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Identification of Dimensions of the Innovation Model in the National Steel Industry by Integrating Thematic Analysis and Delphi Method

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A B S T R A C T

Objective: This study aims to explore and design development policies for the social security retirement system using a futures research approach, identifying potential future scenarios and formulating strategic responses.

Methods: Utilizing a meta-synthesis of existing literature, expert surveys, and scenario analysis, the study systematically identifies key components, challenges, and opportunities within the retirement system, integrating futures research methodologies to project possible future states and policy implications.

Findings: The study reveals a comprehensive set of governance, social, cultural, economic, and technological factors that are pivotal in shaping the future of the social security retirement system. It also outlines several potential future scenarios, ranging from optimistic to pessimistic, with corresponding strategic actions and policies designed to address the identified challenges and leverage opportunities.

Conclusion: The research concludes that a holistic and adaptive approach to policy design, incorporating futures research, is essential for the sustainable development of the social security retirement system. It emphasizes the need for continuous reform, innovation, and stakeholder engagement to navigate the complexities of future societal and economic landscapes.

Keywords: *Social Security, Retirement System, Future Study, Policy Design, Scenario Analysis, Meta-Synthesis.*

1 Introduction

Today's organizations are operating in a highly competitive environment, facing numerous challenges such as rapid and unpredictable environmental changes, shifts in customer preferences, and demands for high-quality products. These factors force organizations to choose between two options: succumb to failure and extinction in the turbulent competitive environment or undergo fundamental changes to remain competitive (Adabi Mamaqani et al., 2020; Karakaya & Sriwannawit, 2015; Wirtz & Janssen, 2010).

One of the topics that facilitate changes and is recognized as a competitive advantage for organizations, alongside knowledge and services, is creativity and innovation. The necessity of innovation in organizations has reached a point where its absence is equated with the long-term destruction of the organization. Innovation is vital for individuals, groups, and units in any organization. In a comprehensive definition, innovation is defined as the organizational potential for rehabilitating products, services, strategies, and new management activities (Adabi Mamaqani et al., 2020).

An organization operating under a traditional model must understand the relationship between innovation and knowledge to transition from a traditional to a modern model. Innovation processes are fundamental knowledge processes that include creating, using, and managing knowledge. Knowledge processes begin with learning and then become a source of knowledge for generating ideas. Converting knowledge into innovation requires more capabilities than just creating knowledge. Various knowledge sets must be integrated to facilitate innovation processes. For example, an innovation process may require the ability to search for and identify external knowledge, use existing knowledge in opportunities, and convert it into successful products, procedures, or businesses (Biron et al., 2021; HashemiDehaghi, 2019).

There are also barriers to innovation. These barriers can stem from human, cultural, and strategic issues within organizations. Additionally, societal norms and attitudes toward technologies may become external barriers to the acceptance of innovation (Sadeghi et al., 2023; Saeedi motlagh & Karimishad, 2022).

The study of innovation management has become a significant aspect at the individual, organizational, and national levels and has expanded globally. Innovation has long been considered a primary priority for maintaining competitive advantages in many countries. As scientific knowledge rapidly expands today, many organizations struggle to stay informed about the technologies necessary for innovation development (HashemiDehaghi, 2019; Mostafa et al., 2021). Literature also indicates that decision-making regarding innovation activities can significantly impact creating competitive advantages and organizational performance (Basouli & Jabbari, 2021; Mostafa et al., 2021; Sadeghi et al., 2023). Thus, the challenge of innovation management is to create a system that can support innovations, reduce their development and application costs, and create synergistic effects (Golmohammadi et al., 2021; Hajesmaeilian & Nezamivand Chegini, 2020; HashemiDehaghi, 2019).

Interdisciplinary methods are required to support organizational creativity for innovation, which depends on analyzing the philosophy and perspective of related models. It is proven today that the success of national organizations in social, economic, cultural, and political fields depends on innovation. Only with such a system can an organization keep up with timely developments and advancements alongside other successful organizations. It cannot be claimed that innovation occurs by itself unless the organization seeks to foster it. The competent management of the organization must apply structured scientific knowledge based on modern technology to resolve organizational problems and continually compare and evaluate its scientific beliefs, adjusting its scientific capabilities with appropriate solutions according to the specific circumstances of the organization (Hajesmaeilian & Nezamivand Chegini, 2020; Sahafzadeh & Haghighi, 2023). Therefore, the management model of innovation-centric systems should be developed to highlight the factors affecting the organization's processes and structures and facilitate simpler structures from more critical components, creating opportunities for further research. Achieving and generalizing this model can significantly impact all current sectors of the country.

Due to the significant role of the development and advancement of the national steel industry in creating added value and competitive advantage in global markets, and its impact on the economy through employment, new technologies in various stages such as iron ore and metal extraction, casting, production stages like rolling, secondary operations like cutting and welding, equipment and machinery manufacturing, training, and transportation and sales, innovation in this industry is of special importance. Therefore, the research problem of this study is to identify the dimensions and components of the innovation model in the national steel industry by integrating thematic analysis and Delphi methods. By identifying the factors influencing innovation in all process areas of the national steel industry, a significant step can be taken towards creating a productive industry that underpins economic development by providing an innovation model and conceptual design compatible with the country's local conditions in the steel industry.

Furthermore, a review of existing innovation models revealed limited studies on the extraction of components for the "innovation" model in the "national steel industry." This study will extract the main components of the innovation

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model in the national steel industry and the sub-criteria of each component. Thus, this study aims to design and develop a conceptual model of innovation areas in the national steel industry by combining thematic analysis and Delphi techniques. The main research question is: What is the structure of the innovation model in the national steel industry?

2 Methods and Materials

This study followed a qualitative paradigm to understand the determinants of innovation in a real context. The thematic analysis and Delphi methods were employed. This research is developmental-applied in terms of its objective. After extracting the conceptual model, the first-round Delphi questionnaire was distributed among 20 experts in the Iranian steel industry, and the completed questionnaires were returned. Finally, the Delphi method was used to present the innovation model for the national steel industry of Iran.

In summary, the research process began with a comprehensive review of previous studies and the collection of innovation components in the national steel industry, followed by in-depth interviews with experts in this industry to obtain more themes during the open coding process. Through iterative data analysis, the initial qualitative data were reduced and transformed into fewer categories.

To examine the content validity of the qualitative section questionnaire, face validity and expert opinions in the steel industry, along with a research audit process that included review, confirmation, and ensuring the accuracy of data analysis during the analysis, were used. Additionally, to ensure the reliability of the research, internal and external evaluation methods were employed. In the internal evaluation, after conducting the interview and coding, the interviewee was asked to review the interview text along with the extracted indices and confirm or deny the accuracy of the interviewer's interpretation. In the external evaluation, experts other than the interviewees were asked to oversee the coding process. For this purpose, a professor experienced in qualitative analysis was used to evaluate the coding quality in the interviews.

The statistical population included senior managers, managers, and experts in the Iranian steel industry, as well as academic professors and experts. The sampling method in the expert community was judgmental sampling, and the desired sample size was determined to be 20 people. The opinions of experts and industry professors and the collected information were iteratively analyzed during the research, and the results of the qualitative analyses were shared with the interview participants, who confirmed the findings. Additionally, the researcher analyzed, interpreted, and presented the collected data from previous studies to the interviewees for judgment on the method's validity and reliability.

3 Findings and Results

Thematic analysis, by examining concepts, terms, and the relationships between them, aims to infer and reveal hidden patterns in interviews, observations, and written documents. Thematic analysis is a research approach for interpreting textual data that uses a systematic coding process. The final result of data analysis is the identification of categories, themes, and patterns.

In the present study, to achieve a conceptual model, the literature review and examination of existing models in the field of "innovation" and in-depth interviews with experts in the national steel industry were used. In this regard, after extracting codes from the research literature, interviews were conducted with experts to identify codes that were overlooked in the literature review. After conducting 8 interviews, theoretical saturation was achieved, and no new indicators were identified. Then, to achieve research categories, the indicators were categorized. At this stage, indicators categorized within a category were named similarly if they matched the categories discovered in the literature analysis. Categories carrying new meanings were also named separately. The initial model derived from thematic analysis using the thematic analysis model by Braun and Clarke (2012) contains eight main dimensions: "economic innovation" with 6 indicators, "marketing innovation" with 17 indicators, "organizational innovation" with 20 indicators, "system innovation" with 13 indicators, "technical and technological innovation" with 9 indicators, "regulatory innovation" with 7 indicators, "financial innovation" with 6 indicators, and "product innovation" with 13 indicators, as shown in Table 1.

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Table 1

Initial Model Derived from Thematic Analysis

Main Categories	Indicators
Economic Innovation	Access to financial resources, Development of upstream/downstream industries and products, Economic development, Development of IT infrastructure, Quick response to environmental changes, Evaluation of market economy performance
Marketing Innovation	Increasing product usage by current customers, Sales support, Appropriate marketing strategy, Searching for unconventional ways to achieve goals, Communicating in different ways, Commitment to creative approaches, Competitive product environment, Market needs, Commercializing new ideas, Focusing on resources that create creative advantages, Creating and quickly entering new markets, Improving geographical dispersion and increasing cooperation, Investing to overcome market limitations, Enhancing relationships considering linked business, Sharing distribution channels, Expanding access (via informal channels, field agents, hub and spoke model, etc.), Changing mindsets and behaviors (through aspirational marketing, value demonstration, community networks, technical readiness with affordable prices, etc.)
Organizational Innovation	Leadership method, Reducing administrative bureaucracy in employing innovation consultants, Attention to fundamental issues, Innovation strategy, Organizational culture, Defined goals and strategies, Teamwork thinking, Organizational structure supporting innovation, Organizational maturity, Employing suggestion and transformation systems, Motivational systems, Enhancing outward-looking spirit, Increasing participation rate, Updating needs, Choosing the right business partner, Learning from competitors, Industry-university connection, Attracting and employing creative and innovative personnel, Creating a motivating promotion system, Social impacts on human development
System Innovation	Specialized systems for screening ideas, Access to information and knowledge systems in the steel sector, Mechanisms for commercializing innovative ideas in the market, Clear existing procedures and mechanisms, Controlling the records of previous actions, Value chain development, Workflow management, Document management, Intelligent processes and procedures, Knowledge management and knowledge processes, Introducing new processes, Using comprehensive software systems, Flexibility in structure and operational processes
Technical and Technological Innovation	Technological capabilities of providers, Technology compatibility, Technology development, Identifying new technologies and ideas, Business participation and monitoring technical activities, Quick adaptation to technological changes, Formalizing the informal sector using technology, Strategic and long-term coordination between activities and technology, Creating networks and communication technologies
Regulatory Innovation	Anti-monopoly laws, Defined national industrial policies, Privatization policies, Attention to unions, Use of competitive mechanisms, Formulating innovative guidelines and requirements, Creating appropriate regulatory and legal framework incentives
Financial Innovation	Selecting investors and providing guarantees to them, Financing input or credit inventory, Defining financial rules and principles based on international standards, Various payment and receipt systems (electronic, government treasury, bank bonds), Financial capability, Improving access to financial or investment resources and market demand
Product Innovation	Commercial durability, Scalability, Pre-prototype cycle for continuous improvement, Designing new products or services with different business models, Maintaining competitive advantage in product innovation, Opportunity cost of investment, Inconsistency between strategic and operational issues, Senior management support for new product, Unlimited and flexible budgeting, Discovering creative methods, Product marketability, Attention to green products, Commercial feasibility

To further analyze the categories, the Delphi method was employed. After conducting interviews with experts and identifying the components of the national steel industry innovation model, the first-round Delphi questionnaire was distributed among 20 experts in the national steel industry, and the completed questionnaires were returned. In the first-round Delphi questionnaire, experts were asked to rate each identified component based on the current state of the national steel industry using a seven-point Likert scale. After collecting expert opinions, the average score for each indicator was calculated. After gathering the experts' views in the first round and calculating the average opinions, the second-round questionnaire along with the first-round results was provided to the experts. At this stage, experts reviewed and adjusted their opinions based on the results from the first round. The degree of consensus among experts was then assessed to determine if consensus was achieved. After calculating Kendall's coefficient of concordance, it was found that a significant increase had not been achieved. After four rounds, it was determined that Kendall's coefficient remained relatively stable, indicating consensus was achieved. Based on this, the final round's average was considered the final weight of each indicator, and since a seven-point Likert scale was used, an average below 5 was the basis for eliminating factors. Table 2 presents the arithmetic mean of expert opinions from the first to the fourth rounds of the Delphi method, the final weight, and the acceptance or rejection status of each indicator.

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Table 2

Mean Expert Opinions from the First Round

Criteria	Indicators	First Round	Second Round	Third Round	Fourth Round	Final Weight	Status
Economic Innovation	Access to financial resources	5.30	5.25	5.30	5.25	5.25	Accepted
	Development of upstream/downstream industries and products	4.60	4.80	4.85	4.85	4.85	Rejected
	Economic development	5.05	5.15	5.65	5.65	5.65	Accepted
	Development of IT infrastructure	4.95	4.80	4.60	4.70	4.70	Rejected
	Quick response to environmental changes	5.25	5.20	5.30	5.35	5.35	Accepted
	Evaluation of market economy performance	5.25	5.40	5.60	5.55	5.55	Accepted
Marketing Innovation	Increasing product usage by current customers	5.25	5.45	5.30	5.45	5.45	Accepted
	Sales support	4.40	4.15	4.05	4.10	4.10	Rejected
	Appropriate marketing strategy	5.20	5.10	5.15	5.20	5.20	Accepted
	Searching for unconventional ways to achieve goals	4.95	4.80	4.70	4.65	4.65	Rejected
	Communicating in different ways	5.15	5.90	5.60	5.70	5.70	Accepted
	Commitment to creative approaches	5.95	6.10	6.15	6.10	6.10	Accepted
	Competitive product environment	4.05	4.75	4.80	4.75	4.75	Rejected
	Market needs	4.15	4.30	4.60	4.90	4.90	Rejected
	Commercializing new ideas	5.95	5.70	5.75	5.75	5.75	Accepted
	Focusing on resources that create creative advantages	5.20	5.30	5.40	5.50	5.50	Accepted
	Creating and quickly entering new markets	5.80	5.60	5.50	5.40	5.40	Accepted
	Improving geographical dispersion and increasing cooperation	5.20	4.85	4.90	5.10	5.10	Accepted
	Investing to overcome market limitations	5.25	5.25	5.30	5.30	5.30	Accepted
	Enhancing relationships considering linked business	4.20	4.70	4.80	4.80	4.80	Rejected
	Sharing distribution channels	4.70	4.75	4.60	4.30	4.30	Rejected
	Expanding access (via informal channels, field agents, hub and spoke model, etc.)	4.60	4.60	4.75	4.70	4.70	Rejected
	Changing mindsets and behaviors (through aspirational marketing, value demonstration, community networks, technical readiness with affordable prices, etc.)	4.25	4.35	4.40	4.50	4.50	Rejected
Organizational Innovation	Leadership method	4.75	4.90	4.90	4.75	4.75	Rejected
	Reducing administrative bureaucracy in employing innovation consultants	4.90	5.40	5.15	5.05	5.05	Accepted
	Attention to fundamental issues	4.80	4.70	4.95	5.20	5.20	Accepted
	Innovation strategy	5.10	5.00	5.30	5.15	5.15	Accepted
	Organizational culture	5.15	4.85	4.90	5.20	5.20	Accepted
	Defined goals and strategies	5.45	4.80	4.80	4.70	4.70	Rejected
	Teamwork thinking	4.85	4.80	4.75	4.70	4.70	Rejected
	Organizational structure supporting innovation	5.15	4.90	5.10	5.10	5.10	Accepted
	Organizational maturity	4.95	4.50	4.50	4.75	4.75	Rejected
	Employing suggestion and transformation systems	5.10	5.35	5.05	5.40	5.40	Accepted
	Motivational systems	5.10	5.10	4.70	4.60	4.60	Rejected
	Enhancing outward-looking spirit	5.40	5.35	5.25	5.30	5.30	Accepted
	Increasing participation rate	4.90	4.25	4.50	4.85	4.85	Rejected
	Updating needs	4.50	4.55	4.55	4.65	4.65	Rejected
	Choosing the right business partner	4.40	4.50	4.50	4.65	4.65	Rejected
	Learning from competitors	5.35	5.50	5.25	5.15	5.15	Accepted
	Industry-university connection	4.90	5.30	5.10	5.25	5.25	Accepted
	Attracting and employing creative and innovative personnel	5.05	5.15	5.05	5.30	5.30	Accepted
	Creating a motivating promotion system	5.45	5.50	5.65	5.50	5.50	Accepted
	Social impacts on human development	4.80	4.90	4.30	4.65	4.65	Rejected
System Innovation	Specialized systems for screening ideas	5.15	5.10	5.20	5.10	5.10	Accepted
	Access to information and knowledge systems in the steel sector	4.95	5.05	5.10	5.15	5.15	Accepted

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	Mechanisms for commercializing innovative ideas in the market	4.35	4.25	4.00	4.55	4.55	Rejected
	Clear existing procedures and mechanisms	5.85	6.15	5.65	5.55	5.55	Accepted
	Controlling the records of previous actions	4.50	4.00	4.35	4.30	4.30	Rejected
	Value chain development	4.55	4.30	4.00	4.05	4.05	Rejected
	Workflow management	4.00	4.60	4.85	4.75	4.75	Rejected
	Document management	4.90	4.80	4.25	4.00	4.00	Rejected
	Intelligent processes and procedures	5.80	5.70	5.75	5.75	5.75	Accepted
	Knowledge management and knowledge processes	4.75	4.50	4.60	4.90	4.90	Rejected
	Introducing new processes	5.55	5.90	5.90	5.85	5.85	Accepted
	Using comprehensive software systems	5.00	5.15	5.15	5.25	5.25	Accepted
	Flexibility in structure and operational processes	5.65	5.45	5.85	5.65	5.65	Accepted
Technical and Technological Innovation	Technological capabilities of providers	5.80	5.65	5.60	5.65	5.65	Accepted
	Technology compatibility	4.90	5.10	5.30	5.15	5.15	Accepted
	Technology development	5.55	5.50	5.75	5.85	5.85	Accepted
	Identifying new technologies and ideas	5.30	5.45	5.25	5.35	5.35	Accepted
	Business participation and monitoring technical activities	4.85	4.30	4.30	4.25	4.25	Rejected
	Quick adaptation to technological changes	4.75	4.95	5.40	5.30	5.30	Accepted
	Formalizing the informal sector using technology	4.80	4.80	4.95	4.75	4.75	Rejected
	Strategic and long-term coordination between activities and technology	4.95	5.15	5.20	5.30	5.30	Accepted
	Creating networks and communication technologies	4.25	4.25	4.80	4.85	4.85	Rejected
Regulatory Innovation	Anti-monopoly laws	5.20	5.35	5.50	5.30	5.30	Accepted
	Defined national industrial policies	5.50	5.25	5.15	5.35	5.35	Accepted
	Privatization policies	5.35	5.20	5.20	5.10	5.10	Accepted
	Attention to unions	4.85	4.60	4.80	4.85	4.85	Rejected
	Use of competitive mechanisms	4.70	4.25	4.35	4.60	4.60	Rejected
	Formulating innovative guidelines and requirements	5.85	5.45	5.95	5.95	5.95	Accepted
	Creating appropriate regulatory and legal framework incentives	5.80	5.85	5.60	5.80	5.80	Accepted
Financial Innovation	Selecting investors and providing guarantees to them	4.20	4.25	4.85	4.95	4.95	Rejected
	Financing input or credit inventory	4.65	4.25	4.70	4.65	4.65	Rejected
	Defining financial rules and principles based on international standards	5.15	5.25	5.30	5.25	5.25	Accepted
	Various payment and receipt systems (electronic, government treasury, bank bonds)	5.95	6.10	5.95	5.85	5.85	Accepted
	Financial capability	5.05	5.05	5.65	5.85	5.85	Accepted
	Improving access to financial or investment resources and market demand	5.40	5.20	5.00	5.10	5.10	Accepted
Product Innovation	Commercial durability	4.85	4.75	4.95	4.80	4.80	Rejected
	Scalability	5.80	5.75	5.65	5.60	5.60	Accepted
	Pre-prototype cycle for continuous improvement	4.50	4.70	4.70	4.65	4.65	Rejected
	Designing new products or services with different business models	5.45	5.00	5.60	5.50	5.50	Accepted
	Maintaining competitive advantage in product innovation	5.45	5.85	5.40	5.30	5.30	Accepted
	Opportunity cost of investment	4.75	4.65	4.90	4.95	4.95	Rejected
	Inconsistency between strategic and operational issues	4.15	4.45	4.30	4.00	4.00	Rejected
	Senior management support for new product	5.05	4.95	5.20	5.10	5.10	Accepted
	Unlimited and flexible budgeting	4.95	5.35	5.55	5.65	5.65	Accepted
	Discovering creative methods	5.45	5.05	5.00	5.40	5.40	Accepted
	Product marketability	5.05	4.85	4.35	4.90	4.90	Rejected
	Attention to green products	5.20	4.90	5.15	5.20	5.20	Accepted
	Commercial feasibility	5.00	5.10	5.20	5.20	5.20	Accepted

According to the research findings, the following results were obtained for each dimension of the model:

The most important sub-dimensions in the "economic innovation" dimension were "economic development" (with

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a final weight of 5.65) and "evaluation of market economy performance" (with a final weight of 5.55).

The most important sub-dimensions in the "marketing innovation" dimension were "commitment to creative approaches" (with a final weight of 6.10) and "commercializing new ideas" (with a final weight of 5.75).

The most important sub-dimensions in the "organizational innovation" dimension were "creating a motivating promotion system" (with a final weight of 5.50) and "employing suggestion and transformation systems" (with a final weight of 5.40).

The most important sub-dimensions in the "system innovation" dimension were "introducing new processes" (with a final weight of 5.85) and "intelligent processes and procedures" (with a final weight of 5.75).

The most important sub-dimensions in the "technical and technological innovation" dimension were "technology development" (with a final weight of 5.85) and "technological capabilities of providers" (with a final weight of 5.65).

The most important sub-dimensions in the "regulatory innovation" dimension were "formulating innovative guidelines and requirements" (with a final weight of 5.95) and "creating appropriate regulatory and legal framework incentives" (with a final weight of 5.80).

The most important sub-dimensions in the "financial innovation" dimension were "various payment and receipt systems (electronic, government treasury, bank bonds)" and "financial capability" (both with a final weight of 5.85).

The most important sub-dimensions in the "product innovation" dimension were "unlimited and flexible budgeting" (with a final weight of 5.65) and "scalability" (with a final weight of 5.60).

4 Discussion and Conclusion

The aim of this research was to identify the main dimensions and components of the innovation model in the national steel industry. This qualitative research was conducted using both library and field methods. After extracting the conceptual model through interviews and employing thematic analysis, the first-round Delphi questionnaire was distributed among experts in the national steel industry, and 20 completed questionnaires were returned. Ultimately, using the Delphi method and after four rounds, the innovation model for the national steel industry was presented. Based on the analyses conducted, the local innovation model for the national steel industry was extracted with 8 main categories and 54 indicators.

There are differences between this research and other similar studies in the field of steel innovation modeling. In the present study, besides exploring innovation in the national steel industry, a comprehensive model was presented that examines various dimensions and comprehensive implementation of innovation in the steel industry in the country, considering the political, economic, cultural, and situational aspects of the country. Compared to the five-helix innovation model by Barcelos-Paula et al. (2021), which has five main dimensions: political, educational, economic, natural, and cultural, the present model is more comprehensive (Barcellos-Paula et al., 2021). For example, technological and market dimensions are also included in the research model. Additionally, Cho and Linderman (2020) presented a process and product innovation model based on resources. Their model included dimensions such as product innovation intensity, process innovation intensity, asset-based resource reliance, knowledge-based resource reliance, sustainable competitive advantage, and market dynamism (Cho & Linderman, 2020). Compared to their model, the present research model addresses additional aspects such as regulatory issues, economic innovations, product innovation, and others, making it distinct in this regard.

Overall, the results of this research have enhanced our understanding of the determinants of "innovation in the national steel industry." Based on the research findings, the following recommendations can be implemented: Steel industry managers are advised to continuously pursue new technologies or the application of new technologies within their companies. Additionally, they should always seek to innovate in their products, either by developing existing products or introducing new ones. Furthermore, it is essential to keep company systems updated and not neglect the improvement process. Likewise, special attention should be given to other identified factors. Managers should also create conditions for technological change to minimize resistance to technological changes and increase the speed of adaptation. Managers should always focus on "technology development," as technologies are available to increase speed and accuracy in work. Another critical factor is "identifying new technologies and ideas." This can be achieved by forming a team of industry and technology experts within the research and development unit.

One of the main limitations of this research was the rapid changes occurring in the national steel industry, which may

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cause the participating managers' perspectives to be based on past industry issues and not cover current and future industry topics. Therefore, for future research, it is suggested that researchers conduct longitudinal surveys of the model to reduce the impact of rapid changes in the national steel industry. In this method, data are collected over time to assess the relationship between variables over time. Future researchers are also recommended to examine and analyze the internal relationships between the main components of the model using methods such as structural equation modeling, interpretive structural modeling, or DEMATEL.

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Declaration of Interest

The authors of this article declared no conflict of interest.

Authors Contributions

All authors have contributed significantly to the research process and the development of the manuscript.

Ethics principles

In this research, ethical standards including obtaining informed consent, ensuring privacy and confidentiality were observed.

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