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Theoretical Article

Supply chain management in a crisis, when the only supplier of critical components suddenly went bankrupt

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Abstract

The article discusses the urgent issue of supply chain crisis management in the context of the sudden bankruptcy of a critical component's sole source, which is a significant threat to the operations of modern production and logistics systems. It analyzes the mechanisms of cascading failures resulting from the instant loss of a key supplier, and assesses the vulnerability of business processes historically dependent on monopoly suppliers. A comprehensive emergency response strategy is proposed, including auditing of critical materials, activation of standby arrangements, legal support for bankruptcy procedures to protect clients' property rights, and accelerated search for alternative suppliers using digital platforms and artificial intelligence technologies. Special attention is paid to preventive measures to increase the sustainability of supply chains. These include the early diversification of the supplier base, the creation of strategic stocks of vulnerable components, and the implementation of predictive analytics to identify financial and reputational risks associated with suppliers. In conclusion, practical recommendations are provided for the development and adaptation of business continuity plans to minimize production disruptions, maintain market position, and reduce financial loss in the event of unforeseen circumstances.

Keywords: crisis management, supply chains, sudden supplier bankruptcy, sole source of supply, critical components, supply diversification

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Keywords: crisis management, supply chains, sudden supplier bankruptcy, sole source of supply, critical components, sustainability of logistics systems, risk management, supply diversification, business continuity, alternative sourcing, predictive analytics and strategic inventories.

Relevance of the study

The study is becoming particularly relevant due to the increasing instability of the global economy, the tense geopolitical situation and the increasing incidence of corporate defaults. These factors make the problem of crisis management of supply chains especially significant for modern business.

The problem becomes particularly acute when the only source of supply for critical components suddenly goes bankrupt. This creates the classic ”single point of failure” effect and can paralyze an enterprise's production processes in the shortest possible time.

Traditional optimized management models, such as the just-in-time concept, are extremely vulnerable to such shocks. This leads to cascading failures, significant financial losses, non-fulfillment of contractual obligations, and long-term loss of market positions. Therefore, the development of scientifically based methods of emergency response and restoration of logistics flows in conditions of force majeure is an extremely urgent task. It requires deep theoretical understanding and practical testing, taking into account modern digital realities and the transformation of global markets.

The purpose of the study

The main objective of this research is to develop a comprehensive and scientifically based methodology and practical tools for crisis management in supply chains, with the aim of minimizing negative consequences and ensuring business continuity in case of a sudden failure of a key supplier.

To achieve this goal, we need to solve several interrelated tasks. These include identifying and establishing key indicators for early warning of the financial insolvency of a counterparty; developing algorithms for the emergency re-routing of materials; creating mechanisms to protect the interests of customers in bankruptcy cases; and designing an adaptive strategy for quickly replacing lost sources of supply while maintaining the required quality and quantity of products.

Materials and research methods

The study used current regulatory legal acts regulating bankruptcy procedures and contractual relations in the field of supplies. Statistical data on cases of corporate defaults in high-tech and manufacturing industries over the past ten years were also analyzed. In addition, open financial reports and detailed cases of real companies that faced a critical disruption in logistics chains were studied.

The work used a set of general scientific and special methods, such as system analysis, which allows assessing the structural vulnerability of supply chains, SWOT and PEST analysis to identify macro-environmental and internal risk factors, as well as mathematical modeling methods, including Monte Carlo simulation. These methods made it possible to quantify the likelihood of cascading failures and predict financial losses in various scenarios of supplier bankruptcy.

Additionally, the study used various expert assessment methods, such as the Delphi method, to test the effectiveness of the proposed algorithms aimed at dealing with crises. In addition, big data analysis tools and the concept of digital supply chain twins were applied. This made it possible to dynamically model the processes of accelerated alternative supply and optimize logistics routes in conditions of time and resource constraints.

The results of the study

The introduction of modern digital technologies is fundamentally changing the approach to supply chain management in times of crisis. This is especially true in extreme situations, when the only source of critical components suddenly declares bankruptcy. Reactive elimination of consequences turns into proactive and highly accurate modeling.

Predictive analytics systems based on artificial intelligence and machine learning play a key role in this process. They analyze large amounts of unstructured data in real time, such as financial reports, news feeds, lawsuit registries, and the tone of vendor mentions in the professional community. This makes it possible to identify signs of impending default several weeks before the official bankruptcy announcement and activate security protocols in advance (Fig. 1).

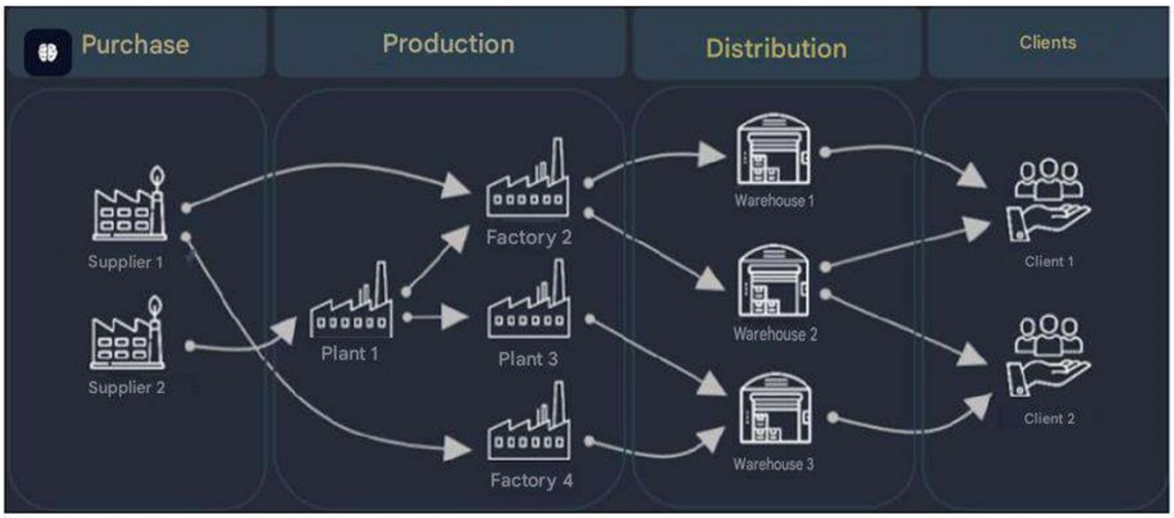

Figure 1. Key factors for the sustainability of supply chain management in the context of global instability [1]

In times of crisis, digital supply chain doubles are becoming an essential tool. These virtual copies of real logistics networks allow managers to simulate the consequences of failures in key areas in a matter of minutes and test thousands of scenarios for the redistribution of material flows. Using these technologies, optimal bypass routes can be instantly calculated, taking into account time, cost, and quality constraints [3, 8].

At the same time, blockchain technologies and smart contracts provide an unprecedented level of transparency and legal protection. For example, if a monopoly supplier goes bankrupt, a distributed registry allows you to accurately track the origin and status of critical components that have already been shipped but are in transit. This prevents their illegal withdrawal by bankruptcy administrators, and smart contracts can automatically redirect financial flows to the accounts of backup suppliers.

Operational decision - making is based on so-called ”control towers” - cloud systems, as well as the Internet of Things (IoT). They provide a complete overview of all parts of the supply chain, allowing you to track the location of each unit of critical raw materials using GPS trackers and RFID tags. This avoids the loss of valuable goods in conditions of legal uncertainty [2].

The practical application of these technologies is clearly demonstrated by examples from high-tech sectors [9]. For example, in the automotive industry, which was faced with the sudden financial collapse of a number of specialized semiconductor manufacturers, leading automakers used artificial intelligence-based systems to instantly analyze a multi-level supply chain. Using these systems, they determined which car models were at risk of the conveyor stopping. Then, using digital twins, they urgently redesigned the electronic control units to adapt them to alternative chips available on the spot market (Table 1).

Table 1. Application of AI for instant mapping of a multi-level supply chain [5, 7]

Category	AI Technologies and Tools	Functional application	Practical results and benefits
Data collection and integration	NLP (natural language processing), web scraping, API integrations, OCR.	Automatic collection of information from contracts, invoices, registers, news, social networks and open sources.	Creating a digital profile for each link in the supply chain in minutes, instead of weeks of manual analysis.
Visualization and mapping	Graph Neural Networks, geographic information systems, digital twins.	Creating interactive supply chain maps that show material, financial, and information flow.	Instant identification of ”single points of failure”, bottlenecks, and critical dependencies within a multi-level system.
Predictive analytics and risk assessment	Machine learning (Random Forest, XGBoost), predictive models, and time series analysis.	The probability of counterparty default is estimated based on an analysis of financial indicators, news sources, judicial activity, and macroeconomic indicators.	Early warning of risks, 30-90 days before the start of the crisis, and the ability to activate reserve contracts in advance.
Search and qualification of alternatives	Recommender systems, semantic search, computer vision for specification analysis.	Automatic selection of alternative suppliers based on technical specifications, certifications, geographical location, and production facilities.	Reducing the search for a replacement from months to hours and minimizing production downtime.
Logistics optimization in crisis	Genetic algorithms, reinforcement learning, dynamic programming.	Recalculation of optimal delivery routes, considering new restrictions, customs procedures, and transport accessibility.	Reducing logistics costs by 15-40% under conditions of shortage and speeding up the delivery of critical goods.
Real-time monitoring and adaptation	IoT sensors + streaming analytics, edge AI, early warning systems.	Continuous monitoring of the status of orders, stock levels, and production processes with automatic alerts in case of any deviations.	Increased operational stability and the ability to quickly respond to failures at any level.
Legal and compliance support	AI contract analysis, smart contracts, document verification systems.	Automatic verification of ownership rights, force majeure conditions, warranty obligations and compliance with regulatory requirements.	Reducing legal risks when changing suppliers and speeding up the process of concluding new contracts.

In the aerospace industry, where critical parts are often made from unique titanium alloys and have a single certified supplier, the sudden bankruptcy of the latter can be a serious problem. To avoid such situations, enterprises in this industry actively use blockchain platforms to check the availability of raw materials in subcontractors’ warehouses. In addition, they are implementing collaborative engineering platforms that help to quickly and efficiently conduct virtual qualification of new manufacturers. This is achieved by comparing their technical specifications with the digital requirements for parts, which allows for informed decisions in the shortest possible time [4].

In the pharmaceutical industry, where the sudden bankruptcy of a single supplier of active pharmaceutical substances can lead to a halt in the production of vital drugs, companies are actively using distributed cloud networks. These networks connect contract-manufacturing organizations, allowing for the instant transfer of technological maps to alternative sites. In addition, machine vision and IoT control systems are used to ensure remote quality audits of production processes in real time.

However, it is worth noting that the problem of crisis management of supply chains in the context of the sudden bankruptcy of a single source of critical components is extremely complex and multidimensional. It includes many interrelated operational, legal, financial, and technological challenges that can destabilize the activities of the buyer company.

The main operational challenge is the unavoidable and rapid paralysis of production due to dependence on a single supplier, which precludes the ability to instantly switch to alternative supply chains. The critical nature of the components means that their unavailability blocks the production of finished products, leading to downtime on assembly lines, disruption of delivery schedules, and violation of contractual commitments to customers [6].

The situation is further complicated by the complex legal conflicts that often arise during bankruptcy proceedings. From the moment, bankruptcy proceedings are initiated or arbitration management is appointed, all assets belonging to the supplier, such as finished products, unfinished goods, and raw materials stored in warehouses, become part of the bankruptcy estate. This makes it impossible for them to be shipped freely, even under previously signed contracts. As a result, the buyer becomes an ordinary creditor on the list of claims, and the chances of receiving any compensation or repayment of advance payments tend towards zero.

The problem of intellectual property protection and technological dependence is particularly acute. If critical components are manufactured using unique drawings, molds, or patented technologies that belong to a bankrupt supplier, the buyer faces legal obstacles when trying to transfer this tooling and documentation to third parties. The bankruptcy trustee may consider such actions as illegal alienation of assets, which makes the process of alternative engineering and reverse engineering very long and risky.

An equally significant obstacle is the time and resource costs required to find and evaluate new suppliers, especially in highly regulated industries such as aerospace, automotive, and pharmaceutical. In these sectors, the process of verifying alternative sources of supply, testing samples, and obtaining the necessary certificates can take from several months to several years, which makes it incompatible with the need for an urgent anti-crisis response [10].

From a financial point of view, the problem manifests itself in significant unplanned costs. Companies have to purchase critical components on the spot market from resellers at speculative, repeatedly inflated prices, as well as pay accelerated logistics to deliver limited available shipments. This leads to a sharp decline in profitability and cash gaps, which are often compounded by penalties from consumers due to supply disruptions.

In addition, the company faces the problem of information asymmetry and insufficient transparency of multi-level supply chains. Because of this, the bankruptcy of a first-level supplier often comes as a complete surprise to her. And a subsequent audit may show that the reason lies in the insolvency of second- or third-level subcontractors. This makes finding alternatives even more difficult and requires the use of sophisticated tools to provide an end-to-end overview of the entire supply chain.

Finally, the strategic and reputational challenges are that the company may lose the trust of key customers, investors, and insurance companies in the long run. This may lead to a decrease in market share and the need to review the entire risk management system. As practice shows, traditional methods of cost optimization, such as consolidating purchases from a single supplier to obtain price discounts, can create unacceptably high hidden costs in conditions of macroeconomic instability. This is due to the lack of alternative value chains and vulnerability to unforeseen circumstances.

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Conclusions

Summing up our research, it is important to note that the sudden bankruptcy of a single supplier of critical components poses a serious threat to any enterprise that builds its production architecture on the principles of strict optimization and cost minimization, without thinking about reliability.

The analysis showed that traditional approaches to procurement management, which focus solely on economic efficiency, are ineffective in the face of unforeseen circumstances. The loss of a monopoly supplier can instantly paralyze operations, cause serious legal problems in bankruptcy proceedings, lead to significant financial losses, and cause irreparable damage to reputation.

In light of this, the most important conclusion of our work is the need to move from reactive mitigation to the active formation of sustainable supply chains. The key factor for business survival is the introduction of modern digital technologies. Predictive analytics based on artificial intelligence, digital twins, and blockchain provide unprecedented transparency of multi-level networks. This allows you to model crisis scenarios and identify hidden vulnerabilities long before they lead to serious consequences.

Thus, effective crisis management resulting from the loss of a key link in the supply chain requires a harmonious combination of legal expertise, operational flexibility, and modern digital equipment. Only by combining preventive strategies, advanced analytical tools, and flexible alternative engineering mechanisms can modern companies not only minimize the negative effects of corporate defaults but also maintain their competitive advantages in the face of constant global uncertainty. This will allow them to turn potential risks into manageable operational tasks.

References

1. Arysov E. Entrepreneurial Models of Supply Chain Management in the Context of Global Instability // Current Research. - 2025. - No. 50 (285). - pp. 6-9.

2. Bazyk E.F. Procurement Management System in Anti-Crisis Management // Issues of Modern Economy. - 2013. - No. 2. - pp. 184-202.

3. Bereza V.E., Ertman Yu.A. Anti-Crisis Management of Supply Chains in the Context of the Covid-19 Pandemic // Logistics Audit of Transport and Supply Chains. - 2020. - pp. 272-276.

4. Gavrilova O.A., Villar G.A.E. Process Approach as a Method of Anti-Crisis Management of an Enterprise // Bulletin of Astrakhan State Technical University. Series: Economy. - 2014. - No. 2. - pp. 14-24.

5. Gorgola E.V. Anti-crisis management: methods of investing in innovative activities of integrated organizations // Intellectual potential of an educational organization and socio-economic development of a region. - 2015. - pp. 223-233.

6. Mirgorodskaya M.G., Polyansky O.V., Kapustina N.V. Anti-crisis management and supply chain interruption risk management // Bulletin of Eurasian Science. - 2025. - Vol. 17. - No. 6S. - pp. 13.

7. Podsorin V.A. Anti-crisis management // M.: MGUPS (MIIT). - 2016.

8. Durugbo C.M., Al-Balushi Z. Supply chain management in times of crisis: a systematic review // Management Review Quarterly. - 2023. - Vol. 73. - No. 3. - pp. 1179-1235.

9. Okeagu C.N. et al. Principles of supply chain management in the time of crisis // Best Practice & Research Clinical Anaesthesiology. - 2021. - Vol. 35. - No. 3. - pp. 369-376.

10. Ponis S.T., Ntalla A. Crisis management practices and approaches: Insights from major supply chain crises // Procedia economics and finance. - 2016. - Vol. 39. - pp. 668-673.