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# Facing Future Uncertainties in the Pharmaceutical Industry Using a Strategic Intelligence Model

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## Abstract

**Purpose:** Uncertainty, complexity, and dynamism are three characteristics of the environment that surround 21st-century organizations and have caused their instability. Due to the advancement of technology, increasing competition, and multiple stakeholders, the pharmaceutical industry faces countless uncertainties and complexities. It can use strategic intelligence as an effective mechanism to deal with these conditions. Accordingly, the present study aims to present a comprehensive model of strategic intelligence in the pharmaceutical industry.
**Method:** This study is applied research from the viewpoint of the goal and uses the grounded theory and specifically the systematic model of Strauss and Corbin as a type of strategy available in the qualitative research approach. The data-gathering tools were interviews. The study population included experts from different sectors of the pharmaceutical industry, such as experts in pharmaceutical technologies, research and development, strategic management, and marketing, as well as experts in pharmaceutical industry policymaking for the public sector. Purposive sampling was used and finally, theoretical saturation was achieved by conducting 22 interviews.
**Findings:** In the open coding stage, 560 statistical codes were classified into 25 subcategories. Finally, the three categories of technology pressure, market pressure, and uncertainty as causal conditions; two categories of knowledge management and perspective building as the core category; individual and organizational factors as the context conditions; thought system and political-economic conditions in the form of micro and macro factors as intervening conditions; two factors of reorganization and empowerment as strategies; and support and survival were identified as outcomes.
**Conclusion:** Today, the pharmaceutical industry is facing countless developments in various fields, including complex research and development processes, the continuous creation of innovative drugs, and responses to unmet needs, which has caused companies active in this industry to face a future full of uncertainty. Strategic intelligence is a mechanism that provides the opportunity for companies active in this field to face these uncertainties. Strategic intelligence can provide fundamental insights to inform and guide the decisions, policies, and actions of companies. Anticipating current changes that will create threats and opportunities, creating an inspiring vision of the future, and partnering with others that complement their abilities and capabilities will be provided through strategic intelligence for these companies

**Keywords:** Intelligence, Strategic Intelligence, Uncertainty, Pharmaceutical Industry

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## Introduction

Modern organizational environments differ greatly from historical ones (Hitt et al., 2017, p. 100). This shift is due to rapid technological advancements, the need for adaptation to new production methods, increased diversity, changing customer priorities, heightened competition, and information overload from globalization (Gitelman et al., 2021; Maccoby & Scudder, 2011; Şener, 2012; López-Robles et al., 2019; Kuosa, 2011). The 21st century's instability stems from volatile environments, complicating predictions, and strategic clarity (Poplavska et al., 2019; Kouzes & Posner, 2017; Moran, 2009). A framework for future-oriented strategic thinking is crucial (Shirazi & Alba, 2024). Organizational success depends on environmental awareness for effective decision-making and competitiveness (Xu & Kaye, 2007; Seitovirta, 2011). Ignoring uncertainty risks competitiveness (Ejdys et al., 2015), while proactive adaptation is vital for survival (Gitelman et al., 2021). Success relies on responding to new opportunities and threats (Gattringer & Wiener, 2020). Strategic intelligence from ongoing environmental scanning and adaptation (Pellissier & Kruger, 2011; Shirvani Nagani et al., 2019) is essential for industry leadership, requiring strong information acquisition and analysis for timely insights (Mukherji & Mukherji, 2016).

The global pharmaceutical industry faces significant challenges, including complex R&D (Jung et al., 2023), diverse stakeholders (Miozza et al., 2024), increasing internationalization, ongoing innovation, unmet medical needs (Nakashima et al., 2023), patent expirations, generic competition (Levis & Papageorgiou, 2004), and fluctuating raw material prices (Marques et al., 2018). These factors create considerable uncertainty. Strategic intelligence is essential for decision-making, providing relevant information (Marchand & Hykes, 2077, p. 2) and insights (De Smedt, 2008, p. 92) to guide organizations in maintaining competitiveness and making informed choices. It helps decision-makers plan for the long term and mitigate risks associated with potential disruptions (PurityU et al., 2017, p. 90; Bernhardt, 2003, p. 30). While there is research on strategic intelligence in other sectors, a comprehensive model for the pharmaceutical industry is lacking. This study aims to fill that gap by interviewing Iranian pharmaceutical experts and utilizing grounded theory to develop a strategic intelligence model that addresses future uncertainties, focusing on effective strategies, influencing factors, and implementation outcomes.

## Materials and Methods

This study is applied research that uses grounded theory within the qualitative research framework, specifically following the Strauss and

Corbin model. Data was primarily collected through interviews with experts from diverse sectors of the pharmaceutical industry, including specialists in pharmaceutical technologies, research and development, strategic management, marketing, and public sector policymakers. A purposive sampling approach was utilized, achieving theoretical saturation after 22 interviews.

## Results

After three stages of analysis, 560 codes from the open coding stage were categorized into 25 subcategories in the axial coding stage and then 6 main categories in the selective coding stage. Three causal conditions identified were technological pressure, market pressure, and uncertainty. Knowledge management and visioning emerged as core categories. Individual and organizational factors were classified as context conditions. The analysis revealed the intellectual system and political-economic factors as intervening conditions, categorized into micro and macro. Strategies included reorganization and empowerment, while support and survival were noted as consequences. Findings from the coding processes are shown in Table 1.

**Table 1. Open, axial, and selective coding**

| - | Selective coding | Axial coding | Open coding |
|---|---|---|---|
| **Causal conditions** | Technology pressure | Timely information | Information overflow, information quantity and quality, and inconsistency, the need for multiple sources of information |
| | | Innovation absorption | Innovation models, identification of modern technologies, use of analytical data, need for business initiative |
| | Market pressure | Customer-centric | Identifying customer needs, determining customer priorities, the need to quickly align with customer needs |
| | | Competition conditions | Identifying current and new competitors, expanding the level of competition to international markets, determining competitors' capabilities |
| | Uncertainty | Self-renewal | Communication between subsystems and their combined performance, increasing implicit connections, solving new problems |
| | | complexity | Multiplicity stakeholders, expanding the dimensions of the industry |
| **Context conditions** | Knowledge management | direction | Type of information required, prioritization of information, determination of indicators and criteria in information collection |
| | | Data gathering | Identifying opportunities and threats, blind spots, customer needs, competitors and technologies, trends and macro trends |

| | | | |
|---|---|---|---|
| | | Data analysis | Database creation, empirical calculations, data mining, process mining, analytical processing, intuitive analysis |
| | | dissemination | How to send data, what kind of information should be provided to whom, and when |
| | Visioning | imagination | Predicting events, estimating the future, considering future images, determining the time horizon, developing a roadmap |
| | | Inspirational management | Understanding situations, understanding dependencies, understanding priorities, understanding disruptive, emerging, and surprising elements |
| **Context conditions** | Individual factors | Managers' capabilities | Resource mobilization, facilitation role, practical action and management involvement, transformational style, crisis thinking |
| | | Employee capabilities | Ideation and creativity, divergent and systemic thinking of employees, long-term thinking, commitment to collective wisdom, |
| | Organizational factors | Organizational culture | Providing a platform for teamwork, creating an atmosphere of cooperation, belonging, and corporate identity |
| | | Organizational structure | Information infrastructure (hardware and software), bandwidth, degree of digitalization of decision-making |
| **Intervening condition** | Reorganization | External networking | Interaction with leading companies, technology hubs, policymakers, universities, power centers, and research centers |
| | | Internal networking | Employee interaction, interaction between different departments, interaction with stakeholders and investors |
| | | Structure design | Renovating and redesigning structures, forming multidisciplinary teams, creating an observatory |
| | Empowerment | Training | Training courses, specialized conferences, development of specialized skills of employees and managers |
| | | Motivation | Promoting belief in information sharing, creating belief in realizing the vision, motivating employees through incentives |
| | | Openness | The flow of ideas, new ideas, and opinions, investment in new ideas |
| **Consequences** | Support | Improve decision-making | Providing the required information, multidimensional perspective, making sound decisions, presenting more alternatives |
| | | Risk management | Avoid surprises, reduce uncertainty, reduce future risk |
| | Survival | Competitiveness | Identifying opportunities and threats, early warning system, creating opportunities for action, increasing competitiveness |
| | | Productivity | Better performance, increased quality, increased profitability |
| | | Development | Increasing readiness and providing the ground for growth, modernization, and transformation, expanding the field of activities |

## Discussion

As the global economy becomes more complex, uncertainty rises, forcing companies to adapt to unpredictable changes, especially in high-tech sectors. The pharmaceutical industry faces significant risks due to lengthy and intensive R&D processes, requiring collaboration across biology, chemistry,

and medicine (Jung et al., 2023), alongside regulatory compliance. In this environment, success depends on the ability to anticipate changes faster than competitors and to envision the future. Preparing for changes ahead of rivals is crucial for competitive advantage and survival, making strategic intelligence essential. This study develops a strategic intelligence framework to address uncertainties in the pharmaceutical sector, filling gaps in existing models. Researchers interviewed 22 experts in management, marketing, and policy to refine the model using grounded theory. The analysis generated 560 initial codes, categorized into 25 subcategories and key themes: technological pressure, market pressure, and uncertainty, reflecting information overload and diverse stakeholder demands. Gitelman (2021) emphasizes that business success hinges on understanding customer needs and timely information, achievable through strategic intelligence. Kori et al. (2021) highlight that strategic intelligence meets the information demand linked to uncertainties, enhancing predictions for stakeholders.

Knowledge management and visioning are crucial to the core category. Key aspects include identifying opportunities and threats, collecting relevant information, analyzing data, recognizing surprises, and disseminating insights effectively. Scholars like Kuosa (2011), and Walsh and Harrison (2021) highlight visioning's importance in strategic intelligence. Additionally, Santa Soriano and Torres Valdes (2021) stress that effective knowledge management is vital for strategic intelligence, while Pellissier and Kruger (2011) emphasize knowledge transfer and storage. Individual and organizational factors are essential contextual conditions, primarily involving managerial capability, organizational culture, and structure. Maccoby and Scudder (2011) stress the significance of team building, collaboration, and interactive methods. Mahdi et al. (2019) note that the characteristics of leaders and managers significantly enhance the implementation of strategic intelligence. McDowell (2009) asserts that creative and intuitive thinking among managers and employees is critical for effectively applying strategic intelligence.

Intervening conditions were divided into micro and macro factors, focusing on the intellectual system and political-economic conditions. Strategies included two main aspects: reorganization and empowerment, with subcategories like training, networking, and structural design. Researchers such as Santa Soriano and Torres Valdes (2021), Gitleman (2021), and Maccoby and Scudder (2011) pointed out the importance of networking for strategic intelligence. Trim and Lee (2008) emphasized structural design and information units in organizations. The outcomes of strategic intelligence

were categorized as support and survival, leading to improved decision-making, risk management, productivity, and competitiveness. Maccoby and Scudder (2011) noted that designing competitive products is a vital outcome, while Pellissier and Kruger (2011) highlighted decision-making and market development as important results. The pharmaceutical industry is undergoing major changes, with advancements in production, R&D, supply chain, and commercial operations. This evolving landscape indicates shifts in customer demands from testing to market launch. The industry is science-based, network-oriented, market-focused, and control-driven. Scientific rigor is crucial for R&D and recognizing tech trends. Effective information sharing among companies is essential. Gathering customer insights and competitive intelligence is necessary. Additionally, prioritizing risk management helps identify potential threats early. Strategic intelligence is vital for organizations to proactively collect, analyze, and share information in these areas.

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