IMPACT OF ARTIFICIAL INTELLIGENCE ON SUPPLY CHAIN RESILIENCE

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Highlights:

- The interplay between AI and supply chain resilience components is captured by the analytic network process (ANP)
- Prioritized strategies may foster continuity and adaptability amid disruptions in supply chains.

1. Introduction

Integrating Artificial Intelligence (AI) into supply chain management transforms operational dynamics by enabling predictive analytics, real-time monitoring, and process optimization. These advancements are crucial for enhancing supply chain resilience (SCRes), defined as the ability to anticipate, adapt to, and recover from disruptions such as natural disasters, pandemics, and geopolitical conflicts. Understanding AI's impact on SCRes is vital for developing competitive and sustainable supply chains in today's unpredictable environment.

2. Literature Review

Existing research highlights various digital technologies that bolster SCRes:

- **Blockchain**: Enhances transparency and traceability through secure, immutable records, mitigating risks associated with single points of failure.
- **Internet of Things (IoT)**: Facilitates real-time data collection, improving operational visibility and enabling predictive maintenance.
- **Big Data Analytics and Cloud Computing**: Optimize decision-making and resource allocation, allowing swift adaptation to disruptions.
- **Artificial Intelligence (AI)**: Automates processes and predicts disruptions, revolutionizing supply chain management by enhancing efficiency and innovation.

However, current studies often overlook the interplay among these technologies and their collective impact on the multifaceted components of SCRes, such as redundancy, agility, visibility, and scalability.

3. Objectives

1. **Identify** the factors through which AI and other digital technologies influence SCRes components.
2. **Analyze** the bidirectional relationships among these factors.

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3. **Prioritize** these factors to develop strategies for building resilient supply chains.

4. Methodology

We propose an Analytic Network Process (ANP) framework to capture the dynamic interdependencies between digital technologies and SCRes components. This approach allows for a holistic assessment of how AI and other technologies contribute to supply chain resilience.

5. Conclusions

Our framework provides a comprehensive perspective on the synergistic effects of AI and digital technologies on SCRes. By acknowledging the bidirectional interactions among SCRes components and technological advancements, organizations can devise more effective strategies to enhance resilience, ensuring continuity and adaptability in the face of disruptions.

6. Limitations

While this study offers valuable insights into the impact of Artificial Intelligence (AI) on supply chain resilience (SCRes), certain limitations must be acknowledged. The empirical data utilized may not fully capture the diversity of supply chain contexts across various industries and regions, potentially affecting the universal applicability of the findings. Additionally, the rapid evolution of AI technologies presents challenges in encompassing the latest advancements and emerging trends, which this study may not fully reflect. Recognizing these limitations is crucial for contextualizing the study's contributions and guiding future research to build upon and address these challenges.

7. Key References

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