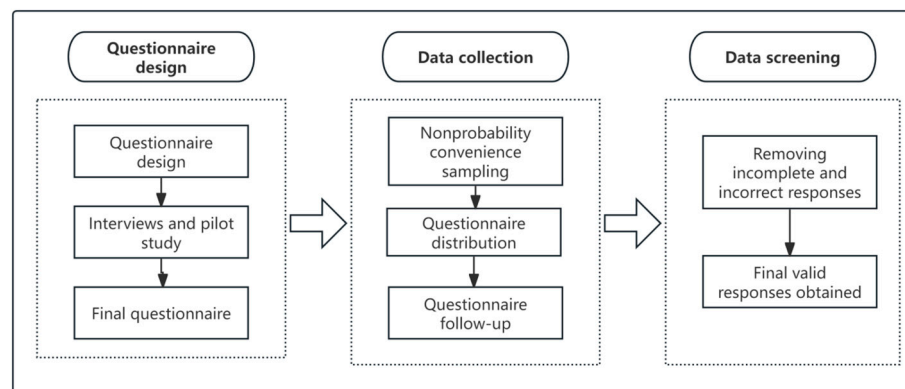
### 4.1. Questionnaire Design and Data Collection

As the primary focus of this study was to assess the driving mechanisms of proactive compliance management strategies for international construction contractors, the studies reviewed identified that the preliminary studies should focus on one country rather than confounding the findings and introducing contextual influences related to the national culture and industry [84]. In the context of China's Belt and Road Initiative (BRI), Chinese international contractors have become significant players in global infrastructure markets, comprising 32.4% of the world's top 250 contractors in 2024 [85] (ENR, 2024). As one of the most prominent emerging market countries, China presents not only substantial opportunities, but also considerable compliance-related challenges for global enterprises. Consequently, China provides a distinctive context for this study. The data collection process is shown in Figure 3. To enhance data validity, the questionnaire design incorporated established methodological safeguards, namely sensitive terminology was systematically avoided to mitigate response bias [86]. A rigorous forward–backward translation protocol was implemented for cross-linguistic accuracy verification, involving professional linguists and domain experts [87].

The questionnaire contains three parts. The introduction explained the objectives of the survey used in the study, and provided the respondents with strictly confidential survey information, which was used for academic research purposes only. The second section collected general information about the respondents, such as their position, educational background, and related project characteristics. Finally, the conceptual framework was presented, followed by items intended to measure stakeholder pressures, compliance values, project complexity, and proactive compliance strategies. The respondents were



required to evaluate, using a seven-point Likert scale, from 1 (strongly disagree) to 7 (strongly agree), their experience with a recently completed project in which they were involved during the entire process and the items according to which they were the most familiar, rather than just assessing the overall experience of the respondents across multiple projects.



**Figure 3.** Data collection process.

Considering the difficulty in identifying a specific and familiar population in the construction industry, where unfamiliar respondents may be reluctant to answer questionnaires involving sensitive research topics, this study utilized a non-probabilistic convenience sampling method. This approach, which is widely used in construction and engineering-related research, was selected to maximize the response rate [88,89]. The target population comprises managers, project leads, and team members working with Chinese international construction contractors, who have experience of managing compliance issues during projects. The questionnaire was distributed via WeChat to managers or team members working for Chinese contractors, engaged in international construction projects. Two sources were used to collect the data. Firstly, the author distributed electronic questionnaires in global engineering exchange WeChat groups. Secondly, contact was made with experienced construction professionals within the industry, requesting their assistance in completing the questionnaire. All the respondents were asked to recall their involvement in a recently completed international construction project when answering the questionnaire. A total of 198 completed survey questionnaires were received. The final sample consisted of 135 cases, resulting in an effective response rate of 68.18%. The use of partial least squares structural equation modeling (PLS-SEM) further supports the adequacy of this sample size. PLS-SEM is particularly suitable for smaller samples and complex models, making it an appropriate choice for this study's analytical needs [90]. Table 2 displays the characteristics of the sample.

**Table 2.** Descriptive statistics of the sample.

Content	Category	Number	Percentage
Gender	Female	11	8.2%
	Male	124	91.8%
Position	Senior manager	10	7.41%
	Middle manager	45	33.33%
	Executive level	72	53.33%
	Other	8	5.93%
Education	Specialist and below	41	30.37%
	Undergraduate	55	40.74%
	Postgraduate and above	39	28.89%
Firm's years of operation outside home country where the project was located	>10 years	79	58.52%
	7–9 years	20	14.81%
	4–6 years	28	20.74%
	1–3 years	8	5.93%
Company size (number of employees)	<1000	33	24.44%
	1000–5000	46	34.07%
	>5000	56	41.48%
Company nature	State-Owned Enterprise	73	54.07%
	Central Enterprise	55	40.74%
	Private Enterprise	7	5.19%

#### 4.2. Measurement

A questionnaire survey has been widely adopted when collecting professional views on factors affecting management strategies in construction companies. Several steps were followed when developing and validating the variable measurements in this study. First, all the measurement items were adapted from established scales used in prior studies. Second, the measurement items were pilot tested by 16 researchers and practitioners. This purposefully selected sample of 16 participants from the international construction sector, despite its limited size, was deemed sufficient for gathering detailed feedback, before conducting a broader survey [91].

Following the extant literature, we identified a total of 6 stakeholder entities that may exert pressure on compliance management strategies adopted by construction companies. These stakeholder groups include governments at all levels, clients, the creditor/investor/lender, the community and public, project partners, and consultants [92]. Six items were used to measure stakeholder pressures, and the respondents were asked to assess the extent to which these stakeholder groups “requested” that they “develop compliance management measures” [66,69]. Measuring organizational values by asking organizational members about their overall perceptions is justified in the literature [81]. The guidance provided by previous studies was followed [73], five questions were used to measure compliance values, capturing distinct dimensions, such as moral obligations, legal adherence, long-term success, proactive management practices, and strategic business benefits. The moderator project complexity was measured based on a 3-item scale, adopted from the work by Bjorvatn et al. [54]. The measurement of proactive compliance management scale is based on prior research on proactive environmental management strategies [49] and incorporates elements from ISO 37301 [3], encompassing the four aspects of planning, implementation, improvement, and monitoring, into its scale items.

When testing the structural model, three control variables were introduced, namely organization size, the nature of the enterprise, and experience of internationalization. These variables may have an influence on the organizational strategy response [93]. A brief

overview of the constructs and their theoretical foundations are provided in Table 3. For detailed information on the full set of measurement items used in this survey, please refer to Appendix A.

**Table 3.** Theoretical foundations of the key constructs.

Variable	Conceptualization	Example Items from the Questionnaire
Stakeholder pressures	Based on the influence of external stakeholders, like authorities, clients, and the community, on compliance.	Government authorities required our organization to enhance its compliance practices (e.g., legal documentation, reporting, or monitoring systems).
Compliance values	Refers to the moral and strategic importance of compliance.	It is our moral obligation to implement compliance management practices (e.g., the use of renewable energy, preserving biodiversity, etc.)
Project complexity	Captures the complexity of and uncertainty in regard to the project.	The project involved complex technical content and required specialized knowledge.
Proactive compliance management	Measures proactive strategies adopted by the management team to ensure compliance.	Our project management team identified potential compliance risks and set clear compliance objectives during the project planning phase.

#### 4.3. Data Analysis and Results

Partial least squares structural equation modeling (PLS-SEM) is adopted to test the proposed hypotheses, which is widely used in architectural and engineering research [76,94]. PLS-SEM is a statistical method used to analyze complex relationships between observed and latent variables. PLS-SEM is different from covariance-based structural equation modeling (CB-SEM) by utilizing total variance for parameter estimation, whereas CB-SEM relies on covariance matrix analysis [95]. This distinction makes PLS-SEM particularly valuable in situations involving smaller sample sizes, as it does not require assumptions in terms of multivariate normality and can handle complex model structures effectively. PLS-SEM was used in this study for the following two reasons. First, the sensitivity of the compliance theme itself, in this study, resulted in a relatively small sample size. In contrast to CB-SEM, PLS-SEM is suitable for dealing with complex model relationships without requiring large sample sizes. It is able to maximize the predictive validity by maintaining robust results, despite small sample sizes. Secondly, by constructing and testing the path relationship in the theoretical model, PLS-SEM provides an effective way to test the theoretical hypotheses, so as to provide support for theory and practice [95]. In regard to PLS-SEM, the measurement model refers to the framework that specifies the relationships between observed indicators and their latent constructs, ensuring that the constructs are accurately represented and measured through reliable and valid indicators. The structural model describes the relationships between latent variables, representing the hypothesized causal paths and the strength of the relationships between independent and dependent constructs.

To mitigate potential common method variance during data collection, we have implemented several precautionary measures. Firstly, we employed back-translation and pilot testing to refine the questionnaire items, ensuring the accuracy and clarity of the questions. Secondly, we structured the questionnaire so that items measuring dependent variables preceded those assessing other variables to prevent respondents from being influenced by previous questions. Furthermore, we assured participants of the confidentiality of their responses and explicitly stated that the data collected would be used solely for academic research purposes. Additionally, through the use of exploratory factor analysis (EFA) and by employing Harman's single-factor test to examine common method variance (CMV), four factors were extracted. The percentage of variance explained by the first factor was 22.87%, which is below the 40% threshold [96]. Hence, the presence of CMV was considered acceptable.

#### 4.3.1. Measurement Model Analysis

First, we assessed the measurement model according to its reliability, convergent validity, and discriminant validity [97]. The measurement reliability was evaluated using both Cronbach's alpha (CA) and composite reliability (CR). As shown in Table 3, all the CA values exceeded the minimum acceptable value of 0.7, indicating satisfactory internal consistency of the model's structure. Additionally, all the CR values were above 0.6, providing evidence of the model's composite reliability [90]. This suggests that the measurement model has good reliability. Secondly, we evaluated the model's convergent validity using the average variance extracted (AVE) value, achieving the acceptable minimum threshold of 0.5 [97]. The factor outer loadings for each item within each construct were greater than 0.5, representing a satisfactory convergent validity of the observed indicators [98]. The analysis results indicate that all the values are above the minimum acceptable threshold, thus ensuring the "convergence validity" of this study. The standard test for discriminant validity is based on the criterion that the square root of the AVE for each latent variable should be greater than the correlations between the latent variables [99]. As shown in Table 4, the AVE values for the latent variables in this study exceeded the benchmark value of 0.5, indicating that the latent variables accounted for at least 50% of the variance in the observed items. Furthermore, as shown in Table 5, the square root of the AVE for each of the four latent variables in this study was greater than the correlation coefficients between the latent variables, indicating good discriminant validity of the measurement model.

**Table 4.** Construct reliability and convergent validity.

Variables	Items	Outer Loading	CR	AVE	Cronbach's $\alpha$
Stakeholder pressures (SPs)	SP1	0.727	0.8758	0.5419	0.844
	SP2	0.782			
	SP3	0.716			
	SP4	0.831			
	SP5	0.693			
	SP6	0.654			
Compliance values (CVs)	CV1	0.817	0.867	0.5688	0.846
	CV2	0.789			
	CV3	0.593			
	CV4	0.754			
	CV5	0.796			
Project complexity (PC)	PC1	0.862	0.8849	0.7198	0.845
	PC2	0.891			
	PC3	0.789			
Proactive compliance management (PCM)	PCM1	0.773	0.8669	0.6195	0.822
	PCM2	0.780			
	PCM3	0.804			
	PCM4	0.791			

Note: SPs = stakeholder pressures; CVs = compliance values; PC = project complexity; PCM = proactive compliance management.

**Table 5.** Results for construct discriminant validity.

Construct	SP	CV	PCM	PC
SPs	0.736	—	—	—
CVs	0.238 (0.017 ***)	0.754	—	—
PCM	0.307 (0.002 ***)	0.436 (0.000 ***)	0.848	—
PC	0.046 (0.650)	0.185 (0.066 *)	0.266 (0.007 ***)	0.787

Note: \* and \*\*\* are significantly correlated at the 0.05 and 0.001 levels, respectively. SPs = stakeholder pressures; CVs = compliance values; PC = project complexity; PCM = proactive compliance management.

#### 4.3.2. Structural Model Analysis

In this study, the bootstrapping repeated sampling method is used to select 5000 samples to calculate the  $p$ -value of the significance test [100,101]. The model fit of the explanatory power of the independent variables on the dependent variable was evaluated using the coefficient of determination ( $R^2$ ), Stone–Geisser’s  $Q^2$ , and the goodness-of-fit value (GoF). In addition to these tests, we performed a sensitivity analysis using bootstrap sub-sample testing to examine the robustness of the model and identify the most effective variables. By conducting this analysis, we were able to assess how variations in the key parameters influenced the model’s outcomes, ensuring that our results were stable across different sub-samples. The coefficient of determination shows the nomological validity, explanatory power, and predictive validity of the structural model on a scale of 0–1. Table 6 shows that the  $R^2$  of the dependent variable was 0.288, this is statistically significant [79]. Stone–Geisser’s  $Q^2$  was used to represent the prediction correlation of the model, and the GoF was calculated to represent the relationship between the quality of all the measured models and the quality of all the structural models [99,101]. Stone–Geisser’s  $Q^2$  was 0.239, indicating medium predictive accuracy of this model [102]. The GoF value of this model is the square root of the product of the average AVE and average  $R^2$ , with a value of 0.430, where a value  $>0.36$  is considered sufficient [100]. As proposed by Henseler et al. [102], the effect size ( $f^2$ ) is an indication of the effect of a particular exogenous construct on an endogenous construct. As shown in Table 7, the effect size ( $f^2 = 0.143$ ) of stakeholder pressures approaches the threshold for a large effect size ( $f^2 \geq 0.15$ ), indicating significant explanatory power of stakeholder pressures on proactive compliance management. The effect size  $f^2$  of 0.062 for compliance values is relatively small. However, it still indicates that compliance values play a role in shaping compliance management strategies ( $f^2 \geq 0.02$ ). Overall, both the predictive validity and the model fit indicators were satisfactory.

**Table 6.** Results for theoretical and predictive validity.

	$R^2$	$R^2$ Adjusted
PCM	0.288	0.261

Note: PCM = proactive compliance management.

**Table 7.** Predictive power based on the  $f$  square of the endogenous latent variables.

Path	$f^2$
SPs→PCM	0.143
CVs→PCM	0.062

Note: SPs = stakeholder pressures; CVs = compliance values; PCM = proactive compliance management.

There was no evidence of multicollinearity, as the absolute value of each correlation was  $<0.7$  [103] and the variance inflation factor (VIF) for the respective variables were 1.129, 1.059, and 1.149, respectively, all of which were  $<2.5$  [101]. Using pathway coefficients and  $p$ -values in the pathway analysis, structural models can test the magnitude and importance of causal relationships between variables. The path coefficient indicates the strength of the relationship between the independent and dependent variables. The path coefficients are statistically significant when the  $p$ -value is less than 0.05 [104].

#### Main Effects

In this study, the bootstrap repeated sampling method (5000 sub-samples) was used to calculate the  $p$ -values of the significance tests and assess parameter sensitivity [102,105]. The bootstrap 95% confidence intervals (CIs) and standard deviations (SDs) of the path

coefficients were reported to evaluate the robustness of the key relationships (Table 7). In our analysis, we consider a T-value greater than 1.96 to be statistically significant at the 95% confidence level. As shown in Table 8, stakeholder pressures have a significant positive impact on proactive compliance management strategies of international construction contractors ( $\beta = 0.328$ ,  $t = 4.781$ ;  $p < 0.01$ ; CI = 0.188, 0.456), supporting Hypothesis 1. Supporting Hypothesis 2, compliance values had a positive impact on the proactive compliance management strategies of international construction contractors ( $\beta = 0.246$ ;  $t = 3.346$ ;  $p < 0.01$ ; CI = 0.099, 0.389). In addition, three control variables were tested using the model and results were gathered. The results showed that project size ( $\beta = 0.089$ ,  $p < 0.05$ ) was positively correlated with the active compliance management strategies of international construction contractors, while the contractor's years of operation outside their home country where the project was located ( $\beta = 0.053$ ), the company size ( $\beta = 0.028$ ), and enterprise ownership ( $\beta = 0.043$ ) had no significant impact.

**Table 8.** PLS-SEM assessment.

Hypothesis	Path Coefficient	T	p-Value	SD	95% Bias Corrected Confidence Intervals		Interpretation
					2.5%	97.5%	
Main path							
H1: SPs→PCM	0.328 <sup>b</sup>	4.781	0.000	0.069	0.188	0.456	Supported
H2: CVs→PCM	0.246 <sup>b</sup>	3.346	0.001	0.073	0.099	0.389	Supported
Moderating impacts							
H3: PC × SPs→PCM	0.203 <sup>a</sup>	2.447	0.014	0.083	0.03	0.355	Supported
H4: PC × CVs→PCM	−0.083	1.565	0.118	0.081	−0.344	−0.015	Not Supported

SPs = stakeholder pressures; CVs = compliance values; PC = project complexity; PCM = proactive compliance management; <sup>a</sup>  $p < 0.05$  (two tailed); <sup>b</sup>  $p < 0.01$  (two tailed).

#### Moderation Effect

To evaluate the moderation effect, we adopted the approach recommended by Henseler et al. [90], using a PLS product indicator with 5000 bootstrap resamples. An interaction construct was used in SmartPLS 4 to measure the moderating effect. The results show a positive moderating impact of project complexity on the relationship between stakeholder pressures and proactive compliance management ( $\beta = 0.203$ ,  $t = 2.447$ ;  $p < 0.05$ ; CI = 0.03, 0.355), thus Hypothesis 3 is supported. Hypothesis 4, in which we predicted a positive impact of project complexity on the relationship between stakeholder pressures and proactive compliance management, was not supported.

## 5. Discussion

First, our findings underscore the critical role of stakeholder pressures in driving proactive compliance management strategies among international construction contractors, consistent with Freeman's stakeholder theory [106]. Organizations operating in global markets are compelled to align with stakeholder expectations due to their reliance on critical resources, such as financing from multilateral banks and permits from host governments. Organizations like the United Nations, multilateral development banks, and national governments have raised compliance standards through the use of stricter anti-corruption and anti-bribery requirements [28]. These pressures create a dual institution–stakeholder dynamic that amplifies operational uncertainties, incentivizing contractors to adopt preemptive measures that exceed baseline legal requirements [37]. Consequently, international construction contractors frequently adopt self-regulatory standards and adapt practices from their home countries to align with the regulatory environment in host countries. For instance, contractors may voluntarily issue compliance reports during infrastructure project



bids to demonstrate adherence to international anti-corruption standards, thereby differentiating themselves in competitive markets. Such strategic self-regulation reflects a proactive response to mitigate risks associated with noncompliance, enabling firms to navigate the complexities of transnational regulatory environments, while aligning with host country norms. This finding provides new insights into the intersection of stakeholder theory and compliance management, demonstrating how external pressures shape contractor behavior in a complex global context. It also emphasizes the importance of strategic self-regulation in responding to the evolving regulatory landscape, marking a theoretical contribution by extending Freeman's stakeholder theory to the domain of compliance management in international construction.

Furthermore, our findings support the positive impact of compliance values on the proactive compliance management of international construction contractors. These findings are consistent with previous research that highlights the role of values-driven cultures in promoting responsible practices. Value-oriented ethical concepts are widely discussed in academic research [107], and have been relatively underexplored in empirical research. Compliance values foster a corporate culture that guides autonomous decision making and shapes the organization's proactive approach to compliance [33,76]. More specifically, contractors with well-established compliance cultures are able to extend these principles effectively to their foreign operations. In practice, these values influence not only the firms' corporate governance structures, but also the day-to-day management of construction projects. Contractors with established compliance and value management systems can successfully extend their well-established corporate compliance culture to their foreign branches, facilitating seamless compliance transfer to other parts of the business.

In line with our hypothesis, project complexity positively moderates the effect of stakeholder pressures on proactive compliance management. Prior studies have underscored that the complexity of large-scale projects prompts contractors to engage in more corporate social responsibility practices and to be more responsive to stakeholder pressures [108,109]. As projects become more complex, marked by increased technological intricacies, cultural differences, or political risks, contractors face greater compliance challenges. As project complexity intensifies, contractors must prioritize risk management, compliance governance, and strategic adjustments to meet the evolving demands of all the stakeholders involved [110]. Contractors must allocate additional resources to ensure compliance, often creating specialized teams with expertise in various disciplines. These teams are tasked with developing a comprehensive compliance framework to guide the project and ensure that all stakeholders' expectations are met [111]. For example, in areas with high political risks, contractors not only face technical challenges, but also need to cope with the complex political environment and the pressure from international stakeholders. Therefore, contractors can strengthen their cooperation with local governments and communities and establish proactive compliance governance structures to ensure compliance with local and international laws and regulations. This finding highlights the interconnectedness between project compliance governance and risk management. It underscores the importance of strategic planning in managing compliance risks, particularly in challenging environments.

Contrary to hypothesis H3, the research findings indicate that project complexity does not moderate the relationship between compliance values and proactive compliance management by international construction contractors. This finding suggests that compliance values serve as a consistent framework for guiding behavior, irrespective of external challenges, such as project complexity. Compliance values, rooted in integrity, amalgamate legal considerations with organizational values, forming a corporate ethos that supports autonomous behavior. This is evident when contractors need to navigate politically unstable regions, wherein proactive compliance governance, including collaboration with

local governments and communities, is essential for mitigating risks. By validating the role of compliance values in shaping contractor behavior, regardless of project complexity, our findings offer important theoretical insights into the stability of values-driven compliance frameworks.

## 6. Conclusions

This study examines how stakeholder pressures and compliance values influence the proactive compliance of international construction contractors, while also exploring the moderating effect of project complexity on the relationship. The findings reveal that stakeholder pressures positively impact the adoption of proactive compliance measures by international construction contractors ( $\beta = 0.328$ ,  $t = 4.781$ ;  $p < 0.01$ ), with project complexity amplifying this effect ( $\beta = 0.203$ ,  $t = 2.447$ ;  $p < 0.05$ ). Additionally, the contractors' compliance values actively support the adoption of proactive compliance ( $\beta = 0.246$ ;  $t = 3.346$ ;  $p < 0.01$ ), and project complexity does not significantly influence this relationship. This research contributes to management theory in several significant ways.

Firstly, this study underscores the pivotal role of compliance management in contractor strategic decision making, revealing that compliance is not solely about meeting legal obligations, but is a critical factor for international construction contractors to achieve sustainable development, earn market trust, and enhance its competitiveness. This study elucidates how compliance management becomes an integral component of corporate strategic decision making, particularly amidst global competition and complex regulatory landscapes. This theoretical contribution provides strong academic backing for the strategic importance given to compliance management, urging contractors to view compliance management as a key instrument for driving sustainable development.

Additionally, this study highlights the significance of compliance values in shaping proactive compliance among international construction contractors. Organizational values transcend superficial commitments, profoundly influencing the mindset and value orientation of decision makers. The metrics for evaluating proactive compliance mirror the latest developments in ISO standards, such as the most recent revision of ISO 37301:2021. These updated standards introduce additional requirements, mandating stronger coupling between an organization's compliance values and the management system and strategic direction of the company. This discovery offers a novel perspective on understanding the cultural drivers that underlie compliance management strategies, highlighting the foundational and enduring impact of corporate culture on compliance practices.

Finally, this study enriches the theoretical framework on compliance management by integrating project complexity as a critical consideration. In doing so, we present a novel viewpoint and strategies for comprehending and addressing compliance challenges in a volatile and uncertain environment. The complexity inherent in international construction projects compels firms to adopt more resolute measures to advocate for stakeholder interests and implement proactive management approaches. This perspective challenges conventional beliefs that complexity may impede management efforts, emphasizing instead the catalyzing role of complexity in prompting organizations to undertake proactive and forward-thinking compliance actions. This innovative perspective furnishes a fresh theoretical justification for comprehending compliance management in complex project environments.

Our study has generated the following management practice implications. The study findings have several implications for the compliance governance of international construction contractors and policy makers in regard to project oversight. Firstly, proactive governance structures and institutional arrangements that reflect the compliance expectations and requirements of stakeholders are essential. International construction contractors should integrate the expectations of stakeholders to adopt proactive compliance manage-

ment measures. This integration can be enhanced through the use of digital technologies, such as blockchain and AI, which can improve transparency and accountability in regard to compliance processes. Regulators can facilitate this integration through various means, including the introduction of incentive policies, media scrutiny, and reporting mechanisms that encourage stakeholder engagement.

Additionally, the empirical findings in this study indicate the moderating effect of project complexity, emphasizing the need for tailored proactive compliance management approaches. Regulators should establish and enforce clear and concise regulations that account for the complexities and realities of international construction. These regulations should be regularly updated to reflect changes in industry standards, societal expectations, and technological advancements.

Furthermore, the integration of corporate ethics and practical strategies is crucial for achieving a sustained competitive advantage and equitably creating value among stakeholders. Effective compliance management requires embedding compliance principles into the core values of the organization, thereby cultivating a robust culture of compliance. Establishing dynamic feedback mechanisms will allow organizations to adapt their compliance strategies in response to evolving project complexities and market conditions.

This study, while offering valuable insights into the compliance strategies of international construction contractors, is not without limitations, which must be acknowledged to provide a clear context in regard to the findings. The research primarily relies on survey data to explore compliance strategies in the international construction contracting sector. While surveys provide quantitative data, they may not fully capture the depth and nuances of the compliance landscape. Future research should consider employing qualitative methods, such as interviews and case studies, to gain a more comprehensive understanding of the subject. Additionally, the unique characteristics of these companies and the regulatory context in China may not be representative of international contractors from other regions. Therefore, future studies should aim to diversify the sample by including contractors from various countries and cultural backgrounds. In addition, future research could explore the role of negative stakeholder pressures as a potential motivator for contractors to proactively comply with regulations and project requirements. Such pressures may help prevent the negative consequences associated with a reactive compliance system, ultimately improving project execution and stakeholder relations. Project complexity measures focus on technical, coordinative, and environmental uncertainties, but exclude traditional risk factors (e.g., cost overruns, schedule delays), as they are often consequences of complexity. Future work should integrate scope–time–cost metrics to broaden the risk coverage. Future studies could enhance the measurement by integrating iron triangle (scope–time–cost) metrics. Furthermore, future studies could explore the long-term impact of proactive compliance on contractors' financial performance, focusing on quantifiable outcomes, such as profit margins, project completion rates, and stakeholder satisfaction.

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## Appendix A

**Table A1.** Survey Questionnaire.

Stakeholder Pressures	
SP1	Government authorities required our organization to enhance its compliance practices (e.g., legal documentation, reporting, or monitoring systems).
SP2	The client requested stricter compliance with regulations or internal control measures.
SP3	Creditors, investors, or lenders imposed requirements related to risk control or legal compliance.
SP4	Project partners emphasized the need for formal compliance processes or accountability mechanisms.
SP5	The local community or public raised concerns or expectations regarding legal, ethical, or environmental compliance.
SP6	External consultants (e.g., legal, audit, or HSE consultants) recommended improvements to our compliance procedures or systems.
Compliance Values	
CV1	It is our moral obligation to implement compliance management practices (e.g., use of renewable energy, preserving biodiversity, etc.).
CV2	Our organization is committed to complying with all relevant regulations, standards, and industry best practices in regard to our operations.
CV3	We believe that adhering to compliance practices, such as legal, environmental, and safety regulations, is essential to the long-term success of our organization.
CV4	Our company prioritizes compliance by ensuring that all its projects meet legal, regulatory, and ethical standards.
CV5	Our commitment to compliance provides us with a competitive edge by improving our reputation, reducing risks, and increasing competitiveness.
Project Complexity	
PC1	The project involved complex technical content and required specialized knowledge.
PC2	The project required coordination between multiple interdisciplinary teams.
PC3	The project was characterized by high levels of risk and uncertainty.
Proactive Compliance Management	
PCM1	Our project management team identified potential compliance risks and set clear compliance objectives during the project planning phase.
PCM2	Our project management team communicated compliance policies, provided training to employees, and implemented clear compliance procedures to ensure adherence to regulations.
PCM3	Our project management team regularly monitored the effectiveness of our compliance management system by conducting audits, tracking performance indicators, and identifying any compliance violations.
PCM4	When compliance issues were identified, our project management team took corrective actions, including updating compliance procedures and adapting to new legal or regulatory changes.

Answers were to be given based on a 1–7 scale; 1 = strongly disagree and 7 = strongly agree.

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