



Lehigh Business Supply Chain
Risk Management Index

Quarterly Report

4th Quarter / 2024



LEHIGH | College of
UNIVERSITY | Business

CENTER FOR SUPPLY CHAIN RESEARCH AT LEHIGH



Council of Supply Chain
Management Professionals

Educating and Connecting the World's Supply Chain Professionals.™

LEHIGH BUSINESS SUPPLY CHAIN RISK MANAGEMENT INDEX

Welcome to the **Lehigh Business Supply Chain Risk Management Index Report** developed by the Center for Supply Chain Research at Lehigh University and the Council of Supply Chain Management Professionals.

We launched this index in August of 2020 to better understand the different kinds of supply chain risks businesses face. **Supply chain professionals rated the likelihood that the risk in the 4th quarter of 2024 compared to the risk in the 3rd quarter of 2024 would likely increase, remain the same or decrease for 10 different supply chain categories.**

The Lehigh Business Supply Chain Risk Management Index (LRMI) value is a number between 0 – 100, where greater than 50 suggests increased risk, equal to 50 suggests the same risk and less than 50 suggests decreased risk. **The average LRMI for the 4th quarter is 67.48 which is an increase from the 3rd quarter, suggesting a higher level of risk in the 4th quarter 2024.**

The table below reflects the 10 categories of risk from highest risk to lowest risk when evaluated independently as perceived by supply chain professionals.

If you would like to have additional information about the survey or to participate in the survey, please contact Dr. Zach G. Zacharia at zacharia@lehigh.edu.



Executive Summary

Approximately 45,000 dock workers went on strike on October 1, 2024, at 36 U.S. ports from Maine to Texas. As of October 2, the date this report was published, there was no settlement. The data collection process for this report was closed the previous week to prepare this report, so the estimates of risk were given before the strike. Some of the surveyed supply chain managers noted the possibility of a strike.

The overall risk has increased significantly since the last quarter, with the average risk index rising from 65.95 to 67.48. Six out of the ten risks have increased since the previous quarter. Government Intervention has surged to a number 1 risk with a value of 80.81 – this is the highest level in the past four years, reflecting managers' worries about the Elections and the potential effects on tariffs, trade wars, and regulatory restrictions on source materials, methodologies, or technologies. For the first time in over a year, Cybersecurity is not the highest risk but the second highest, which has increased to 78.41 this quarter from 77.69. Economic risk has climbed to the third highest risk at 77.91.

Risk Type	2024 Risk Index	2024 Risk Index	Trend
Government Intervention Risk	74.62	80.81	↑
Cybersecurity and Data Risk	77.69	78.41	↑
Economic Risk	72.31	77.91	↑
Transportation Disruption Risk	64.39	67.78	↑
Supplier Risk	63.08	67.05	↑
Customer Risk	68.46	66.48	↓
Technological or Competitive Risk	62.31	64.20	↑
Environmental Risk	61.54	61.05	↓
Operational Risk	59.09	56.11	↓
Quality Risk	56.06	55.00	↓
Average Risk Index	65.95	67.48	↑

The Risk Index is a number between 0 – 100.

The further the number is from 50 the greater the level of risk.

The arrow indicates whether the risk is increasing or decreasing in comparison to the previous quarter.

Did You Know?

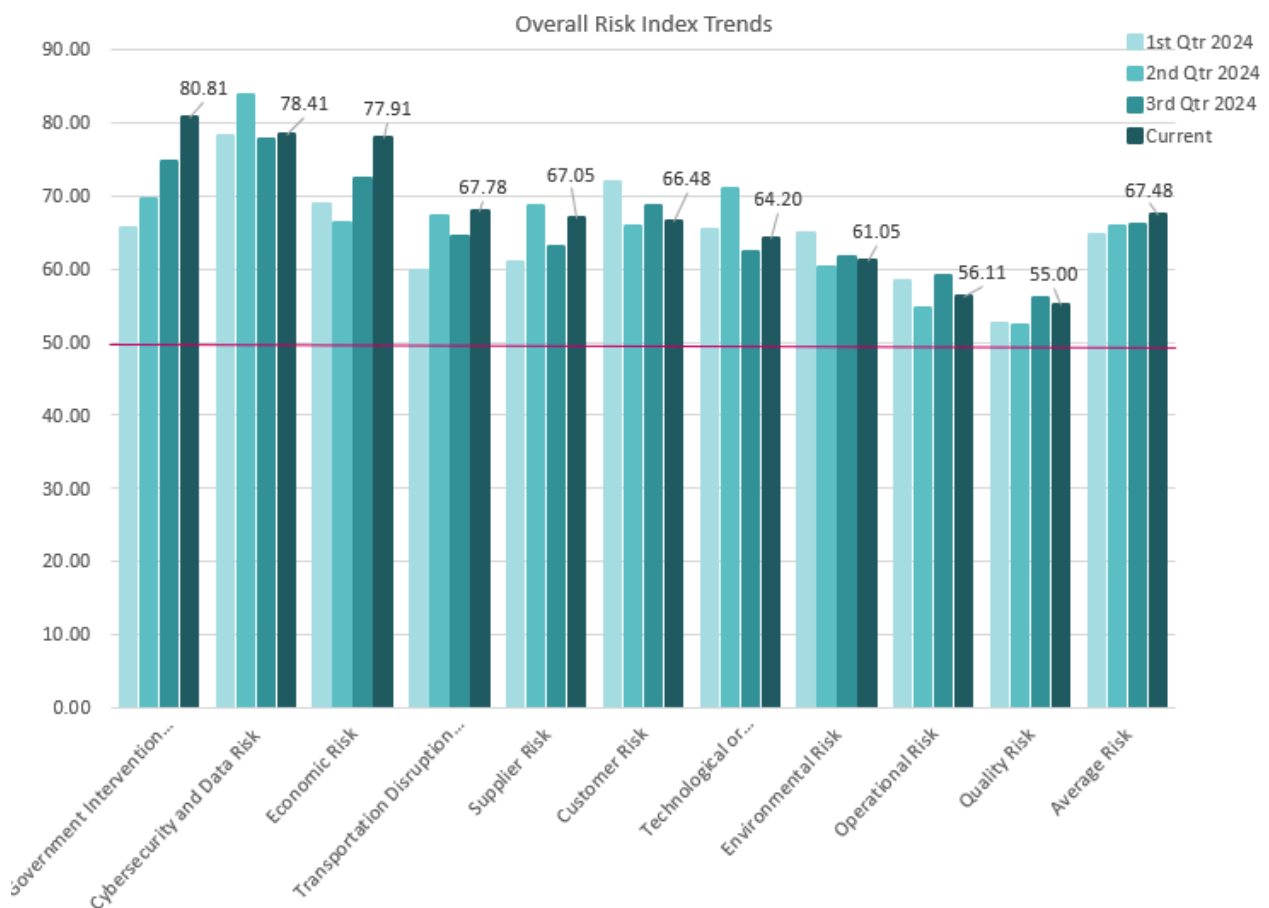
The Lehigh Business Supply Chain Management Risk Index for the 4th Quarter in 2024 is

67.48



LRMI Risk Index Over the Last Year

One of the advantages of regularly examining supply chain risk is to consider how these risks change over time. The table below shows the changing levels of risk across the 10 different areas of the supply chain this last year. It is also insightful to see that some areas of the supply chain are consistently seen as high risk and other areas of the supply chain are seen as lower risk over the same 1-year time period.



Four Biggest Risks in Head-to-Head Comparison 4th Quarter 2024

(Respondents are asked to compare across all 10 risks simultaneously, instead of rating one risk at a time.)

1. Cybersecurity and Data Risk
2. Government Intervention Risk
3. Economic Risk
4. Technological or Competitive Risk

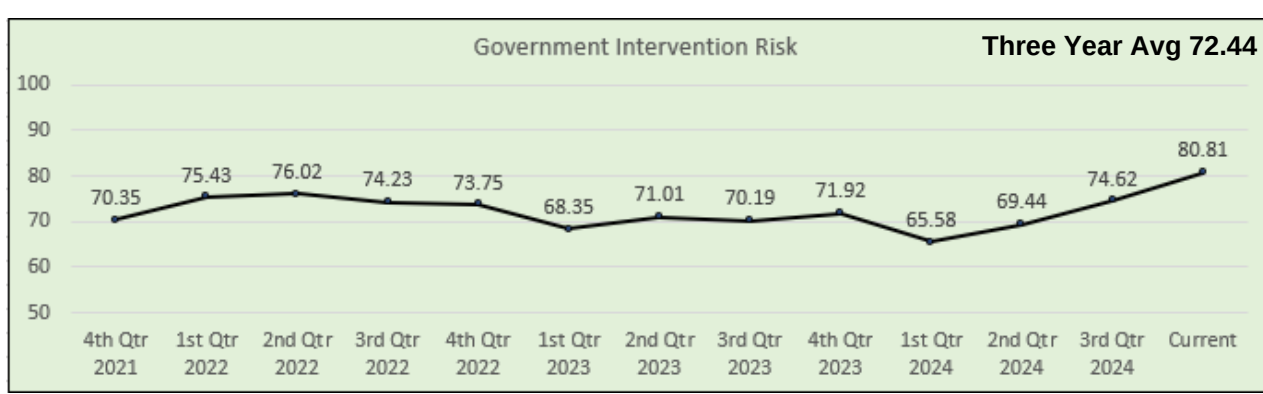


01 Government Intervention Risk

Some examples are: new regulations, tariffs/trade wars and governmental restrictions on source material, methodologies or technologies.

Selected Comments:

- The US government can now negotiate prices with Pharma companies. The top ten products are now done and focus turns to the next ten. Pharma companies believe that this will hurt investment and innovation. The government disagrees. The truth is probably somewhere in the middle!
- Increased risk is expected due to a possible ILA Strike (maritime workers at container ports) and additional tariffs.
- The wars in Ukraine and Israel are significant and other wars are heating up as well. The US Government is in shambles and the US election will likely be contested. We are preparing for the chaos leading up to and after the election.
- Increased risk is expected due to the fact that Government oversight (FERC) of capacity auctions in PJM (Regional transmission organization for wholesale electricity) will likely be higher.
- We expect an increase in risk as the current administration will make whatever moves necessary to put themselves in a favorable position to win the election.
- Most neutral analysts agree that a Trump presidency would increase geopolitical risk and a higher probability of tariff-induced inflation.
- This risk is expected to increase. Watch out for 4Q initiatives as the Biden administration comes to an end regardless of who wins the election.
- An increase in risk is expected as both presidential candidates are supportive of high tariffs and general protectionism.
- The election is a huge risk due to a potential disruption in operations, especially in 3PL transportation. We tend to have to deal with riots, strikes, etc.
- The level of risk is dependent on the election results.

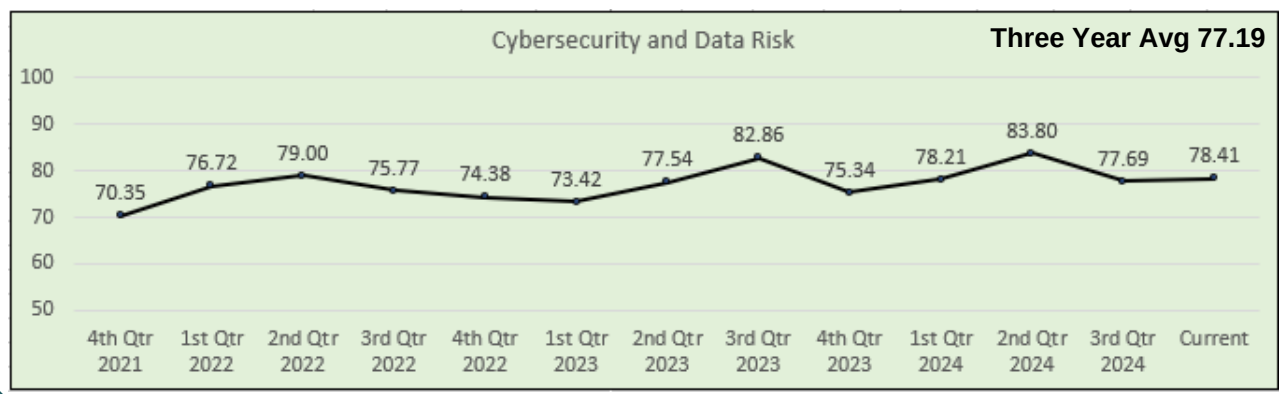


02 Cybersecurity and Data Risk

Some examples are: cyberattacks, data corruption, data theft, system viruses, hardware and software issues and security platform controls.

Selected Comments:

- This risk continues to rise. Not only because there are more and more malicious actors but also because companies (and government) find it difficult to allocate enough funds to deal with it.
- Cybersecurity is still a risk, but there is still lots of training for phishing scams and a robust firewall to protect intellectual property.
- Cyberattacks and data breaches are happening more often and with greater sophistication. The election process will be tested.
- The advent of AI/ML attacks across multiple vectors has seen an increase of volume and severity of attacks.
- Recently data breaches have been extensive and have uncovered significant amounts of user data. These risks will only get more severe.
- We are cautiously optimistic that the level of risk will not change as hackers are more focused on other industries/politics/fraud.
- Election years have heightened risks. This is our expectation, especially given the current domestic and international political environment.
- This risk is expected to increase as we transition 3rd-4th qtr. 2024 to a new owner of the company that supplies and supports our MRP program.
- Election time in the US means more cyber and cognitive attacks.
- AI has strengthened the competence and resolve of the cybercriminals; attacks are coming from everywhere. Their business is flourishing.
- The level of cybersecurity and data risk is high every month; no increase is anticipated.
- I read that data theft and similar crimes become more common at the end of the year.



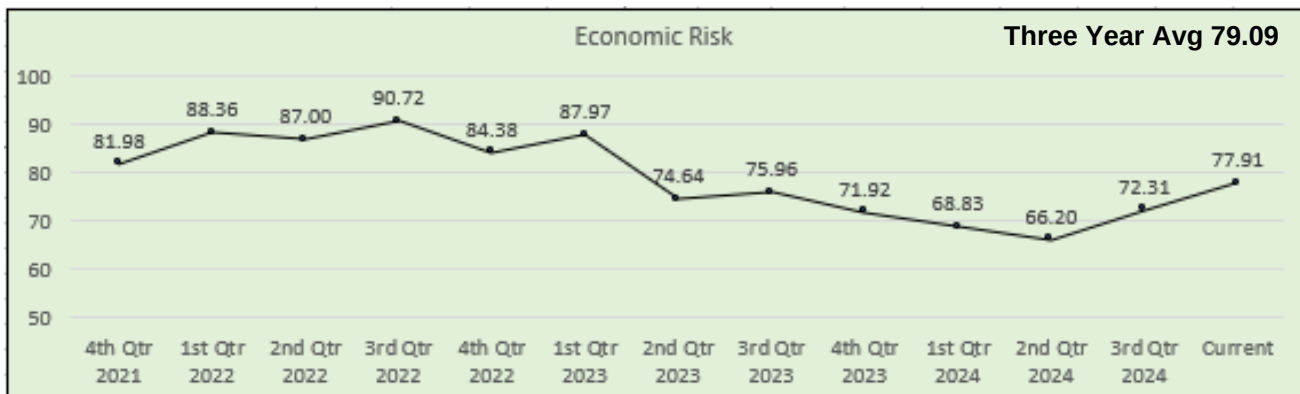
03 Economic Risk



Some examples are: increasing energy costs, commodity price volatility, labor shortages, sudden demand shocks, global energy shortages and border delays.

Selected Comments:

- Increased risk is expected due to a possible ILA Strike (maritime workers at container ports) and additional tariffs.
- Economic risk is expected to increase. Will the USD retain its purchasing power?
- This risk is expected to increase due to the current political environment.
- Maybe interest rates will decline now? But will unemployment and recessionary problems increase. Who is funding all the illegal immigration costs?
- Extreme pressure continues on wages, especially for technical positions.
- While inflation seems to be subsiding, with the election and some geopolitical stress around the world, drama seems to be always in play as it is now.
- We have seen a slowing of growth on homes and projects as prices continue to climb and the threat of inflation looms.
- Economic risk may decrease with inflation currently at 2.9% and the FED signaling the 1st rate cut in Sept!
- Risk will increase as strikes and border delays absolutely are higher.
- No change in risk is expected. We still see delays related to border crossings and import clearance but no different than in previous quarters.
- The presidential election will surely send economic shockwaves, regardless of the victor.
- Risk will increase as disparaging comments and attacks on immigrants will continue to leave certain industries with significant labor shortages.
- We expect an increase in economic risk as there will be an increase in demand.
- Labor shortages are always top of mind.

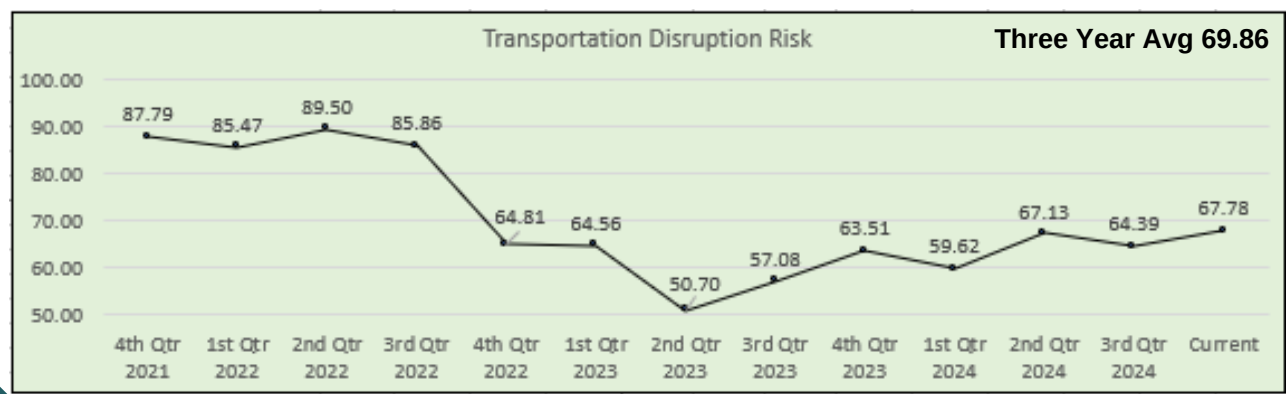


04 Transportation Disruption Risk

Some examples are: fuel prices, driver shortage, infrastructure and demand volatility.

Selected Comments:

- Increased risk is expected due to a possible ILA Strike (maritime workers at container ports) and additional tariffs.
- We rely on delivery services, UPS mostly, and know of no significant upcoming changes.
- Fuel costs, although falling, are higher than we would like. Uncertainty around the Presidential election adds risk.
- We expect better energy prices and, therefore, decreased risk.
- Depending on the political climate, this risk can be affected with overseas shipping as well as domestic shipping.
- We expect an increase in risk due to weather concerns in the Northern Hemisphere this winter.
- Transportation disruption risk remains on the high side, but about the same as in the prior quarter.
- We have been facing 1-2 days per week of transport disruptions due to civil unrest.
- Increased risk is expected due to a significant increase in transportation costs, fuel, and electricity.
- Instability in the middle east could definitely give risk to fuel prices. Diesel is very favorable right now, so likely only to increase. Driver shortage...has been a topic for over a decade. Less volatility there. Infrastructure is not good as it is. That is a risk for sure. Demand volatility - this will be a major risk as people have less to spend. Shippers update right now is looking only slightly positive in 2025 (1%) for increase in loadings.
- Risk will decrease as we expect ocean container imports to decrease in Q4.
- We expect risk to increase as we are a seasonal business that relies heavily on the US Postal Service, Fed Ex, UPS and other carriers.



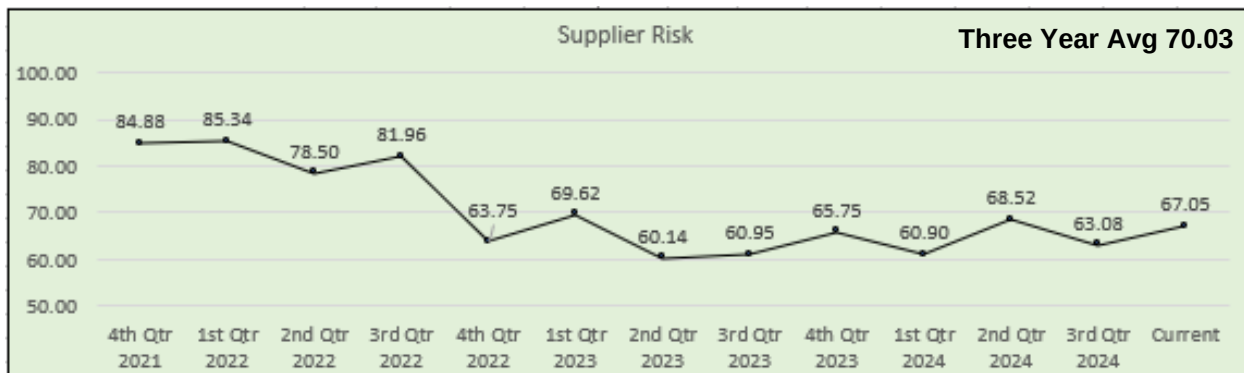
05 Supplier Risk



Some examples are: single/sole source supplier, suppliers from one geographic location, supplier quality issues, and price volatility.

Selected Comments:

- Risk is expected to increase. Just as banks must "Know Your Client (KYC)" we have to Know Your Suppliers and Customers.
- Commodity metals, such as aluminum, are up in the market, which is leading to some pricing swings.
- Everyone still wants someone else to hold the inventory; and playing push the payables is just getting crazy.
- We expect this risk to remain the same as the supply chain currently seems stable.
- This has been a consistent issue and I don't foresee any changes, good or bad.
- Further supplier risk increases, especially in automotive as more suppliers face financial issues (due to flat sales and high customer order changes away from BEVs and toward HEV and gas powered).
- Supplier risk is expected to increase as suppliers cannot keep up with customer demand.
- This risk will decrease. I think, as a 3PL, we are constantly looking out for this and doing a good job of evaluating this component.
- We do not anticipate a change in risk. We have vendors in the middle east that still have fairly high risk. Due to regulatory and customer approvals, switching to another vendor is neither fast nor easily accomplished.
- Supplier risk is expected to increase.
- Risk is expected to increase due to possible east coast port strikes.



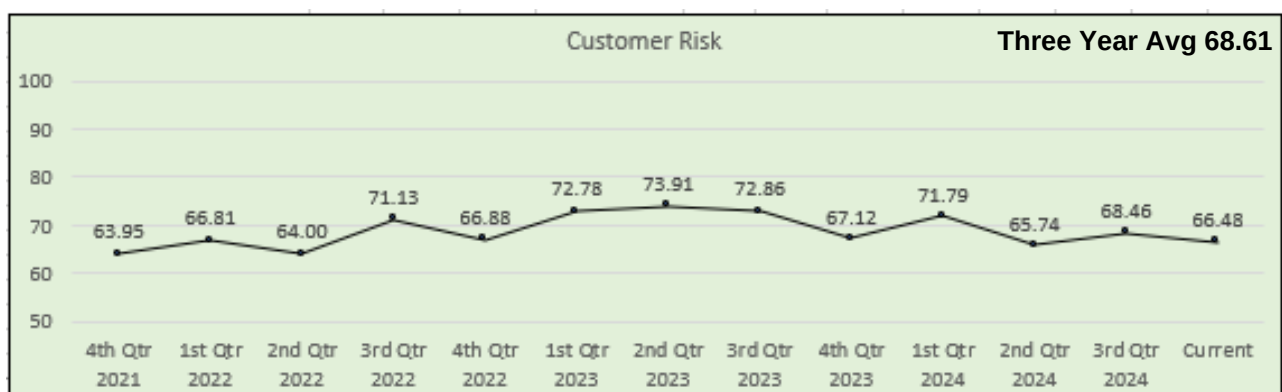
06 Customer Risk



Some examples are: fast changing customer demand, easy to lose customer loyalty, changing customer base demographics, hard to predict customer behavior and hard to service customers.

Selected Comments:

- Housing starts are increasing and mortgage rates are decreasing, which leads to greater sales in the home improvement market. Inflation still needs to decrease, however.
- Uncertainty surrounding the Presidential election and consumer behavior adds risk to the forecast.
- Our biggest customer risk is consumer credit and the price of everything.
- No change in risk is expected as demand seems strong and stable.
- Customer risk remains high (ex. fast changing customer demand in automotive, away from BEVs due to range/charging infrastructure/political reasons).
- Risk is expected to increase based on our current experience - increased competition and weakening buying power.
- Consumer demand has been fluctuating with some significant highs and lows. Inflation is directly impacting the demand as well.
- Risk will increase due to the changing healthcare landscape, specifically the move to consumerism and retail.
- Customer risk is extremely high right now. Loyalty is low and lost in favor of cheaper cost decisions, especially in the 3PL space. Only portfolios with strong relationships and good pricing have a fighting chance.
- We have improved service levels from mid-70's to high mid-80's, which has greatly improved customer satisfaction and reduced switching risk.
- Risk is expected to increase as customer expectations change more rapidly than ever.



07 Technological or Competitive Risk

Some examples are: disruptive or replacement technologies, introduction of new competitor firms and ineffective or non-existent regulation for competitors.

Selected Comments:

- This risk is high and it's always high.
- This risk is expected to increase due to the unknown success of new products introduced in 2024-25.
- Increased risk is expected as AI and related tech is disruptive.
- Tech is moving much faster in the supply chain space than other verticals, which leads to increased risk.
- Competitive pressures seem to be increasing.
- AI is a disruptive force we need to incorporate responsibly.
- Increased risk is expected as a result of global changes in both technology and competition.
- Gen AI is a young technology but powerful. Adapting to the changing AI landscape and leveraging AI will determine the success of businesses going forward.
- The economy is creating a competitive landscape to perform unnaturally when competing for work. This creates significant downward price pressure while having increased costs. Downward margin.
- No change in risk is anticipated.
- I believe that we may see a decrease in risk as companies have adjusted to the generative AI boom and are now all competing to master the technology.
- The abuse of AI will create numerous problems unless the government takes action against this.

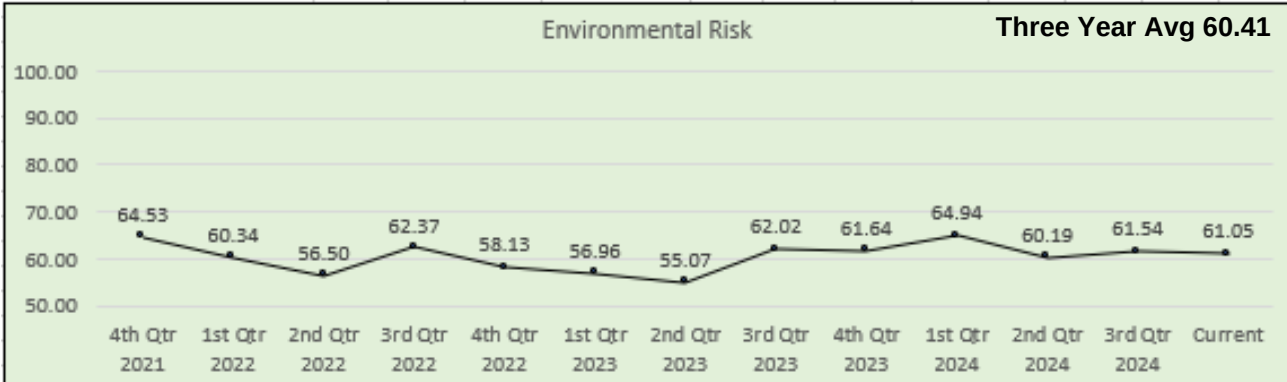


08 Environmental Risk

Some examples are: natural disasters, extreme weather, industrial accidents and pandemics.

Selected Comments:

- No change in risk is expected, unless the forecasted increase in hurricane activity comes to fruition. Then there could be a sharp increase.
- Environmental risk is expected to increase as extreme weather continues and increases.
- Hurricane risk always is high for our Puerto Rico plant around Q3.
- Weather, sea level rise, and hurricane season are all additive to the list that keeps pushing this risk higher.
- There is greater risk each quarter as the planet is getting hotter, with more severe weather, due to climate change.
- Yes, climate change is a real thing. We expect this risk to continue to increase.
- We expect no change in risk.
- Increased risk is anticipated as winter is coming, and this winter season is expected to be worse than the previous few.



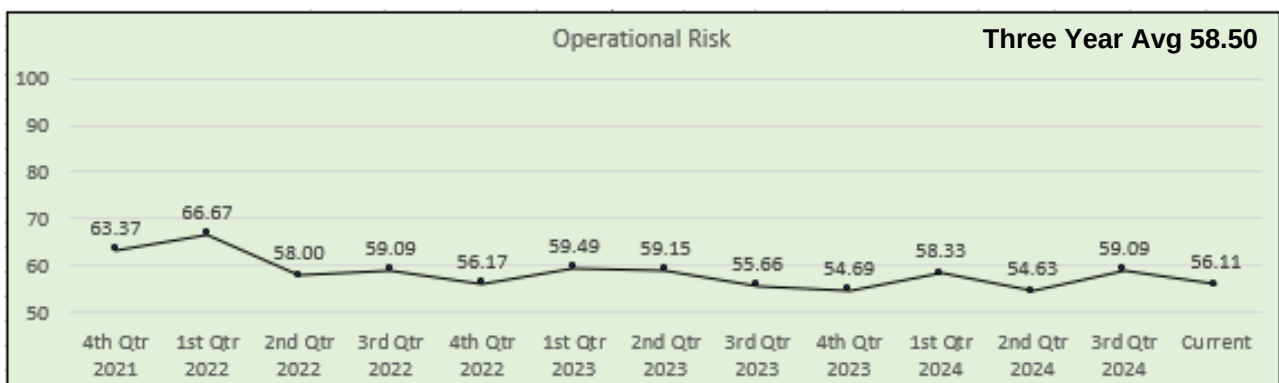
09 Operational Risk



Some examples are: site disasters, product counterfeiting, damage or disruption to physical assets and machine breakdown.

Selected Comments:

- Increased risk is expected due to a possible ILA Strike (maritime workers at container ports) and additional tariffs.
- The election may have a slight impact, but nothing material. Supply chains in general are soft and continue to bounce around the bottom.
- I don't see any indicators for this to change.
- Risk from cybersecurity breaches is increasing. Cyberattacks and the physical safety of our teams around the globe has been a growing concern.
- Increased risk is expected as international transportation may affect our supply chain.
- I think around the holidays there is always more operational risk as companies push the envelope to get things done and tend to go around best practices.
- No changes in risk are anticipated.
- The mold incident at the Boar's head plant will cause many companies to launch inspections of their own facilities.
- Cybersecurity risks continue to increase.
- We have hired people and created more projects to minimize this risk. It is a concern, but we are addressing it.

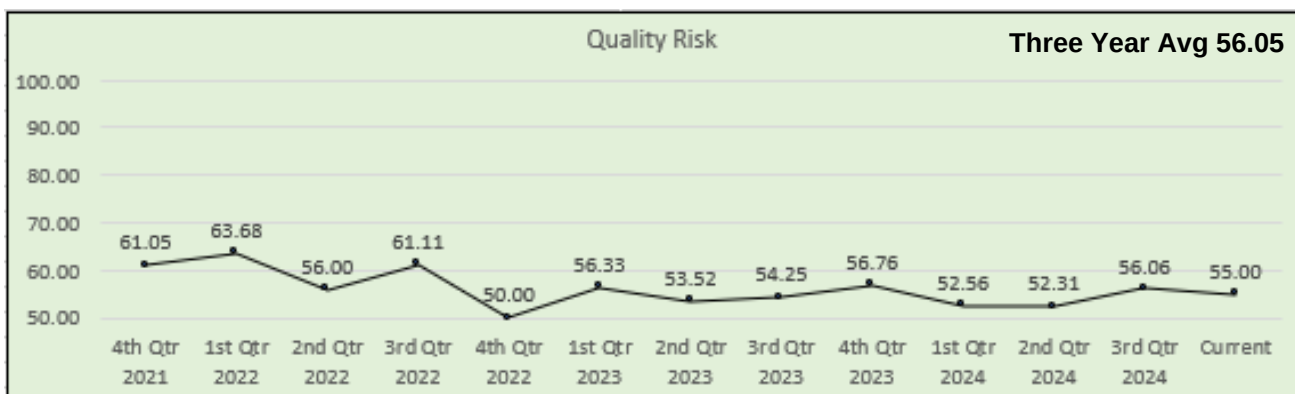


10 Quality Risk

Some examples are: lack of sufficient quality testing, changing quality standards, informal quality control documentation, customer safety issues and product recalls.

Selected Comments:

- Increased risk is expected due to a possible ILA Strike (maritime workers at container ports) and additional tariffs.
- We expect this risk to remain the same as we begin a transition to a new quality team 3rd quarter 2024 through June 2025.
- Risk is expected to increase as anything coming from China is questionable.
- Organizations may try to cut corners in an effort to try and become more efficient/profitable, but nothing material.
- With unions and strikes for items such as copper in Chile and China, it may be more difficult to catch up and manufacture quality products.
- The verification of legitimate results from AI have added additional testing and quality risks.
- My company, as a 3PL, deals with many other companies who are manufacturers. I expect to see more quality risk in Q4 as companies try to close in on higher profits by EOY. However, as more and more incidents happen (look at Delta, Boeing), I hope people allow regulations to come into play. Corporations are not regulating, just apologizing and moving on, and the government is not agile enough to handle anything.
- Due to acquisition activities and rebranding of products, quality risk will increase.
- We have identified potential risks and are putting measures in place to minimize our exposure to those risks.



Appendix A

Risk Index Summary

The Risk Index is a number between 0 – 100.

Risk Index \leq 49 suggests less risk

Risk Index = 50 indicates no change in risk

Risk Index \geq 51 suggests greater risk

The further the number is from 50 the greater the level of risk.

$$\text{LRMI} = (P1 * 1) + (P2 * 0.5) + (P3 * 0)$$

P1 = percentage of answers reporting an improvement

P2 = percentage of answers reporting no change

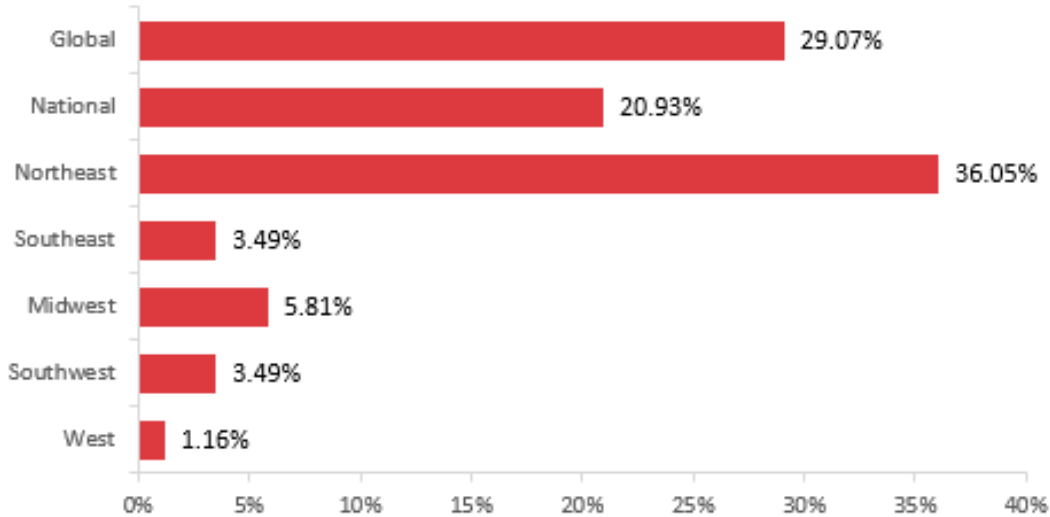
P3 = percentage of answers reporting a deterioration



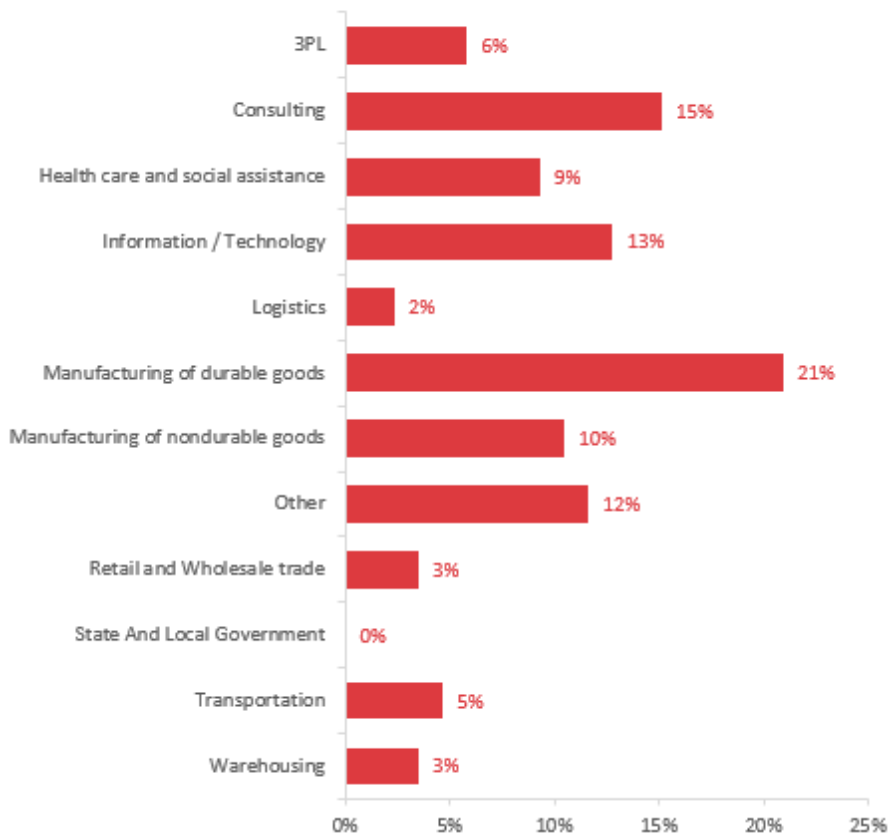
Appendix B

Survey Demographics

Region



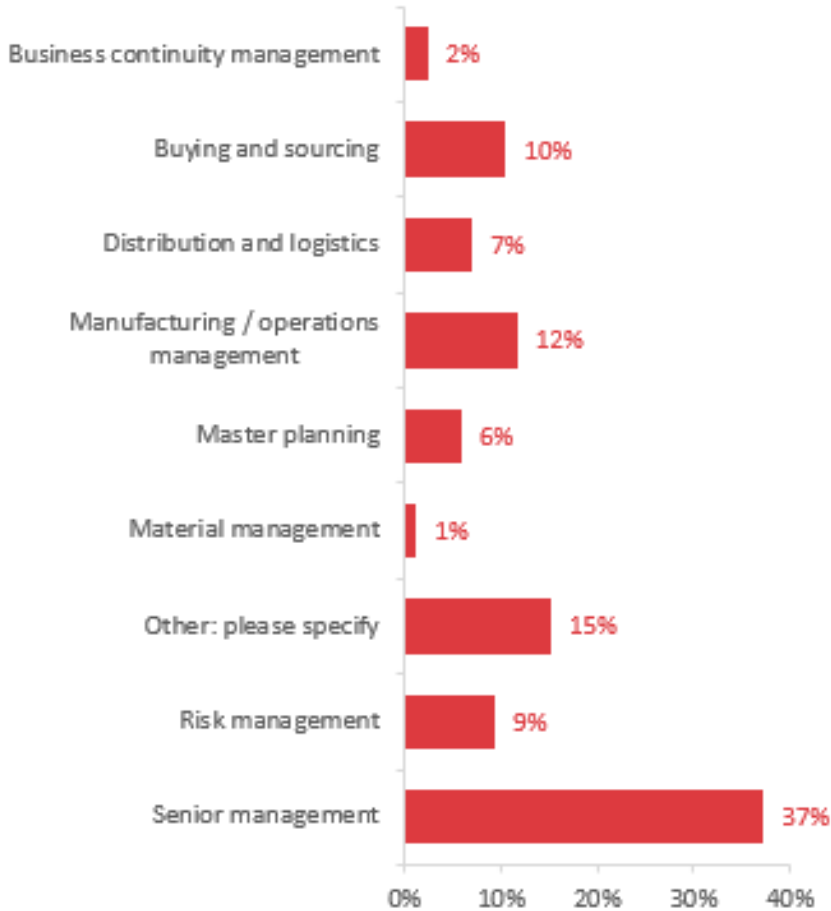
Industry



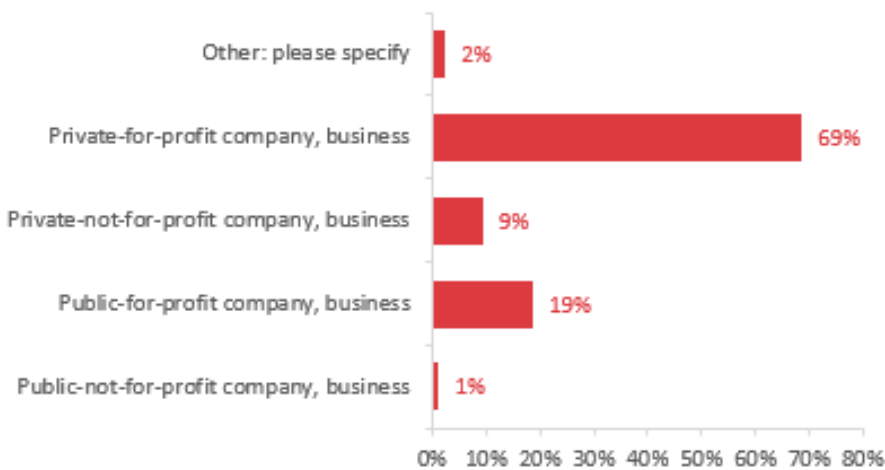
Appendix B

Demographics (continued)

Primary Role



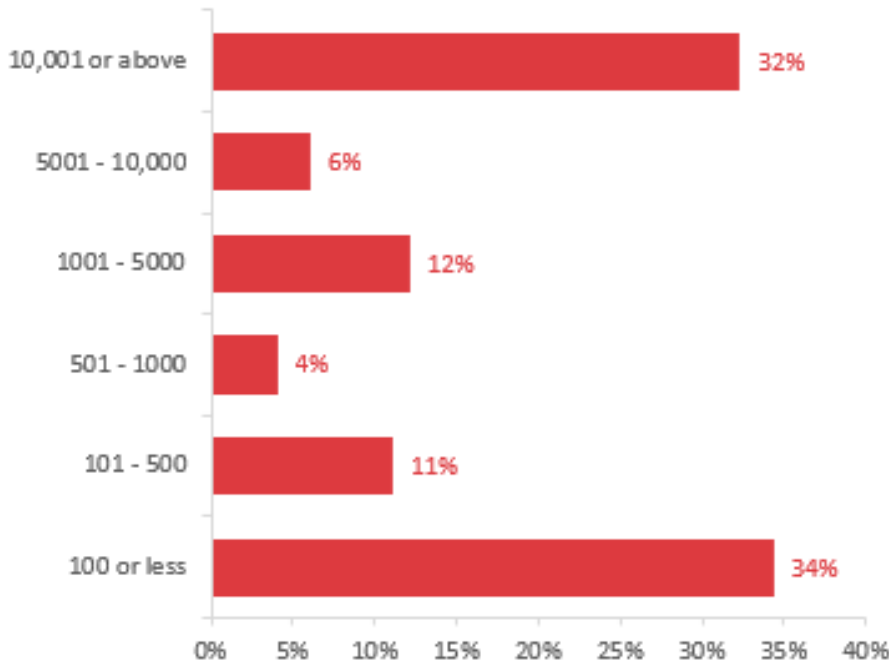
Place of Employment



Appendix B

Demographics (continued)

Company Employee Amount



Work Experience

