Lehigh Business Supply Chain
Risk Management Index

Quarterly Report

1st Quarter / 2025

SUPPLY CHAIN RISK INDEX™ LEHIGH + CSCMP

LEHIGH UNIVERSITY | College of Business

CENTER FOR SUPPLY CHAIN RESEARCH AT LEHIGH

CSCMP™ 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 1st quarter of 2025 compared to the risk in the 4th 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 1st quarter is 66.18 which is a decrease from the 4th quarter, suggesting a lower level of risk in the 1st quarter 2025.**

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.

SUPPLY CHAIN RISK INDEX™ LEHIGH + CSCMP

Executive Summary

Cybersecurity has regained the top spot with the highest overall risk at 76.97. Although this represents a decline from the previous quarter, it is still indicating that cyberattacks, data corruption, data theft, system viruses, and security platform controls remain a serious concern. Interestingly, government intervention dropped from the highest risk last quarter, with a high of 80.81, down to the second highest risk of 74.16. However, in direct comparison across all risks, government intervention risk remains the top concern, suggesting there is still a lot of worry about new regulations and tariffs/trade wars. Supplier risk has jumped two spots from last quarter to 74.16, suggesting there is increasing worry about single/sole source supplier, suppliers from one geographic location, supplier quality issues, and price volatility. Economic risk dropped significantly from 77.91 to 67.98, suggesting less worry about rising energy costs, commodity price volatility, labor shortages, sudden demand shocks, global energy shortages, and border delays. Finally, rounding out the top 5 is technological or competitive risk, that has never been a top 5 risk. This could reflect the likely impact of AI as managers are more concerned about disruptive or replacement technologies, the introduction of new competitor firms, and ineffective or non-existent regulations for competitors. Overall, the average risk index has dropped from 67.48 to 66.18, suggesting a decrease in risk in the first quarter of 2025.

Risk Type	4th Quarter 2024 Risk Index	1st Quarter 2025 Risk Index	Trend
Cybersecurity and Data Risk	78.41	76.97	↓
Government Intervention Risk	80.81	74.16	↓
Supplier Risk	67.05	74.16	↑
Economic Risk	77.91	67.98	↓
Technological or Competitive Risk	64.20	66.29	↑
Transportation Disruption Risk	67.78	64.04	↓
Environmental Risk	61.05	61.80	↑
Customer Risk	66.48	61.24	↓
Operational Risk	56.11	57.87	↑
Quality Risk	55.00	57.30	↑
Average Risk Index	67.48	66.18	↓

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.

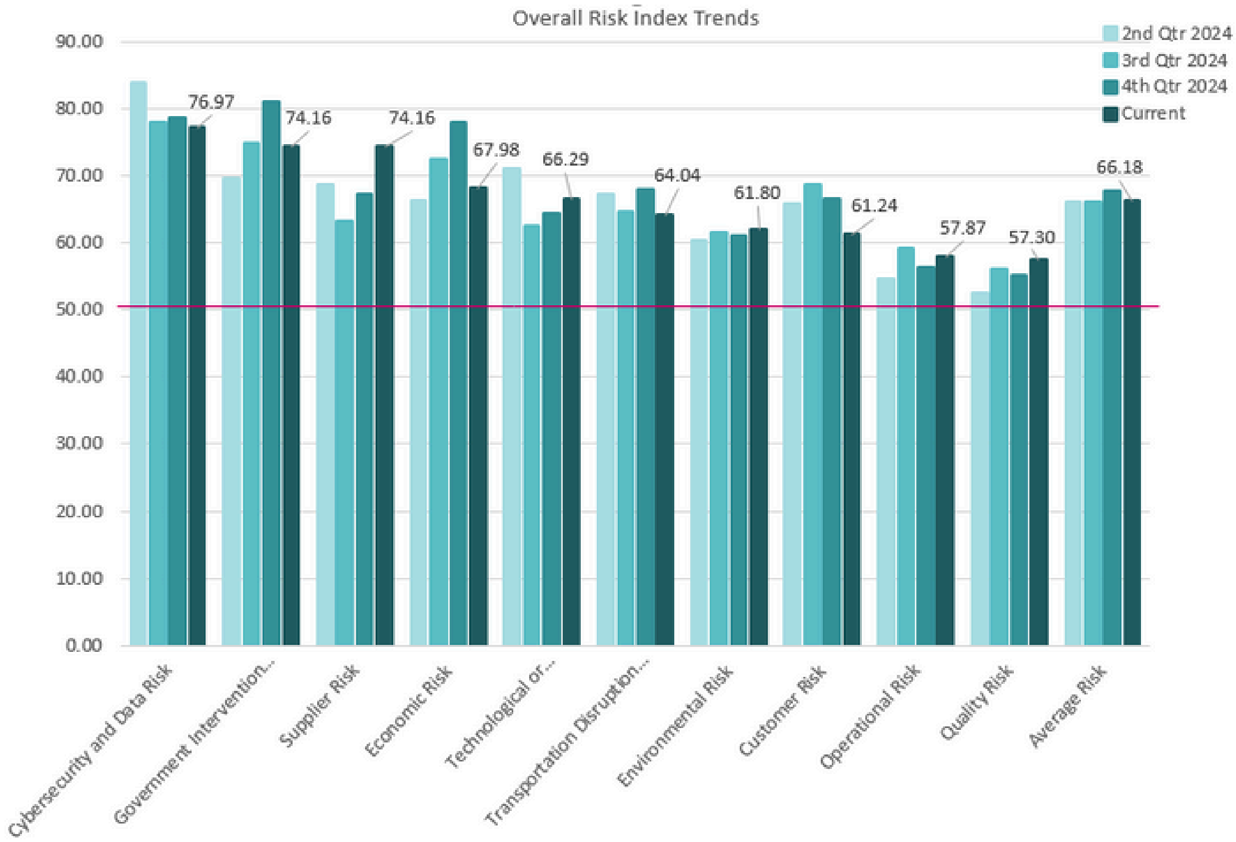
Did You Know?

The Lehigh Business Supply Chain Management Risk Index for the 1st Quarter in 2025 is

66.18

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 1st Quarter 2025

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

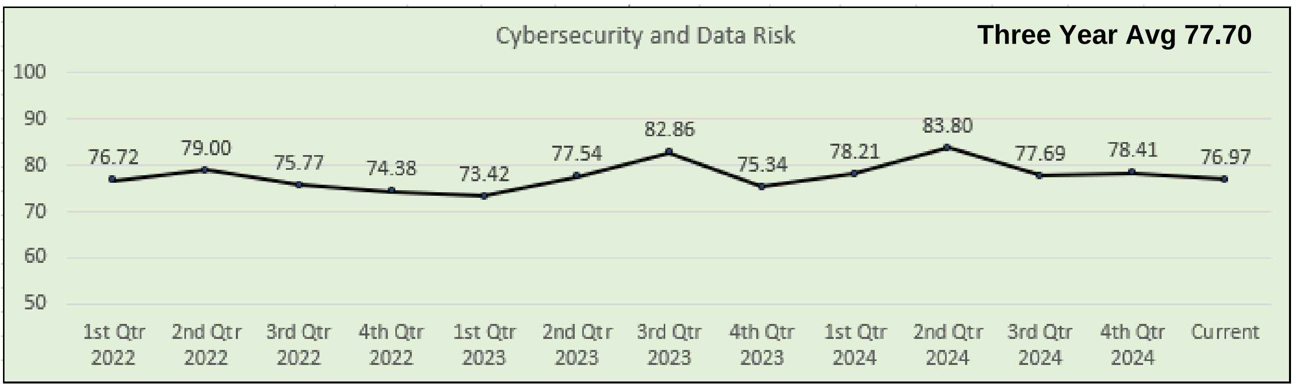
1. Government Intervention Risk
2. Cybersecurity and Data Risk
3. Economic Risk
4. Supplier Risk

01 Cybersecurity and Data Risk

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

Selected Comments:

- We anticipate that this area, for the foreseeable future, will be constantly increasing. We are in the midst of data and cyber warfare among nation states, corporations and other powerful entities. Securing data and building strong relationships with partners is key right now.
- Part of our work is to provide an extra barrier between our members and their supply chain partners so that our members decrease their own risks; thus, we are always having to remain vigilant against attempts by bad actors.
- We definitely expect this risk to increase. We have seen firms trying to keep pace with "criminal" activity. To paraphrase Mark Twain: "A lie gets half way around the world, while the truth is still putting its shoes on." We're always playing catch-up in this area.
- Here there are significant unknowns, and unknowns breed risk.
- Our company has ramped up security measures (password complexity, more updates, etc.) to combat cyber security risks.
- It's not a matter of "if" but "when" for most companies in dealing with a cyber/data incident.
- Trump's anticipated actions will put a target on our backs with China / Russia.
- Competence and quality of products and service both internally and externally will likely impact this risk, as well as geopolitics.
- Requests for ISO 27001, and now ISO 22340, are increasing.
- Technology changes, continuously leading to software issues. Also "quick & easy" earning will damage our culture. We are expecting that this risk will increase.
- We expect malevolent foreign hacking activity to continue as part of a grey zone conflict scenario with Russia, Iran, China and others.

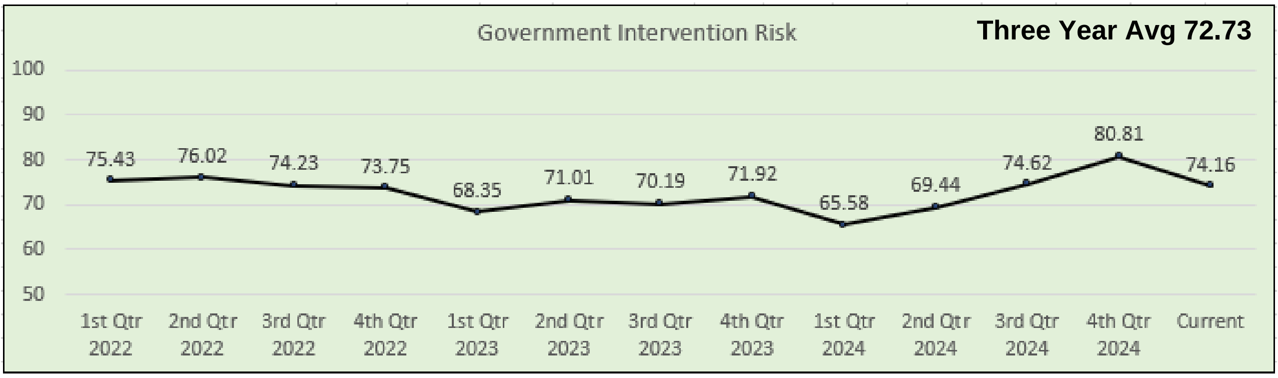


02 Government Intervention Risk

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

Selected Comments:

- We expect an increase in risk as the impact of promised tariff policy changes could be significant. Potential deportation and immigration policy changes could further impact the overall labor shortage.
- We anticipate that this risk will remain the same. Government often adopts standards for supply chain; depending on the quality of its choices at any given time, this can facilitate good industry practice or hamper it. Eventually, if the choice is poor, industry pushes back and government revises its approach. These risks are perpetual, but so are the opportunities for correction.
- Risk will decrease due to expected deregulation under the new administration.
- Risk will increase as the Trump administration brings with it many uncertainties regarding tariffs and commerce with mainland China, which is part of our company's market.
- The new US government is expected to be pro-business, particularly in regards to manufacturing, which should mean decreased risk.
- Risk will increase. Tariffs are a large concern going into 2025. Goods coming into the U.S. from Canada, Mexico and China face increased costs due to tariffs.
- Overall, I expect this risk to remain the same. The only first quarter changes I might anticipate would involve suppliers who may hedge-increase prices in anticipation of intervention risks.
- While we strive for energy independence in the U.S. and increase outputs to offset disruptions from continued Middle East and Ukraine conflicts, the exposure to the price of oil continues to exist. China's reaction to tariffs will need to be monitored. The BRICS nations currency, as well as saber-rattling and the U.S. response, are also factors which lead us to expect an increased level of risk.

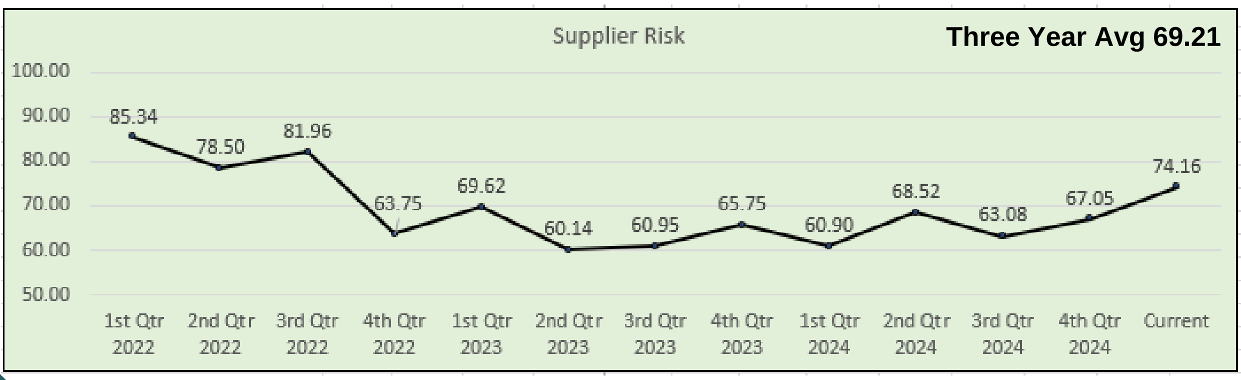


03 Supplier Risk

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

Selected Comments:

- Tariffs will have an impact on this category. Supplier diversification will be key to minimizing risk.
- The likelihood of tariffs impacting discreet nations and the response to this disruption will stretch infrastructure, freight flows and supplier capabilities during a prolonged adjustment period.
- Upcoming tariffs will increase prices overall and force suppliers to either raise prices or relocate their operations.
- Risk is increased due to the possibility of China moving on Taiwan, since we have a major manufacturing plant in Taiwan.
- Anticipation for 2025 increased costs for supplies, if not disruptions, depending upon the new administration. Additionally, BRICS countries are delivering greater levels of competitive products, both quality and counterfeit, including academic outputs.
- Some raw materials are sourced outside the U.S. and may be subject to unknown tariff decisions. I don't feel there will be checks and balances to rein in hasty decisions.
- The threat of tariffs is real, and may cripple many manufacturers.
- Products approved in the past will have components no longer available and customers will be reluctant to approve substitutes.
- We expect this risk to remain the same - We check our own members' and our suppliers' registrations in the relevant government business register to confirm their legal existence and standing before completing business with them. We also check our members' suppliers' registrations for them in order to reduce their risks from corporate fraud, geopolitical shocks and sole source (particularly when what appears to be multiple suppliers is actually one legal entity operating under multiple trade names).
- We expect this risk to remain the same as we have a solid relationships with suppliers.

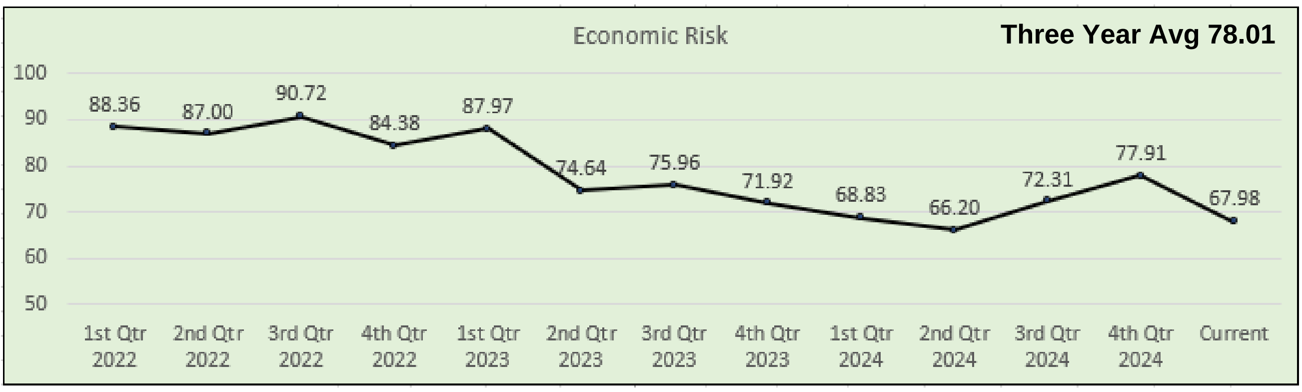


04 Economic Risk

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

Selected Comments:

- Labor shortages are likely to continue and potentially increase.
- Economic Risk is expected to increase due to anticipated tariffs.
- Risk will increase as mass deportations will impact the workforce.
- Metals pricing, including tin and nickel, are up and down the last quarter.
- We are dependent on smooth running global logistics; it is the life blood of our operation.
- There will be an increase on re-shoring and we don't have enough skilled labor in the U.S. anymore.
- A tightening immigration policy will affect labor availability and cost. How tariffs and geopolitical issues affect cost structure are critical matters.
- We expect this risk to remain the same. What would be the impact of tariffs versus less government regulation?
- Not anticipating much change in the short term, but a lack of intervention in energy supply and the commoditization of electricity, and perhaps water, in the future will likely impact longer term supply chain.
- It is a low probability, but if Trump cuts U.S. Customs staff, or if he pushes out experienced people, it could cause delays in processing cargo imports.
- Labor shortages and costs will increase with reduced immigration and deportation of immigrants.
- This administration may "pick favorites" as far as trade, and tariff actions and border delays are an unknown. Cost and pricing in 2025 is a wild guess at best. We've already have several customers trying to tie us into no increases for 2025.

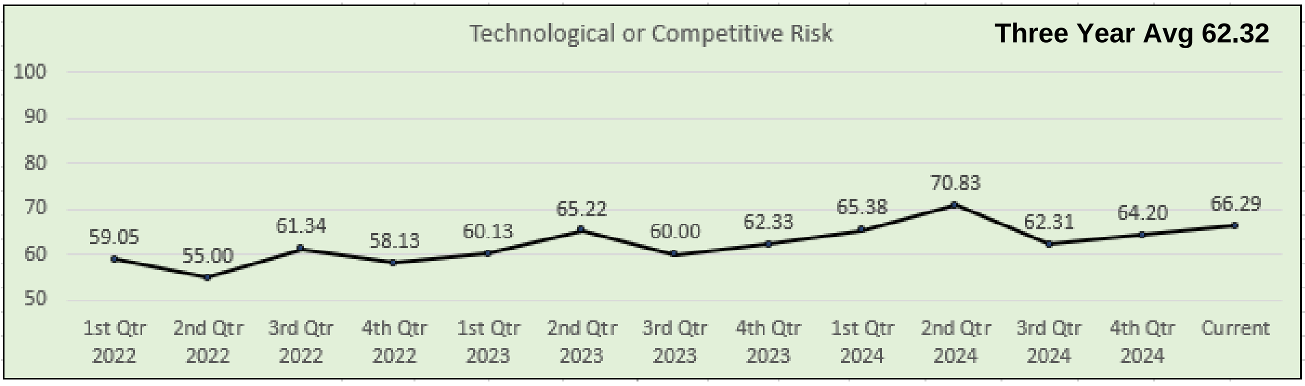


05 Technological or Competitive Risk

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

Selected Comments:

- Increased risk in this area is expected due to: 1) disruption caused by new and different uses of AI, 2) competition forcing large investments in AI which may not be profitable, and 3) increased use of BITCOIN with opaqueness and lack of regulation.
- AI will continue to become a key competitive advantage for those who can implement it effectively.
- Lower cost, lower quality alternatives have entered the durable goods sector and are fighting for shelf space with my company.
- The momentum towards electrification/alternative fuel vehicles in the transportation industry may be delayed as a result of the Trump administration policies.
- Compared to manufacturing, internal operations and quality management and risk management will not likely change in the short term. However, in the longer term, even in FY2025-26, this will likely be impacted technologically and competitively.
- As IOT, AI etc. will launch, risk will increase.
- We expect this risk to remain the same owing to the new product pipeline and existing product improvements intended to keep the company competitive.
- Cutting tools and NC machining evolve slowly over time and aren't really subject to short term technological changes. We have upgraded several pieces of equipment and added capacity in 2024.
- We expect this risk to remain the same as it remains to be seen what AI will do.
- We expect increased risk due to Artificial Intelligence.

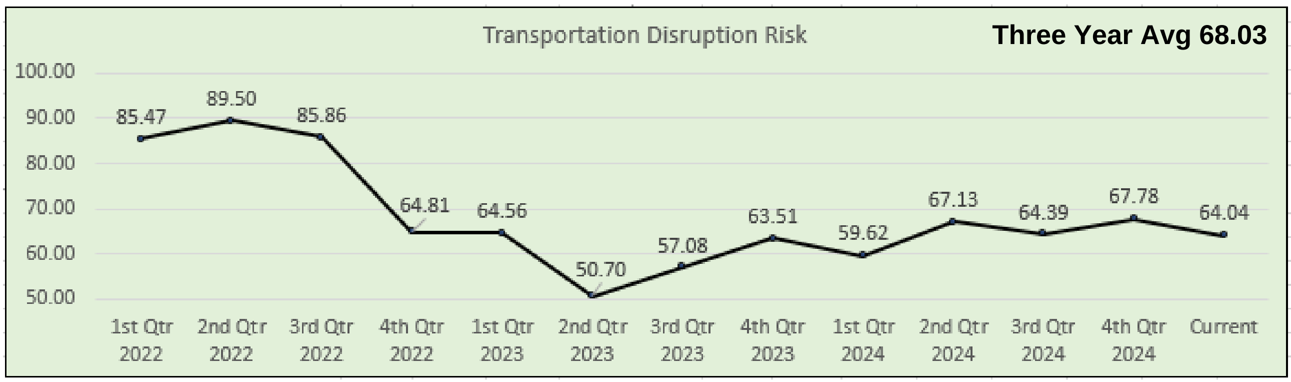


06 Transportation Disruption Risk

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

Selected Comments:

- Now that the election is done and the focus on energy revitalizes, transport cost and disruption should start to ease.
- We use only outside delivery services - UPS, FEDEX, DHL and others - per customer request. Transportation risk is not completely within our control.
- We expect this risk to decrease, but a port strike on the east coast could make it increase.
- There seems to be significant uncertainty as to how suppliers will be linked together. The more complex the supply chain, the greater the likelihood of disruption.
- Risk is expected to increase due to deportations, which will cause driver shortages.
- The ILA strike hasn't been settled and they continue to fight automation in the ports.
- U.S. port strike is expected to resume in January putting raw material supply at high risk of stockout. Increased logistics costs to be incurred due to air freight.
- The transportation industry has rightsized during the weakness of available tonnage in 2024. Additionally, almost 50% of the Yellow terminal capacity will not reenter the market.
- Risks have expanded with Panama canal water levels, potential strikes, port delays, etc.
- Currently, we are finding open availability with shipment from China and Taiwan to the United States.
- Some of the raw materials we use are sourced from outside the U.S. and level of accessibility may be subject to the unpredictable whims of the incoming administration.
- As infrastructure increases with digital access in our transportation facility, we strongly believe that risk will reduce.
- The threat of tariffs and the continuation of global instability will increase risk.

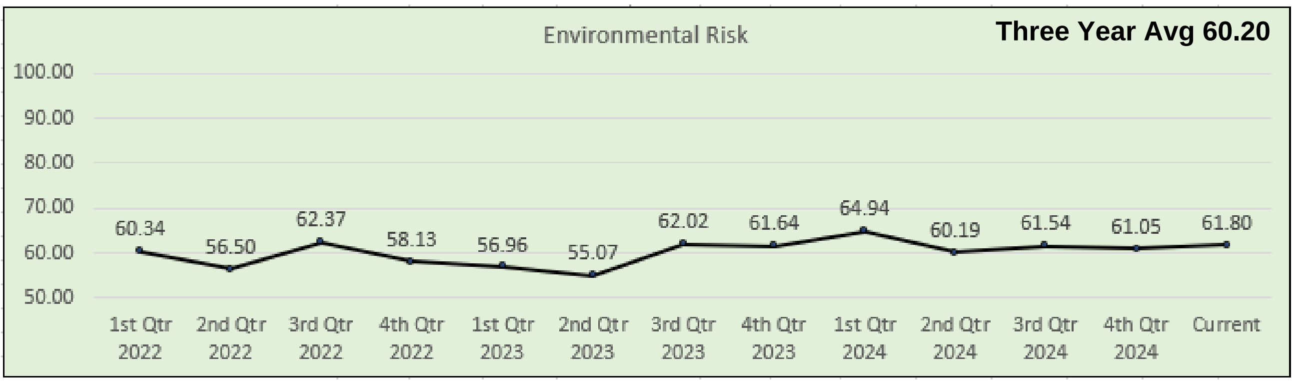


07 Environmental Risk

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

Selected Comments:

- We anticipate an increase in transportation risks related to winter storms. We have not had a "bad" winter in 5+ years, and a severe winter can create many challenges including increased energy consumption.
- Risk will increase as there will be reduced spending on climate issues.
- After a busy hurricane season in October, improvement in normal seasonality is expected. The Trump administration is expected to roll back many environmental policies, which will decrease risk in this area.
- It appears that global warming is increasing the chances of site disasters, such as flooding, tornados and very powerful storms of all types.
- We expect an increase in risk as we are in a hurricane-prone region.
- Suppliers who are located in areas prone to fire, earthquakes and flooding may be impacted even more in 2025.
- Environmental risk, on some level, is increasing for nearly every company and organization on the planet. How it is understood or reported is another matter, and how it impacts the bottom line in the short term is not necessarily apparent. Costs for new furnishings coming via NC, as an example, for campuses were impacted in the short term due to floods and hurricanes just this last fall, but companies like Steelcase have their own supply chains and manufacturers distributed broadly globally.
- We are destroying our planet.
- The uncertainty in this realm is psychologically magnified, all because people do not know how to deal with the problems. They run and hide and hope things will "magically" be better, (whatever that means).

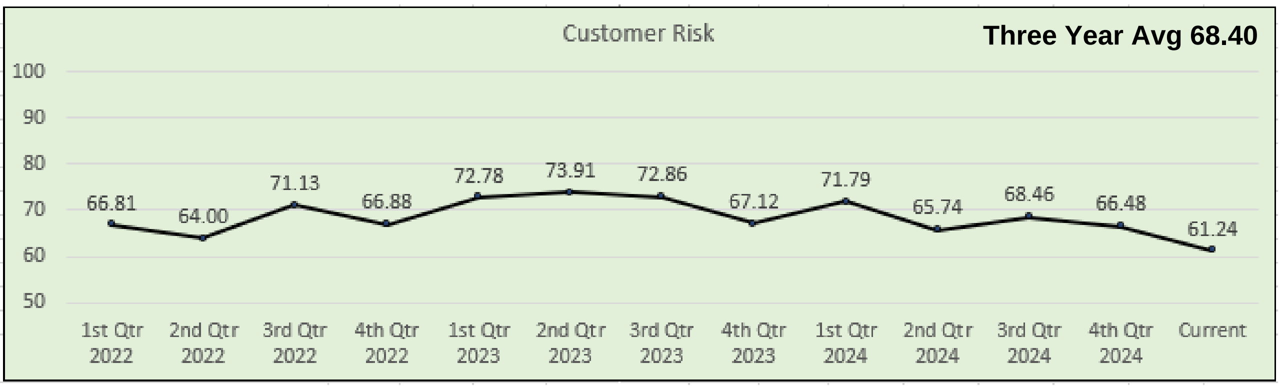


08 Customer Risk

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:

- No change in risk is anticipated. Our customers are members. Our work is based on their needs and production of/assistance in projects to implement international supply chain data quality and interoperability standards to help them and industry as a whole.
- Again, as the economy fluctuates consumer behavior becomes less predictable.
- As the ocean carriers build or buy their own marine terminals, they may choose to move away from their current third-party terminals. This could hurt our Port.
- Nearshoring will help.
- Risk will increase due to tariffs disrupting normal transportation patterns.
- As a regional state university, our customers (students) and stakeholders-shareholders (broad including tax-payers) are relatively consistent behaviorally, but the base demographics are changing, as well as behaviors influenced by social media, global messaging and potentially substantial changes in political-governmental administration at state and national levels. Decreases in available students due to a decrease in birthrates and changes in the interest in 4-year university studies at R2 and R3 institutions has the potential to impact supply chain and operational costs in the short term, but not necessarily the long term, dependent on operational shifts made internally. The quality of students entering may not be the same, however.
- As customer expectations increase, if companies do not change with time and demand, Customer Risk will increase. Cost is the most important factor for survival, so companies MUST focus on process.
- We have several long-term major customers with multi-year contracts and much of the business is already booked.



09 Operational Risk

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

Selected Comments:

- As the supply chain increases in numbers, there is more opportunity for failure. More is at risk.
- We anticipate a decrease in risk due to an investment to improve production machinery.
- We do not anticipate a change in risk. A good maintenance program and spare parts on the shelf are paramount to low Operational Risk.
- Winter is a more difficult time at a Port. So, there will be increased operational risk compared to the other seasons of the year, but not compared to other years.
- With "improvements" in technology, risk seems to be decreasing at present.
- University-level risks remain the same in terms of predicted and planned-for operations. International internal operations can more easily be impacted by students, staff and faculty participating in external programs, conferences, courses and events which can indirectly impact operational risks, including branch site disasters in other countries. Risk mitigation falls between operational and elements of customer safety as well.
- I worry that computer hacking will accelerate, and this risk will be increased.
- We expect Operational Risk to by higher because of warfare happening in regions where we have a presence.
- Operational Risk is a factor defined as effected by Data Transport.
- We are located in an area not prone to flood, fire or hurricane risk and we have good preventive maintenance on our equipment. We have also replaced several aging machines.
- We expect risk to decrease as the new administration smooths the international issues.
- We expect increased risk due to Union disruptions in January.
- Winter weather will increase risk.

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:

- The Boar's Head recall is impacting food safety/consuming processing capacity for HPP.
- This attribute is inextricably connected to the overall availability of workforce participation and attitude. Customer service is suffering at the moment, as firms are reliant upon AI bots and digital assistants as the first line with customers in need of help. No one likes getting lost in a sea of FAQs, etc.
- Quality risk will be monitored as the company management rep for quality (ISO 9001) is retiring in 2025 and training employees to assume new responsibilities.
- Poor quality execution from suppliers, particularly from overseas.
- The new administration will likely create a heightened risk of cyberattacks. Quality standards could be drastically impacted as a result.
- Government incentives are causing ports to delay purchases.
- Requirements to flow down to lower tier suppliers who, in many cases, don't have the resources to comply will be an increasing risk.
- Implementation of improved quality control documentation, and updating quality standards that we can adhere to, should lower the percentage of Quality Risk.
- Institutional quality is impacted by changing software and hardware, decreased enrollments, higher acceptance rates, students' poor reading skills, and divisional differences in assessments related to programs and products.
- Customers are also requesting ISO 28001 certification to better manage SC Risks.
- As quality standard and customer expectations are changing quickly, we are predicting risk increases year-over-year. We must be prepared and must improve our benchmark.

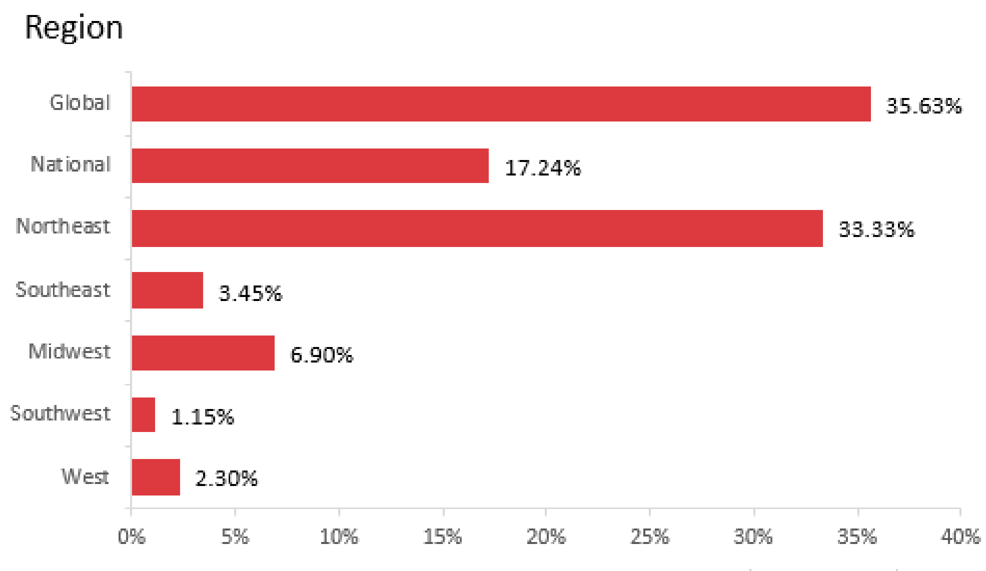
Appendix A
Risk Index Summary

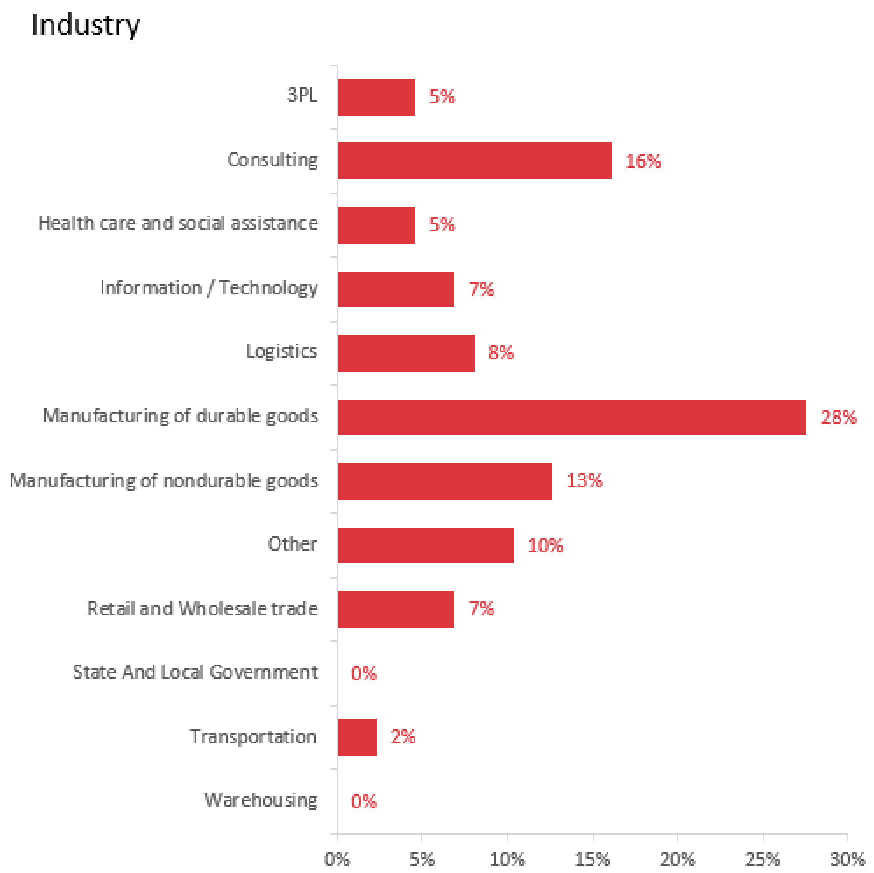
The Risk Index is a number between 0 – 100.
Risk Index ≤ 49 suggests less risk
Risk Index = 50 indicates no change in risk
Risk Index ≥ 51 suggests greater risk

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

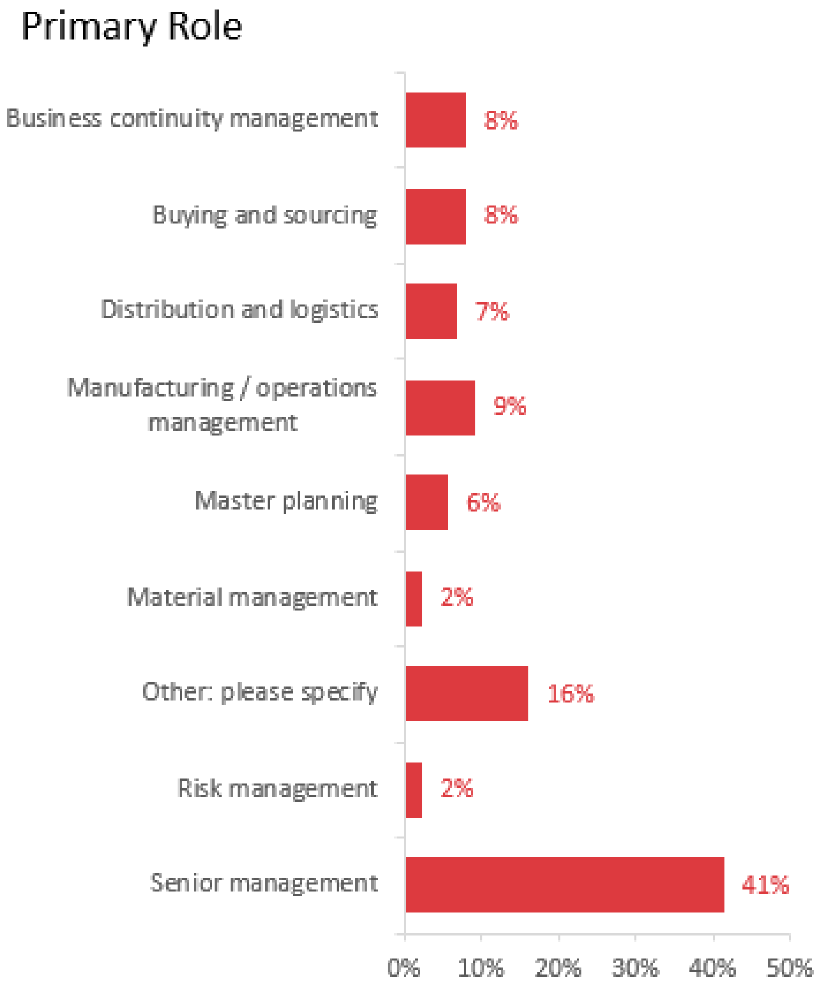
Appendix B

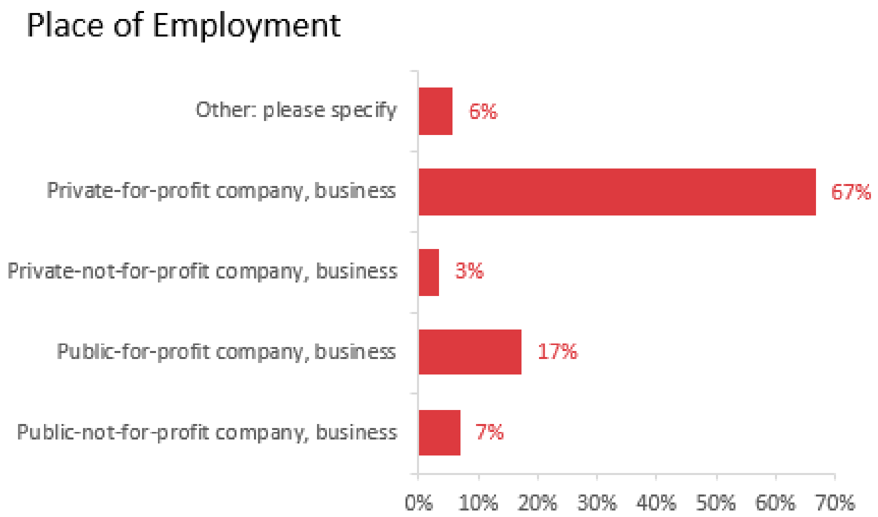
Survey Demographics





Appendix B
Demographics (continued)





Appendix B
Demographics (continued)