Lehigh Business Supply Chain Risk Management Index

Quarterly Report

4th Quarter / 2020

College of Business

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 developed this index to better understand the different kinds of supply chain risks businesses face. Supply chain professionals' rate the likelihood that the risk in the 4th Quarter of 2020 compared to the risk in the 3rd Quarter will likely increase, remain the same or decrease for 10 different 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 is 66.97 suggesting a high level of risk in the 4th Quarter.

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.

Overview

Risk Type	Risk Index	Trend
Economic Risk	78.26	⬇
Supplier Risk	74.38	⬇
Cybersecurity and Data Risk	72.13	⬆
Customer Risk	70.66	⬇
Government Intervention Risk	70.43	⬆
Transportation Disruption Risk	69.60	⬇
Operational Risk	60.00	⬇
Environmental Risk	59.13	⬆
Technological or Competitive Risk	58.26	⬆
Quality Risk	56.80	⬆
Average Risk Index	66.97	⬇

The Risk Index is a number between 0 – 100.
The further the number is from 50 the greater the level of risk.

Four biggest risks in 4th Quarter 2020

(When compared head-to-head.)

1. Economic Risk
2. Operational Risk
3. Customer Risk
4. Supplier Risk

Did You Know?

The Lehigh Business Supply Chain Management Risk Index for the 4th Quarter in 2020 is

66.97

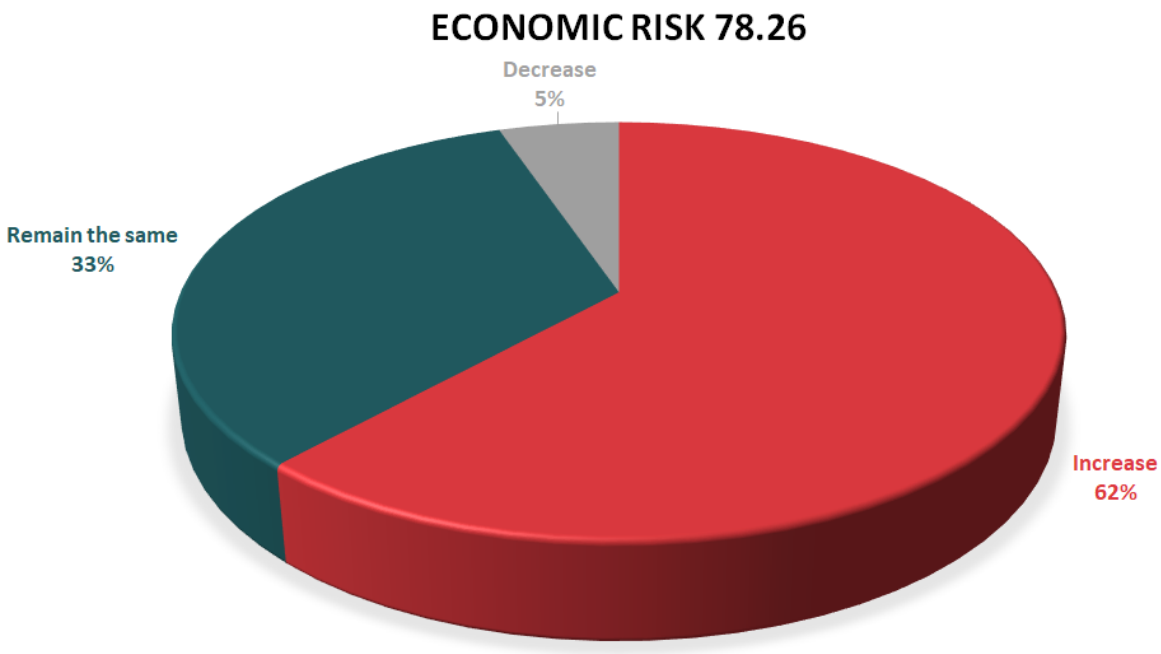
SUPPLY CHAIN RISK INDEX™ LEHIGH + CSCMP

01 Economic Risk

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

Selected Comments:

- What will happen to the economy later in the year with a potential flair-up with COVID and the uncertainties of the Presidential elections?
- Until we get the virus under control, our business is uncertain.
- Continued labor shortages due to stimulus benefits exceeding prevailing wage levels disincentivize workers from re-entering the workforce.
- Hopefully Economic Risk should slowly decrease, as the global economy gradually improves from the depth of the COVID recession.
- Already increasing. People are afraid to leave their jobs and start a new one.
- Anticipated consumer demand changes amid opening, closing, and re-opening pattern in various states with COVID outbreaks.
- Huge US government deficits will have an impact on investments and consumption as people have to tighten belts related to reckless Government spending.
- Demand spikes has necessitated purchasing additional product to augment the supply of products that we manufacture.



02 Supplier Risk

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

Selected Comments:

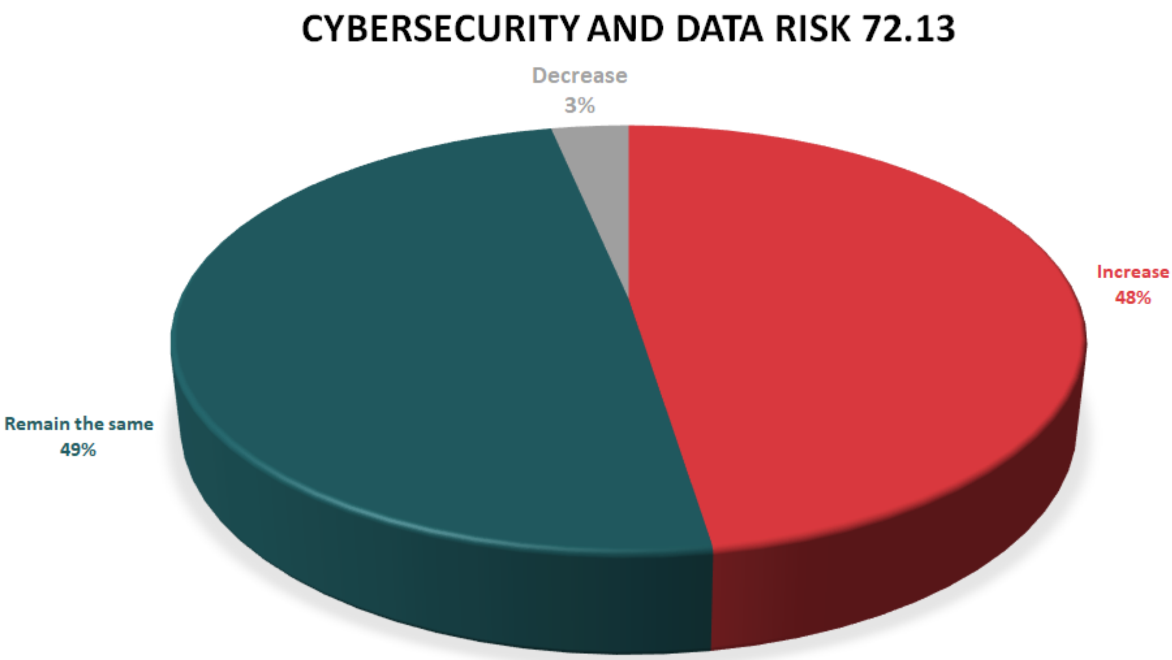
- We have control over our suppliers; however, we have no influence over their suppliers.
- We believe supplier financial risk during COVID-19 is the primary risk.
- Small sized suppliers <$10M in sales are at financial risk due to pandemic.
- Suppliers may go out of business. Deliveries may be inconsistent.
- Labor availability is affecting our suppliers.
- The reliability of suppliers is one of the largest issues with Covid-19.
- Due to the economic downturn in China, our risk of supplier bankruptcy or production reduction has increased.
- We are having issues with our Chinese supply chain partners. We are approving alternate geographically located suppliers to help offset some of those risks.
- Efforts to avoid tariffs from China have driven many customers to other countries that are 1) not prepared or 2) completely overwhelmed.
- Supply options are tightening placing more concentration on domestic materials where domestic suppliers control availability and pricing.

03 Cybersecurity and Data Risk

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

Selected Comments:

- Remote work will increase the potential for a cyber-attack.
- We have seen an increase in phishing attempts against corporate executives.
- If companies aren't moving to API, IoT and newer technologies they will have issues.
- We continue to hear of other industries that are having their systems compromised.
- People working from home may be more vulnerable.
- This continues to be a risk and will only increase with the number of remote or teleworking employees.
- Expecting further cyber-security attacks with online Holiday shopping.
- Earlier this year we were hit with a ransom virus. This exposed many weaknesses in our system that have now been corrected.
- We have been working for the last 4 years on our network security systems. We now enjoy the decreased risks associated with those efforts.
- Cyberattacks increased, Phishing emails keeps coming through.
- More organizations working remote has led to an increase in cybercrime.

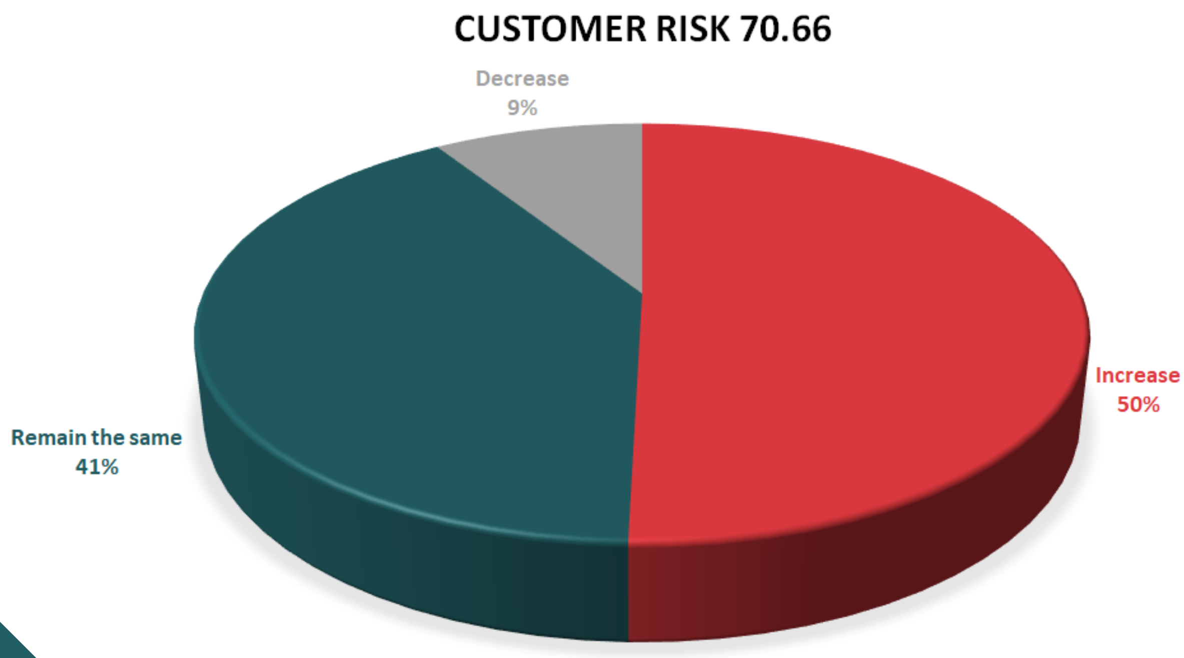


04 Customer Risk

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 customer.

Selected Comments:

- Unfortunately store closures, bankruptcies are common for our Retail customers.
- Economic disruption increases private equity buyouts of our customers; this decreases customer loyalty, increases management change at customers, and can change the product and service mix they buy.
- What will the holidays look like?? No one knows and this is the biggest risk to Q4.
- Easing of restrictions and more people going back to work has decreased the customer risk this quarter.
- Servicing the customer at previously agreed prices is almost impossible due to double and triple transportation costs.
- Customers are struggling to find labor and velocity of the transportation network is decreasing due to greater dwell times at origins and destinations.
- Some customers unilaterally pushed payment terms out from 30 days to 60, 90, 120 days, forcing a similar move toward our suppliers to offset cash shortfall.
- Customer demand has been very difficult to predict leading to capacity shortages.

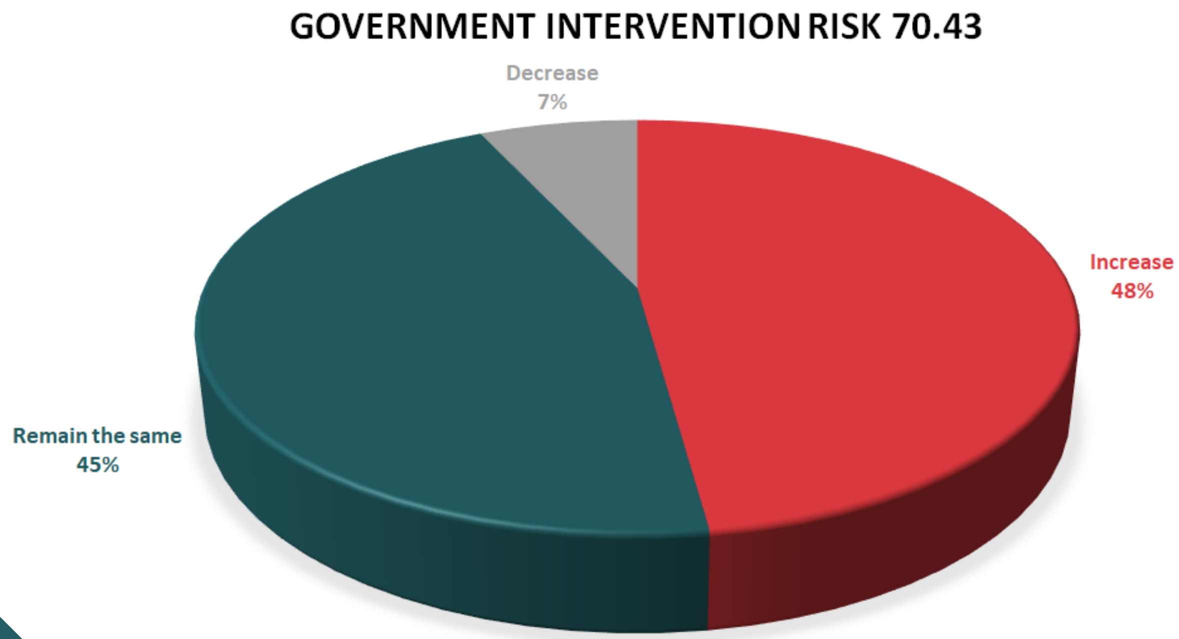


05 Government Intervention Risk

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

Selected Comments:

- There is a way to negotiate without creating such aggressive global trade wars.
- 301 Tariffs with China remain a large "tax" on US economy.
- The US/China Trade War may get worse, thus hampering/restricting shipments of products to and from China. Costs may go up as more tariffs could be applied.
- Unemployment benefits cause large issue, even in union backed plants.
- Increases in regulations surrounding Covid-19 in warehouses and in retail locations increases risk to our business.
- Tariffs and duties are still unknown and changing daily. Government is not sending consistent messages causing backlashes and misunderstandings across trading partners.
- Government must roll all import export agencies governing compliance and licensing in ONE- There is much duplicity and burden on small logistics providers.
- Election dependent to some degree.
- The more the Govt protects the steel industry the higher the price for manufacturing. Only when our Mfg. customers make money so do we.

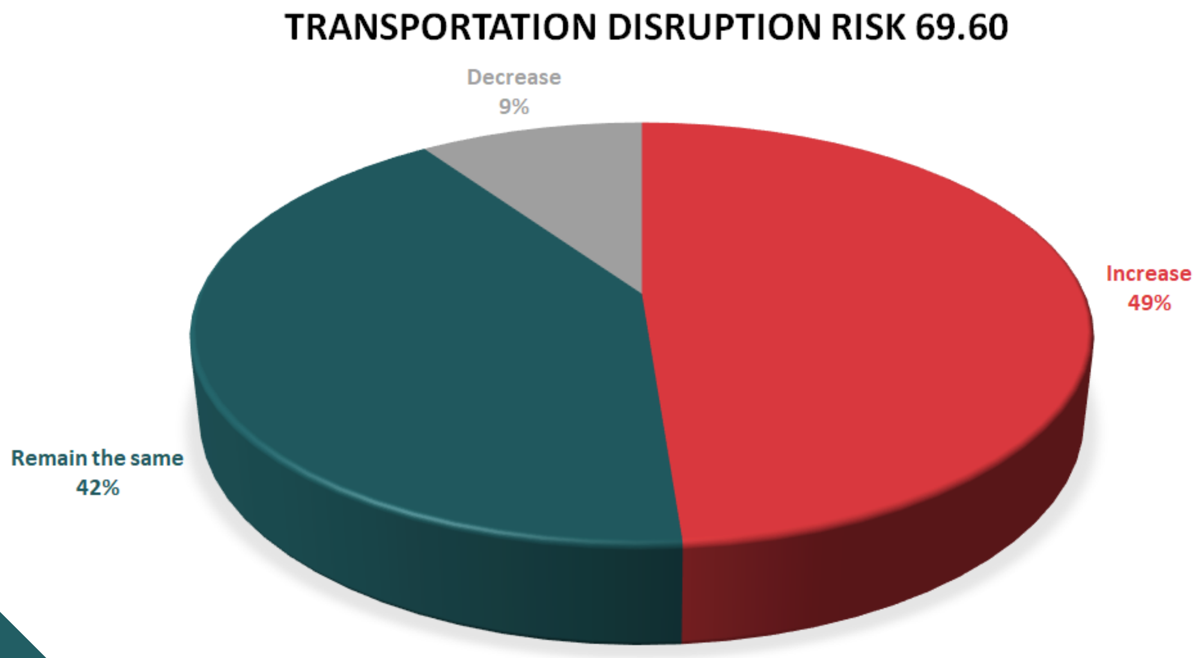


06 Transportation Disruption Risk

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

Selected Comments:

- Driver availability and demand volatility are greatest concerns.
- USPS delays in delivering payment by check may reduce cash flow.
- Concerned that linehaul carriers will go out of business and that November election results will disrupt business.
- Demand will continue to make wild swings (mostly downward) for some time to come.
- Air cargo lanes are still very tight and near capacity due to the lack of belly cargo on passenger planes.
- Issues with cold chain capacity with potential new vaccine production.
- Demand for transportation is increasing leading to capacity issues for Rail and Ocean.
- HOS. Driver shortage, capacity issues, unknown demand could all impact Q4.
- Lack of trailer pools across the entire company with increased demand. Covid-19 guidelines slowing production inside facilities causing trailers to sit full.
- Driver shortages and where drivers refuse to deliver/pickup will increase costs.
- Demand will remain far beyond the capability of ALL asset-owned service providers.

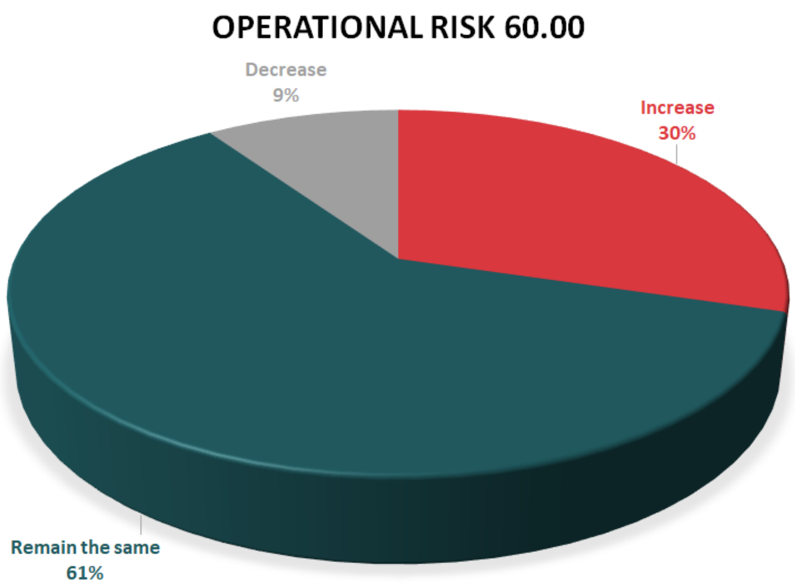


07 Operational Risk

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

Selected Comments:

- Concern about the November elections and the disruption to supply chains if violence in major cities increases. Trucking companies may not to deliver to hot spots.
- Counterfeiting is rapidly increasing.
- COVID-19, even with extensive industrial social distancing and safety procedures, threatens unplanned shutdown of manufacturing and logistics facilities at any time.
- Availability of temporary labor is the wild card in Q4.
- Higher demand working in e-commerce if Covid-19 does not slow down so there is large risk with holiday season coming.
- Lack of labor due to unemployment benefits and Covid-19 at home schooling will impact material vendors, plants, and transportation industry (whole supply chain).
- Avalanches of business have swamped parcel, LTL and TL carriers to the point that embargoes to/from hubs and geographic areas are expected. Many are +130% of capacity - and have been - for months now.
- Our trucks have already been damaged and broken into by protesters in 2 cities.

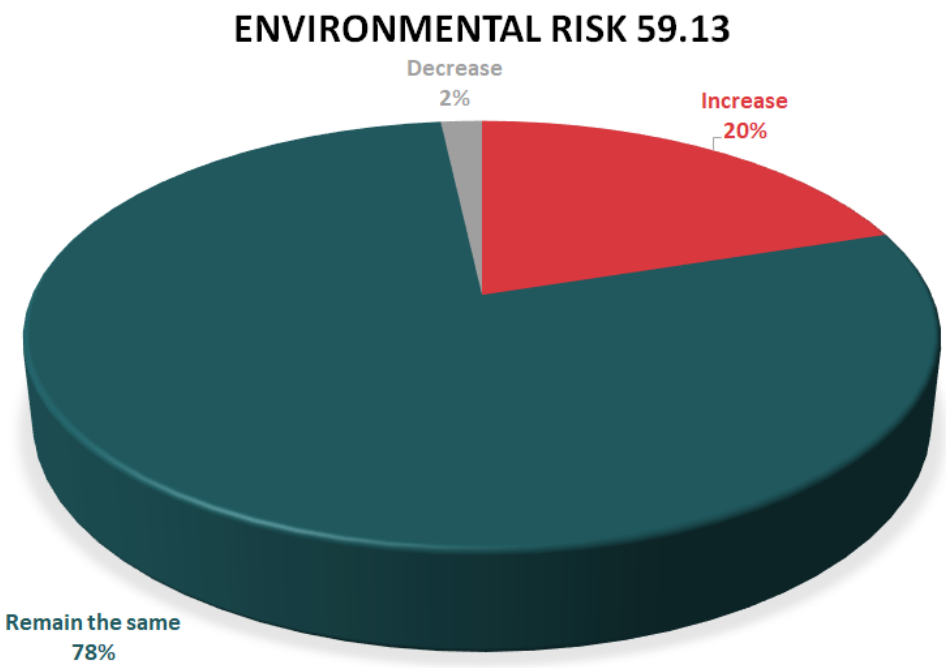


08 Environmental Risk

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

Selected Comments:

- We are inland and not near water, so less likely to face a problem.
- Hurricane season gets worse in the fourth quarter of every year.COVID-19 spike coupled with flu.
- Global warming is already increasing natural disaster risk, and this will accelerate.
- Hurricane season may impact supply chain.
- No significant Environmental Risk.
- Hurricane season.

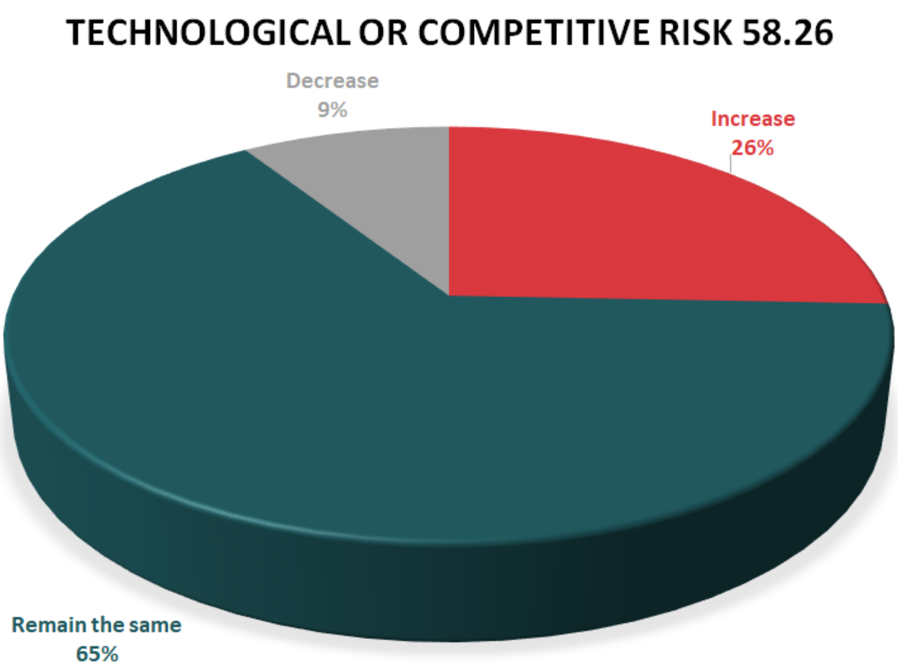


09 Technological or Competitive Risk

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

Selected Comments:

- Competition is more intense, technological change with ML and AI may become differentiators, and there is less regulation (for good and bad).
- Most companies have not invested in new technologies for their supply chains and transportation systems and very few companies have real time visibility (RTV) to make intelligent real time decisions.
- Everyone is working harder to find new business, so competition will increase.
- Difficulty adding staff to handle the typical seasonal spikes will impact any company who has not invested in technology/automation to supplement their staff.
- We see digitization efforts increasing and this change will be risky to companies that are not staying current with new technologies that increase competitiveness.
- No significant Technological Risk BUT Competitor Risk grows as larger resellers can buy better than a smaller reseller. We still feel we can compete.
- An old but poor competitor has been acquired and may have new life.

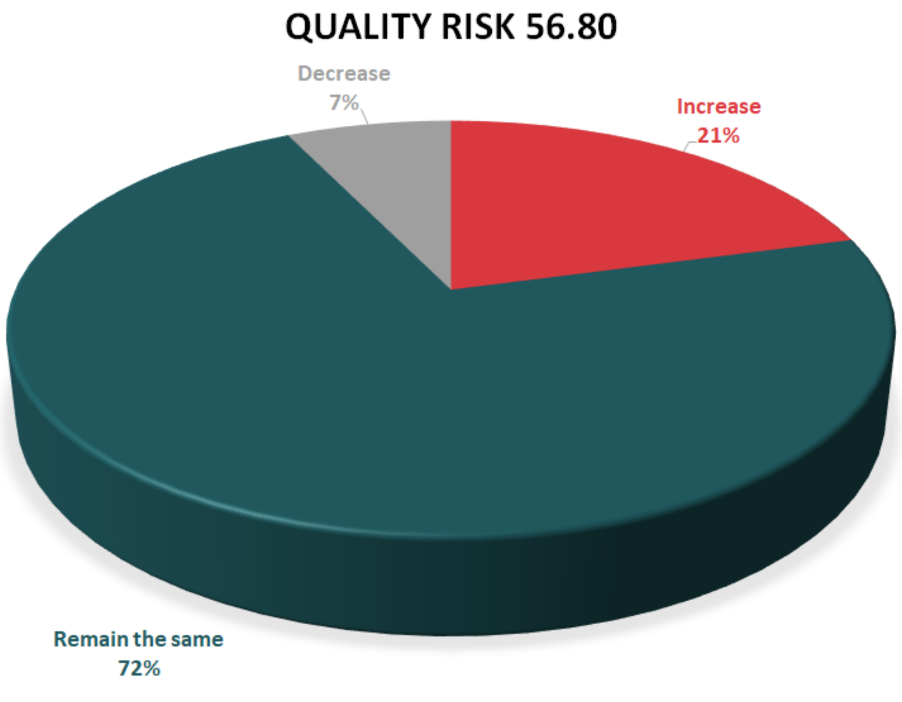


10 Quality Risk

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

Selected Comments:

- Turmoil in operations may cause more quality issues.
- As idled plants start up again, there is some degree of inherent Quality Risk.
- High unemployment reduces turnover and keeps the labor pool consistent and within standards.
- FDA has lessened the need for strict NFPs during Covid-19, lack of transparency could cause quality issues. Additionally, new temporary employment to cover plant absenteeism could cause quality issues, as they are not as well versed on protocol.
- Automakers continue strong efforts to recovery quality costs from all suppliers.
- Due to the increased use of 3PL providers we have had an increase in quality issues.
- We tightly control two and three tiers down in our supply chain.
- Our quality is in the on-going service we provide to liaise with chosen vendors. Gaps in vendor's services means we have to fill, leading to 4 times increased shipment time.
- Increasingly companies are forced to hire and train new workers, more quality issues.

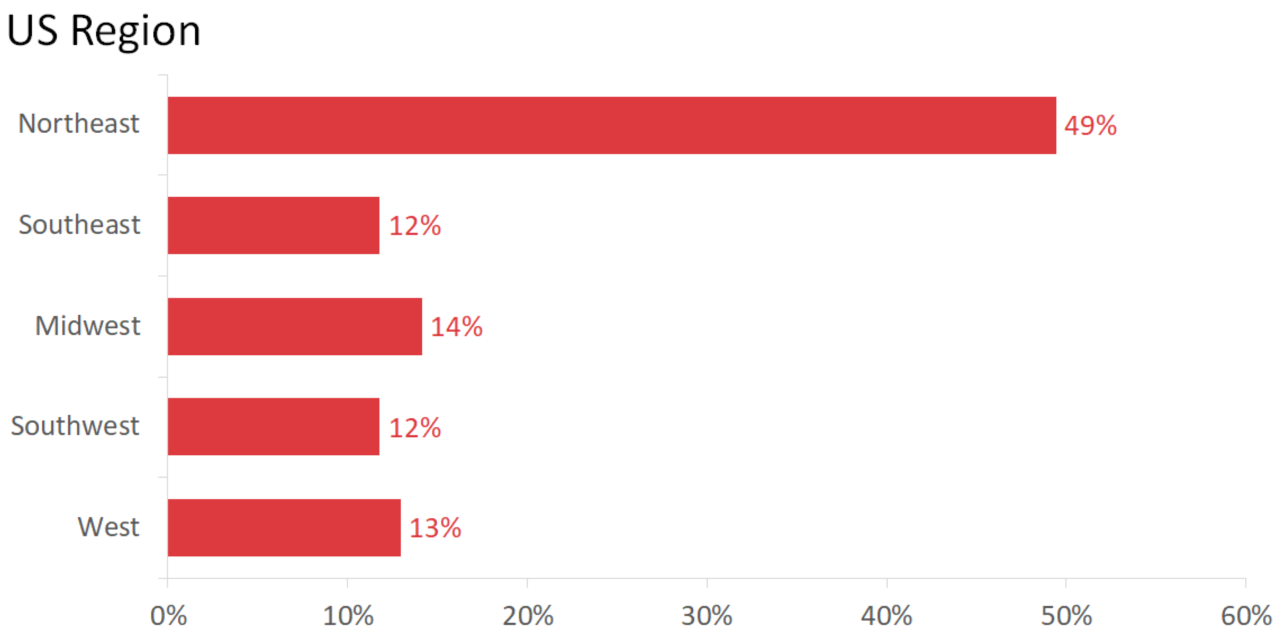


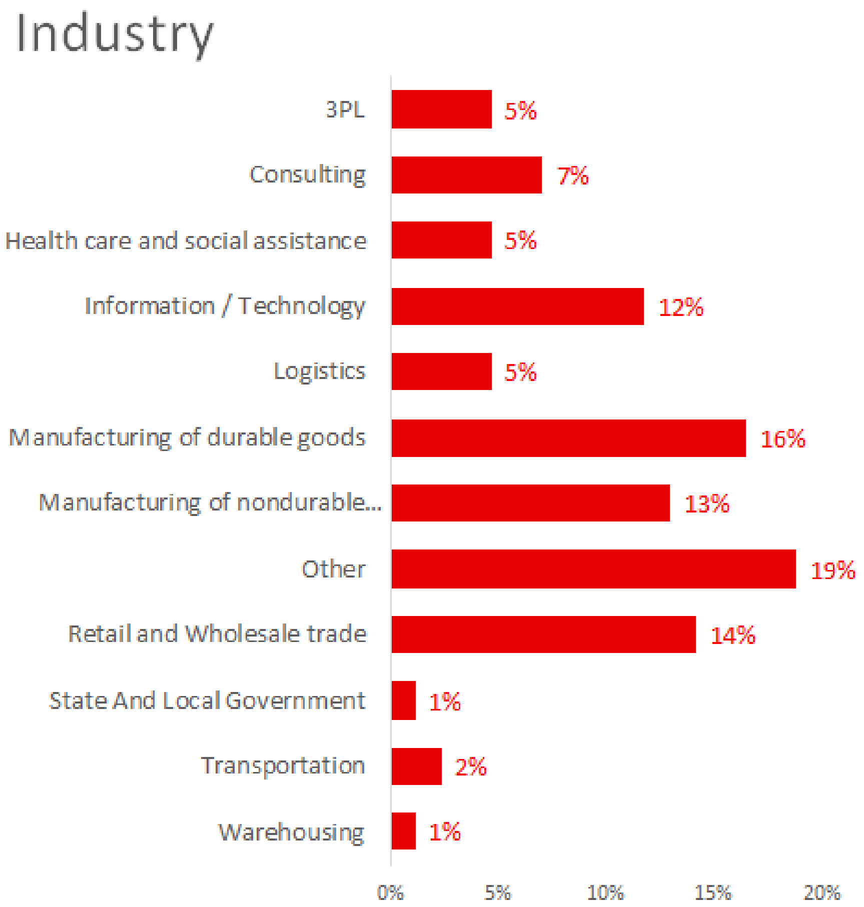
Appendix A
Risk Index Summary

The Risk Index is a number between 0 – 100
Risk Index $\leqslant$ 49 suggests less risk
Risk Index = 50 indicates no change in risk
Risk Index $\geqslant$ 51 suggests greater risk

The further the number is from 50 greater the level of risk
LBRI = (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

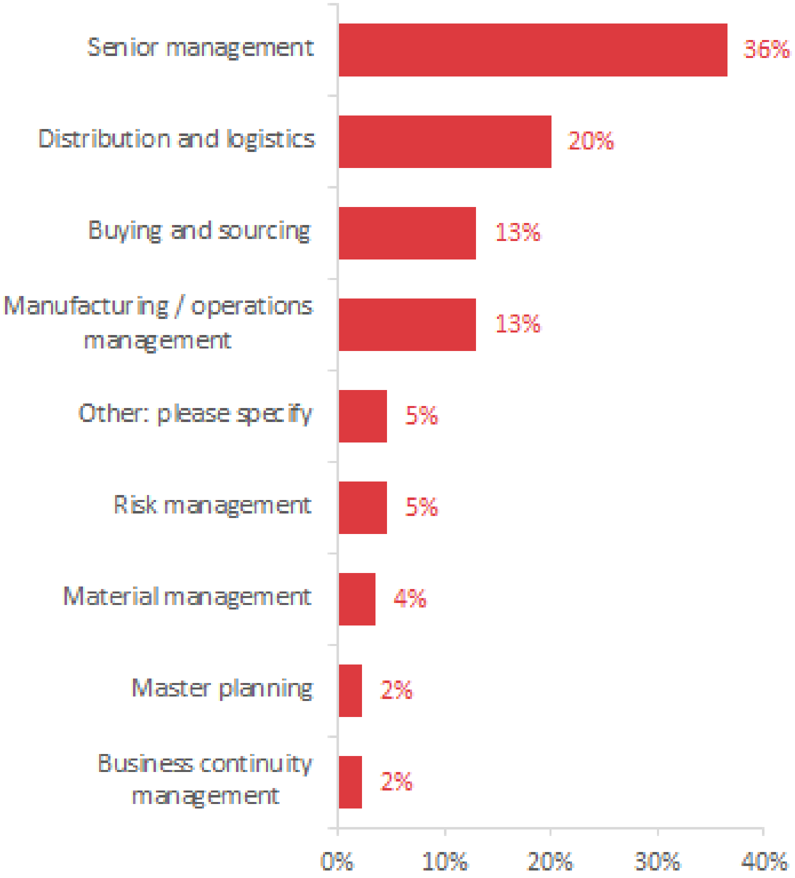
Appendix B
Survey Demographics



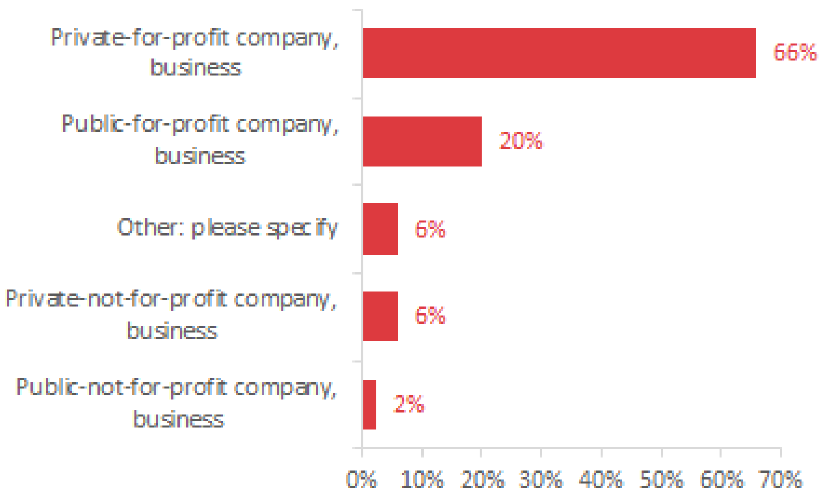


Appendix B
Demographics (continued)

Primary Role



Place of Employment



Appendix B
Demographics (continued)