Design and Analysis of Exit Strategies from Recession in Active Companies in the Automotive Parts Manufacturing Industry Using the Fuzzy Cognitive Map Approach (Case Study: Northwest Iran)

Masoumeh Akbarzadeh[1], Houshang Taghizadeh*[2], Majid Bagherzadeh Khajeh[3]

1.PhD Student, Department of Management, Tabriz Branch, Islamic Azad University, Tabriz, Iran.
2.Professor, Department of Management, Tabriz Branch, Islamic Azad University, Tabriz, Iran (Corresponding author).
3.Assistant Professor, Management Department, Tabriz Branch, Islamic Azad University, Tabriz, Iran.

*** Corresponding author email address**: taghizadeh46@yahoo.com
Received: 2024-11-01 **Reviewed:** 2024-11-30 **Revised:** 2024-12-10 **Accepted:** 2025-01-21 **Published:** 2025-06-29

Abstract

The purpose of this study is to design and analyze a model for exit strategies from recession in companies operating in the automotive parts manufacturing industry. This study is of a developmental-applied nature and follows a mixed-methods approach (qualitative and quantitative). The qualitative section is based on a multi-grounded theory approach to develop a qualitative model of dimensions, combining empirical exploratory findings (interviews) and theoretical exploratory findings (meta-synthesis of scientific documents). Quantitative analyses were conducted using the fuzzy cognitive map approach and clustering of companies based on k-means partitioning. The validity of the qualitative findings was confirmed using content validity for constructs and the opinions of external experts. The quantitative research population consisted of two groups: an expert panel of 18 individuals and managers and directors of automotive parts manufacturing companies located in northwest Iran. The expert panel was selected through purposive sampling, while the sample of companies, comprising 360 firms, was selected using stratified random sampling based on provincial distribution. The qualitative findings identified a model of exit strategies from recession for automotive parts manufacturers within a framework of 63 key concepts, 11 subcategories, and 3 major categories. The quantitative findings resulted in the development of a relational model comprising one sender node, two receiver nodes, and eight central nodes. Company clustering identified three major clusters of firms in response to recession exit strategies. The overall analysis of corporate exit strategies from recession indicated that automotive parts manufacturers should adopt a long-term plan focused primarily on transformation-oriented strategies to achieve a suitable level of competitiveness and competitive advantage in the business environment.

Keywords: *Supply Chain Management Strategies, Recession, Automotive Parts Manufacturing Industry, Clustering.*

How to cite this article:

Akbarzadeh M, Taghizadeh H, Bagherzadeh Khajeh M. (2025). Design and Analysis of Exit Strategies from Recession in Active Companies in the Automotive Parts Manufacturing Industry Using the Fuzzy Cognitive Map Approach (Case Study: Northwest Iran). Management Strategies and Engineering Sciences, 7(2), 43-59.

1. Introduction

Modeling and determining macro and effective policies to mitigate the impacts of recession and maximize the benefits of economic boom are among the achievements of social sciences, particularly in the field of economics. These models help forecast various economic trends and implement regulatory policies accordingly in different societies and economic environments worldwide [1, 2]. The cyclical formation of recessions and interruptions on the one hand, and economic booms and prosperity on the other, constitutes the core nature of macroeconomic systems. Various economic theories have been developed by scholars to depict and analyze the causes and factors underlying these fluctuations at the macroeconomic level. However, describing these downturns and upturns at the micro-level, particularly for industrial and business enterprises, is relatively more complex [3-5].

The reasons behind recessions and booms at the corporate level, as well as the process of adjusting and recovering company performance to ensure a smooth transition from crises and downturns or to maximize profit during economic upturns, are influenced by a variety of factors. It can be argued that the primary concern of researchers in this field is to identify corporate transition strategies from recession and evaluate them at both micro and macro levels, particularly in the domain of industrial business management. The occurrence of a recession at an industrial firm requires crisis exit policies and strategies tailored to its specific causes [6]. The effectiveness of these policies in overcoming corporate crises and recessions logically depends on the company's circumstances, business environment, regulatory policies, and market conditions [7].

Enhancing knowledge about the strategies adopted by business firms to recover from crises and corporate recessions, as well as understanding the pathways through which recessions spread across industrial firms, can provide valuable insights for mitigating future recessions with reduced time and cost [8]. Additionally, it improves the understanding of both researchers and industrial managers regarding existing mechanisms in this context.

Recent research has explored various strategies for corporate recovery from recession across different industries. Hasin et al. (2024) examined the implementation and execution of different recession exit strategies in small and medium-sized enterprises (SMEs) and their impact on business performance, particularly sales growth. Their findings indicate that the primary objective of recession exit strategies revolves around sales enhancement, with a focus on five key principles: customer relationship management, general promotional efforts, discount offerings, credit periods, and online commerce. Among these, strengthening online business proved to be the most sustainable and effective strategy for improving sales performance, whereas credit period extensions negatively impacted SME performance [9]. Similarly, Stoeber et al. (2024) investigated financial crises and corporate restructuring strategies, emphasizing transparency and openness as overarching approaches for recovery. Their study suggests that policymakers aim to improve restructuring success rates through updated policies supporting corporate revival. However, financially distressed firms often fail to invest in proactive restructuring opportunities. Conventional corporate recovery strategies, particularly under financial constraints such as resource scarcity, time pressure, and confidentiality requirements, necessitate rapid, top-down decision-making. Stoeber et al. (2024) proposed an integrated framework outlining eight propositions on the potential effects of openness on corporate restructuring strategies, highlighting a dual-level approach encompassing both corporate and organizational strategy [5]. Nhung (2024) focused on supply chain stability and logistics management in automotive parts manufacturing firms, underscoring that profitability, recovery from recession, and corporate performance improvement are achievable through strategic management approaches aimed at inventory restoration and first-tier supplier relationships [4]. Manuj et al. (2024) addressed resilience capabilities in automotive supply chains, recommending that firms enhance their internal capabilities in supply assessment, operational efficiency, and logistics evaluation to prevent and mitigate recession risks [3]. Similarly, Ur Rehman et al. (2022) emphasized the role of dynamic corporate capabilities in crisis and recession recovery, particularly in production planning and control. Their findings suggest that firms typically enhance inventory management and output quality to navigate business uncertainties and activate supply chain risk management. Additionally, knowledge management activities focused on production planning and operational performance were found to effectively guide firms in supply chain risk management. Moreover, preventive risk management practices were shown to influence operational performance only when combined with reactive risk management strategies, reinforcing their role in recession prevention and corporate sustainability [10].

The automotive parts manufacturing industry, particularly in Iran, has faced numerous fluctuations since its inception approximately half a century ago. Over different periods, this industry has witnessed the shutdown and bankruptcy of both small and large industrial firms due to economic recessions. Some companies that, merely a year or two before their closure, could not even anticipate their downfall have now disappeared, making way for more resilient and emerging firms. Meanwhile, some industrial firms in the parts manufacturing sector have managed to survive economic downturns and crises through effective managerial strategies and continue to operate dynamically in the industry [11]. Gaining insights into, first, what management strategies have been employed in various areas such as finance, credit, human resources, production and operations, and marketing to overcome crises and revive automotive parts manufacturing firms from corporate recessions, and second, what policies and strategies tailored to companies' needs and circumstances can aid in overcoming recessions, is crucial for both micro and macro-level managers and policymakers in this industry [12-15]. Given the lack of focused studies on identifying and examining corporate strategies during recessions, especially for industrial firms operating within the automotive parts supply chain, the present study serves as a comprehensive and structured investigation in this domain, highlighting the necessity of systematic research in this area.

Accordingly, the findings of this research contribute to advancing knowledge on formulating strategic policies for selecting corporate recession exit approaches in the automotive parts manufacturing industry. Furthermore, to enhance public understanding, ensure transparency, and provide an in-depth perspective on strategic planning and long-term capacity building in recessionary periods, field analyses have been conducted. Specifically, this study examines strategic policies for firms operating in the automotive parts manufacturing sector, considering its unstable nature and market constraints. Subsequently, a relational model for strategic policies in selecting recession exit approaches in the automotive parts industry is presented. Finally, based on previous findings and company clustering using k-means partitioning, an analysis of firms' conditions regarding corporate recession exit strategies is provided.

Given the significance of the various findings at different stages of this research, addressing the design and analysis of corporate recession strategic models for the automotive parts manufacturing industry based on industry-specific strategic clusters represents an innovative aspect of this study.

As highlighted in the previous paragraphs, identifying and analyzing corporate recession exit strategies can provide valuable insights into firms' conditions, their inclination to enhance competitive advantages, and their corporate strategies in response to long-term threats in the business environment. Despite the crucial role of the automotive parts manufacturing industry in employment generation and exports, firms in this sector are highly susceptible to rapid changes in the market, customer preferences, and production and operational technologies [16, 17]. These dynamics can potentially make industrial firms in this sector vulnerable [18]. If not managed properly, such vulnerabilities may lead to the erosion of firms' competitive advantages, corporate recessions, bankruptcies, and eventual shutdowns, negatively impacting long-term investment attractiveness, production trends, and value creation in this industry.

Accordingly, the primary objective of this study is to design a model for recession exit strategies in active companies in the automotive parts manufacturing industry in northwest Iran using the fuzzy cognitive map approach and to analyze these strategies considering the status of sampled firms through clustering. Consequently, the following secondary objectives guide the study in identifying strategies, designing the model, and analyzing strategies:

1. What are the recession exit strategies for companies operating in the automotive parts manufacturing industry?
2. What is the relational model of recession exit strategies for automotive parts manufacturers in northwest Iran?
3. How can the status of automotive parts manufacturing companies within the sampled population be assessed and analyzed in terms of their inclination to adopt different corporate recession exit strategies using cluster analysis based on k-means partitioning?

2. Methodology

The present study falls within the pragmatist paradigm according to contemporary classifications of research philosophy. From a methodological perspective, it employs a mixed-methods approach (qualitative and quantitative). In terms of analytical strategy, the qualitative phase utilizes a multi-grounded theory approach. The primary reason for adopting this approach was the researcher's assessment that previous deductive conceptualizations related to the study had not reached a satisfactory level of theoretical saturation.

In the quantitative phase, two methods were applied for analyzing corporate recession transition strategies: fuzzy cognitive mapping (FCM) and clustering based on k-means partitioning.

The qualitative research population and sample were structured into two sections: theoretical exploration and empirical exploration, following the multi-grounded theory approach.

Accordingly, data collection integrated two strategies: meta-synthesis for systematically extracting information from scientific documents and semi-structured interviews conducted based on non-probability sampling until theoretical saturation was achieved. To synthesize findings and develop the theoretical model, systematic analyses were performed, and open and axial coding outputs from both the meta-synthesis and interview stages were compiled. This process followed a three-phase approach as per the multi-grounded theory method, culminating in the final model.

1. Phase One – Theoretical Exploration: Data collection for theoretical exploration was conducted using a deductive approach through meta-synthesis. The studied population comprised domestic and international studies published in reputable scientific sources between 2000 and 2024. A systematic review in three stages yielded 88 relevant documents as the theoretical sample.
2. Phase Two – Empirical Exploration: The empirical sample was selected purposively from academic, industrial, and governmental experts until theoretical saturation was reached. A total of 18 experts, divided into three categories, participated in the study:
    - Category One (Academic Experts): Six faculty members from domestic universities engaged in research related to industry, recession, and industrial recovery, each with at least two published papers in reputable scientific journals on topics relevant to the present study.
    - Category Two (Policymakers and Industrial Decision-Makers): Six senior policymakers and decision-makers from industrial regulatory bodies, industry-support organizations, and governmental institutions at the provincial and national levels.
    - Category Three (Industrial Managers): Six senior managers from automotive parts manufacturing firms with at least a master's degree in business administration or related fields, selected as industry experts.

Theoretical saturation was achieved after conducting 18 semi-structured interviews with experts from these three categories.

3. Phase Three – Theory Refinement and Model Development: A four-cycle process was conducted to refine and integrate findings from the previous two phases, including comparative analysis with existing literature, validation, and iterative revisions to the model. The final research model was developed through three validation techniques:
    - Triangular theoretical validation
    - Explicit empirical validation
    - Consistency and coherence assessment

The final conceptual framework was structured into major categories, subcategories, and core concepts based on these findings.

The quantitative research phase had two primary objectives:

1. Developing the relational model using fuzzy cognitive mapping (FCM)
2. Clustering automotive parts manufacturing firms based on their strategic preferences during corporate recessions

To construct the relational model, data were collected using a first-type questionnaire, which was designed for pairwise comparisons of corporate strategies. This questionnaire was distributed to the same group of 18 experts who participated in the interview phase. Experts were asked to evaluate the strength of relationships between all possible paired strategies using integer values in the range of [0,4]. After data collection and normalization, responses were processed into an adjacency matrix, which was then entered into FCM software to generate the relational model between strategic dimensions.

For clustering companies, the research population included all senior executives and managers of small, medium, and large automotive parts manufacturing firms located in northwest Iran (East Azerbaijan, West Azerbaijan, Ardabil, Zanjan, Kurdistan, and Hamadan provinces). Based on the most recent data from the Iran Small Industries and Industrial Parks Organization and other relevant institutions, the total number of active firms in the study region was estimated at 1,436.

A random stratified sampling approach was used to select the sample, ensuring proportional representation of firms across different provinces. The initial sample size was determined using the Krejcie-Morgan table with a 5% margin of error, yielding 351 firms as the preliminary sample. Given the common challenges in obtaining corporate data from private-sector firms, the specified sample size was considered the minimum acceptable threshold for scientific validity.

After distributing 440 questionnaires to senior executives and managers of parts manufacturing firms and conducting two follow-ups at one-month intervals, 380 completed questionnaires were received. Of these, 20 responses with significant missing data were excluded, resulting in a final sample of 360 valid responses for statistical analysis.

The clustering of firms based on their strategic preferences during recessionary periods was performed using qualitative findings as the foundation.

A second-type questionnaire was designed to assess companies' strategic inclinations in selecting recession exit strategies. This questionnaire was developed based on qualitative findings, validated for content validity and internal consistency, and then distributed among 360 firms using stratified random sampling, ensuring proportional representation by province.

The data collected from this second-type questionnaire were analyzed using cluster analysis (k-means partitioning) to classify firms based on their strategic behaviors during recessions. These insights contributed to understanding company tendencies in leveraging different recession exit strategies, ultimately shaping the final model for corporate recession recovery in the automotive parts manufacturing industry.

3. Findings and Results

Following the multi-grounded theory approach, this study employed theoretical exploration, empirical exploration, and theory refinement to develop the strategy model. After the initial extraction of open and guided codes through deductive and inductive approaches, the researcher, along with external experts outside the research team, conducted validity assessments in subsequent rounds. In this process, some codes were merged, while others were separated.

As a result, 290 unique open codes were extracted from theoretical exploration, and 346 unique open codes were derived from empirical exploration through interviews. These were eventually consolidated into 63 final concepts. These concepts were then categorized into 11 subcategories representing corporate strategies and three overarching categories, classified as follows: internal resource adjustment strategies, inter-firm supply chain strategies for exiting recession, and support-oriented strategies at the governance and macro-level. These categories form the overarching framework for corporate recession exit strategies, leading to the initial development of the research model based on both theoretical and empirical exploration.

To refine the theory and finalize the conceptual model, a focus group method was used to validate relationships among categories, merge, remove, or add subcategories, and consolidate the conceptual model. In this phase, eight experts from the automotive and parts manufacturing industry, who had previously participated in the interview process, were invited to a two-hour session. During this session, after an explanation of group modeling techniques, the experts discussed, debated, and provided refinement suggestions, such as merging and separating categories and finalizing the theoretical model.

To assess the validity and reliability of each element and criterion within the proposed framework, the content validity ratio (CVR) and content validity index (CVI) were calculated. Each focus group member was asked to evaluate every major category, subcategory, and indicator in the final theoretical model by selecting one of the following options: essential, useful but not essential, or not necessary.

After calculating the validity indices, the lowest CVR value obtained was 0.94, the lowest CVI value was 0.89, and the overall model validity index was 0.91. These results confirm the validity of the theoretical model, supporting the use of the multi-grounded theory approach.

Table 1 presents a summary of the theoretical exploration, empirical exploration, and theory refinement findings, structured within the qualitative model for recession exit strategies and the recovery of industrial firms in the automotive parts manufacturing sector in Iran.

Table 1. The theoretical modeling findings as the final multi-grounded approach

General category macro-strategies	Subcategory corporate strategies	Concepts operational and policy level	Frequency in the literature	Frequency in interviews	Total frequency

Internal resource adjustment strategies	Gradual improvement and strengthening of internal production factors	Defining competitive quality and establishing and strengthening quality improvement and control teams in production and operations	4	6	10
		Implementing and executing gradual improvement policies to achieve competitive quality	6	4	10
		Upgrading production lines and processes to reduce waste and enhance product quality	5	7	12
		Improving products and outputs through developing in-house R&D units	4	9	13
	Fundamental infrastructural changes reviewing and revising core in-firm	Reducing final product cost by revising production and operations infrastructure	8	6	14
		Transitioning from traditional firm management to more modern efficient administration	4	8	12
		Replacing outdated machinery with modern high-efficiency equipment	3	3	6
		Overhauling and revising firm infrastructure by strengthening sustainable in-house competitive advantages	5	5	10
		Readjusting infrastructure toward exporting manufactured products	6	6	12
	Corporate knowledge management strategies for exiting recession	Establishing collaborative networks to complete the value chain and share resources and capacities among industrial firms	4	7	11
		Creating necessary infrastructures for sharing technical knowledge of stagnant industrial firms with private-sector investors	5	7	12
		Reviewing and enhancing customer knowledge management systems to generate insights for exiting recessionary conditions	3	9	12
		Utilizing real-time in-house information systems for production scheduling and product distribution	5	13	18
		Proper managerial use of real-time internal information systems to monitor inventories of finished goods raw materials and semi-finished products	6	0	6
		Reviewing and adjusting corporate knowledge management systems to improve competitive capacity	7	12	19
	Change management and specialized firm empowerment for exiting recession	Developing and implementing targeted in-house training and empowerment programs for managers and employees aimed at rescuing the firm from recession	4	9	13
		Training and specialized empowerment of managers to address weaknesses in managerial skills and change management during recession transitions	6	7	13
		Training and specialized empowerment of employees to address organizational development weaknesses	0	7	7
		Training and specialized empowerment of employees to address market management weaknesses	5	8	13
		Revisiting and transforming corporate knowledge management through modern technologies such as digital twins	5	7	12
	Market-oriented strategies for firm recovery	Focusing more on key customers in marketing and sales processes	7	10	17
		Transitioning from mass-channel marketing toward direct and virtual channels and participating in international exhibitions to attract more customers	4	7	11
		Adjusting production output quality to meet acceptable standards for customers in target markets	6	6	12
		Increasing the level of market orientation in firms as an important strategic goal	6	8	14
		Establishing proper policies to readjust the competitive pricing of manufactured products	5	3	8

		Addressing potential weaknesses in branding and market identity	0	5	5
		Eliminating noncompetitive products from the production cycle and replacing them with competitive products for market offerings	5	3	8
		Conducting thorough market research to identify target markets and customers	5	3	8
	Enhancing in-house financial capacity for transformation and recession recovery	Utilizing real-time information systems for firm financial planning and management	5	0	5
		Securing adequate fixed and working capital for low-risk in-house change management projects	3	5	8
		Revising asset and corporate investment structures to support in-firm change management	6	1	7
		Protecting short-term cash flows income generation against risk-prone investments in the firm's financial decision-making processes	6	6	12
		Reducing unnecessary expenses and cutting non-value-added costs in industrial firms	4	8	12
		Downsizing assets by selling or converting them into resources needed for competitive advantage	8	3	11
Supply chain strategies for exiting recession inter-firm	Utilizing opportunities arising from vertical supply chain complexity	Firm-level efforts to form strategic alliances with vertical chain members upstream and downstream	5	3	8
		Outsourcing low-margin less critical activities to chain members with strategic alliances	5	5	10
		Exchanging and sharing knowledge to enhance the effectiveness of information flows with upstream and downstream partners	3	4	7
		Merging the firm with successful upstream partners as a last-resort solution in the event of persistent recession and losses	5	5	10
		Strengthening networking and eliminating related barriers or weaknesses to form strategic agreements with vertical chain members	6	7	13
		Using real-time information flows among vertical chain members to monitor inventories of finished goods raw materials and semi-finished products for production planning	4	1	5
		Collaborating with startup companies to introduce innovation to various firm processes	5	5	10
	Utilizing opportunities arising from horizontal supply chain complexity	Efforts to build strategic alliances and joint collaborations across supply chains with competing or parallel firms at equivalent levels	6	8	14
		Merging with competing firms that have superior competitive positions in the supply chain	6	6	12
		Employing unused industrial firm capacities under the factory-free production strategy to lower capital costs	0	5	5
		Collective negotiations between peer-level supply chain firms and government or the Ministry of Industry Mine and Trade to form industry associations reduce risks and prevent disruptions leading to recession	4	12	16
Support-oriented strategies at the governance and macro	Targeted financial support from external and governance sources to firms	Employing crowd funding mechanisms to secure financing for industrial firms	7	0	7
		Increasing the number of venture capital funds offering favorable conditions to industrial firms low interest extended grace periods minimal guarantees	4	6	10
		Passing rules and regulations to improve the efficiency of interactions between the banking system and manufacturing firms seeking financing	6	11	17
		Reviewing bank arrears for firms with effective employment rates to support their exit from recession	4	7	11

		Facilitating government investment in modernizing traditional firms to help them recover from recession while enhancing effective employment	0	4	4
		Offering targeted bank loans under special conditions to overcome recession and achieve firm prosperity	4	3	7
		Granting tax and financial exemptions to recession-affected firms to alleviate financial pressures	4	0	4
		Strategically employing government economic tools including the terms and repayment of short-term loans to help firms exit recession	6	0	6
	Providing non-financial facilities and incentives from governance sources	Delivering free targeted training programs for personnel in active industrial firms to strengthen the automotive parts manufacturing sector	4	5	9
		Enacting mandatory regulations prohibiting production permits for already saturated products in the industrial business environment	6	7	13
		Issuing directives and requirements for domestic automakers to purchase locally manufactured parts	3	7	10
		Establishing comprehensive research and development systems to identify strengths and address weaknesses in industrial firms with a focus on empowerment	2	0	2
		Implementing policies to curb excessive imports of products already manufactured by domestic producers	2	7	9
		Planning to increase the share of knowledge-based production in firms	3	2	5
		Streamlining customs regulations to boost export rates of competitive products	5	7	12
	Enhancing economic stability in business environments	Improving the business environment by ensuring political social and legal security to attract investment	5	3	8
		Passing laws and regulations that incentivize investment and activity in the industry	3	5	8
		Government efforts to maintain consistent industrial policies customs regulations taxation and insurance rules	8	3	11

Before presenting the quantitative findings, the following table provides descriptive characteristics of industrial firms in terms of their years of operation and number of employees, as reported by the senior executives (CEO or senior manager) who completed and returned the research questionnaire.

Table 2. Descriptive characteristics of automotive parts manufacturers in terms of years of operation and number of employees

Type of activity and main products	Frequency	Years of operation range	Number of employees range
Engine and gearbox components and accessories	91	15–48	49–850
Body, cabin, and chassis components and accessories	64	11–48	35–880
Power transmission system accessories (excluding gearbox)	56	9–46	45–700
Plastic and rubber automotive components	52	5–27	35–194
Electronic automotive components	43	6–36	39–140
Glass, mirrors, and lighting components	20	10–38	38–109
Other automotive-related components and accessories	34	7–39	29–142
Total	360	-	-

Table 2 indicates that the sample includes firms with nearly half a century of experience in automotive parts manufacturing. However, the newest firms, with less than ten years of operation, are primarily engaged in the production of power transmission system accessories, plastic and rubber automotive components, and various electronic automotive components.

Table 3 presents information on the educational level of respondents, who were either corporate experts or heads of automotive parts manufacturing firms, serving as the sample representatives.

Table 3. Frequency distribution of the sample based on the educational level of the firm's CEO or senior manager

Cumulative percentage	Percentage	Frequency	Education level
17.22	17.22	62	High school diploma and below
66.94	49.72	179	Associate's degree and bachelor's degree
93.61	26.67	96	Master's degree and equivalent
100.00	6.39	23	Doctorate
-	100	360	Total

Table 4 provides descriptive characteristics of the sampled industrial firms based on their geographic location, following a stratified sampling framework.

Table 4. Provincial distribution in the research population and sample (stratified sample determination)

Province	Population size	Initial estimated sample size	Distributed questionnaires	Final confirmed sample
East Azerbaijan	475	116	130	122
West Azerbaijan	208	51	66	52
Ardabil	186	45	60	47
Zanjan	197	48	63	48
Kurdistan	208	51	66	51
Hamedan	162	40	55	40
Total	1436	351	440	360

As shown in Table 4, East Azerbaijan had the highest number of automotive parts manufacturers in both the total population and the sample.

To develop a suitable relational model using the fuzzy cognitive map approach, a first-type questionnaire was designed to identify and determine causal relationships among the 11 identified dimensions of industrial recovery strategies from the previous phase. The questionnaire was validated for reliability and consistency by an expert panel of 18 academics, as previously detailed. After validation, the final questionnaire was distributed, and data were collected.

Following data collection, triangular fuzzy numbers were used to determine the intensity of influence between dimensions (from row to column) based on the Chang et al. (2019) approach. The final results, after fuzzy aggregation of expert opinions and defuzzification using the weighted average method, are summarized in Table 5.

Table 5. Summary of expert opinions in the adjacency matrix of dimensions

Variable	Code	INB	RES	KMB	EMP	BOS	INFM	VCOSC	HCOSC	TAFI	FAG	ESEN
Gradual improvement and strengthening of internal production factors	INB	0	0.11	0.216	0.706	0.31	0.706	0.31	0.706	0.31	0.706	0.31
Fundamental infrastructural changes in firms	RES	0.12	0	0.11	0.216	0.31	0.428	0.31	0.428	0.31	0.428	0.31
Corporate knowledge management strategies for industrial recovery	KMB	0.428	0.31	0	0.216	0.11	0.216	0.11	0.216	0.11	0.216	0.11
Change management and specialized firm empowerment for recession recovery	EMP	0.216	0.11	0.216	0	0.34	0.31	0.428	0.31	0.706	0.31	0.706
Market-oriented strategies for firm recovery	BOS	0.31	0.706	0.31	0.32	0	0.11	0.216	0.11	0.428	0.31	0.428

In the next phase, the fuzzy cognitive map structure was analyzed using graph theory and artificial intelligence techniques based on machine learning. The data from the table above were entered into FCM Expert 2022 software for analysis. The following figure illustrates the direct and indirect relationship weights between elements.

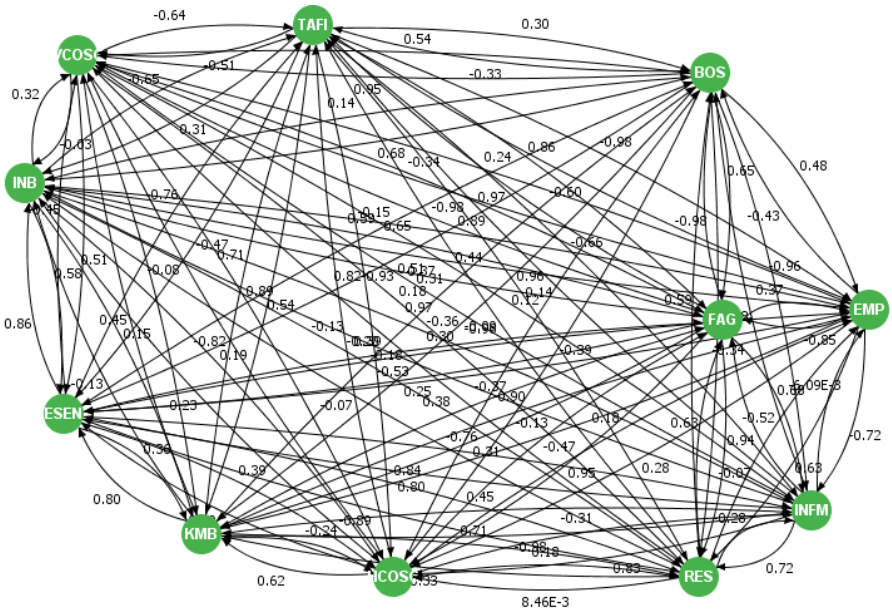

Figure 1. Fuzzy cognitive map showing direct and indirect relationship weights between elements in the system

Another key outcome of the fuzzy cognitive map approach is the determination of influence, dependency, and centrality rankings for each strategy. The summary of these findings is presented in Table 6, where the indices are ranked based on centrality.

Table 6. Influence, dependency, centrality, and impact ratio of elements

Variable	Code	Influence	Dependency	Centrality	Influence ratio	Dependency ratio	Rank
Market-oriented strategies for firm recovery	BOS	1.865	3.264	5.129	0.101	0.216	1st
Gradual improvement and strengthening of internal production factors	INB	2.161	2.484	4.645	0.117	0.165	2nd
Targeted financial support for firms from external and governance sources	TAFI	3.556	0.234	3.79	0.192	0.016	3rd
Corporate knowledge management strategies for recession recovery	KMB	3.243	0.421	3.664	0.175	0.028	4th
Fundamental infrastructural changes in firms	RES	2.361	1.009	3.37	0.127	0.067	5th

The influence column represents the impact of each factor within the system. Higher values indicate greater influence on other factors. The dependency column shows how much a factor is influenced by changes in other elements. The centrality index is the sum of influence and dependency, reflecting the level of interaction between factors.

In analyzing a fuzzy cognitive map, decision-makers should focus on the centrality index to identify key leverage points in strategic planning.

In the following section, artificial intelligence approaches based on neural networks have been used to identify the main strategic pathways and compute the corresponding weights. By filtering out weak pathways, the strategic pathways are extracted. Although the previous table determined the degree of influence of each element on other elements, a key criterion for identifying strategic pathways is the interaction level of the centrality index of each element with the learning system and the computation of the total pathway weight from the sender node(s) to the receiver node(s). To identify these aspects, the artificial intelligence system was executed in the respective software.

The FCM software was run multiple times with a weight reduction approach to optimize the topology of the cognitive map and eliminate weaker pathways. Ultimately, in the seventh learning iteration, the resultant vectors for the system elements were computed, with their values stabilizing from the fifth iteration onward. Based on these findings, it can be concluded that the learning process moved toward reducing chaos and increasing stability. The results of the stabilization phase (final iteration) of the fuzzy cognitive map are presented.

The outputs of the static analysis of the fuzzy cognitive map, conducted based on graph theory, indicate that the map contains a total of 11 nodes (elements), including one sender node, two receiver nodes, and eight central nodes. In the seven learning iterations, the resultant vectors for the system elements were computed, showing that values stabilized after the fourth iteration. Consequently, with the system adjusting its 11 elements from sender nodes to central nodes, the strategic pathways were identified and extracted.

One of the strategic pathways extends from the sender node TAF to the receiver nodes HCO and VCO, with three central elements between them. The total weight of the strategic pathway from TAF to HCO is 1.42, while from TAF to VCO, it is 1.30. Other strategic pathways were also identifiable within the fuzzy cognitive map model. Among them, a strategic pathway was observed from the sender node INF to the receiver nodes HCO and VCO, along with the central elements between them, with the highest total weight of 2.63. Furthermore, another strategic pathway from INF to HCO and VCO had the highest total weight among all identified pathways, amounting to 2.24.

Finally, the aggregated model, incorporating three sender nodes (KMB, INF, and TAF), five central nodes, and three receiver nodes (HCO, VCO, and EMP), was defined as the relational model with a cumulative weight exceeding the threshold set in the fuzzy cognitive map learning algorithm. The following figure presents this final model.

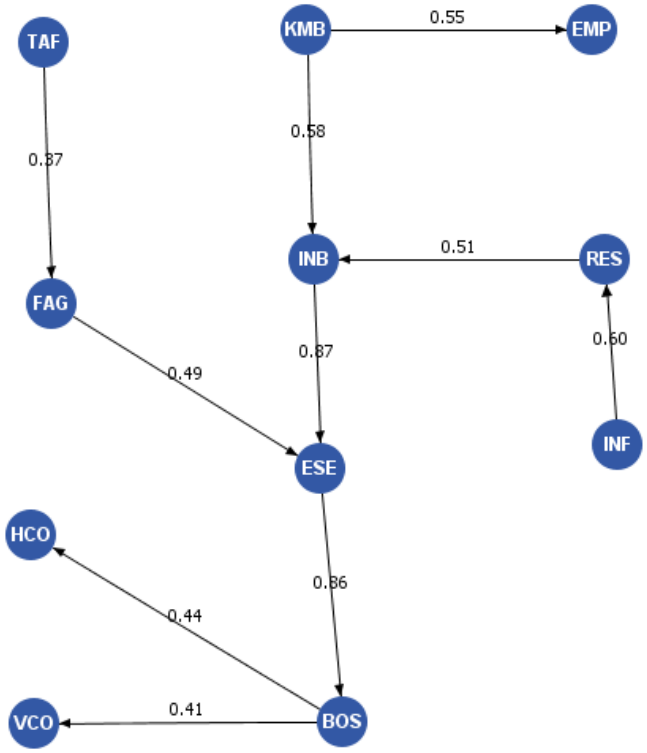

Figure 2. The final relational model after pruning the initial fuzzy cognitive map model based on the threshold criterion, incorporating three sender nodes (KMB, INF, and TAF), five central nodes, and three receiver nodes (HCO, VCO, and EMP).

The findings from the static analysis of the fuzzy cognitive map, obtained through graph theory and machine learning, present the relational model among elements. The above figure serves as the final output and represents the relational model of corporate recession exit strategies, establishing a reference framework for recession recovery strategies as components of a static system.

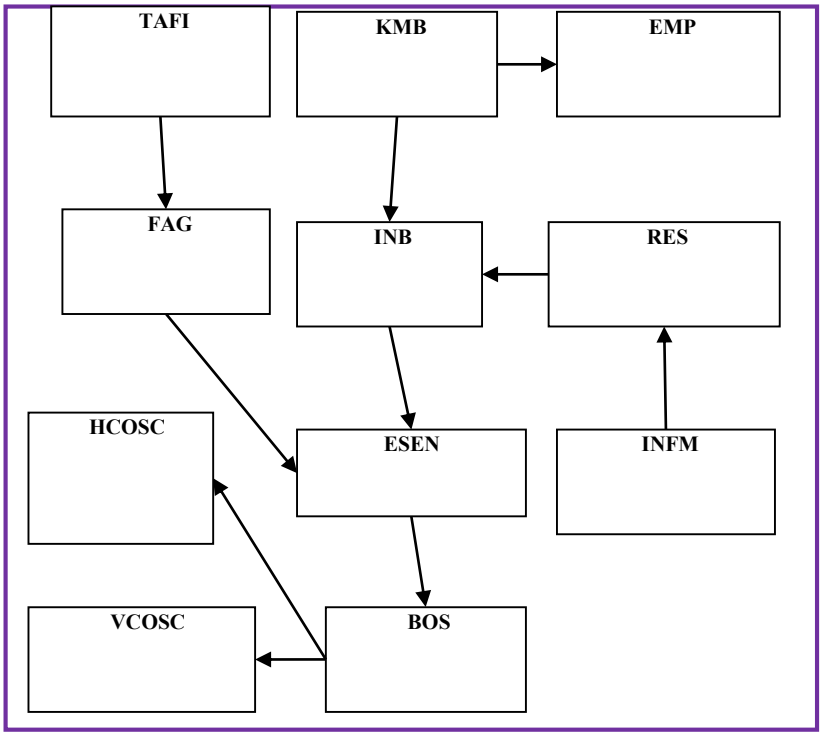

Figure 3. The relational model of corporate recession exit strategies for automotive parts manufacturing firms derived from the fuzzy cognitive map approach.

In this study, clustering was employed to examine similar patterns within datasets that lacked specific labeling and to reduce the dataset size for segmentation. Clustering algorithms aim to separate data into groups such that members within each group share specific similarities, while those in different groups or clusters exhibit minimal or no similarities. Consequently, comparing differentiated groups leads to comprehensible interpretations and clearer analyses.

To achieve this, a second-type questionnaire was distributed among the sampled companies, and the collected data were subjected to clustering analysis using the k-means partitioning method. Determining the optimal number of clusters was a key step. Since there is no single definitive method for cluster determination in clustering literature, five internal evaluation methods were employed to assess clustering quality using the k-means approach, including the Davies-Bouldin index, Dunn index, Galinski index, Elbow method, and dendrogram analysis.

In the Davies-Bouldin index, the optimal cluster number corresponds to the lowest value, while in the Dunn and Galinski indices, the highest values determine the ideal number of clusters. The results indicated that the optimal number of clusters in the Davies-Bouldin index was three, while in the Dunn and Galinski indices, it was determined to be eight. Due to the lack of a consistent optimal cluster count from these methods, the outputs of the dendrogram and Elbow methods were further examined.

Since hierarchical clustering does not require a predefined number of clusters, the dendrogram for the 360 sampled automotive parts manufacturing firms was extracted using SPSS statistical software. The complete dendrogram analysis for the 360 firms revealed a clear distinction of three clusters. Additionally, the findings from the Elbow method, which considers the percentage variance index as a function of the number of clusters, supported the three-cluster solution. The optimal number of clusters in the Elbow method is identified where adding another cluster no longer significantly improves data modeling. More precisely, when plotting the percentage variance index against the number of clusters, an initial increase in clusters significantly adds information, but at a certain point, the marginal benefit diminishes, forming an angle in the plot. The point corresponding to this angle indicates the optimal number of clusters.

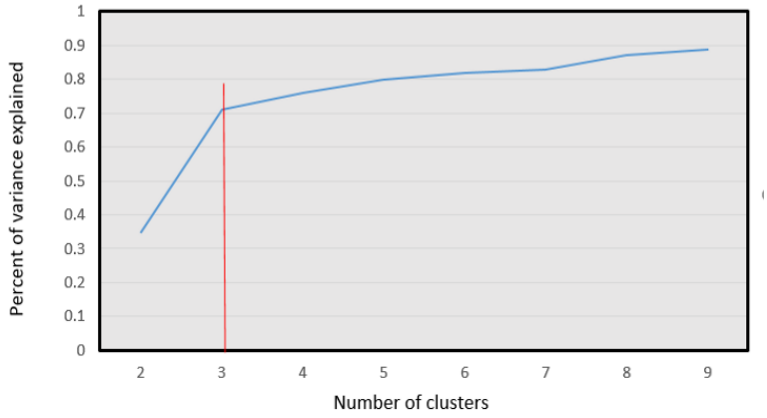

Figure 4. Analysis of percentage variance changes corresponding to selected cluster numbers using the Elbow method.

Since the Davies-Bouldin index, dendrogram analysis, and Elbow method all suggested an optimal cluster count of three, clustering was performed using the k-means method with three clusters. The following table presents the results of this analysis, showing the mean value of each primary component (construct), its rank within each cluster, and its rank across all clusters.

Table 7. Results of cluster analysis of automotive parts manufacturing companies based on their preference for utilizing recession exit strategies

Cluster	INB	RES	KMB	EMP	BOS	INFM	VCOSC	HCOSC	TAFI	FAG	ESEN	Count
1	Mean	3.503	3.316	3.282	3.675	3.442	4.208	2.620	2.144	3.208	2.985	4.137
	Rank within cluster	4	6	7	3	5	1	10	11	8	9	2
	Rank between clusters	1	2	2	2	2	1	3	3	2	2	2
2	Mean	2.924	3.596	3.420	3.972	4.425	4.122	4.420	3.683	3.122	2.110	4.383
	Rank within cluster	10	7	8	5	1	3	2	6	9	11	4
	Rank between clusters	3	1	1	1	1	2	1	2	3	3	1
3	Mean	3.298	3.131	3.129	3.364	3.054	2.646	3.385	3.937	4.146	3.820	4.044
	Rank within cluster	7	8	9	6	10	11	5	3	1	4	2
	Rank between clusters	2	3	3	3	3	3	2	1	1	1	3

Analysis of variance (ANOVA) was conducted to examine the differences between clusters for each construct. The results indicate significant differences between the clusters across all constructs. The results of this analysis are shown in Table 8.

Table 8. Analysis of variance for examining differences between clusters

Index	Mean Square (Cluster)	df (Cluster)	Mean Square (Error)	df (Error)	F	Significance Level
BOS	297.670	2	0.340	357	874.463	0.000
INB	300.734	2	0.340	357	884.402	0.000
TAFI	271.464	2	0.423	357	641.603	0.000
KMB	259.313	2	0.576	357	449.883	0.000
RES	267.437	2	0.463	357	577.765	0.000
ESEN	240.855	2	0.603	357	399.646	0.000
FAG	234.544	2	0.585	357	400.850	0.000
INFM	226.871	2	0.645	357	351.786	0.000
HCOSC	240.733	2	0.603	357	398.993	0.000
VCOSC	215.342	2	0.715	357	301.157	0.000
EMP	212.367	2	0.785	357	341.326	0.003

To name the clusters, the strategy scores for recession recovery, as well as the ranking of each construct within and across clusters, were considered.

Cluster one consists of firms inclined toward pursuing internal financial strategies for recession recovery.

Cluster two consists of firms inclined toward pursuing primarily market-oriented strategies by leveraging internal competitive advantages.

Cluster three consists of firms inclined toward pursuing government financial resource acquisition strategies for recession recovery.

4. Discussion and Conclusion

Recession is an economic condition in which demand for goods and services declines. If a recession deepens, it can lead to an increase in bankruptcies and unemployment, causing significant challenges for many companies. This research aims to identify the strategies that companies have pursued despite intense competition and harsh recessionary conditions, enabling them to sustain their operations. One way to achieve this goal is to analyze recessionary strategies within each business sector. This study seeks to identify the factors and indicators of supply chain strategies during a recession and determine their impact on sales from the perspective of managers.

1- What are the recession exit strategies for companies operating in the automotive parts manufacturing industry?

The recession recovery strategies and revitalization of industrial firms engaged in automotive parts manufacturing were designed and presented within the framework of this study using both qualitative and quantitative approaches. This study is developmental-applied and employs a mixed-methods (qualitative and quantitative) research design. The qualitative analysis was conducted using thematic analysis, while the quantitative validation of the qualitative model was performed using factor analysis. The primary reason for adopting thematic analysis was the lack of comprehensive and inclusive studies on recession exit strategies and the revitalization of industrial firms in the automotive parts sector, particularly in the specific business environment of Iran.

For data collection, the study employed field observations and semi-structured interviews as qualitative data collection techniques for conceptual model development. Additionally, survey data were gathered using questionnaires to validate the qualitative model. Initially, qualitative data were collected through interviews and analyzed to construct the theoretical model. Subsequently, the model was validated using questionnaire data and confirmatory factor analysis. The findings identified recession exit strategies for automotive parts manufacturers, categorized into 63 key concepts, 11 subcategories, and three overarching categories: firm-level resource and internal factor strategies, inter-firm supply chain strategies for recession recovery, and government and macro-level support strategies.

Emphasis on factors such as internal firm capabilities, corporate knowledge management, and gradual production system improvement aligns with previous studies [1-10, 12-29]. This demonstrates partial alignment between the present study's findings and those of previous research.

In addition to the aforementioned concepts, providing non-financial incentives through government resources and efforts to enhance economic stability and leverage its positive effects on the business environment were identified as key subcategories within the overarching category of government and macro-level support strategies. Furthermore, capitalizing on opportunities arising from vertical supply chain complexity was recognized within the main category of inter-firm supply chain strategies for recession recovery. Based on the interpretation of adjusted R-squared values, while the index values for all identified concepts were found to be significant, the remaining subcategories not mentioned in the previous two paragraphs were classified as less influential or less significant as supply chain revitalization strategies during a recession in the automotive parts manufacturing industry. Thus, the findings indicate that inter-firm supply chain strategies for recession recovery were identified as having the weakest impact as a general category of recession strategies in industrial firms in the Iranian automotive parts sector.

2- What is the relational model of recession exit strategies for automotive parts manufacturing companies in northwestern Iran?

To develop an appropriate relational model, the fuzzy cognitive map approach was employed, and a second-type questionnaire was distributed. To identify and determine causal relationships between the dimensions of industrial recovery strategies identified in the previous section, a questionnaire was designed and distributed among a panel of 18 experts. In the next phase, following the methodological steps, data reliability and validity were assessed by the expert group. After final distribution and data collection, fuzzy numbers were used to determine the influence intensity of dimensions (from row to column). The final

results were summarized after obtaining the fuzzy mean of expert opinions and defuzzifying using the weighted average defuzzification method.

The final findings from learning algorithms for path recognition indicated that the cognitive map comprised a total of 11 nodes (elements), including one sender node, two receiver nodes, and eight central nodes. In seven learning iterations, the resultant vectors for the system elements were computed, with values stabilizing from the fourth iteration onward. Consequently, the system adjusted its 11 elements from sender to central nodes, identifying and extracting strategic pathways.

The first strategic pathway was identified from the sender node TAF to the receiver nodes HCO and VCO, with three central elements in between. The total weight of the strategic pathway from TAF to HCO was 1.42, while the weight from TAF to VCO was 1.30. The primary output from the static analysis of the fuzzy cognitive map, derived from graph theory and machine learning, presents the relational model among the elements. The above figure illustrates that the aggregated map comprises 11 nodes (elements), including three sender nodes (KMB, INF, and TAF), three receiver nodes (HCO, VCO, and EMP), and five central nodes.

3- How can the status of automotive parts manufacturers in the sample be evaluated and analyzed in terms of their tendency to adopt different corporate recession exit strategies using cluster analysis with k-means partitioning?

Findings from the k-means approach showed that automotive parts manufacturers could be classified into three clusters based on key dimensions of supply chain management strategies during recessions in the automotive parts sector.

The first cluster consists of companies inclined toward pursuing internal financial strategies for recession recovery. In this cluster, the highest scores were observed for factors related to internal resource and financial management strategies, such as strengthening and gradually improving internal production factors and managing internal financial resources to enhance the capacity for transformation and recession recovery. Therefore, this cluster was labeled as firms inclined toward pursuing internal financial strategies for recession recovery.

The second cluster consists of companies inclined toward pursuing primarily market-oriented strategies by leveraging internal competitive advantages. Despite the high scores of factors related to internal firm resources, this cluster also exhibited the highest scores for inter-firm supply chain strategies in recession recovery, particularly in vertical relationships, and proactive recession recovery strategies, such as government and macro-level support strategies. Therefore, this cluster was labeled as firms inclined toward pursuing primarily market-oriented strategies by leveraging internal competitive advantages for crisis recovery.

The third cluster consists of companies inclined toward pursuing government financial resource acquisition strategies for recession recovery. The advantage of companies in this cluster lies in their emphasis on government and macro-level support strategies, particularly in securing investments and subsidies to navigate recessions and crises. Additionally, these firms focused on leveraging opportunities arising from horizontal supply chain complexity and governmental lobbying to optimize the allocation of financial support from external and government sources. This included receiving financial and non-financial incentives from government resources as a key objective and policy for overcoming recessions. These firms are recognized as strategic recession exit forecasters. However, according to findings from Gutman (2022), Laraguibel et al. (2021), and Paul et al. (2021), long-term and structural recessions do not allow for a reliable recovery of this type of company, limiting their ability to successfully navigate economic downturns.

Recommendations for companies in the first cluster, identified as firms inclined toward pursuing internal financial strategies for recession recovery, based on the findings of this study, are as follows:

- Invest in new projects to expand their activities.
- Equip the company with more advanced control and information systems based on information technology advancements to analyze financial and production data more effectively.
- Prioritize improving the quality of products and services as a competitive advantage.
- Enhance employee commitment and skills through periodic training programs.
- Continuously monitor and control cash flow within the organization.
- Gradually reduce costs and production expenses to avoid recession.
- Senior management should assess the status of each department and consider hiring external consultants for production, procurement, and sales operations.

Recommendations for companies in the second cluster, identified as firms inclined toward pursuing primarily market-oriented strategies by leveraging internal

competitive advantages, based on the findings of this study, are as follows:

- Focus on product and market expansion by developing new products and entering new markets.
- Prioritize improving the quality of products and services as a competitive advantage.
- Equip the organization with more advanced control and information systems based on technological advancements.
- Enhance employee commitment and skills through periodic training programs.
- Invest in new projects to expand their activities.
- Increase sales and marketing efforts through new distribution channels.
- Conduct market analysis and continuously monitor sales and revenue performance while assessing market share and competitors.
- Continuously monitor and control cash flow within the organization.
- Use short-term financing for new investments aimed at increasing market penetration.
- Gradually reduce costs and production expenses to avoid financial crises.
- If the owner is also acting as the company's manager, it is recommended to delegate management responsibilities to a professional manager.
- Senior management should assess the status of each department and consider hiring external consultants for production, procurement, and sales operations.
- Managers of companies in this cluster should adapt their management style and become more responsive to environmental changes.
- Define and document the company's core activities.
- Permanently or contractually outsource non-core and unnecessary activities to free up resources.
- Focus on developing products and services aligned with the needs of the automotive parts supply chain.
- Outsource activities with low added value.

Recommendations for companies in the third cluster, identified as firms inclined toward pursuing government financial resource acquisition strategies for recession recovery, based on the findings of this study, are as follows:

- Use short-term financing for new investments aimed at increasing market penetration.
- If the owner is also acting as the company's manager, it is recommended to delegate management responsibilities to a professional manager.
- Managers of companies in this cluster should adapt their management style and become more responsive to environmental changes.
- Outsource activities with low added value.
- Equip the organization with more advanced control and information systems based on technological advancements.
- Develop and strengthen control and information systems for analyzing financial and production data within the company.
- Continuously monitor and control cash flow within the organization.
- Gradually reduce costs and production expenses to avoid financial crises.
- Define and document the company's core activities.
- Permanently or contractually outsource non-core and unnecessary activities to free up resources.

Authors' Contributions

Authors equally contributed to this article.

Acknowledgments

Authors thank all participants who participate in this study.

Declaration of Interest

The authors report no conflict of interest.

Funding

According to the authors, this article has no financial support.

Ethical Considerations

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

References

[1] F. U. Ahmed, M. M. Babu, M. N. Rahman, M. J. Uddin, and B. L. Dey, "Strategic orientation, strategic renewal, and the international performance of born global firms," *Asia Pacific Journal of Management*, 2023, doi: 10.1007/s10490-023-09903-7.

[2] I. v. Wyk, "Strategic decision-making in small and medium enterprises in South Africa," *The Southern African Journal of Entrepreneurship and Small Business Management*, vol. 15, no. 1, p. 684, 2023, doi: 10.4102/sajesbm.v15i1.684.
[3] I. Manuj, M. Herburger, and S. Adana, "Supply chain resilience capabilities in automotive and other industries: A mixed method approach," *Journal of Business & Industrial Marketing*, vol. 39, no. 6, pp. 1311-1336, 2024, doi: 10.1108/JBIM-07-2022-0355.
[4] T. Nhung, "Supply Chain and Logistics Management in the Automotive Industry," *Journal of Asian Multicultural Research for Economy and Management Study*, vol. 5, no. 1, pp. 27-33, 2024, doi: 10.47616/jamrems.v5i1.492.
[5] K. Stoiber, D. Degischer, J. Hautz, and K. Matzler, "Open Strategy as Turnaround: The Impact of Openness in Restructuring Under Financial Distress," *Academy of Management Perspectives*, 2024, doi: 10.5465/amp.2023.0363.
[6] A. Madani Zadeh, A. Karimi Rad, and A. Mahmoudzadeh, "Evidence of Recession Impacts on Industrial Firms in Iran," *Budgeting and Planning Quarterly*, vol. 23, no. 3, pp. 23-57, 2018. [Online]. Available: http://jpbud.ir/article-1-1601.
[7] T. Anderson, Z. Liu, J. Cruz, and J. Wang, "Social and environmental sustainability: An empirical analysis of supply chain profitability and the recession," *Operations and Supply Chain Management*, vol. 13, no. 2, pp. 176-193, 2020, doi: 10.31387/oscm0410261.
[8] M. Bugeja, Y. Shan, and Y. Zu, "The disciplinary role of unsuccessful takeovers and changes in corporate governance," *Accounting & Finance*, 2023, doi: 10.1111/acfi.13170.
[9] H. Hasin, E. Nordin, W. S. Hussain, and E. Fauzihardani, "The Impact of Turnaround Strategies on SME Performance," *Information Management and Business Review*, vol. 16, no. 3, pp. 470-486, 2024, doi: 10.22610/imbr.v16i3(I).3896.
[10] A. Ur Rehman, M. Shakeel Sadiq Jajja, and S. Farooq, "Manufacturing planning and control driven supply chain risk management: A dynamic capability perspective," *Transportation Research Part E: Logistics and Transportation Review*, vol. 167, 2022, doi: 10.1016/j.tre.2022.102933.
[11] R. Varshavi, M. E. Mohammad Porzarandi, and S. Z. Hashemi, "Formulating a Suitable Strategy For a Car Parts Manufacturing Company (Case Study: Kosha Afarin Ideal Car Industries Company)," *Dynamic Management and Business Analysis*, vol. 2, no. 4, pp. 94-111, 2024, doi: 10.22034/dmbaj.2024.2035823.1038.
[12] L. Alfet, S. S. Ghazi Nouri, and M. Ghasemi, "The Relationship Between Strategic Production Decisions and Competitive Priorities and Their Impact on Company Performance in the Automotive Parts Industry in Iran," *Production and Operations Management*, vol. 10, no. 2, pp. 17-35, 2019.
[13] S. Amiri, N. Naderi, Y. Mohammadi Far, and B. Rezaei, "Designing and Developing a Revitalization Model for Dormant Industrial Firms (Case Study: Kermanshah Province)," *Industrial Management Perspective*, vol. 9, no. 4, pp. 63-88, 2019, doi: 10.52547/jimp.9.4.63.
[14] S. Amiri, N. Naderi, Y. Mohammadi Far, and B. Rezaei, "Analytical Hierarchy Process of Recession Components in Industrial Firms to Provide Strategies," *Executive Management Research Journal*, vol. 12, no. 24, pp. 181-207, 2020, doi: 10.22080/jem.2021.18694.3193.
[15] S. Amiri, N. Naderi, Y. Mohammadi Far, and B. Rezaei, "Formulating Key Components of Industrial Firms' Recession in Food and Pharmaceutical Sectors," *Industrial Management Journal*, vol. 12, no. 1, pp. 143-171, 2020, doi: 10.22059/imj.2020.291720.1007675.
[16] A. Esmaeili, S. S. Ghazi Nouri, M. Naghi Zadeh, J. Bamdad Sofi, and M. Manteghi, "Operational Capabilities as a Prerequisite for Participation in the Global Supply Chain of the Automotive Parts Industry: A Multi-Case Analysis," *Journal of Technology Development Management*, vol. 9, no. 1, pp. 95-133, 2021, doi: 10.22104/jtdm.2021.4661.2750.
[17] A. Esmaeili, S. S. Ghazi Nouri, M. Naghi Zadeh, J. Bamdad Sofi, and M. Manteghi, "Industrial Development Model in Iran's Automotive Parts Industry: Insights into the Current Reality," *Improvement Management Journal*, vol. 15, no. 1, pp. 125-147, 2021.
[18] M. Rico, N. R. Pandit, and F. Puig, "SME insolvency, bankruptcy, and survival: An examination of retrenchment strategies," *Small Business Economics*, vol. 57, no. 1, pp. 111-126, 2021, doi: 10.1007/s11187-019-00293-z.
[19] A. Motameni, A. Rahimi, and R. Rezaei Banafshah, "Designing an Interpretive Structural Model for Revitalization Strategies in Declining and Bankrupt SMEs (Case Study: Food Industry in Ardabil Province)," *Industrial Management Perspective*, 2023, doi: 10.48308/jimp.2023.232783.1482.
[20] M. M. H. Chowdhury, S. Rahman, M. A. Quaddus, and Y. Shi, "Strategies to mitigate barriers to supply chain sustainability: An apparel manufacturing case study," *Journal of Business & Industrial Marketing*, 2022, doi: 10.1108/JBIM-04-2021-0233.
[21] F. Castelló-Sirvent and V. Roger-Monzó, "Research agenda on turnaround strategies beyond systemic disruptions," *Journal of Organizational Change Management*, 2022, doi: 10.1108/JOCM-05-2022-0160.
[22] M. Ziaee Hajipirloo, H. Taghizadeh, and M. Honarmand Azimi, "Designing a Model to Evaluate Upstream Supply Chain Structures in the Automotive Industry Using Comparative Spectral Clustering," *Journal of Industrial Management Studies*, vol. 19, no. 61, pp. 147-180, 2021, doi: 10.22054/jims.2021.56523.2566.
[23] S. K. Paul, P. Chowdhury, M. A. Moktadir, and K. H. Lau, "Supply chain recovery challenges in the wake of COVID-19 pandemic," *Journal of Business Research*, vol. 136, pp. 316-329, 2021, doi: 10.1016/j.jbusres.2021.07.056.
[24] H. Taghizadeh, N. Heidarzadeh, and M. Honarmand Azimi, "Identifying Factors Influencing Strategic Supply Chain Collaboration in Tabriz's Automotive Parts Industry," *Management Foresight*, vol. 31, no. 3, pp. 13-27, 2020.
[25] S. Miglani, K. Ahmed, and D. Henry, "Corporate governance and turnaround: Evidence from Australia," *Australian Journal of Management*, vol. 45, no. 4, pp. 549-578, 2020, doi: 10.1177/0312896220902225.
[26] H. Taghizadeh, "Identifying and Examining Barriers to Value Creation in the Automotive Parts Industry Using Interpretive Structural Modeling," *Productivity Management Journal*, vol. 12, no. 46, pp. 211-231, 2018.
[27] A. S. Okello, "Relationship Between Turnaround Strategies and Performance of Small and Medium Enterprises in Kenya Antony Sije," *COHRED, JKUAT*, 2017. [Online]. Available: http://hdl.handle.net/123456789/3292.
[28] M. T. Kamali Seyed Beigloo and R. Taghizadeh, "Identifying and Prioritizing Factors Affecting the Success of SMEs Using Fuzzy Network Analysis Process: A Case Study of Firms in Industrial Parks of Urmia," *Parliament and Strategy*, vol. 24, no. 91, pp. 291-318, 2017.
[29] H. Rahman Sarreshteh, Y. Hassas Yeganeh, M. Falah Shams, and M. Irandoost, "Strategies for Revitalization and Business Performance During Economic Recessions," *Strategic Management Studies*, vol. 4, no. 15, pp. 15-35, 2013.