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RESEARCH ARTICLE **Open Access**

Design and Development of a Value-Based Performance Excellence Model for a Sustainable Power Supply Chain at the National Level: A Comprehensive Approach to Organizational Improvement and Sustainable Development

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Abstract
This study examines organizational capabilities as a critical success factor in the electricity industry and analyzes their role in achieving sustainable development. Sustainable development, as a multidimensional concept, requires simultaneous attention to economic, social, and environmental aspects. In this regard, empowering organizations through enhancing effective leadership, strategic thinking, appropriate structure, and strong organizational culture is essential to increase resilience and responsiveness to complex challenges. The research findings indicate that transparency, the adoption of modern technologies, and the enhancement of knowledge and human capital significantly contribute to improving organizational performance and reducing operational risks.Moreover, regional and international collaborations in energy exchange and investment in electricity import and export infrastructures create new opportunities for strengthening the competitive position of organizations. On the other hand, formulating incentive policies and managerial mechanisms to reduce energy losses and increase efficiency can guide employees toward achieving organizational goals, resulting in cost reduction and increased profitability. This study presents a comprehensive framework for developing organizational capacities that can serve as a guideline for managers in navigating the dynamic environment of the electricity industry. Ultimately, the research emphasizes that only through the effective integration of technology, risk management, and human capital development can sustainable development and long-term competitiveness be achieved.

Keywords: *Performance excellence, Organizational capabilities, Organizational focus, Sustainable supply chain, Electricity supply chain*

Introduction

The generation, transmission, and distribution of electricity are foundational pillars of modern society, underpinning economic development, industrial growth, and social welfare. Ensuring a stable and reliable electricity supply has become increasingly complex due to a convergence of factors, including rapid technological advancements, evolving regulatory landscapes, heightened environmental concerns, and the multifaceted expectations

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of stakeholders across diverse sectors such as industry, agriculture, and residential communities. As the energy sector transitions towards more sustainable practices, the need for comprehensive, integrated frameworks that encompass the entire power supply chain has become not only a strategic priority but a necessity for long-term resilience and sustainability (Kabeyi and Olanrewaju, 2022). Despite significant strides in operational efficiency and technological innovation, current performance management models within the energy sector often fall short of addressing sustainability across the entire supply chain. These models tend to focus narrowly on internal operational metrics, overlooking the broader implications of economic, social, and environmental sustainability. This fragmented approach leads to inefficiencies in resource allocation, increased operational risks, and missed opportunities for value creation at both the organizational and societal levels (Kao et al., 2021). Moreover, a critical research gap exists in the integration of performance excellence models with sustainability principles within national-level energy supply chains. Although various studies have examined isolated aspects of sustainable energy practices, few have addressed the holistic integration of sustainability within a comprehensive performance framework. This gap is particularly pronounced in regions where energy stability, economic growth, and environmental protection are intertwined, and where the consequences of an unsustainable supply chain can have far-reaching societal and economic impacts (Ogbu, 2023). Addressing this gap requires a paradigm shift towards a value-based performance excellence model that not only optimizes operational efficiency but also aligns with broader sustainability goals. Such a model should incorporate key organizational capabilities—including leadership, strategic thinking, and knowledge capital—while fostering resilience, stakeholder satisfaction, and social responsibility. By embedding sustainability at the core of performance evaluation, this model can serve as a transformative tool for electricity companies, enabling them to navigate the complex interplay of operational excellence and sustainable development (Permana et al., 2021).

This study proposes a novel framework that integrates value-based performance excellence with a sustainable supply chain approach, tailored specifically to the electricity sector. The model aims to provide a strategic roadmap for enhancing organizational performance while addressing the economic, environmental, and social dimensions of sustainability. By applying this framework to the electricity supply chain in Iran, the research seeks to demonstrate its applicability in real-world contexts, offering insights that can be extended to other national and regional energy systems. Ultimately, this research contributes to the global discourse on sustainable energy by providing a robust, scalable model that aligns with the United Nations Sustainable Development Goals (SDGs), fostering long-term energy security, and promoting a sustainable future for all stakeholders involved.

Research Contributions

This paper offers a significant contribution to the field of performance management and sustainable energy by addressing a critical gap in the integration of value-based performance excellence models within

national-level power supply chains. While existing studies primarily focus on either operational efficiency or isolated aspects of sustainability, this research bridges these domains through a comprehensive, holistic framework.

First, the proposed model introduces a novel **value-based approach** that aligns performance excellence with economic, environmental, and social sustainability dimensions. Unlike traditional models that emphasize internal efficiency, this framework integrates key organizational capabilities—such as leadership, strategic thinking, and knowledge capital—into the broader context of sustainable development.

Second, the model extends the application of performance excellence beyond isolated operational metrics by incorporating the entire **electricity supply chain**, from generation to distribution. This approach not only enhances organizational resilience but also ensures a more sustainable, efficient, and stakeholder-focused energy system.

Third, this study provides empirical validation through its application in Iran's electricity sector, demonstrating how the model can be adapted to real-world national contexts. By doing so, it establishes a practical framework that other countries, especially those in developing regions, can adopt to improve energy stability, economic efficiency, and social responsibility.

Ultimately, the research contributes to the broader academic discourse on sustainable energy by offering a scalable, adaptable model that aligns with the **United Nations Sustainable Development Goals (SDGs)**, providing a roadmap for long-term energy security and sustainable development. This integration of performance excellence with sustainability principles positions the study as a pioneering effort in redefining how energy companies can achieve both operational and sustainable success.

Research Background

Wang and Zeng (2017) proposed a functional competence model, building on Nguyen and Zeng's earlier framework, to define organizational knowledge, skills, and needs as key determinants of individual capability within organizations. Their model emphasized aligning organizational structures with environmental factors, such as goals and workforce dynamics, to enhance outcomes.

Aquaye et al. (2018) introduced a model for measuring environmental performance in supply chains using multi-country input strategies, applying it to metal production in BRICS nations. Their findings underscored the impact of imports and economic growth on carbon footprints, offering insights for sustainable development in these regions. Similarly, Bola-Efe et al. (2019) explored value management (VM) in Nigeria's construction industry, concluding that the effective use of VM could enhance sustainability, improve quality, and promote cost efficiency, provided its principles are integrated into organizational practices.

Rehman et al. (2019) investigated the influence of management control systems on organizational performance, highlighting the critical roles of cybernetics, rewards, and compensation. Their findings revealed that management planning and cultural dimensions had limited effects, suggesting targeted interventions for performance improvement, particularly in the textile sector. In a systematic review, Carter et al. (2020) mapped the evolution of sustainable supply chain management (SSCM) research,

noting a shift towards integrating the triple bottom line in logistics. Building on these principles, Mastrocinque et al. (2020) developed a multi-criteria model for SSCM, focusing on the photovoltaic energy sector and its sustainability challenges.

Laurett et al. (2021) identified 25 variables spanning natural farming, innovation, and environmental considerations as measures of sustainable agriculture. Meanwhile, Fietz and Günther (2021) emphasized the importance of adaptive organizational cultures for fostering sustainable development. Peterson et al. (2021) analyzed consumer evaluations of sustainability, finding that customer satisfaction played a central role in support for sustainable business practices.

Politis and Grigoroudis (2022) evaluated contemporary business models, concluding that while some address sustainability challenges, they fall short of becoming universal benchmarks. Dai et al. (2022) examined the interplay between corporate social responsibility, transformational leadership, and sustainability, with findings highlighting the mediating role of cultural change. Similarly, Piwowar-Sulej and Qaisar (2023) reviewed the influence of leadership styles, showing that transformational and sustainable leadership positively impact organizational sustainability.

Recent studies, such as Zhang et al. (2023) and Shinu (2023), explored the effects of green supply chain management and entrepreneurial innovation on business value and sustainability, respectively. Zhang and Li (2024) identified the mediating role of ambidextrous innovation in linking CEO intellectual capital to SME growth, while Almanza Floyd et al. (2024) highlighted health, safety, and human resources as critical for competitiveness and sustainability in manufacturing.

Despite extensive research in sustainability and supply chain domains, there remains a gap in examining the relationship between the Excellence Performance Model (EPM) and sustainability across the entire energy supply chain, particularly in its role in value creation within sustainable frameworks.

Research Methodology

Value-based models focus on increasing shareholder value, ensuring efficient operations, customer satisfaction, and stakeholder engagement. Implementing such models in utility sectors enables organizations to align their operations with community expectations, thereby enhancing overall effectiveness. By utilizing value-based approaches, companies can define their strategic goals, prioritize initiatives, measure performance, and continuously improve processes.

This research presents a model to assess the performance excellence of electricity supply companies across the entire production, distribution, and transmission chain, incorporating a value creation approach within the context of a sustainable supply chain. Given the lack of studies exploring indicators related to organizational capabilities across the entire electricity supply chain, this research aims to fill that gap. To extract these indicators, the Theme Analysis method and expert interviews were employed. Furthermore, any action taken must be aligned with organizational focus. In this model, the strategies of Iran's electric power companies serve as the primary indicators.

The integration of sustainable development indicators to evaluate performance

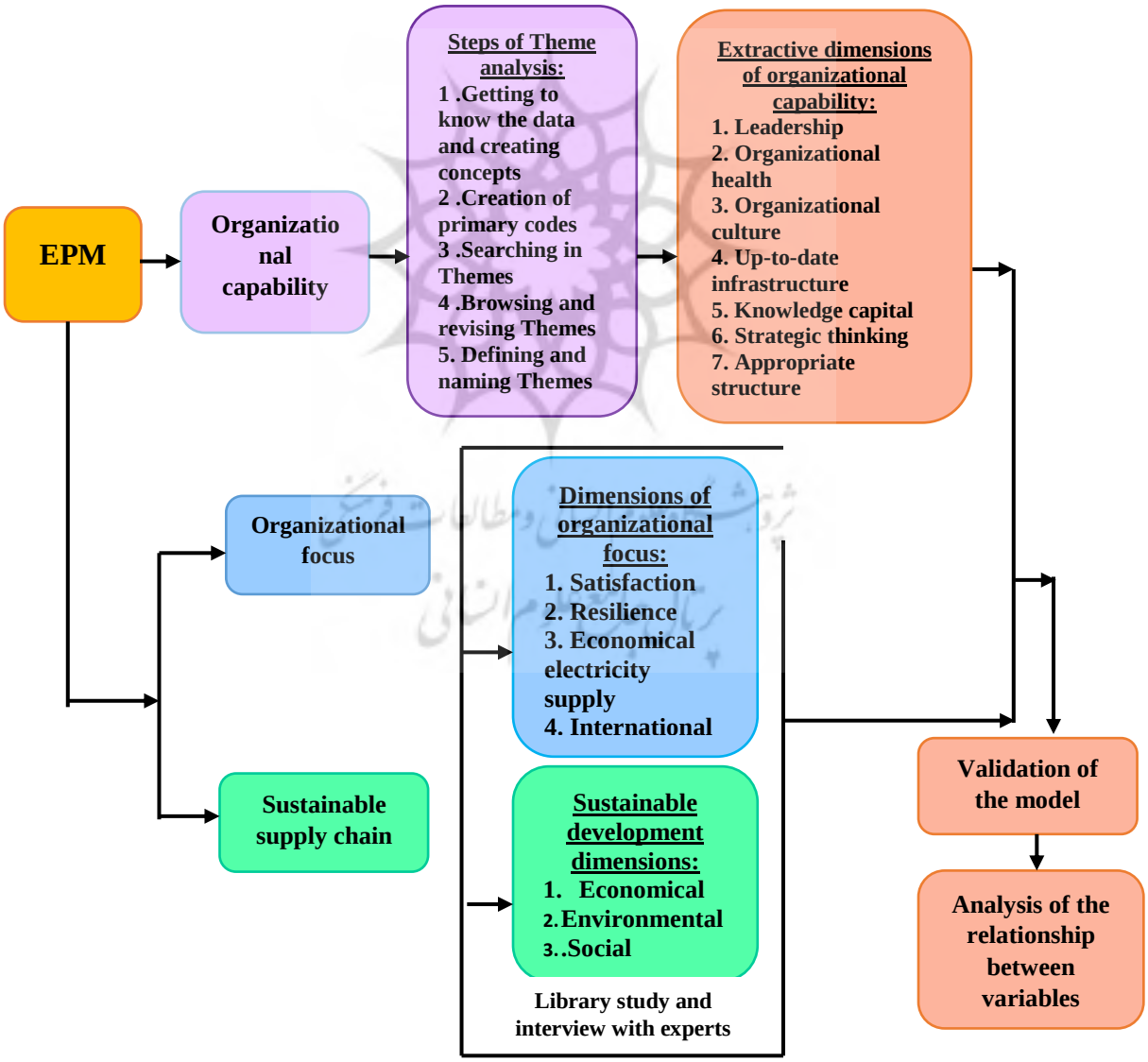
excellence is a key feature of this model, which were developed using library studies and expert opinions. After identifying these indicators, a questionnaire was designed, and pilot analysis, along with confirmatory factor analysis tools such as KMO and Bartlett's test, were employed to measure its reliability and validity. Finally, Structural Equation Modeling (SEM) was applied to investigate the relationships between latent variables, simultaneously considering observable variables.

Population of the Research

The **population of the research** in the quantitative section comprises all **employees in the** electricity **sector**, totaling **9,000 individuals**. From this population, a sample of **294 participants** was selected randomly for the study. This sample was chosen to ensure it adequately represents the broader workforce and to enable the generalization of the findings to the entire population of electricity sector employees. Figure 1 illustrates the general stages of the research methodology.

Figure 1.

General stages of the research method (source: research findings)



Results

Thematic analysis

In general, the Theme analysis process has been carried out in five stages as follows:

First step- Getting familiar with the data and creating concepts: Qualitative data were collected as audio files and to be mixed with the investigated data, all the interviews were implemented in writing in Word file format. In order to create a deep familiarity with the obtained data, the text of the interviews was read several times.

Second step- Creating initial codes: For this purpose, the interview text was converted into paragraphs, additional sentences were deleted; and then, the primary codes were extracted by the researcher. These codes were reviewed and revised by expert experts. This review was done to ensure familiarity with the data. The review was again conducted by an expert in organizational industrial psychology and along with these revisions, reflective notes were created to ensure the reliability of the data at this stage (Braun and Clarke, 2006); Then selective coding was done for each group of expressions that together formed a similar concept.

Third step- Searching in Themes: Themes are created through components of ideas that are meaningful if they are examined alone. At this stage, inductive reasoning was used to analyze the data and find the default themes in accordance with the research literature; Therefore, based on the existing performance management system, we expected to find codes consistent with the existing literature on the subject and in order for the analysis to be reliable and follow-up, notes were taken by the researcher; As a result, each of the selected codes that were related to each other formed a sub-theme.

Fourth step-Browsing and revising Themes: At this step, in order to ensure that the identified themes have created a coherent pattern, they were checked once again to ensure that these themes accurately reflected the meaning of the data (Braun and Clarke, 2006). Some of the themes overlapped and others had to be divided into smaller themes. For referential adequacy, the obtained themes were compared with the Initial raw data.

Fifth step - Defining and naming Themes: This step is focused on naming the themes and the development of the theme stops here (quoted from Noel et al., 2017). To ensure the validity of the data analysis, a human resources expert was asked to review the themes. Finally, all themes were merged under the title of a main theme according to the desired model.

Statistical example of theme analysis

Since the sample in qualitative research is not representative of the society, therefore its sampling methods are also special and some experts have invented methods for sampling. In this type of researches, more targeted sampling is used and the sample is selected based on the purpose of the research and individual judgment. In this research, the managers and assistants of planning and operation of the three sectors of production, distribution and transmission in the entire statistical population of Iran, who had sufficient expertise and experience, were selected for the interview. Unlike the quantitative research method, where the research samples are determined at the beginning, in the qualitative research methods, the number of samples is determined during the research and continues until it reaches theoretical saturation; this means that no new data is obtained after

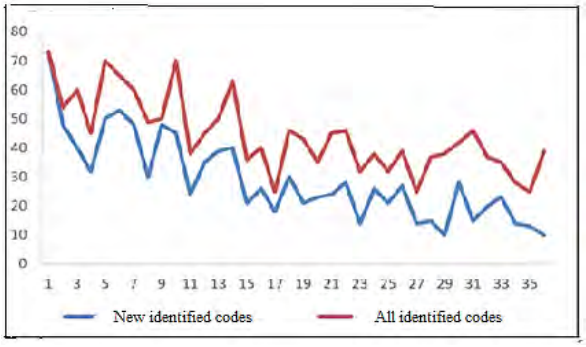
interviewing the participants, which is called theoretical sampling. Table 1 shows the demographic characteristics of the members of this sample.

Table 1.
Demographic characteristics of the thematic survey respondents

Characteristic	Level	No.	Percentage	Characteristic	Level	No.	Percentage
sex	Male	30	83	Major	Electrical engineering	4	10
	Female	6	17		Electronic Engineering	6	17
Position	manager	6	17		Computer Engineering	6	17
	deputy	10	27		Industrial Management	4	10
	Senior expert	16	43		mechanical engineering	6	17
	expert	4	13		chemical engineering	4	10
Work experience	10-15 years	4	10	Level of Education	Bachelor	10	28
	16-20 years	8	22		MA	20	54
	21-25 years	13	36		PhD.	6	18
	More than 26	11	32				

To compile the codes, each interview was reviewed separately and the number of each code is shown in Figure 2, that after 36 interviews, the collected data have reached informational saturation. The total number of codes is 136 codes, among which the number of agreements is 62, and as a result, the reliability coefficient for encodings has been calculated as 90.5%; therefore, the analyzed data have the necessary reliability.

Figure 2.
Saturation of qualitative data obtained from interviews

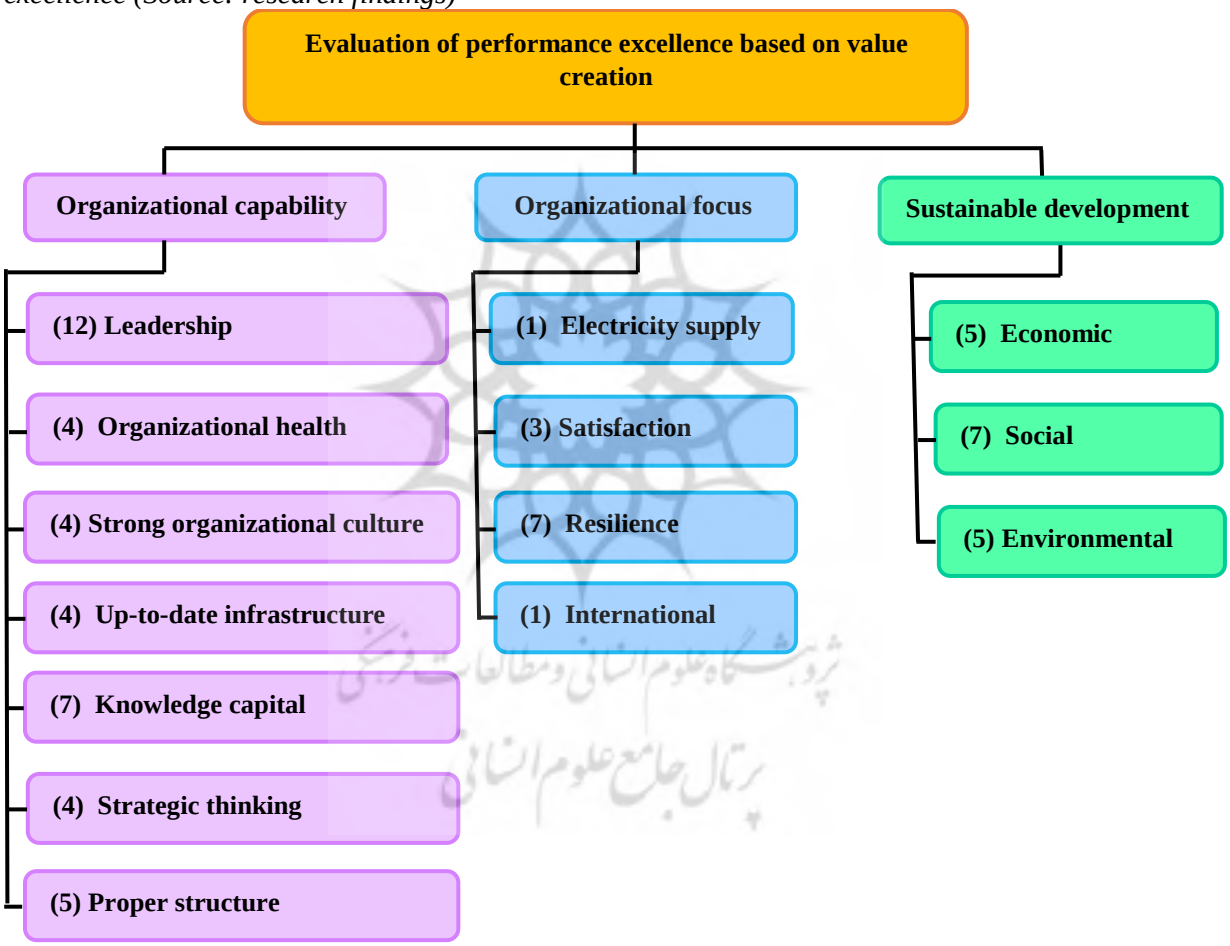


Identified Factors

In order to measure the organizational capability, after conducting library and document studies, taking advantage of experts' opinions and theme analysis, 40 questions to measure 7 main dimensions including: leadership (effective communication with society), appropriate structure (software), organizational health, strong organizational culture (acceptance of change), up-to-date infrastructure (hardware), knowledge capital (human capital and intellectual capital and knowledge) and strategic thinking were designed. Also, in order to measure the organizational focus, 21 questions were asked to measure the 4 main dimensions of economic electricity supply, satisfaction (increasing the level of satisfaction of subscribers, applicants and other stakeholders), improving resilience (resilience of the network in crises), and international(transformation to the centrality

of electricity exchange at the regional level) and in order to measure sustainable development with three economic, social and environmental dimensions, a 17-question questionnaire was designed. Finally, in the questionnaire, the extent to which Iran's electric power companies enjoy each of the concepts has been asked in the form of questions with a 5-point Likert scale. The scoring method of the questionnaire is 1 (equivalent to too little option) to 5 (equivalent to too much option). Also, the questionnaires were designed as an electronic link and were provided to the main sample of the research. Figure 3 summarizes the main indicators and the number of questions in each section.

Figure 3.
Summary of designed indicators along with the number of questions to measure performance excellence (Source: research findings)



Con rmatory Factor Analysis

Confirmatory factor analysis (CFA) is used to assess whether the measured variables of a construct align with the researcher's conceptualizing of the construct. The process involves two steps: confirmatory factor analysis and trust (Thompson, 2004). Essentially, CFA enables researchers to measure the relationship between a latent construct and its observable variables (Hair et al., 2014). The structural and measurement sections are discussed in detail below. In this

study, 44 managers and experts participated in verifying authenticity and reliability. Figures 4, 5 and 6 show the CFA results where all factors are reliable.

Figure 4.

Second-order confirmatory factor model of validation of organizational capability questionnaire (Source: research findings)

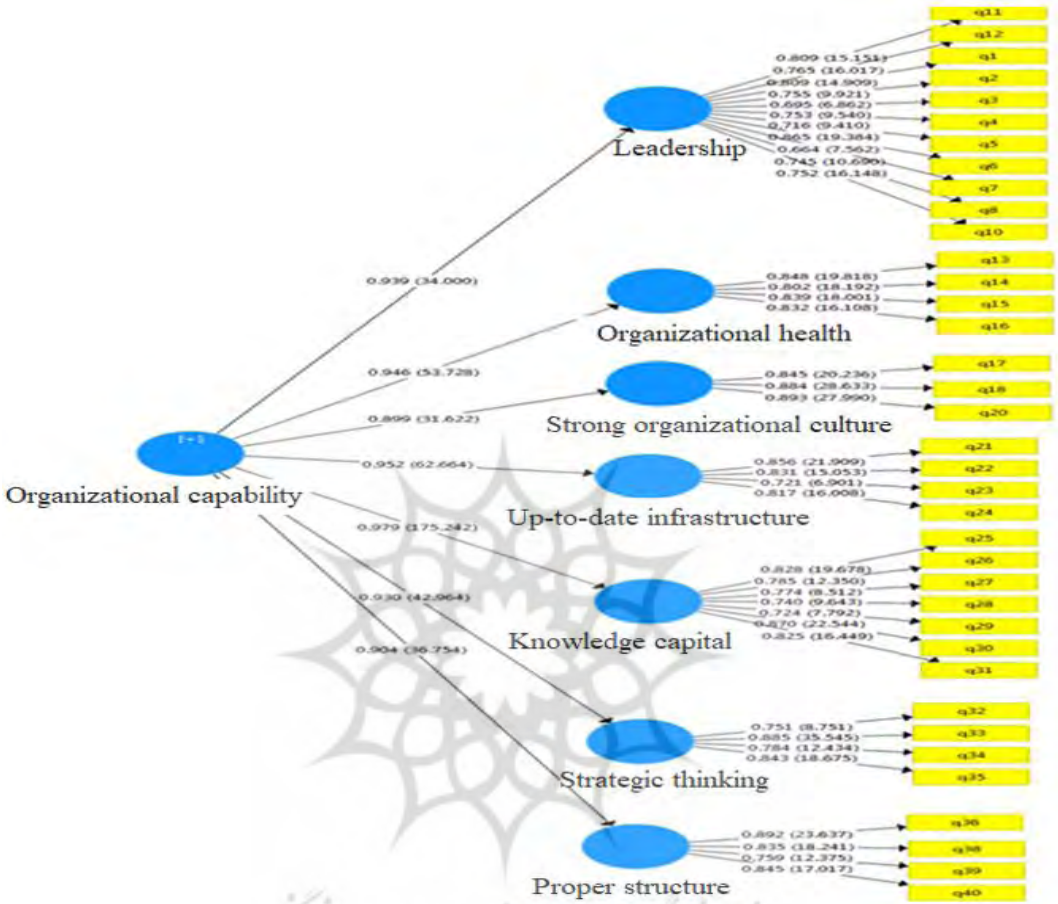


Figure 5.

Second-order confirmatory factor model of validation of Organizational Focus Questionnaire (Source: research findings)

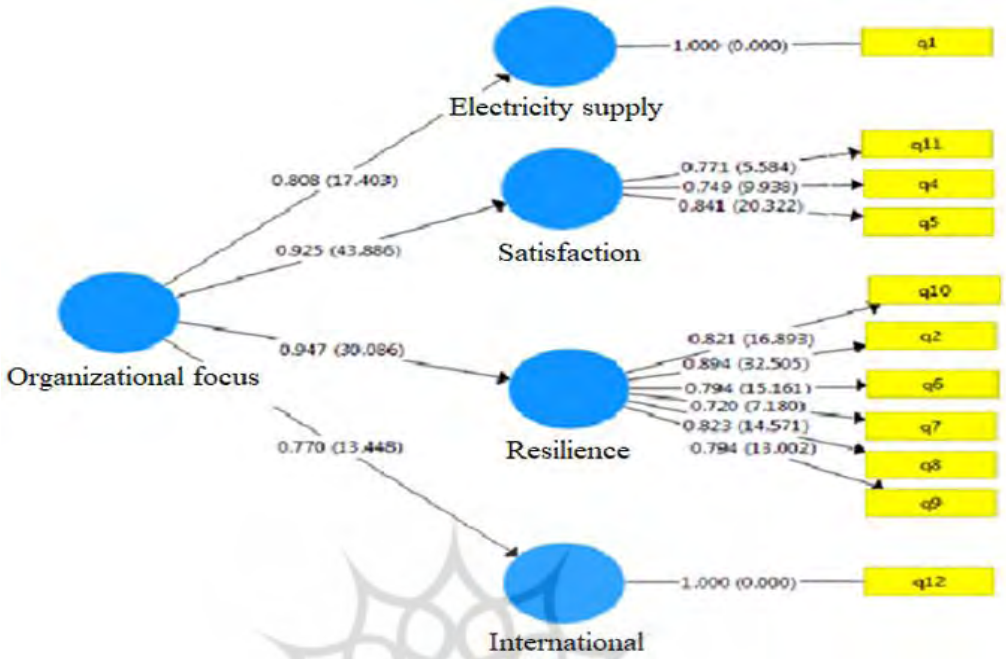
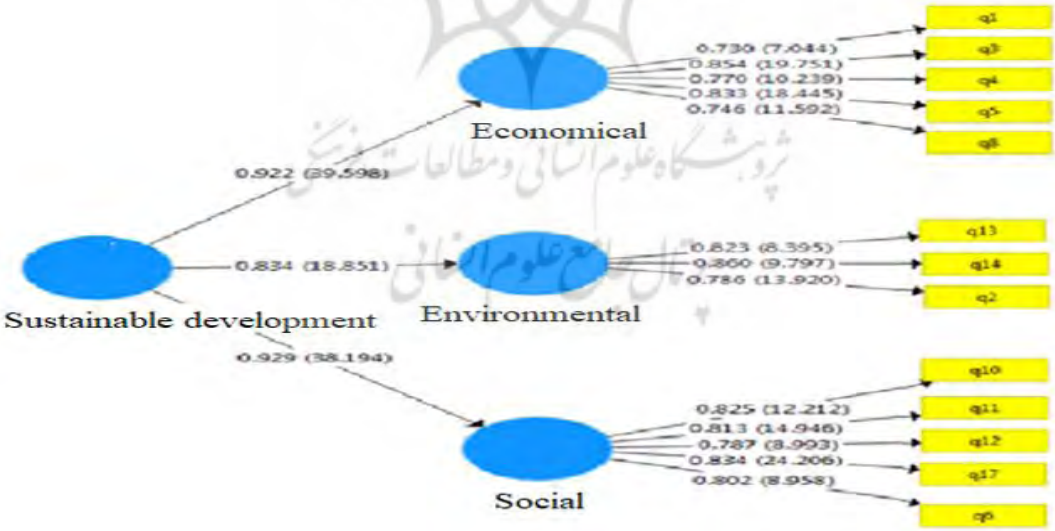


Figure 6.

Second-order confirmatory factor model of validation of sustainable



Additionally, the convergence of the model is assessed using the average variance (AVE), where all measurements must exceed 0.5 (Hair et al., 2014). To address the second level of the measurement model, Cronbach alpha (CA) and composite reliability (CR) were used to evaluate the reliability of the research model. CA is a method that ensures that the internal reliability of each sample is different and must exceed 0.7 (Cronbach and

Meehl, 1955). The results are shown in Table 2 and all indicators confirm the validity and reliability of the proposed model.

Table 2.

Average variance extracted values, Cronbach's alpha and composite reliability of research constructs (Source: research findings)

Structures	Cronbach 's alpha	Composite reliability	Convergent validity (AVE)
Strategic thinking	0.833	0.889	0.668
Leadership	0.926	0.937	0.576
Up-to-date infrastructure	0.821	0.882	0.652
Proper structure	0.853	0.901	0.696
Knowledge capital	0.901	0.922	0.63
Organizational health	0.85	0.899	0.69
Strong organizational culture	0.845	0.907	0.764
Organizational capability (total)	0.979	0.98	0.875
International	1	1	1
Resilience	0.893	0.919	0.655
Electricity	1	1	1
Satisfaction	0.700	0.831	0.621
Organizational focus (total)	0.927	0.922	0.749
Social	0.871	0.907	0.66
Economy	0.847	0.891	0.621
Environmental	0.763	0.863	0.678
Sustainable development (total)	0.939	0.924	0.802

Structural Equation Model

The structural equation model is a method for investigating the relationships between hidden variables, which also considers observable variables at the same time. Hidden variables are the main factors that are displayed in a pattern or conceptual model. Observable variables are the same items (speech) or questions related to measuring the main factors. This method is a special causal structure between a set of latent variables and observable variables. Using the structural equation modeling method, the relationships between hidden variables can be investigated with each other, as well as the measurement items of each hidden variable with the relevant variable.

In this section, based on Demorgan's table, 294 samples of experts from different production, distribution and transmission units of Iran's electric power companies were prepared to answer the questions of the questionnaire, which were selected to evaluate the causal relationships between the model indicators. Table 3 shows the demographic characteristics of the members of this sample.

Table 3.

Demographic characteristics of the SEM (Source: research findings)

Characteristic	Level	No.	Percentage	Characteristic	Level	No.	Percentage
Sex	Male	284	96.6	Level of Education	Diploma	1	0.34
	Female	10	3.4		Associate Degree	23	7.82
Age	26-35 years	9	3.06		Bachelor	151	51.36
	36-45 years	102	34.69		MA	95	32.31
	46-55	143	48.64		PhD.	24	8.16
	More than 55	40	13.61	Work experience	Less than 10	1	0.38
Area	Production	98	33.33		11-15 years	12	4.08
	Distribution	116	39.46		16-20 years	108	36.73
	Transmission	80	27.21		21-25 years	125	42.52
					More than 26	48	16.33

In this research, structural equation modeling with partial least squares (PLS) method has been used. The partial least squares method, which is a variance-based approach, needs fewer conditions compared to covariance-based techniques. Four causal relationships have been evaluated in the form of the following hypothesis:

Main hypothesis 1: Organizational capability has an effect on organizational focus.

Main hypothesis 2: Organizational capability has an effect on sustainable development.

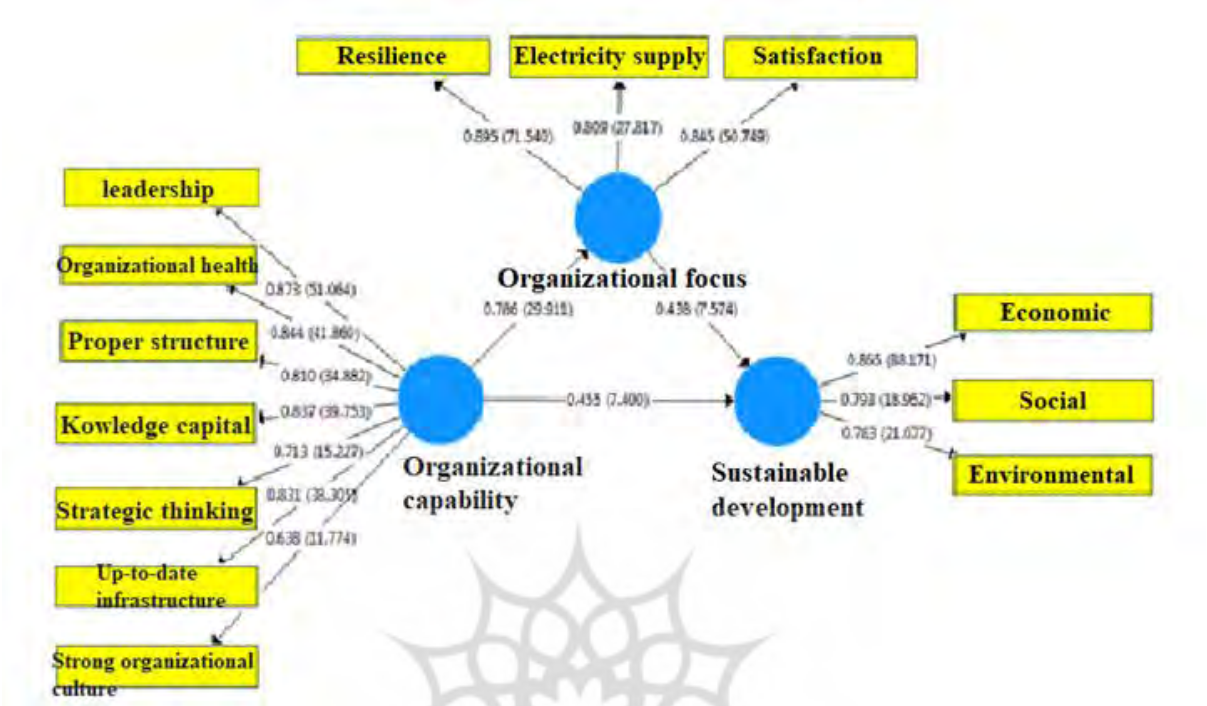
Main hypothesis 3: Organizational focus has an effect on sustainable development.

Main hypothesis 4: The electricity industry sector as a moderating variable affects hypotheses and relationships 1 to 3.

The structural equation model according to the research assumptions is presented in Figure 7.

Figure 7.

Structural equation model to investigate the impact of organizational capability on sustainable development with the mediating role of organizational focus (Source: research findings)



In the following, according to the confirmation of the structural equation model in Figure 7, it is possible to answer the hypotheses of the research by referring to it. In order to respond to the hypotheses of the research, the estimation of the coefficients of direct and indirect paths is used in the structural part of the model. Table 4 shows this.

Table 4.

Findings obtained from the structural equation model to examine hypotheses 1 to 3 (Source: research findings)

Hypothesis	Path	Path coefficient	Statisticst	Significance level	Test result
Organizational capability affects organizational focus	Organizational focus < Organizational capability	0.786	29.911	0/0001**	ok (positive effect)
Organizational capability affects sustainable development	Sustainable development < Organizational capability	0.455	7.574	0/0001**	ok (positive effect)

Hypothesis	Path	Path coefficient	Statisticst	Significance level	Test result
Organizational capability affects sustainable development	Sustainable development < Organizational focus < Organizational capability	0.344	7.194	0/0001**	ok (positive effect)
Organizational focus affects sustainable development	Sustainable development < Organizational focus	0.438	7.574	0/0001**	ok (positive effect)

For example, the standard value of the path coefficient "organizational focus > sustainable development" is 0.438. In other words, it can be said that 19.18% of the sustainable development variable is predicted by organizational focus and it is significant at the 95% confidence level and it can be concluded that organizational focus has a meaningful impact on sustainable development.

Also, according to the coefficient of the indirect path of the independent variable of organizational capability on sustainable development, it can be said that organizational capability has an indirect effect on sustainable development at the rate of 0.344 and because the significance level of the path is less than 0.05, this path is significant at the error level of 0.05 ; Therefore, organizational capability has a significant effect on the dependent variable of sustainable development indirectly and through the mediating variable of organizational focus. In total, the total impact of organizational capability on sustainable development (direct and indirect) is equal to a significant amount of 0.799. In addition, to evaluate the main hypothesis 4, the industry sector variable has been proposed as a qualitative moderating variable and by using the group analysis method, the path coefficients of all three hypotheses have been calculated separately by sections, and then the difference between the groups in each hypothesis has been compared with an appropriate test. Table 5 shows this.

Table 5.

Findings obtained from the SEM comparing the impact of organizational capability on sustainable development (Source: research findings)

Hypothesis	Path	Statistics t	Significance level	Significance level of the group analysis test comparing groups		
				Distribution and Transmission	Production and Transmission	Production and Distribution
Main hypothesis1	Organizational focus < - Organizational capability - Production	6.619	0.0001	0.631	0.885	0.853
	Organizational focus < - Organizational capability - Distribution	17.232	0.0001			

Hypothesis	Path	Statistics t	Significance level	Significance level of the group analysis test comparing groups		
				Distribution and Transmission	Production and Transmission	Production and Distribution
Main hypothesis2	Organizational focus < - Organizational capability - Transmission	13.399	0.0001	0.45	0.987	0.997
	Sustainable Development < - Organizational focus - Production	3.063	0.002			
	Sustainable Development < - Organizational focus - Distribution	7.382	0.0001			
Main hypothesis3	Sustainable Development < - Organizational focus - Transmission	6.016	0.0001	0.697	0.022	0.005
	Sustainable Development < - Organizational capability - Production	8.251	0.0001			
	Sustainable Development < - Organizational capability - Distribution	3.422	0.0001			
	Sustainable Development < - Organizational capability - Transmission	4.114	0.0001			

The results of Table 5 show that: because the significance level of two-by-two comparisons of the groups in the first main hypothesis, i.e. the effect of organizational capability on organizational focus, is greater than 0.05 in all cases; therefore, there is no significant difference between the impact of organizational capability on organizational focus among different industry sectors; so, the industry sector cannot be a moderating variable in this hypothesis.

Because the significance level of two-by-two group comparisons in the second main hypothesis, i.e., the effect of organizational focus on sustainable development is greater than 0.05 in all cases; therefore, there is no significant difference between the impacts of organizational focus on sustainable

development among different industry sectors; so, the industry sector cannot be a moderating variable in this hypothesis.

Because the significance level of two-by-two group comparisons in the third main hypothesis, i.e. the effect of organizational capability on sustainable development in the production and distribution group and the production and transmission group, is less than 0.05; therefore, there is a significant difference between the impact of organizational capability on sustainable development in the production and distribution sector as well as the production and transmission sector; so, the industrial sector as a moderating variable overshadows the impact of organizational capability on sustainable development.

Discussion and Conclusion

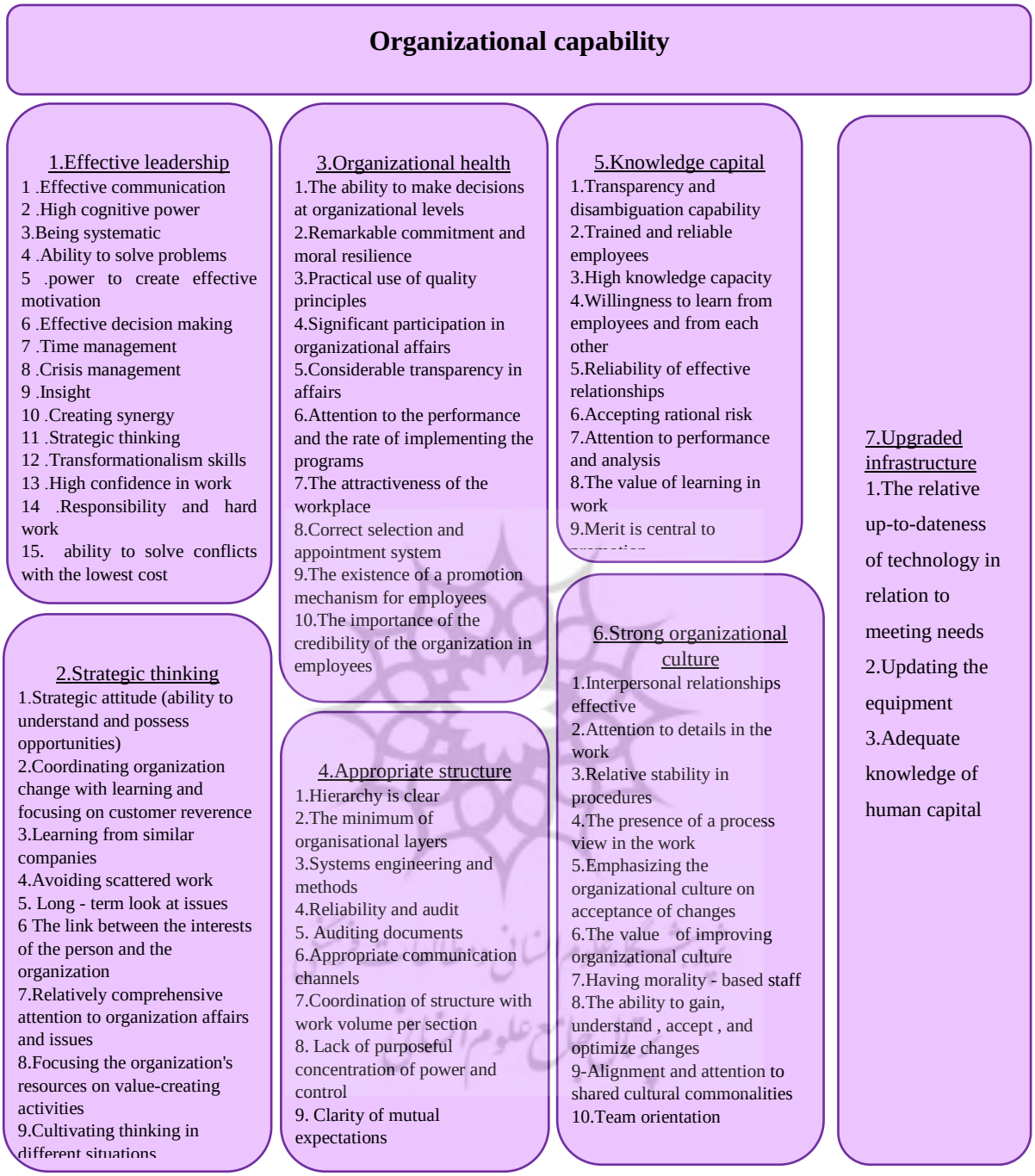
This research makes several important contributions that distinguish it from previous studies in the field of performance excellence in the electricity industry. The key achievements of this research are as follows:

Comprehensive model for performance excellence: This study introduces a comprehensive model aimed at enhancing the performance of electricity companies across all three sectors: generation, transmission, and distribution. The model is based on organizational values, encompassing both tangible and intangible factors, and is designed to promote excellence throughout the electricity supply chain. In the proposed model, key organizational capabilities are identified and include various components such as effective leadership, strategic thinking, organizational health, and organizational culture. These characteristics are clearly shown in the figure 8.

Sustainability in the supply chain: A significant contribution of this research is the integration of sustainable supply chain dimensions within the performance excellence model. This focus supports clean energy initiatives, enhances the economic efficiency of electricity production, and ensures that the interests of society are considered, a crucial aspect that has been given particular attention in this study.

Holistic approach to performance excellence: Unlike traditional models of organizational excellence, which often rely on external, one-size-fits-all frameworks and focus on performance as a mere component of the supply chain, this model addresses the **entire supply chain** (production, transmission, and distribution). It takes a holistic view that reflects the interconnectedness of all stages in the energy supply process.

Figure 8.
Organizational capability indicators (Source: research findings)



Customized organizational assessment tools: One of the unique aspects of this model is the development of a **customized questionnaire** tailored to the specific conditions, structural characteristics, and sensitivities of the organization. This tool effectively measures organizational capabilities, allowing for a qualitative and comprehensive evaluation.

Long-term strategic focus: The model incorporates long-term strategic considerations, drawing on insights from senior managers, experts, and practitioners. This ensures that the model is aligned with

the evolving strategies of electricity companies and remains relevant in the future. Figure 9 emphasizes organizational focus in the electricity industry and introduces four key areas:

- Becoming the focus of electricity exchange at the regional level by creating necessary infrastructure for electricity export and import, and entering power plant construction in regional countries.
- Improving network resilience in crises through optimization and development of infrastructure, diversifying the profitability of electricity investments, and network automation.
- Improving the level of satisfaction of subscribers and stakeholders by proper supply and demand management and focusing on safety principles.
- Economical electricity supply by continuously reducing grid losses, ensuring uninterrupted service delivery, and minimizing outages.

This Figure highlights that organizational focus is a crucial factor in enhancing performance and achieving sustainable development in the electricity industry, playing a key role in network optimization and stakeholder satisfaction.

Social responsibility and justice-oriented approach: A distinctive feature of this model is its emphasis on **social responsibility**, promoting a justice-oriented approach. It emphasizes the importance of sustainable benefits, both material and non-material, and upholds universally accepted transcendental values that align with the principles of sustainable development.

Figure 9.
Organizational focus indicators (Source: research findings)

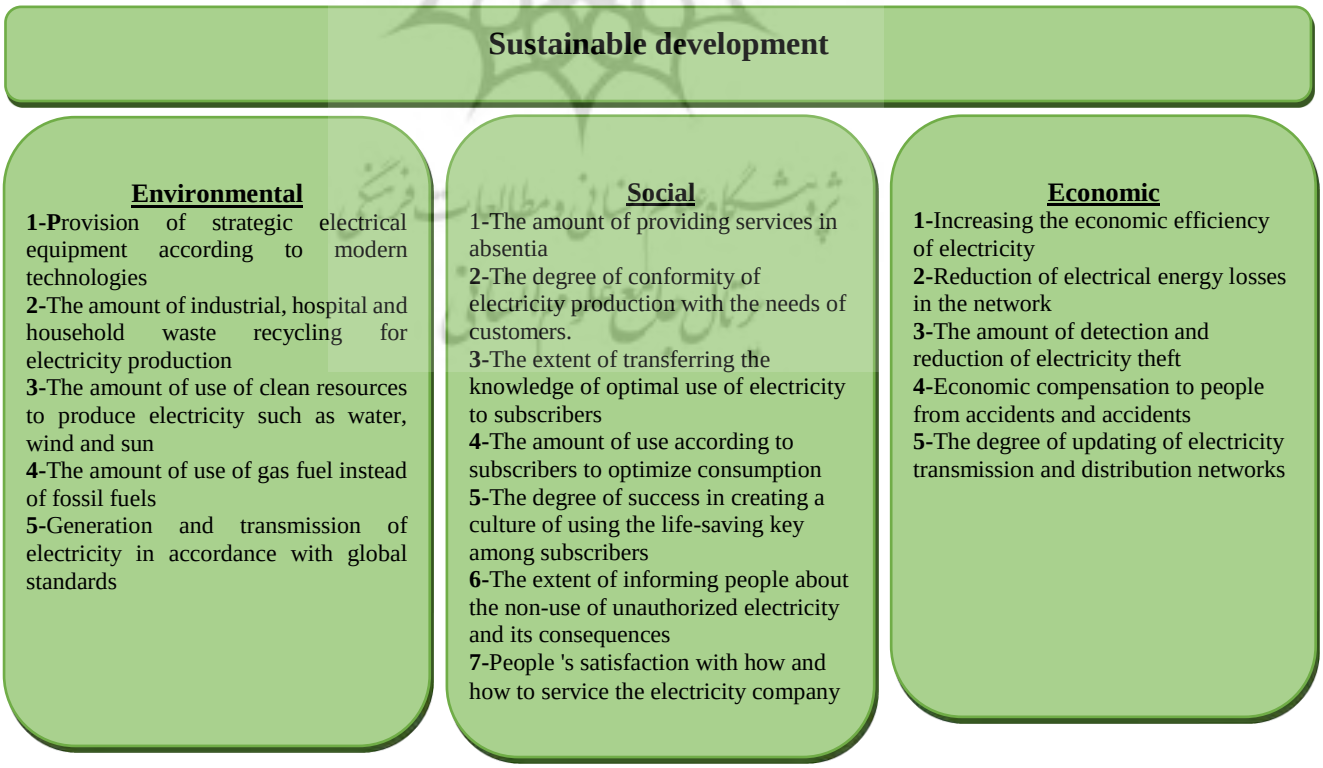
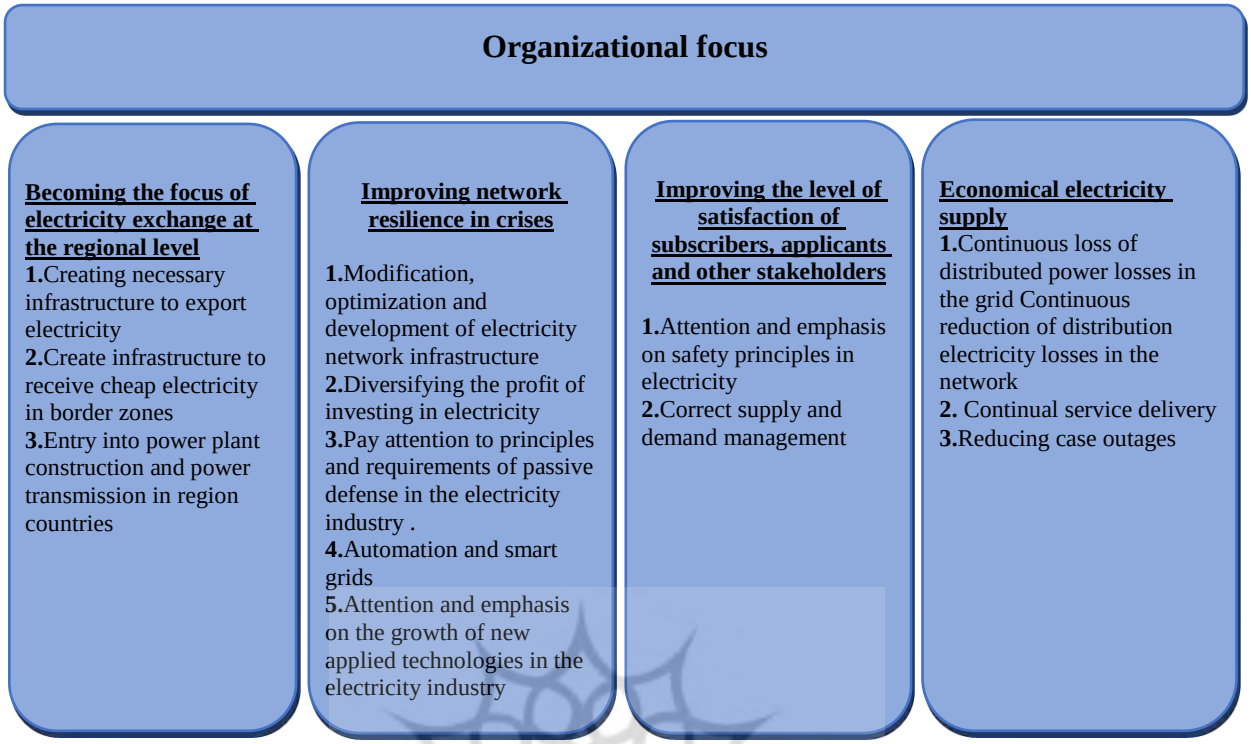


Figure 10.
Sustainable development indicators (Source: research findings)



Quantitative measurement of sustainable development: This model provides a clear framework for measuring the impact of organizational capabilities and focus on sustainable development. Through expert interviews and surveys, key pillars of sustainable development were identified, and statistical methods were employed to quantify the relationships between these factors, revealing the distance between the current state and the desired level of organizational excellence. Figure 10 illustrates the three main dimensions of sustainable development: environmental, social, and economic, each defined by specific and relevant indicators. These indicators are designed to assess the performance of electricity companies in the context of a sustainable supply chain. The primary goal of this model is to integrate sustainable development into the processes of electricity generation, transmission, and distribution, thereby reducing environmental impacts, improving social interactions, and increasing economic efficiency. This image effectively demonstrates the essential role of the proposed model in balancing economic, social, and environmental objectives.

Value engineering techniques: In addition to its focus on performance excellence, this research highlights the **application of value engineering techniques** across various parts of the industry. The findings provide a solid foundation for the implementation of value engineering practices to enhance operational efficiency and sustainability.

Sector-specific moderation effects

The findings of this research indicate that the **industry sector** plays a significant role in moderating the relationship between organizational capabilities, organizational

focus, and sustainable development; specifically, the following can be stated:

■The industry sector does **not moderate the relationship between organizational capability and organizational focus**. This suggests that organizational capability holds equal importance across various industry sectors, as its effect on organizational focus does not vary significantly between sectors.

■However, the industry sector does **moderate the relationship between organizational focus and sustainable development**. This indicates that the impact of organizational focus on sustainable development differs among sectors, likely due to varying market conditions, regulatory environments, and resource availability.

■Most notably, the **industry sector significantly moderates the effect of organizational capability on sustainable development**. The influence of organizational capability on sustainable development is stronger in certain sectors, such as the production sector, compared to others like transmission or distribution. This highlights the need to consider sector-specific dynamics when assessing the effectiveness of organizational capabilities in achieving sustainable development.

Overall, the results emphasize the importance of considering the unique characteristics of the electricity industry sector when analyzing the interplay between organizational capability, organizational focus, and sustainable development. The sector-specific factors, including market conditions, regulatory frameworks, and technological advancements, play a critical role in shaping how these variables interact and influence each other. The model proposed in this research offers a comprehensive and adaptable framework that can be utilized to drive improvements in performance excellence and sustainability across the electricity supply chain.

Managerial Recommendations

To enhance the performance of organizations operating in the electricity sector and achieve sustainable development, it is essential to reconsider managerial strategies from not only an economic perspective but also social and environmental dimensions. This requires adopting innovative management approaches with a focus on integrating advanced technologies, risk management, and human capital development. Therefore, senior managers are advised to systematically redesign their structures and processes, establishing new frameworks aimed at long-term efficiency and sustainability.

First and foremost, strengthening an organizational culture based on sustainable values can serve as a crucial factor in improving overall organizational performance. Creating an environment where transparency, fairness, and accountability are embedded at all managerial levels will not only boost employee motivation but also foster innovation and teamwork. Furthermore, continuous performance evaluation based on comprehensive and multidimensional indicators enables managers to assess not only economic efficiency but also the social and environmental impacts of their actions, allowing for necessary improvements.

The utilization of modern technologies such as smart grids, big data analytics, and advanced automation systems is another recommended strategy that can enhance the resilience of electricity networks during crises. By leveraging these technologies,

organizations can improve efficiency and prevent potential crises while simultaneously reducing operational costs. Coupled with the development and implementation of comprehensive risk management policies, this approach can significantly reduce organizational vulnerabilities and enhance the speed of emergency responses.

Moreover, international and regional collaborations in the field of energy exchange will create new opportunities for expanding electricity markets. Investing in the necessary infrastructure for electricity export and import, as well as participating in joint projects with neighboring countries, can strengthen the organization's competitive position in global markets. Additionally, prioritizing investment in employee training and capacity building as a cornerstone of sustainable development should remain a top priority for managers. This approach not only increases productivity but also enhances the organization's competitive ability in adapting to environmental changes.

Finally, the development of incentive policies aimed at improving efficiency and reducing network losses can motivate employees to strive towards achieving organizational goals, thereby reducing costs and increasing profitability. By integrating innovative management approaches and making intelligent use of resources, organizations in the electricity sector can achieve sustainable development and long-term competitiveness.

Research Limitations

This research encountered several limitations that should be considered when interpreting the results. First, the focus of this study on the management of Iran's electricity industry may limit the generalizability of the findings to other countries. Second, the study only examines the relationship between organizational capabilities, organizational focus, and sustainable development indicators, without considering other potential factors or variables that might influence these relationships. Additionally, the possible impacts of external or contextual factors on organizational capabilities and sustainable development indicators were not investigated.

Finally, it is recommended that researchers in other countries, especially those in developing countries, validate these models to establish a foundation for comparison and the development of effective standards. It is important to note that the proposed model should not be used as a direct decision-making tool but rather as a support mechanism in the decision-making process. Given the diversity of managerial solutions, varying perspectives on performance evaluation criteria, and unique mental models, achieving a universally accepted standard model for performance evaluation is not feasible. Therefore, the framework and research direction in this field remain open to interpretation and adaptation by managers.

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Availability of data: All the data of this manuscript are available and will be provided if needed.

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