Providing a Model for the Labor Relations System in Knowledge-Based Organizations (Engineering Companies Affiliated with the Ministry of Defense and Armed Forces Support)

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Abstract

The main objective of this article is to propose a model for the labor relations system in knowledge-based organizations (engineering companies affiliated with the Ministry of Defense and Armed Forces Support). The research method is mixed (qualitative-quantitative). In the qualitative section, grounded theory was employed using MAXQDA14 software to identify indicators related to the labor relations system in knowledge-based organizations. The research population included experts in management specializing in public administration, human resources, and organizational relations (who had authored books or articles) as well as managers and deputies of engineering companies affiliated with the Ministry of Defense and Armed Forces Support. Based on the theoretical saturation criterion, 15 participants were purposefully selected. In the quantitative section, a developmental-applied method was used. The quantitative statistical population consisted of all employees of engineering companies affiliated with the Ministry of Defense and Armed Forces Support, and the sample size was determined using Cochran's formula. Accordingly, 384 participants were randomly selected as the sample. As a result, 131 initial concepts (open codes), 19 main concepts (axial codes), and 6 selective codes were identified. Quantitative results indicated that the influence of contextual factors on strategic factors, with a coefficient of 0.896, represents the strongest relationship, while the relationship between the main phenomenon and strategies, with a coefficient of 0.443, is the weakest. The proposed model, comprising four dimensions (understanding, adaptation, generalization, and control), was validated by expert opinion.

Keywords: *Labor relations system, knowledge-based organizations, engineering companies, Ministry of Defense and Armed Forces Support*

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1. Introduction

Industrial (labor) relations encompass all interactions between workers and employers, workers and labor organizations, labor organizations and employers, labor organizations and employer organizations, labor organizations and the government, and employer organizations and the government, aimed at collaboration and conflict resolution [1]. In other words, industrial relations are a set of relationships between worker groups and employer groups within a society. The government plays the role of observer and mediator in these relations, both influencing and being influenced by them. The primary actors in this domain include workers (or their representatives, such as Islamic labor councils and trade unions), employers (or their representatives, such as employer associations), and the government [2].

A significant distinction exists between the traditional perspective, which focused solely on establishing relationships and managing rules to control interactions among industrial relations actors, and the modern perspective, which emphasizes a participatory relationship heavily influenced by various factors. This shift addresses a critical gap in traditional industrial relations systems [3]. Diverse and comprehensive models, such as the systems theory, social action theory, and dynamic open models, have been introduced to study labor relations [4]. These models underscore the importance of adopting a process-oriented view of industrial relations and considering external and internal factors influencing this process.

In the volatile and dynamic environment of the modern world, designing a universal model is highly challenging. Given this rapid pace of change, the focus of industrial relations model design has shifted toward flexibility and dynamic modeling [5]. Most industrial relations models agree on the inputs, outputs, and core processes of labor relations but differ in their interpretation of the connections among these components and the interaction of primary and secondary actors with the internal and external environments [6].

Consequently, industrial relations models can be redefined across different environments. Introducing a model that reflects the presence of all primary and secondary actors in the industrial relations system and their interactions, while considering situational and environmental changes, is of paramount importance [7].

Among external factors, with consideration of their functional nature, "decent work" is a significant external factor that can penetrate the internal boundaries of the industrial relations system, exerting direct internal and external influence. Decent work is arguably one of the most critical and prominent issues in today's and the future's business landscape. First introduced in 1999 by the Director-General of the International Labour Organization, decent work presents a broad and valuable concept centered on fundamental labor rights, appropriate employment, social dialogue, and social protection.

Decent work is prominently featured in international documents, including the Millennium Development Goals adopted by the United Nations in 2000, alongside other objectives such as achieving peace, security, sustainable development, and good governance. In Iran's Fourth (Article 101), Fifth (Article 25), and Sixth (Articles 4 and 120) Development Plans, as well as the National Employment Development Plan, the necessity of adopting and implementing the decent work framework in the business sector is explicitly emphasized. Similarly, the Constitution, Labor Law, Twenty-Year Vision Document, and general policies of the system indirectly stress the components of decent work [8].

Decent work is poised to become a transformative and exciting concept in the legal and operational framework of business. Given its profound significance and influence on the nature and future of business, incorporating decent work into industrial relations modeling is an imperative that cannot be ignored or avoided.

The literature on labor relations highlights a variety of perspectives across different contexts. Hosseinabadi (2020) examined the sociological relationship between labor relations and social cohesion in Iran, concluding that tensions between workers and employers, coupled with the rise of temporary contracts, threaten social cohesion by fostering instability and alienation [9]. Zamaniyan and Karami (2020) analyzed Iran's labor law from the perspective of the flexicurity approach, emphasizing that the law lacks sufficient flexibility to balance labor market dynamics and advocating for reforms to align with international policies [10]. Santos and Siman (2024) explored civil-military labor relations in Brazil, focusing on the integration of military and civilian roles in missions beyond traditional defense, such as peacekeeping and public security, suggesting that the development of military doctrine like CIMIC supports effective coordination in these domains [11]. Similarly, Binkley (2024) investigated the deterioration of civil-military relations during the Trump administration in the United States, attributing the decline to

the president's disregard for military professionalism and attempts to politicize the armed forces, which disrupted traditional norms of military expertise and nonpartisanship. Together, these studies underscore the complex interplay of labor relations with social, legal, and institutional factors, revealing diverse challenges and opportunities in varying geopolitical and organizational contexts [12].

Therefore, this study aims to develop a labor relations system model for knowledge-based organizations, particularly engineering companies affiliated with the Ministry of Defense and Armed Forces Support, by relying on upstream documents, prior research, and the insights of experts and central organizational officials. The central research question is: "Can a suitable model be designed for the labor relations system in knowledge-based organizations, specifically engineering companies affiliated with the Ministry of Defense and Armed Forces Support?"

2. Methodology

This study employed a mixed-methods approach (qualitative and quantitative). In the qualitative phase, semi-structured interviews were conducted to identify initial components using the grounded theory method. The study participants included experts in management (public administration, human resources, and organizational relations) as well as managers and deputies of engineering companies affiliated with the Ministry of Defense and Armed Forces Support, who had expertise or authored articles and books in the relevant field.

Eligibility criteria included experts with at least three years of experience in teaching at public or private universities, holding a Ph.D. in labor relations, knowledge-based organizations, or related subjects. Additionally, managers and deputies of engineering companies affiliated with the Ministry of Defense and Armed Forces Support with a minimum education level of a master's degree were included. The sampling method was purposeful. According to Taskhiri and Tashakori (2003), in this method, cases are selected non-randomly and deliberately to serve the research objectives (Taskhiri & Tashakori, 2003, p. 96). A total of 15 experts participated in the qualitative phase of this research.

The grounded theory process was utilized to identify factors influencing the labor relations system in knowledge-based organizations (with a case study of engineering companies affiliated with the Ministry of Defense and Armed Forces Support). Data collection for the quantitative phase involved a questionnaire with 384 Likert-scale questions ranging from "very high" to "very low." The statistical population in this phase included employees of engineering companies affiliated with the Ministry of Defense and Armed Forces Support, with a sample size of 384 participants determined based on Morgan's table. A simple random sampling method was employed.

The average duration of the interviews was 84 minutes. After transcribing the interviews, data analysis was performed concurrently with data collection using the grounded theory method. The process began with the transcription of recorded interviews, followed by sending a version of the extracted codes to participants for verification. To familiarize and immerse the researchers in the data, multiple readings were conducted. Initial codes were identified, and similar codes were grouped into categories, forming initial classifications. These categories were then merged to create themes.

To ensure data reliability, prolonged engagement and deep interaction with the data were maintained. Additionally, two independent researchers participated in the data analysis alongside the primary researchers. Handwritten notes were reviewed for code and category validation. To enhance credibility, participants were revisited for confirmation. Maximum diversity in sampling and prolonged interviews were additional methods to ensure data validity.

From the initial interviews, codes and subcategories began to emerge, and data reduction continued across all units of analysis (codes) until themes emerged. Interviews continued until theoretical saturation was achieved. Qualitative content analysis was performed using MAXQDA12 software. For structural equations, SmartPLS3 software was used, and SPSS25 software was employed to validate the model.

3. Findings

The research participants indicated that the labor relations system in knowledge-based organizations (case study: engineering companies affiliated with the Ministry of Defense and Armed Forces Support) was identified with six dimensions, 19 components, and 131 indicators.

Ultimately, six dimensions, 19 components, and 131 indicators were recognized for the labor relations system in knowledge-based organizations (engineering companies affiliated with the Ministry of Defense and Armed Forces Support).

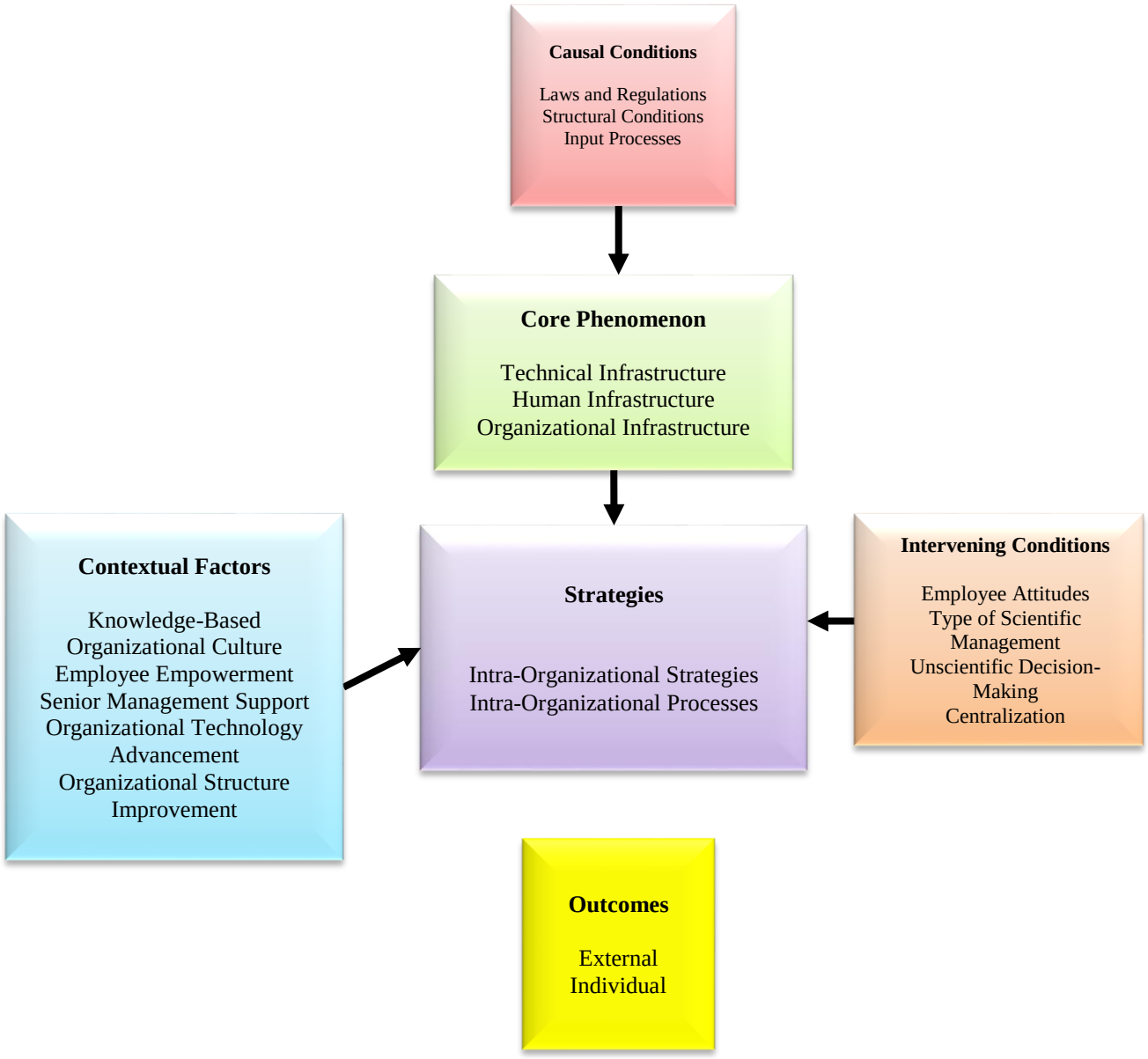

Figure 1. Model of factors influencing the labor relations system in knowledge-based organizations (case study: engineering companies affiliated with the Ministry of Defense and Armed Forces Support).

Subsequently, a questionnaire was distributed among 384 participants, and the results were analyzed using structural equation modeling.

Figure 2. Factor loadings and determination coefficients of the appropriate labor relations system model in knowledge-based organizations (case study: engineering companies affiliated with the Ministry of Defense and Armed Forces Support).

In the final step, model validation was conducted using software outputs and a standard questionnaire by Strauss and Corbin.

$$R^2 = (0.670 + 0.925 + 0.678) / 3 = 0.756$$

This criterion pertains to the overall fit of structural equation models. It allows the researcher to verify the fit of the overall model after evaluating the measurement and structural sections. The GOF criterion was introduced by

Tenenhaus et al. (2004) and is calculated using the following formula:

$$GOF = \sqrt{(Avg(Communalities) \times R^2)}$$

According to Wetzels et al. (2009, p. 187), GOF values of 0.01, 0.025, and 0.36 are considered weak, moderate, and strong, respectively.

$$R^2 = 0.756$$
$$GOF = \sqrt{(0.598 \times 0.756)} = \sqrt{0.452} = 0.672$$

Based on the obtained GOF coefficient, it is evident that the proposed model demonstrates appropriate relationships.

The final model presented in this study is a conceptual model developed by the researcher through comparative studies, a review of the labor relations system in knowledge-based organizations, theoretical and empirical foundations, and an analysis of the results derived from interviews and questionnaires. The labor relations system model for knowledge-based organizations (case study: engineering companies affiliated with the Ministry of Defense and Armed Forces Support) was designed as shown below.

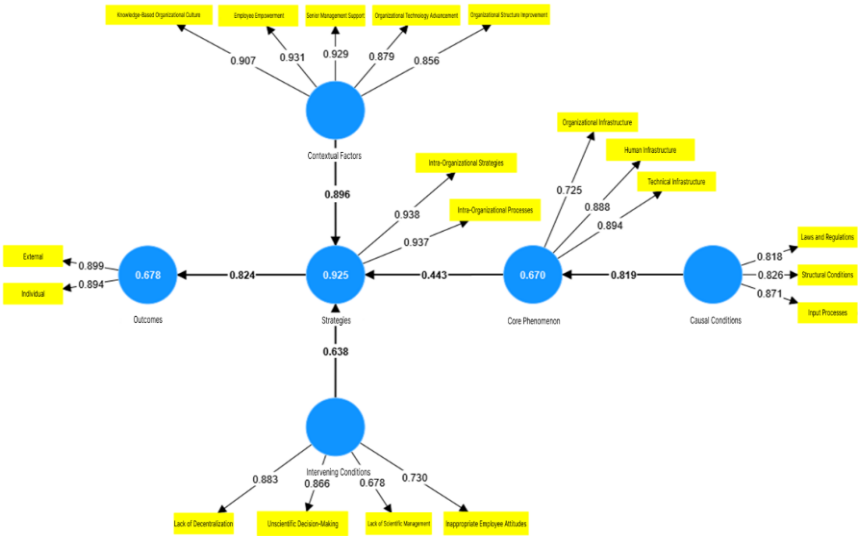

Figure 3. Labor relations system model in knowledge-based organizations (case study: engineering companies affiliated with the Ministry of Defense and Armed Forces Support).

In the fourth stage, the researcher conducted a re-examination of the selective codes, aiming to categorize the selected concepts (based on content and appearance) into broader categories (sub-themes). Based on the findings from this step, a total of 22 sub-categories, or organizing themes, were created. Additionally, to assess the validity of the sub-categories extracted in this stage, a back-and-forth review from steps one to four was conducted, ensuring the content validity of the identified categories, as detailed in Table 1.

Table 1. Validation of the quantitative fit of components in the labor relations system model in knowledge-based organizations (case study: engineering companies affiliated with the Ministry of Defense and Armed Forces Support).

Component	Cronbach's Alpha	AVE	CR
Causal Conditions	0.72	0.605	0.783
Core Phenomenon	0.757	0.722	0.852
Strategic Variables	0.701	0.559	0.786
Intervening Factors	0.734	0.670	0.899
Contextual Factors	0.802	0.710	0.992
Outcomes	0.891	0.721	0.956

For model validation, R^2 must exceed 0.3. In this study, R^2 was calculated as 0.756, confirming the model's validity. Additionally, the GOF coefficient, which must also exceed 0.3, was calculated as 0.672, further validating the model.

The initial model was designed as a two-dimensional matrix and returned to the experts (specialists participating in the interviews). A Likert-scale questionnaire with six dimensions was prepared, and the experts were asked to review the results for accuracy.

Table 2. Results of the one-sample t-test for evaluating the suitability of the proposed model.

Component	Mean Difference	Std. Deviation	t	df	Sig.
Adaptation	1.17	0.909	4.96	29	0.000
Comprehensibility	1.23	0.857	5.23	29	0.000
Generalizability	1.13	0.784	4.00	29	0.000
Control	0.76	0.546	5.03	29	0.000

For internal validity, experts evaluated the initial proposed model using a survey. Given the 5-point Likert scale, a mean score of 3 served as the benchmark.

In the "Adaptation" component, the calculated t-statistic was $t = 4.96$, significant at $p < 0.01$. A comparison of the component mean $M = 4.17$ with the population mean of 3 indicated high validity.

In "Comprehensibility," the calculated t-statistic was $t = 5.23$, significant at $p < 0.01$. A comparison of $M = 4.23$ with 3 showed high validity.

In "Generalizability," the calculated t-statistic was $t = 4.00$, significant at $p < 0.01$. A comparison of $M = 4.13$ with 3 demonstrated high validity.

In "Control," the calculated t-statistic was $t = 5.03$, significant at $p < 0.01$. A comparison of $M = 3.76$ with 3 showed high validity.

In sum, the t-statistics calculated for all components exceed the critical t-value at $df = 29$ and $\alpha = 0.01$. Thus, the null hypothesis of no difference between observed means and the population mean (3) is rejected, confirming that the observed means significantly differ from the population mean. Consequently, the proposed research model is validated with 99% confidence according to expert evaluations.

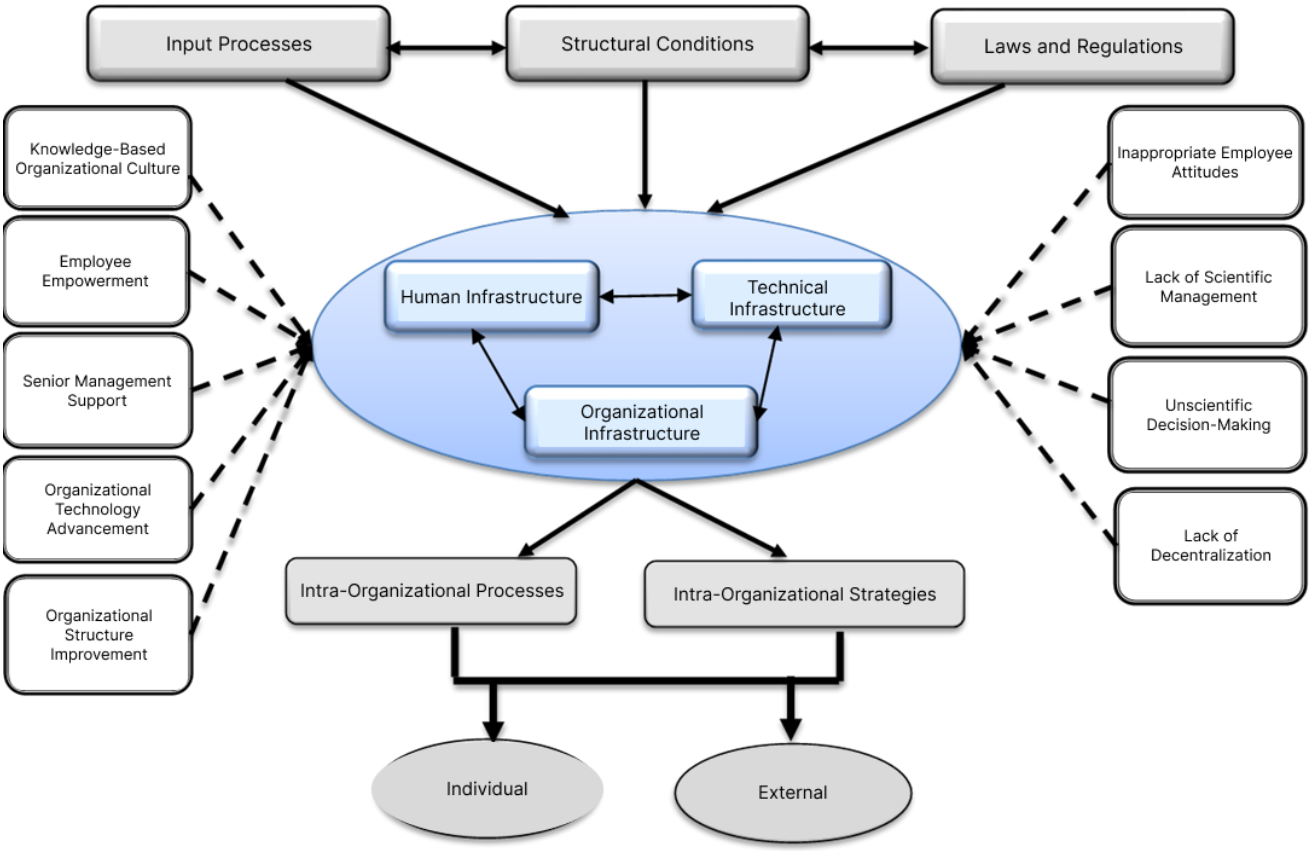

Figure 4. The Network of Themes, Dimensions, and Components of Human Resource Governance

4. Discussion and Conclusion

Today, organizations, both large and small, emphasize the importance of knowledge as a core asset and effective knowledge management within organizations [2, 7]. Over time, this knowledge must contribute to strengthening relationships among employees. Organizations that accumulate knowledge without effectively utilizing their workforce are likely to face failure and lose competitiveness in today's complex and turbulent world [3]. To ensure sustainability, organizations must strengthen relationships, adapt to changes, and leverage opportunities such as creative employees, technological advancements, and internal organizational structuring. Therefore, studying the labor relations system in knowledge-based organizations is of particular importance.

In this context, examining the labor relations system in knowledge-based organizations as the core of engineering companies affiliated with the Ministry of Defense and Armed Forces Support becomes crucial. To achieve this, it is first necessary to identify the dimensions and components of labor relations in knowledge-based organizations. Then, through appropriate management and planning, conditions for improving and enhancing labor relations in knowledge-based organizations—and consequently, the quality of services in engineering companies affiliated with the Ministry of Defense and Armed Forces Support—can be achieved. Considering the above, studying the labor relations system in knowledge-based organizations holds significant importance. This research aimed to explain the general concept of labor relations, examine it within the context of public organizations, and apply it to knowledge-based organizations. The primary focus of this research was to explore the challenges faced by managers, policymakers, and researchers in understanding and applying the labor relations system in knowledge-based organizations.

This study examined how labor relations systems function in knowledge-based organizations. A significant issue in humanities research in non-Western societies, particularly in Iran, is the lack of indigenous theories based on local management systems. Several factors contribute to this lack, one of which is the choice of research methodology. Most studies in Iran are conducted using quantitative methods within the positivist paradigm. This study advocates for qualitative research methods that allow for a deeper understanding of phenomena and individuals, enabling researchers and the academic community to develop theories.

One of the innovative aspects of this research is its use of a qualitative approach and grounded theory for model development, contrasting with the predominantly quantitative approaches in most existing models. The use of MAXQDA software is another innovative element, reflecting the application of advanced technology in theory construction. Since the labor relations system in knowledge-based organizations emerged as a significant topic in management and organizational studies, various perspectives and definitions have been offered, leading to diverse models and frameworks. Both qualitative and quantitative methods have been used to design these models, with a stronger tendency toward quantitative approaches.

This study acknowledges Western scientific findings and models but incorporates elements closer to the local culture, particularly when these models reflect cultural contexts unrelated to Iranian decision-making and indigenous contexts. Additionally, artificial intelligence functionalities were tailored to the specific organizational activities of the engineering companies affiliated with the Ministry of Defense and Armed Forces Support, given their unique security sensitivities. This adaptation is another innovative aspect of this research, emphasizing the localization of labor relations systems for the specific context under study.

The study aimed to introduce changes in management policies and internal relations within these engineering companies. In the second phase, structural equation modeling was used to prioritize the dimensions before constructing and shaping the model. The results showed the following priorities:

Among causal factors, "structural conditions" (0.988), "input processes" (0.925), and "rules and regulations" (0.884) ranked first, second, and third, respectively.

Among the core phenomenon components, "organizational infrastructure" (0.965), "technical infrastructure" (0.885), and "human infrastructure" (0.896) ranked first, second, and third, respectively.

Among strategic factors, "intra-organizational strategies" (0.908) and "intra-organizational processes" (0.872) were first and second in importance.

Among contextual factors, "employee empowerment" (0.960), "technological advancement" (0.913), "organizational structure improvement" (0.911), "knowledge-based organizational culture" (0.897), and "senior management support" (0.852) ranked first through fifth, respectively.

Among intervening factors, "inappropriate employee attitudes" (0.890), "lack of scientific management" (0.840), "unscientific decision-making" (0.827), and "lack of decentralization" (0.826) were the top four priorities.

Among outcomes, "external factors" (0.967) and "individual factors" (0.909) ranked first and second, respectively.

These findings align with previous research which demonstrated that rebuilding organizational and technical infrastructures could eradicate corruption, highlighting the role of technical, organizational, and human infrastructure in shaping labor relations [3, 5, 13-15].

In the third phase, the final model was developed and validated by experts, confirming its robustness and applicability.

Authors' Contributions

Authors equally contributed to this article.

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Declaration of Interest

The authors report no conflict of interest.

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Ethical Considerations

All procedures performed in this study were under the ethical standards.

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