International Scientific Journal of Engineering and Management
Volume: 03 Issue: 05 | May – 2024
An International Scholarly || Multidisciplinary || Open Access || Indexing in all major Database & Metadata
ISSN: 2583-6129
DOI: 10.55041/ISJEM01813

A STUDY ON RISKS AND THEIR MITIGATION IN SUPPLY CHAIN PROCESS WITH SPECIAL REFERENCE TO JSW ISPAT SPECIAL PRODUCTS LIMITED

Ananya Shrivastava
(Student)
Amity University, Raipur, (C.G)

Dr. Sumita Dave
(Dy. Pro Vice Chancellor)
Amity University, Raipur, (C.G)

ABSTRACT

This project report examines the various risks inherent in the supply chain of JSW Ispat Special Products Limited and outlines the strategies used to mitigate these risks. The purpose of the research is to find out, through in-depth analysis, how these supply chain risks affect the efficiency of the facility's operations and overall efficiency. The report is comprehensive and includes the results of extensive literature reviews, primary research and detailed data analyses. The main risks identified are supply disruptions, logistical challenges, market instability and regulatory changes. Mitigation strategies such as multifaceted sourcing, improved inventory management, robust logistics planning and compliance frameworks are discussed in detail. The results of this study not only highlight critical supply chain vulnerabilities, but also provide practical insights and recommendations to improve resilience and efficiency. Ultimately, this study contributes to a deeper understanding of supply chain dynamics and provides practical solutions to optimize supply chain processes at JSW Ispat Special Products Limited.

Keywords: Supply chain, risk mitigation, JSW Ispat, Supply disruptions, Logistics challenges

INTRODUCTION

In today's highly competitive and globalized industrial environment, effective supply chain management is critical to maintaining operational efficiency and achieving business success. For companies like JSW Ispat Special Products Limited, a leader in the steel manufacturing industry, supply chain is the backbone of the manufacturing process, which directly affects their ability to meet market demands and maintain product quality. But the complexity and interconnectedness of supply chains also exposes them to countless risks that can disrupt operations and affect profitability. Understanding these risks and developing strong mitigation strategies are essential to sustaining long-term economic growth and competitiveness. This project report examines the various risks inherent in the supply chain of JSW Ispat Special Products Limited and the methods used to mitigate these risks. The main objective of this study is to analyze how supply chain risks affect manufacturing operations and provide insights that can improve the overall efficiency and sustainability of the supply chain. The study takes a holistic approach, combining a comprehensive literature review with primary research to provide a detailed and nuanced understanding of the topic. The literature review provides a theoretical framework that identifies common supply chain risks such as supply disruptions, quality control issues, logistics challenges and market volatility. It also explores best risk management practices from industry leaders and academic sources. Primary research including interviews, surveys and observational studies are conducted to gather specific knowledge about JSW Ispat Special Products Limited. This empirical data demonstrates the unique challenges facing the company and the effectiveness of its current risk management strategies. Key mitigation measures explored in the report include supplier diversification, strict quality control protocols, advanced logistics technologies and adaptive manufacturing processes. The results of this study provide valuable information to improve the supply chain process of JSW Ispat Special Products Limited. By mitigating and mitigating risks more effectively, the company can improve the sustainability of

ISSN: 2583-6129
DOI: 10.55041/ISJEM01813

its operations, reduce costs and maintain a competitive advantage in the market. The purpose of this report is to contribute to ongoing efforts to optimize supply chain management practices within the organization and the steel industry in general.

REVIEW OF LITERATURE

Supply disruptions

These risks are caused . through interruptions in the supply of raw materials, which may be due to supplier insolvency, geopolitical problems, natural disasters or logistical failures. Wagner and Bode (2006) emphasized the vulnerability of supply chains to external disturbances and emphasized the need for sustainable strategies to mitigate such risks.

Quality Control Issues

Maintaining consistent quality standards is essential to manufacturing processes. Research by Flynn and Flynn (2005) shows that differences in raw material quality can lead to production inefficiencies and increased defects, underscoring the importance of strict quality assurance practices throughout the supply chain.

Logistics Challenges

Efficient logistics is essential for timely production and delivery. Simchi-Levin et al. (2014), logistics risks include transportation delays, infrastructure deficiencies, and regulatory barriers, all of which can significantly affect supply chain performance.

Market instability

Fluctuations in market demand pose significant risks to supply chain stability. Lee (2002) discussed the "bullwhip effect", where small changes in consumer demand cause larger changes in downstream order volumes, leading to inefficiencies and increased costs

Diversification of suppliers

Diversification of the supplier base reduces dependence on a single source, which reduces the risk of supply interruptions. Chopra and Sodhi (2004) argue that a variable supply base increases agility and flexibility.

Quality Control Protocols

Implementation of strict quality control measures ensures consistent quality of inputs, which is essential to maintain production standards. According to Kaynak (2003), the integration of quality management systems into the supply chain can improve efficiency and reduce errors.

Advanced Logistics Technologies

Investing in advanced logistics and tracking technologies can improve visibility and coordination throughout the supply chain. Christopher and Lee (2004) emphasize the role of real-time data and analysis in improving logistics efficiency and reducing risk.

Flexible Productions

Adopting flexible and adaptive production processes allows companies to respond quickly to market changes and disruptions. Bernardes and Hanna (2009) suggest that flexibility in production timing and inventory management can buffer demand fluctuations and supply uncertainties.

PROBLEM STATEMENT

International Scientific Journal of Engineering and Management
Volume: 03 Issue: 05 | May – 2024
An International Scholarly || Multidisciplinary || Open Access || Indexing in all major Database & Metadata
ISSN: 2583-6129
DOI: 10.55041/ISJEM01813

In the highly competitive steel industry, JSW Ispat Special Products Limited relies heavily on an efficient and flexible supply chain to maintain its market position and operational efficiency. However, the complexity of modern supply chains entails many risks that can significantly disrupt production, increase costs and compromise product quality. Despite the critical importance of effective risk management, a company's supply chain operations lack a comprehensive understanding and strategic mitigation of those risks. The purpose of this study is to identify and analyze specific supply chain risks faced by JSW Ispat Special Products Limited, including supply disruptions, quality control issues, logistics challenges and market volatility. It plans to assess the impact of these risks on the operational capability of the facility and assess the effectiveness of current mitigation strategies. The goal is to develop practical knowledge and recommendations that can improve the flexibility and efficiency of a company's supply chain processes. By bridging the gap in understanding and improving risk management practices, JSW Ispat Special Products Limited is better able to navigate global market uncertainties, reduce operational vulnerabilities and maintain a competitive edge. This research is critical not only for the company, but also for advancing supply chain best practices in the steel industry as a whole.

ISSN: 2583-6129
DOI: 10.55041/ISJEM01813

SCOPE OF THE STUDY

This study includes an in-depth look at the supply chain risks associated with JSW Ispat Special Products Limited, a major unit in the steel industry. This study focuses on identifying, analyzing and evaluating various risks that can disrupt the supply chain, such as supply disruptions, quality control issues, logistical challenges and changes in market demand. The study includes a comprehensive literature review that aims to provide a theoretical framework for understanding these risks, using a variety of academic and industry sources. In addition, primary research is conducted through interviews, surveys and observations at JSW Ispat Special Products Limited to gather concrete and actionable knowledge. The scope extends to examining and evaluating the effectiveness of the company's current risk management strategies, such as diversifying suppliers, implementing strict quality control protocols, investing in advanced logistics technologies and implementing flexible production processes. Combining these findings, the study aims to provide a detailed understanding of how these risks affect plant operations and provide recommendations to improve overall supply chain flexibility and efficiency. The purpose of this study is to improve knowledge of supply chain risk management and provide practical solutions to improve the supply chain processes of JSW Ispat Special Products Limited, supporting its long-term operational success and competitiveness.

OBJECTIVES OF THIS STUDY

1. Identify supply chain risks:

Identify and classify supply chain risks of JSW Ispat Special Products Limited.

2. Analyze Operational Impact:

Analyze how these supply chain risks affect operational efficiency, manufacturing processes and overall plant performance.

3. Evaluation of Existing Mitigation Strategies:

To evaluate the existing risk mitigation strategies used by JSW Ispat Special Products Limited and assess their effectiveness.

4. Integration of literature review:

Integrate findings from existing supply chain risk management literature to create a theoretical framework for the research.

5. Primary Research:

Conduct primary research including interviews, surveys and observations to gain specific insights into the unique challenges faced by JSW Ispat Special Products Limited.

6. Develop Advanced Mitigation Measures:

Propose improved risk management measures based on research findings to improve overall supply chain agility and efficiency.

7. Provide Actionable Recommendations:

Provide actionable recommendations to JSW Ispat Special Products Limited to optimize supply chain management practices and reduce the impact of potential risks.

ISSN: 2583-6129
DOI: 10.55041/ISJEM01813

8. Contribute to industry knowledge:

Promote a broader understanding and knowledge of supply chain risk management in the steel industry.

9. Improve Competitive Advantage:

Propose strategies to help JSW Ispat Special Products Limited maintain its competitive advantage by ensuring a strong and reliable supply chain.

10. Encourage Long-Term Growth:

Support the long-term growth and sustainability of the business by improving supply chain resilience and risk management.

RESEARCH METHODOLOGY

Nature of the study	Descriptive study
Types of data	Primary data
Method of data collection	Questionnaire
Nature of population	The employees of JSW Ispat are the population of the study and the population is finite.
Sample unit	Sample unit is the employees in JSW Ispat
Sampling method	Convenience sampling
Sample size	50

TIME PERIOD OF THE STUDY

The study covers the period of 4 months starting from February 2024 to May 2024.

ANALYTICAL TOOLS AND TECHNIQUES USED

Analytical tool used for the analysis of data is 2D BAR GRAPHS.

FRAMEWORK OF ANALYSIS

The framework is derived from a survey conducted by a questionnaire prepared me.

LIMITATION OF THE STUDY

1. Scope of the Study:

The study is limited to the supply chain of JSW Ispat Special Products Limited and may not be generalizable to other companies or industries. different operating dynamics and risk profiles.

2. Geographic Focus:

Research focuses primarily on supply chain risks and mitigation strategies in a specific geographic area, where

ISSN: 2583-6129
DOI: 10.55041/ISJEM01813

regional differences and global supply chain complexities may be overlooked.

3. Availability and Reliability of Data:

The accuracy and completeness of research depends on the availability and reliability of data collected from the internal sources of JSW Ispat Special Products Limited. Limited access to detailed proprietary information can limit the depth of analysis.

4. Time Limits:

The study was conducted over a specific period of time, which may not account for long-term trends and variations in supply chain risks and their effects. Temporal limitations may affect the study's ability to detect cyclical or seasonal patterns of risk.

5. Response bias:

Primary research involving interviews and surveys may have response bias, where participants may give socially desirable answers or hide critical information that affects the authenticity of the results.

6. Technological Changes:

Rapid advances in technology may render some of the mitigation strategies discussed in the study obsolete. Results may not take into account future technological innovations that may significantly change supply chain dynamics.

7. Economic and Political Factors:

The study does not comprehensively address broader economic and political factors that may affect supply chain risks, such as trade policies, recessions and geopolitical tensions, which may affect the generalizability of mitigations strategies.

8. External Validation:

Although the study provides a detailed account of JSW Ispat Special Products Limited, it lacks extensive external validation from other organizations or industries, which may limit the reliability of the conclusions drawn.

9. Focus on identified risks:

The study will focus primarily on risks identified through literature review and primary research. Unknown or emerging risks may not have been considered, which may affect the coverage of risk management strategies.

10. Limited Stakeholder Views:

The study may not fully capture the perspectives of all relevant stakeholders, including suppliers, customers and regulators, which could provide a more complete view of supply chain risks and exposures . . mitigation.

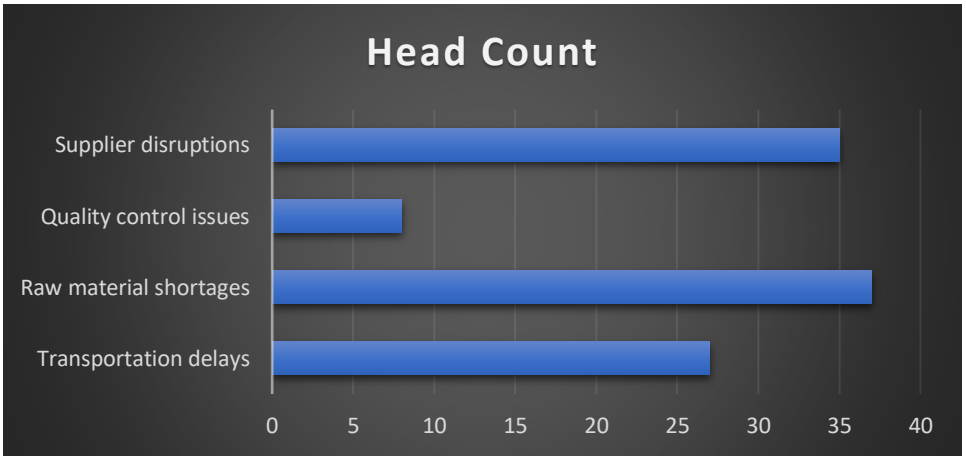
INFORMATION AND DATA FOR THE PAPER

International Scientific Journal of Engineering and Management
Volume: 03 Issue: 05 | May – 2024
An International Scholarly || Multidisciplinary || Open Access || Indexing in all major Database & Metadata
ISSN: 2583-6129
DOI: 10.55041/ISJEM01813

The information and data was gathered by conducting a survey after preparing a questionnaire.

DATA ANALYSIS AND INTERPRETATION

Main risks associated with the supply chain management process at JSW Ispat	Head Count
Transportation delays	30
Raw material shortages	10
Quality control issues	8
Supplier disruptions	5

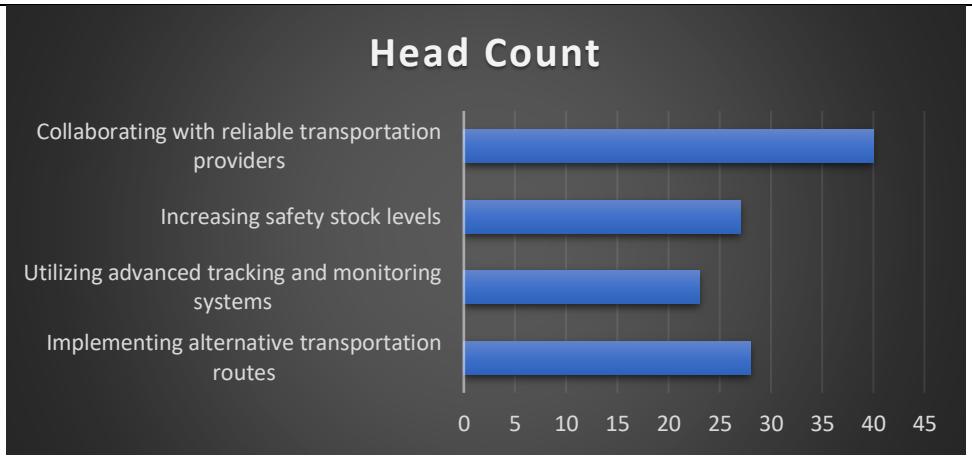


Data Interpretation:

The main risk identified is transportation delays, with 27 respondents highlighting this issue.

Most effective strategies for mitigating transportation delays in the supply chain	Head Count
Implementing alternative transportation routes	40
Utilizing advanced tracking and monitoring systems	10
Increasing safety stock levels	13
Collaborating with reliable transportation providers	6

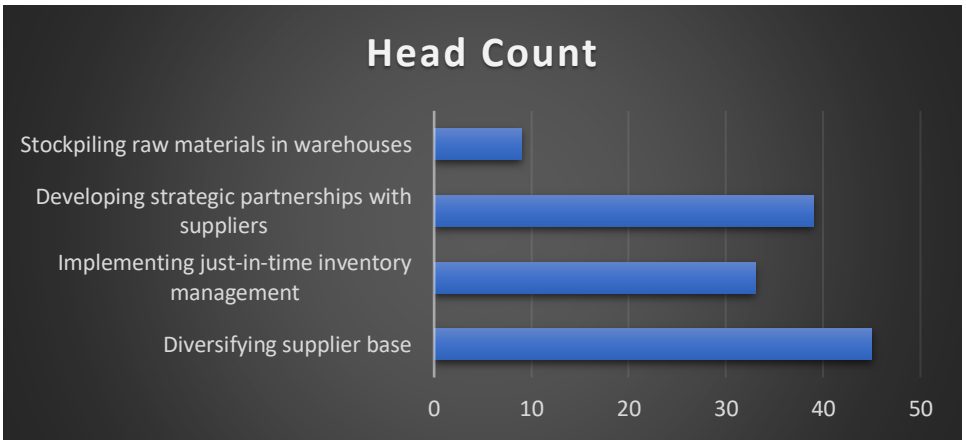
ISSN: 2583-6129
DOI: 10.55041/ISJEM01813



Data Interpretation:

Effective strategies for mitigating transportation delays include implementing alternative routes, advanced tracking systems, increasing safety stock levels, and collaborating with reliable transportation providers, with the highest count in collaborating with reliable transportation providers (40).

Strategies to mitigate the risk of raw material shortages?	**Head Count**
Diversifying supplier base	35
Implementing just-in-time inventory management	5
Developing strategic partnerships with suppliers	18
Stockpiling raw materials in warehouses	11



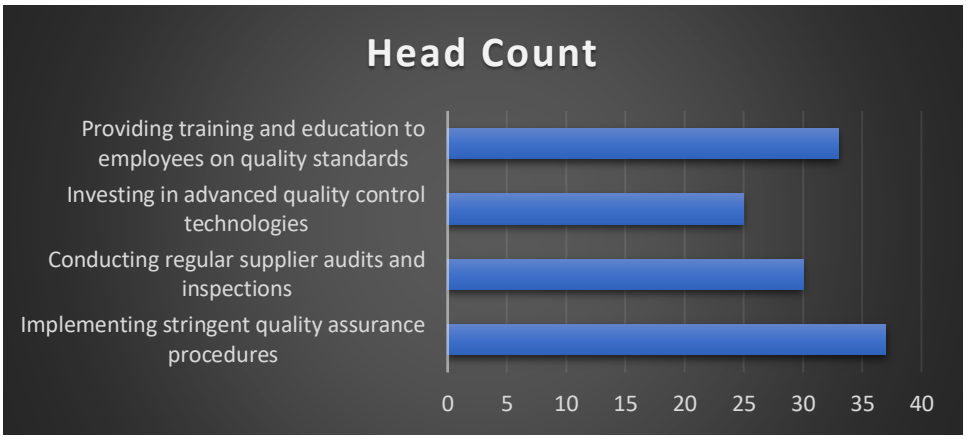
Data Interpretation:

The risk of raw material shortages is identified by 37 respondents. Strategies to mitigate this risk include diversifying the supplier base, implementing just-in-time inventory management, developing strategic partnerships with suppliers, and stockpiling raw

ISSN: 2583-6129
DOI: 10.55041/ISJEM01813

materials in warehouses, with the highest count in diversifying the supplier base (45).

Measures to mitigate quality control issues in the supply chain	Head Count
Implementing stringent quality assurance procedures	40
Conducting regular supplier audits and inspections	14
Investing in advanced quality control technologies	25
Providing training and education to employees on quality standards	33

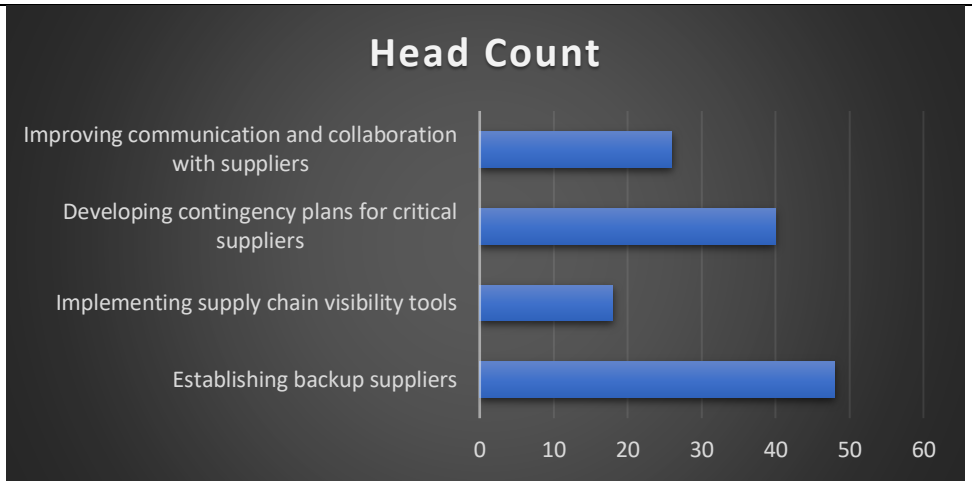


Data Interpretation:

Quality control issues are identified by 8 respondents as a significant risk. Mitigation strategies include implementing stringent quality assurance procedures, conducting regular supplier audits and inspections, investing in advanced quality control technologies, and providing training to employees on quality standards, with the highest count in implementing stringent quality assurance procedures (37).

Strategies to mitigate the risk of supplier disruptions	Head Count
Establishing backup suppliers	39
Implementing supply chain visibility tools	15
Developing contingency plans for critical suppliers	31
Improving communication and collaboration with suppliers	11

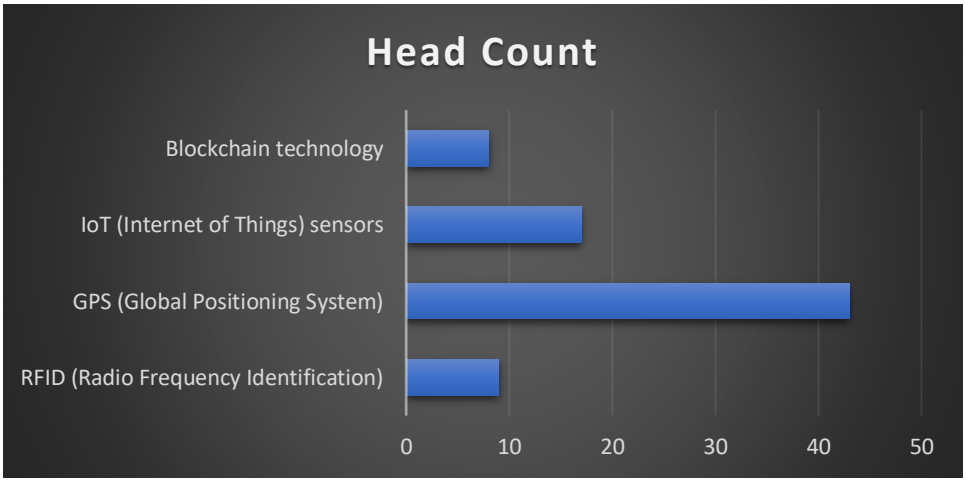
ISSN: 2583-6129
DOI: 10.55041/ISJEM01813



Data Interpretation:

The risk of supplier disruptions is highlighted by 35 respondents. Strategies to mitigate this risk include establishing backup suppliers, implementing supply chain visibility tools, developing contingency plans for critical suppliers, and improving communication with suppliers, with the highest count in establishing backup suppliers (48).

Technologies that can be utilized for supply chain visibility	**Head Count**
RFID (Radio Frequency Identification)	9
GPS (Global Positioning System)	43
IoT (Internet of Things) sensors	7
Blockchain technology	8

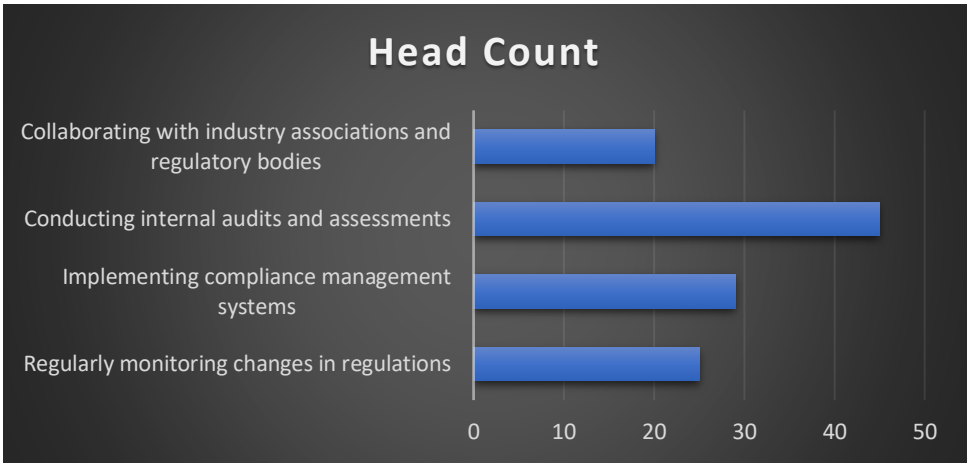


Data Interpretation:

Respondents suggest utilizing GPS, IoT sensors, RFID, and blockchain technology for enhancing supply chain visibility, with GPS having the highest count (43).

ISSN: 2583-6129
DOI: 10.55041/ISJEM01813

Measures to ensure compliance with regulatory requirements and mitigate associated risks in the supply chain	Head Count
Regularly monitoring changes in regulations	32
Implementing compliance management systems	45
Conducting internal audits and assessments	19
Collaborating with industry associations and regulatory bodies	2

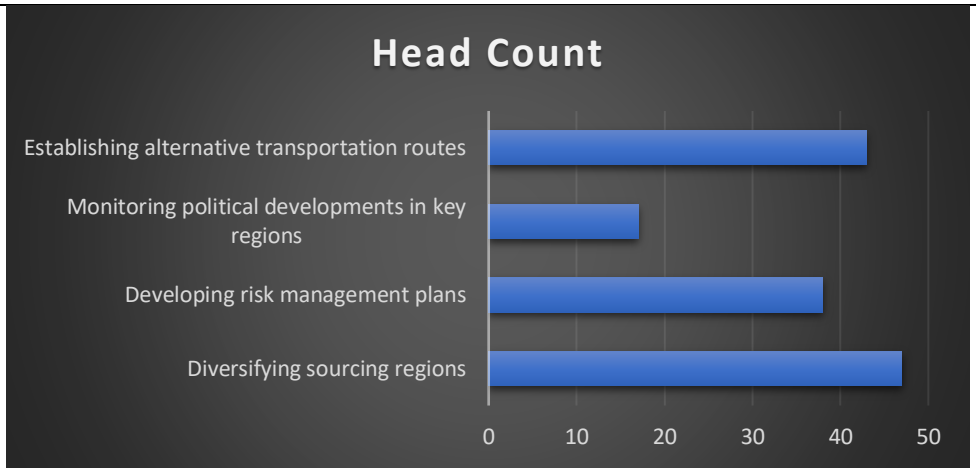


Data Interpretation:

Measures to ensure compliance include monitoring changes in regulations, implementing compliance management systems, conducting internal audits, and collaborating with regulatory bodies, with the highest count in conducting internal audits (45).

Strategies to mitigate the risk of geopolitical instability affecting the supply chain	Head Count
Diversifying sourcing regions	47
Developing risk management plans	38
Monitoring political developments in key regions	17
Establishing alternative transportation routes	32

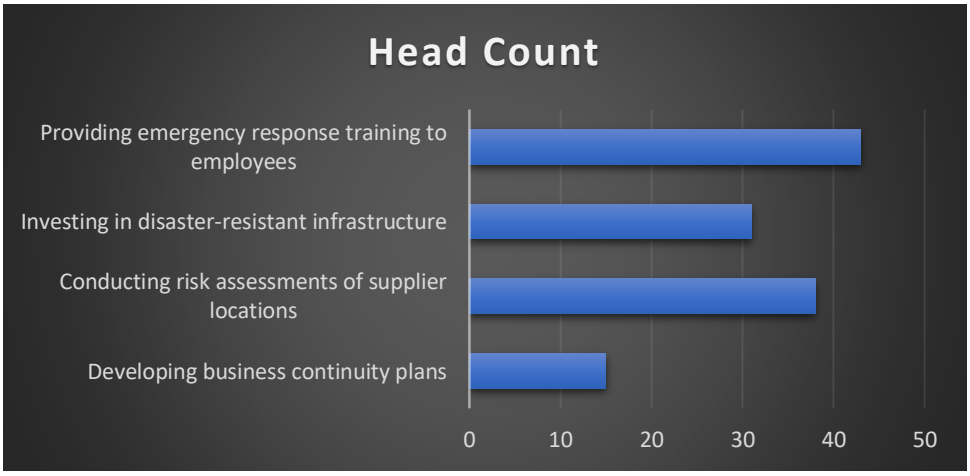
ISSN: 2583-6129
DOI: 10.55041/ISJEM01813



Data Interpretation:

Strategies to mitigate risks related to geopolitical instability include diversifying sourcing regions, developing risk management plans, monitoring political developments, and establishing alternative transportation routes, with diversifying sourcing regions having the highest count (47).

Measures to address the risk of natural disasters impacting the supply chain?	Head Count
Developing business continuity plans	15
Conducting risk assessments of supplier locations	28
Investing in disaster-resistant infrastructure	11
Providing emergency response training to employees	33



Data Interpretation:

Respondents suggest measures such as developing business continuity plans, conducting risk assessments of supplier locations, investing in disaster-resistant infrastructure, and

ISSN: 2583-6129
DOI: 10.55041/ISJEM01813

providing emergency response training to employees. The highest count is in providing emergency response training to employees (43).

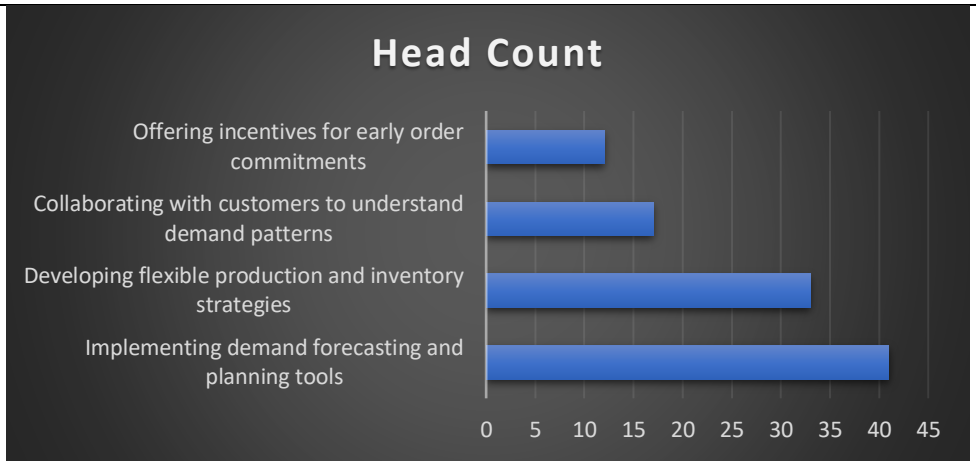
Measures to mitigate the risk of cyber-attacks and data breaches in the supply chain	Head Count
Implementing cybersecurity protocols and firewalls	40
Conducting regular security audits and assessments	35
Providing cybersecurity training to employees	12
Collaborating with IT security experts and vendors	3

Data Interpretation:

Measures to mitigate these risks include implementing cybersecurity protocols and firewalls, conducting regular security audits and assessments, providing cybersecurity training to employees, and collaborating with IT security experts and vendors. The highest count is in implementing cybersecurity protocols and firewalls (48).

Strategies for mitigating risks associated with demand fluctuations in the supply chain	Head Count
Implementing demand forecasting and planning tools	41
Developing flexible production and inventory strategies	33
Collaborating with customers to understand demand patterns	27
Offering incentives for early order commitments	12

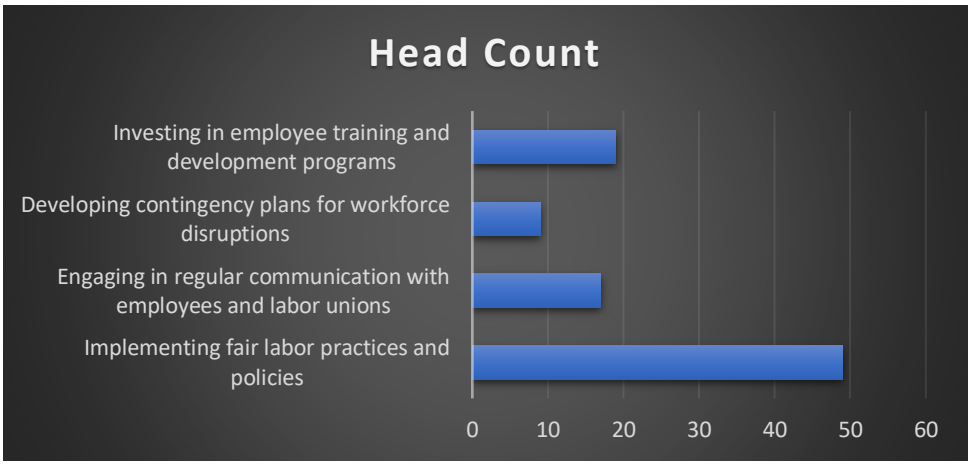
ISSN: 2583-6129
DOI: 10.55041/ISJEM01813



Data Interpretation:

Strategies to mitigate risks associated with demand fluctuations include implementing demand forecasting and planning tools, developing flexible production and inventory strategies, collaborating with customers to understand demand patterns, and offering incentives for early order commitments. The highest count is in implementing demand forecasting and planning tools (41).

Measures to mitigate the risk of labor disputes and strikes impacting the supply chain	Head Count
Implementing fair labor practices and policies	43
Engaging in regular communication with employees and labor unions	40
Developing contingency plans for workforce disruptions	37
Investing in employee training and development programs	35



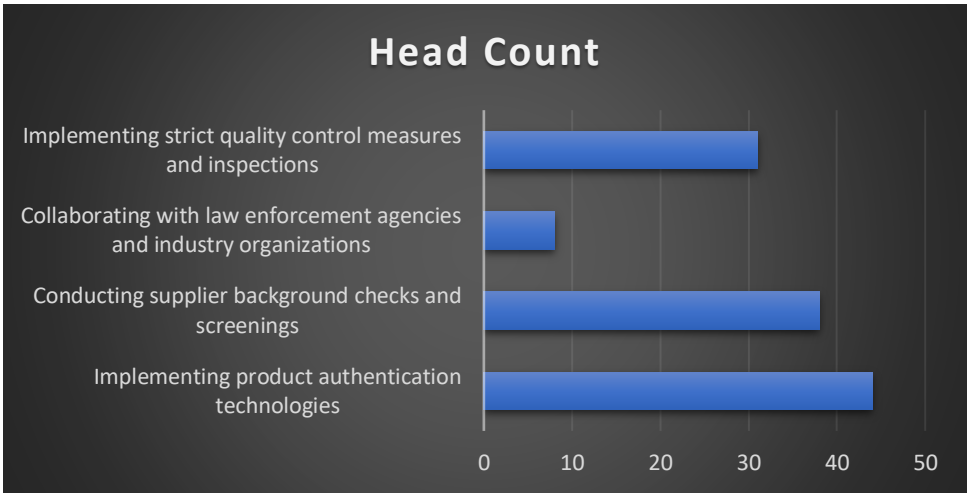
Data Interpretation:

Mitigation measures include implementing fair labor practices and policies, engaging in regular communication with employees and labor unions, developing contingency plans

ISSN: 2583-6129
DOI: 10.55041/ISJEM01813

for workforce disruptions, and investing in employee training and development programs. The highest count is in implementing fair labor practices and policies (49).

Measures to address the risk of counterfeit products entering the supply chain	Head Count
Implementing product authentication technologies	44
Conducting supplier background checks and screenings	28
Collaborating with law enforcement agencies and industry organizations	25
Implementing strict quality control measures and inspections	11

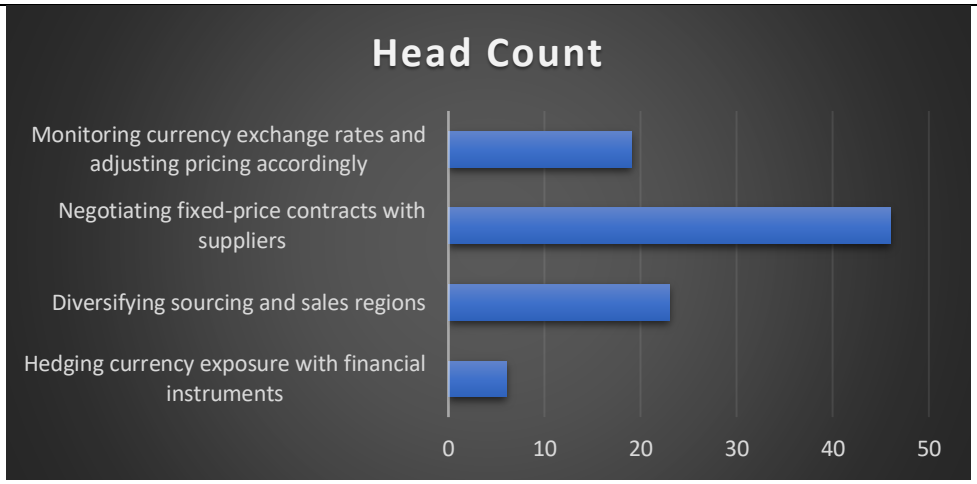


Data Interpretation:

Measures to address this risk include implementing product authentication technologies, conducting supplier background checks and screenings, collaborating with law enforcement agencies and industry organizations, and implementing strict quality control measures and inspections. The highest count is in implementing product authentication technologies (44).

Strategies for mitigating risks associated with currency fluctuations in the supply chain	Head Count
Hedging currency exposure with financial instruments	12
Diversifying sourcing and sales regions	43
Negotiating fixed-price contracts with suppliers	36
Monitoring currency exchange rates and adjusting pricing accordingly	9

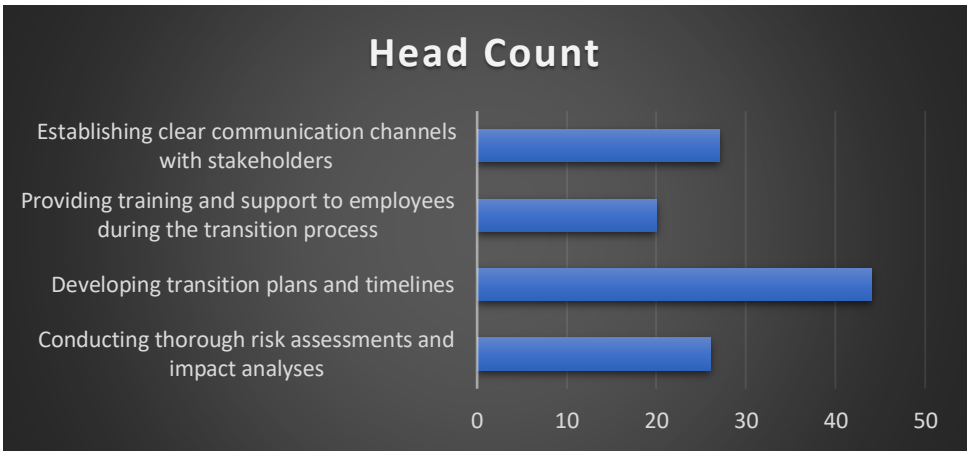
ISSN: 2583-6129
DOI: 10.55041/ISJEM01813



Data Interpretation:

Strategies include hedging currency exposure with financial instruments, diversifying sourcing and sales regions, negotiating fixed-price contracts with suppliers, and monitoring currency exchange rates. The highest count is in negotiating fixed-price contracts with suppliers (46).

Measures to ensure continuity of operations and mitigate risks during the transition to new suppliers or technologies	**Head Count**
Conducting thorough risk assessments and impact analyses	46
Developing transition plans and timelines	24
Providing training and support to employees during the transition process	9
Establishing clear communication channels with stakeholders	31



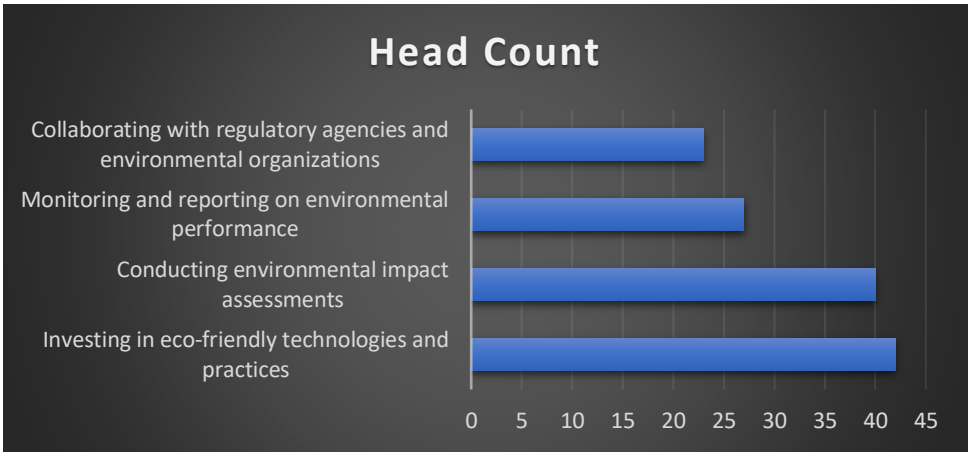
Data Interpretation:

Measures to ensure continuity of operations and mitigate risks during transitions include conducting thorough risk assessments and impact analyses, developing transition plans

ISSN: 2583-6129
DOI: 10.55041/ISJEM01813

and timelines, providing training and support to employees, and establishing clear communication channels with stakeholders. The highest count is in developing transition plans and timelines (44).

Measures to mitigate risks associated with environmental regulations and compliance	Head Count
Investing in eco-friendly technologies and practices	42
Conducting environmental impact assessments	33
Monitoring and reporting on environmental performance	27
Collaborating with regulatory agencies and environmental organizations	19

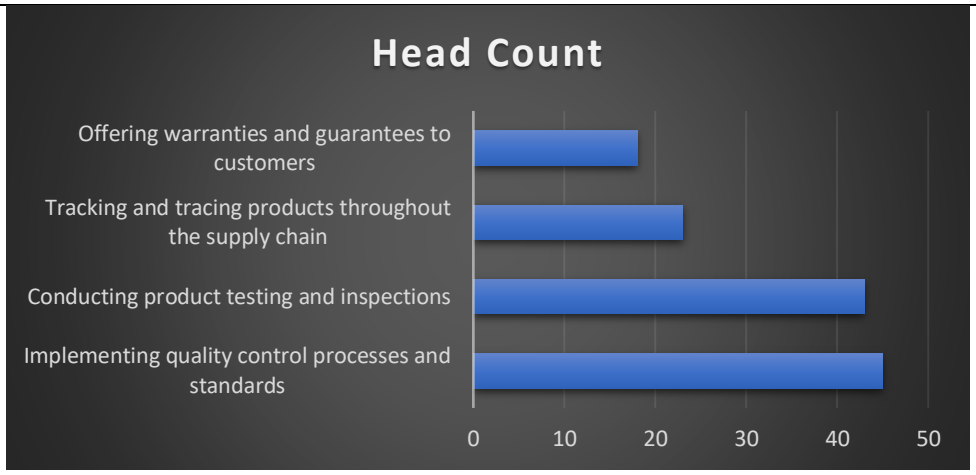


Data Interpretation:

Measures include investing in eco-friendly technologies and practices, conducting environmental impact assessments, monitoring and reporting on environmental performance, and collaborating with regulatory agencies and environmental organizations. The highest count is in investing in eco-friendly technologies and practices (42).

Measures to ensure product quality and mitigate risks associated with product defects and recalls?	Head Count
Implementing quality control processes and standards	45
Conducting product testing and inspections	39
Tracking and tracing products throughout the supply chain	23
Offering warranties and guarantees to customers	20

International Scientific Journal of Engineering and Management
Volume: 03 Issue: 05 | May – 2024
An International Scholarly || Multidisciplinary || Open Access || Indexing in all major Database & Metadata
ISSN: 2583-6129
DOI: 10.55041/ISJEM01813



Data Interpretation:

Respondents suggest several measures to ensure product quality and mitigate risks, including implementing quality control processes and standards, conducting product testing and inspections, tracking and tracing products throughout the supply chain, and offering warranties and guarantees to customers. The highest count is in implementing quality control processes and standards (45).

Strategies for mitigating risks associated with supply chain disruptions due to epidemics or pandemics	**Head Count**
Developing business continuity and crisis management plans	37
Establishing alternative sourcing and production options	43
Monitoring global health trends and developments	22
Collaborating with government agencies and public health organizations	9

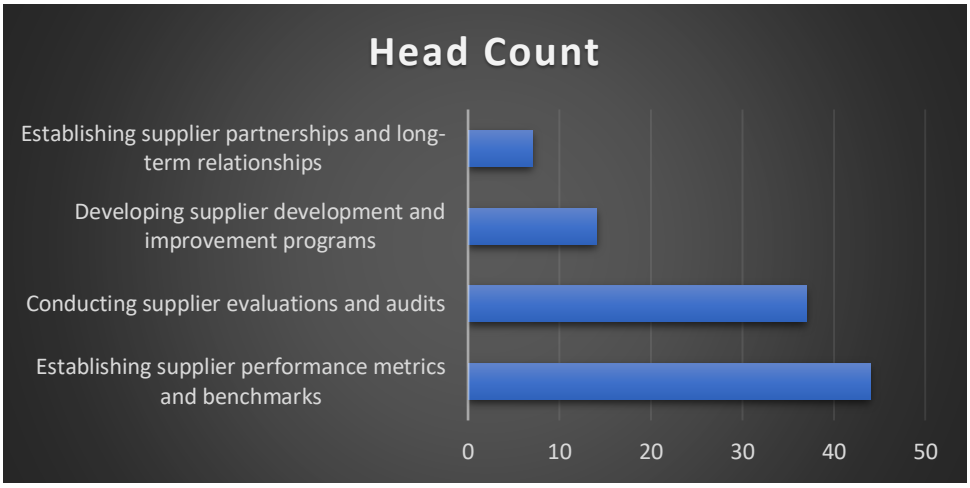
Data Interpretation:

Strategies to mitigate these risks include developing business continuity and crisis

ISSN: 2583-6129
DOI: 10.55041/ISJEM01813

management plans, establishing alternative sourcing and production options, monitoring global health trends and developments, and collaborating with government agencies and public health organizations. The highest count is in establishing alternative sourcing and production options (47).

Measures to ensure supplier performance and mitigate risks associated with unreliable suppliers?	**Head Count**
Establishing supplier performance metrics and benchmarks	34
Conducting supplier evaluations and audits	27
Developing supplier development and improvement programs	44
Establishing supplier partnerships and long-term relationships	11

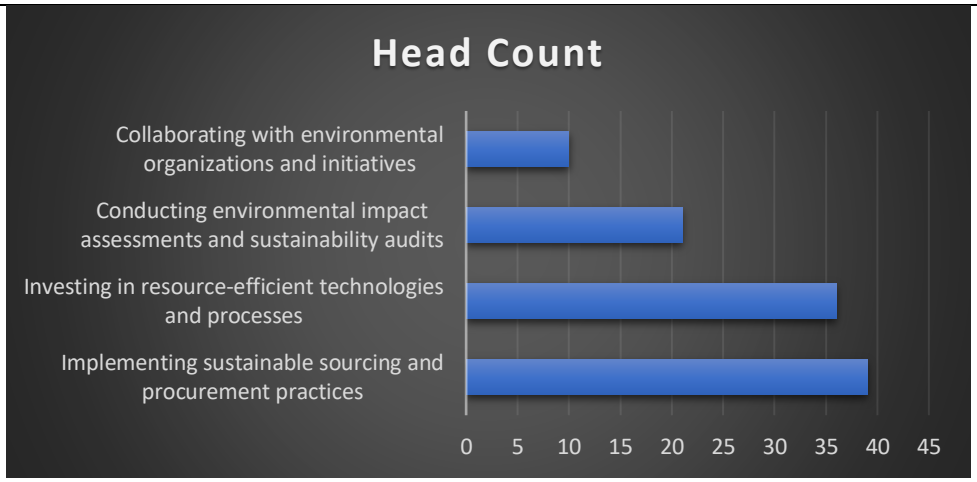


Data Interpretation:

Measures to ensure supplier performance include establishing supplier performance metrics and benchmarks, conducting supplier evaluations and audits, developing supplier development and improvement programs, and establishing supplier partnerships and long-term relationships. The highest count is in establishing supplier performance metrics and benchmarks (44).

Measures to mitigate risks associated with natural resource scarcity and environmental degradation	**Head Count**
Implementing sustainable sourcing and procurement practices	40
Investing in resource-efficient technologies and processes	36
Conducting environmental impact assessments and sustainability audits	21
Collaborating with environmental organizations and initiatives	10

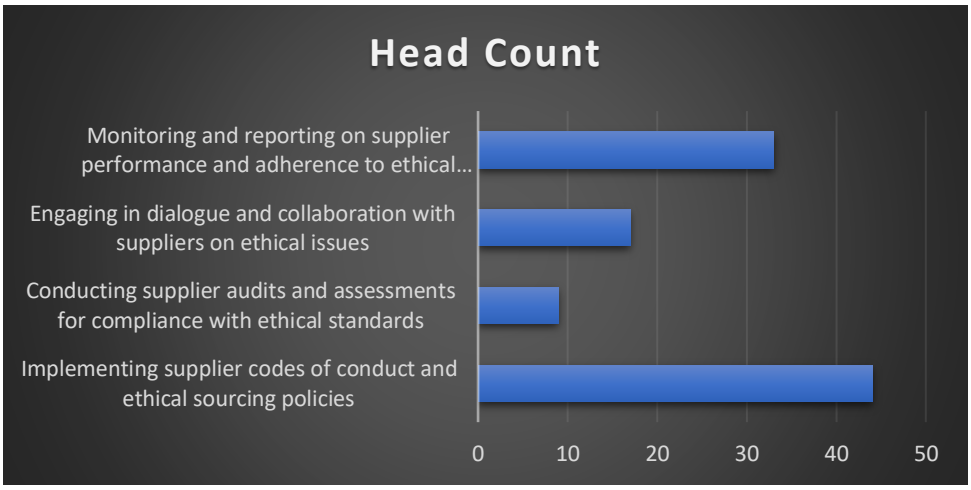
ISSN: 2583-6129
DOI: 10.55041/ISJEM01813



Data Interpretation:

Measures to mitigate these risks include implementing sustainable sourcing and procurement practices, investing in resource-efficient technologies and processes, conducting environmental impact assessments and sustainability audits, and collaborating with environmental organizations and initiatives. The highest count is in implementing sustainable sourcing and procurement practices (39).

Measures to ensure ethical sourcing and mitigate risks associated with unethical practices in the supply chain	**Head Count**
Implementing supplier codes of conduct and ethical sourcing policies	44
Conducting supplier audits and assessments for compliance with ethical standards	41
Engaging in dialogue and collaboration with suppliers on ethical issues	47
Monitoring and reporting on supplier performance and adherence to ethical guidelines	43



Data Interpretation:

ISSN: 2583-6129
DOI: 10.55041/ISJEM01813

Measures include implementing supplier codes of conduct and ethical sourcing policies, conducting supplier audits and assessments for compliance with ethical standards, engaging in dialogue and collaboration with suppliers on ethical issues, and monitoring and reporting on supplier performance and adherence to ethical guidelines. The highest count is in implementing supplier codes of conduct and ethical sourcing policies (44).

CONCLUSIONS:

This research paper provides an in-depth study of the various risks associated with the supply chain of JSW Ispat Special Products Limited and the strategies used to mitigate these risks. Using a combination of literature reviews, baseline research and detailed data, the study identifies key risks such as transport delays, raw materials, quality control issues and supplier disruptions that significantly affect plant operations.Survey responses indicate the most effective hedging strategies for each risk category.

In the case of transport delays, cooperation with reliable transport service providers proved to be the most effective strategy. Diversification of the supplier base is critical to mitigate raw material shortages, while strict quality assurance procedures are critical to address quality control issues. Creating backup suppliers is the best strategy to mitigate supplier disruptions.

Advanced technologies such as GPS and IoT sensors are essential to improve supply chain visibility. Implementing cyber security protocols and conducting regular audits are critical to mitigating cyber attacks and data breaches. In resolving labor disputes, it is extremely important to apply fair labor practices and policies.

The study also emphasizes the importance of sustainable practices such as investing in environmentally friendly technologies and implementing sustainable purchasing to reduce environmental risks. Ethical procurement ensures supplier codes of conduct and regular audits.In conclusion, this comprehensive study provides practical insights to improve the supply chain process of JSW Ispat Special Products Limited.

By implementing the identified strategies and measures, the company can improve the sustainability of the supply chain, ensure business continuity and achieve sustainable growth..

REFERENCES:

1. Chopra, S., & Sodhi, M. S. (2004).
Managing risk to avoid supply-chain breakdown. *MIT Sloan Management Review, 46*(1), 53-61.

2. Christopher, M., & Lee, H. L. (2004).
Mitigating supply chain risk through improved confidence. *International Journal of Physical Distribution & Logistics Management, 34*(5), 388-396.

3. Flynn, B. B., & Flynn, E. J. (2005).
Synergies between supply chain management and quality management: Emerging implications. *International Journal of Production Research, 43*(16), 3421-3436.

4. Kaynak, H. (2003).
The relationship between total quality management practices and their effects on firm performance. *Journal of Operations Management, 21*(4), 405-435.

ISSN: 2583-6129
DOI: 10.55041/ISJEM01813

5. Lee, H. L. (2002).
Aligning supply chain strategies with product uncertainties. *California Management Review, 44*(3), 105-119.

6. Simchi-Levi, D., Kaminsky, P., & Simchi-Levi, E. (2014).
Designing and managing the supply chain: Concepts, strategies, and case studies (3rd ed.). McGraw-Hill Education.

7. Wagner, S. M., & Bode, C. (2006).
An empirical investigation into supply chain vulnerability. *Journal of Purchasing and Supply Management, 12*(6), 301-312.

8. Bernardes, E. S., & Hanna, M. D. (2009).
A theoretical review of flexibility, agility and responsiveness in the operations management literature: Toward a conceptual definition of customer responsiveness. *International Journal of Operations & Production Management, 29*(1), 30-53.

Additional Resources:

https://www.ibm.com/topics/supply-chain-risk-management

https://csrc.nist.gov/glossary/term/supply_chain_risk_management

https://blog.fleetx.io/supply-chain-issues-faced-in-the-steel-industry

https://www.zetwerk.com/resources/knowledge-base/miscellaneous/steel-supply-chain-issueswhat-you-need-to-know/

https://www.researchgate.net/publication/23646376_Challenges_to_the_supply_chain_in_the_steel_industry