

# AEROSPACE AND DEFENSE THE FINANCIAL IMPACT OF COVID-19 ON THE ROLLS- ROYCE SUPPLY CHAIN

Student researcher Khushboo Jain investigates how companies in the entire A&D sector can adapt when challenges arise, not only during a pandemic, but also during other global crises.

## Abstract

After the pandemic hit in 2020, the aerospace and defense industry was specifically impacted very harshly. Rolls-Royce was one of the main companies that had to go through major structural and logistical changes to cope with the changing economy. As one of the leaders of the aerospace and defense (A&D) industry, the main problem that Rolls-Royce was facing was the drastic reduction in demand for civil and commercial aircraft, which was one of Rolls-Royce's core businesses. This led to supply chain problems, reduced profits, and eventually heavy losses. The effects of these problems caused great distress in the company.

My specific role was twofold: to analyze their financial statements for the present and to provide risk management strategies for the future. For the former, I offer solutions on how they can minimize their losses and maximize their profits. Most of my research on this part was conducted by studying how companies performed under great financial distress in the past during black swan events, such as the housing crisis of 2008, the Great Recession, the dot-com bubble, and so forth. For the latter risk management objective, I created a personalized risk matrix for Rolls-Royce by identifying and ranking all their current and potential risks. Then I prioritized the risks that required more attention based on both qualitative and quantitative analyses of cost and performance impacts, and presented recommended solutions for these risks. Overall, I address six main issues and risks that Rolls-Royce should focus on and provide solutions to mitigate them.

## Keywords

aerospace and defense industry, pandemic, economy, supply chain, profits, losses

## RISK ANALYSIS

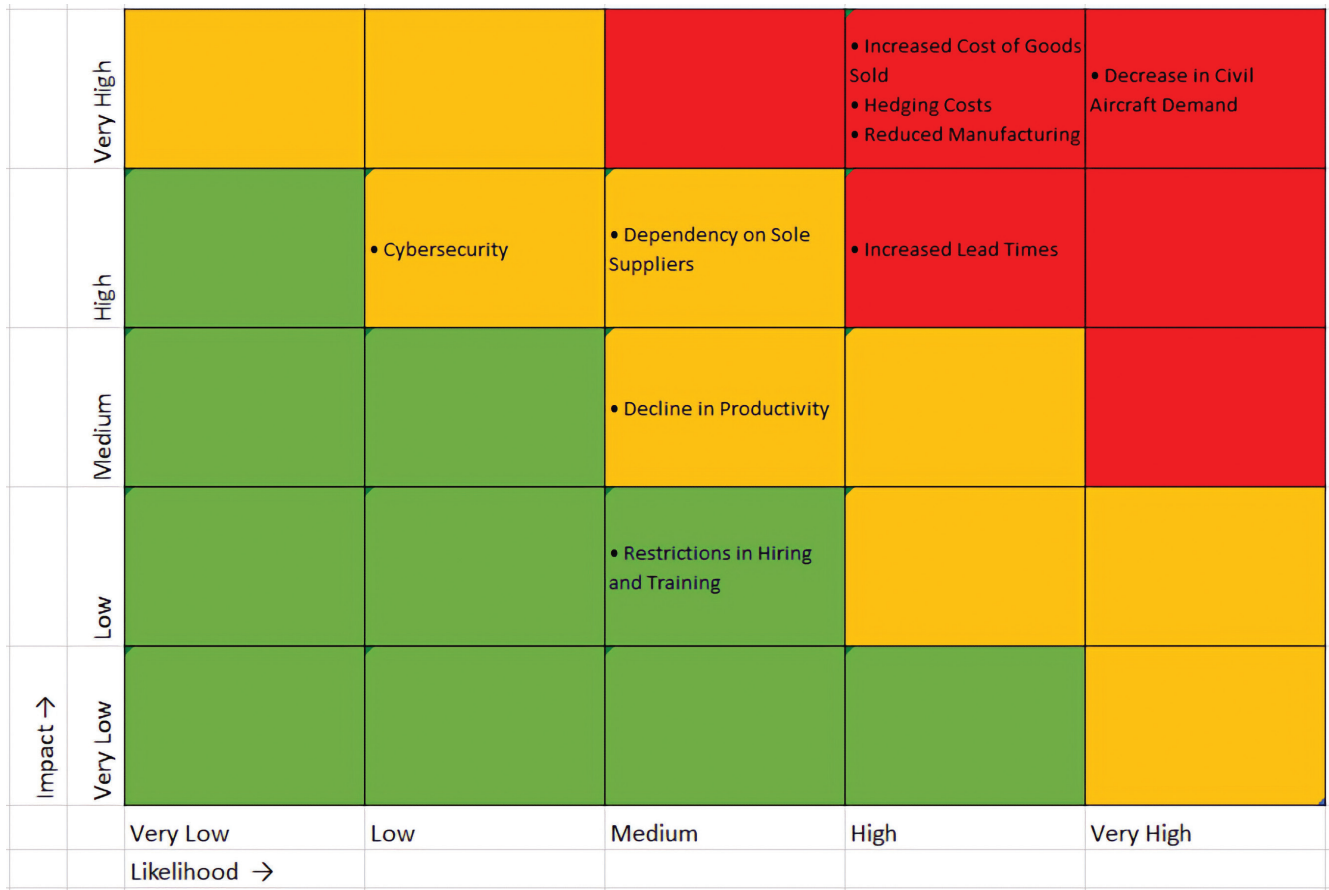
As per the risk analysis I conducted using the IRIS intelligence software, I narrowed down the top six risks and issues that I would recommend Rolls-Royce to prioritize and focus on. I discuss these issues in greater detail throughout this paper:

- 1. DECREASE IN CIVIL AIRCRAFT DEMAND**  
Since a majority of commercial flights were grounded, the civil aircraft demand decreased drastically, causing heavy losses.
- 2. INCREASED COST OF GOODS SOLD**  
With decrease in delivery, inventory costs increased. Fixed costs also remained high due to backlogs and high lead times.
- 3. LAYOFF IMPACTS**  
Productivity levels had been impacted due to changes in mental health while working from home amid COVID-19.
- 4. CURRENCY HEDGING RISKS**  
Due to the sudden hit of the pandemic, Rolls-Royce was experiencing a shortfall of USD cash receipts and had to reduce its hedge book.
- 5. INCREASED LEAD TIMES**  
With the pandemic shutting down many businesses, procurement, production, and delivery times were delayed, which resulted in delayed orders.
- 6. DEPENDENCY ON SOLE SUPPLIERS**  
Sole/single supplier relationships have historically proven beneficial in the A&D industry, but the ongoing climate showed the fallacies of this strategy.

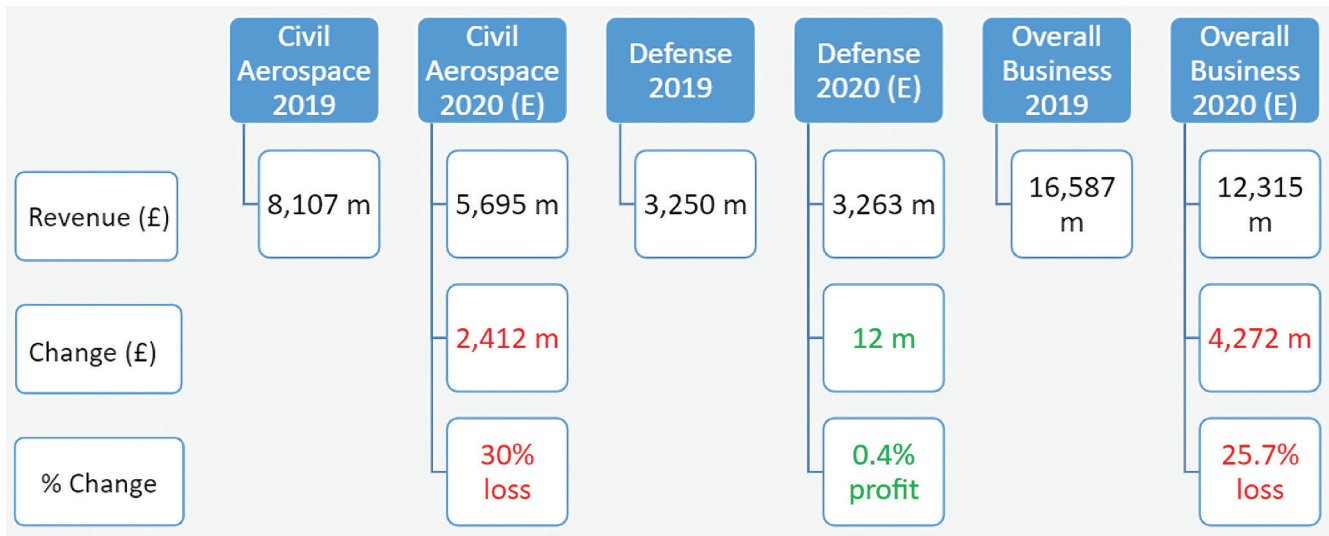
## DECREASE IN CIVIL AIRCRAFT DEMAND

After conducting a general high-level analysis of the company's overall financials, figure 2 shows that COVID-19 had very diverse effects on the company's revenues. The civil aerospace business had been heavily impacted, taking major losses, while the defense business seemed completely unaffected as it continued to make profits and increase revenue over time.

With the civil aerospace sector taking a 30% loss and the defense sector making a 0.4% gain, Rolls-Royce



**FIGURE 1.** Risk matrix: Heat map indicating the prioritization of risks and issues by analyzing their likelihood and impact.



**FIGURE 2.** Analysis of overall financials of Rolls-Royce based on total revenue and change in revenue from 2019–2020 (expected). The estimates taken in this analysis for 2020 are from the analyst consensus published on Rolls-Royce’s website, while the 2019 figures are from their annual report.

could take advantage of its strengths and weaknesses in this scenario. That being said, their civil aerospace segment is much larger and is part of their core business, which is why we see the overall core business taking a 25.7% loss. With this analysis, it is evident that the costs in the civil aerospace business need to be managed, and heavy losses need to be mitigated. This analysis also tells us that these losses can be mitigated by focusing on the better performance of the defense sector and taking advantage of the unaffected defense market to ultimately maximize the company's overall profit. As per this analysis, I would recommend that Rolls-Royce consider taking on more government projects and shifting more operations to focus on their defense business if civil aerospace profits continue to decline over time.

### INCREASED COST OF GOODS SOLD

The next in-depth analysis performed is the company's financial statements. When looking at the company's income statement specifically, one can notice an extremely high cost of goods sold (COGS) for the past several years. After more research, I found that this problem was occurring because a lot of A&D companies run with a lot of debt as they are capital-intensive industries. They have a high backlog of orders due to which their COGS are their highest costs for the running of their normal operations. To further analyze this problem of increased COGS, I performed a three-scenario cost analysis for Rolls-Royce in the figure 3. In the first column, the breakdown of the fixed costs and variable costs can be seen along with the costs expressed as percentages of the revenue.

The first column scenario shows that the fixed costs and variable costs do not add up to 100%, which is the reason why Rolls-Royce currently has positive revenues but a negative net income. To solve this issue, it is important to note that fixed costs and variable costs both need to be reduced. This can be done by increasing efficiency in the functioning of the company, reducing unnecessary costs, and through restructuring of finances.

In the second scenario, a similar breakdown of costs has been done for the year 2020, after updating the estimates of revenues, which include the impact of COVID-19 on

	Total Business 2019	Total Business 2020(E)	Total Business 2020(E)
Revenue (£)	16,587 m	12,315 m	12,315 m
Fixed Costs (FC)	2,296 m	2,296 m	1,704 m
Variable Costs (VC)	15,645 m	11,615 m	11,615 m
Fixed Cost Percentage	13.84%	18.64%	13.84%
Variable Cost Percentage	94.32%	94.32%	94.32%

**FIGURE 3.** Analysis of fixed costs (FC) and variable costs (VC) of Rolls-Royce from 2019–2020 (expected). FC and VC are not equal to 100%, resulting in negative net income. Potential \$433 million cost savings due to layoffs. By bringing better efficiency and optimization within operations, the company should bring down the variable costs substantially.

Rolls-Royce. These figures have been taken from the analyst consensus released on Rolls-Royce's website.

In this scenario, the fixed costs have been kept constant and variable costs have been adjusted to meet the decreased demand by taking the same percentage proportion of the previous year as an estimate. This shows the financial position the company would be in if it made no major changes in fixed costs for the year 2020. In this analysis, it can be seen that the total costs rise to approximately 113% from 108%, which is a full 5% increase. This shows that if these costs aren't reduced, the company will be facing heavy losses due to the impact of the pandemic.

As a result, in the third scenario, fixed costs have been reduced along with variable costs, holding the percentages from 2019 constant to reflect neither an increase nor decrease in costs so that the company can retain the financial position it had in 2019 in terms of total costs. Through this analysis, I would recommend that Rolls-Royce should reduce its fixed costs by £592 million and variable costs by approximately £4 billion compared to 2019. These figures appear in red in figure 3, as the company is still operating at a net loss if it does so. Despite this, to work toward a more realistic goal, it would be highly recommended for the company to focus its current efforts on retaining its financial position from before the pandemic and then gradually continue to reduce these costs over the next few years.



**FIGURE 4.** Financial impact of layoffs in Rolls-Royce based on revenue per employee. According to the financial analysis, I took the revenue of the aerospace and core business sectors primarily across two years (2019 and 2020). The 2020 figures are estimates taken from the analyst consensus report published on the Rolls-Royce website, and the number of employees are from the 2019 annual report.

## LAYOFF IMPACTS

One of the primary things that companies do during financial crises is layoffs. Layoffs are very impactful when a company needs to directly reduce its fixed costs. Corporate layoffs especially can be very convenient in these times, without impacting the manufacturing side, and thus, the revenue of the business. During the summer of 2020, due to the sudden losses that Rolls-Royce was facing, they announced that they were going to have layoffs in the company. In this analysis, I try to quantify the financial impact of these layoffs and figure out whether they actually help Rolls-Royce in such a scenario or not.

In figure 4, I calculated the revenue per employee to see how much an employee was contributing to the company financially, on average. I did this simply by taking the total revenue of that business segment and dividing it by the total number of employees in that segment. I found that in 2019, the average employee was contributing approximately 310,000 pounds toward the civil aerospace business and 302,000 pounds toward the overall core business.

Then I calculated the difference in employees after taking into consideration the layoffs that Rolls-Royce had announced to meet the new demands after the

COVID-19 impact. This was approximately 8,000 employees from the civil aerospace business and 9,000 employees overall, which I have reflected in the core business in figure 4.

After taking the layoffs and 2020 estimated revenues into consideration from the analyst consensus, I calculated the revenue per employee for 2020 again and found that there is a 4,000-pound increase in the revenue contributed toward the civil aerospace business, but an 8,000-pound decrease in revenue toward the core business.

While this change was done to reduce costs and has been successful in the civil aerospace business in doing exactly that, it primarily is not a good sign for the core business to have such a high number of layoffs. This is because in global crises like the pandemic, this move can backfire as well. For a critical segment of the company, such as the core business, the company should focus more on increasing the revenue per employee. Even if the company has had layoffs, the work being done per employee should be high in such a time. Unfortunately, in this case, the revenue to employee ratio actually decreased after the layoffs, which was a truly concerning issue.

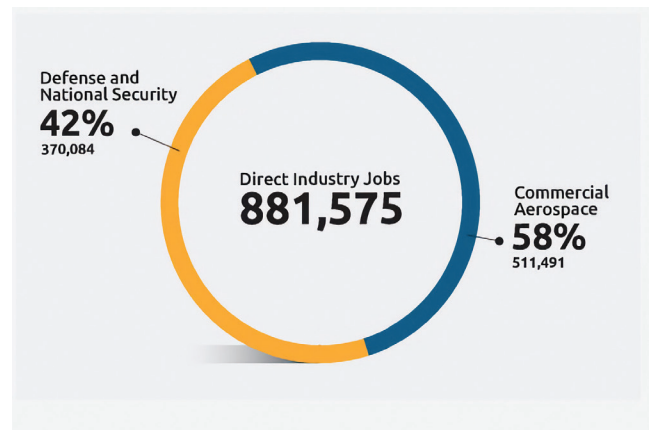
Therefore, my recommendation would be that the company should take efforts to bring their employee

productivity above average, which is the opposite of what can actually be seen. Not only would I suggest that Rolls-Royce maintain their employee per revenue for the core business, but I would also encourage them to strive to increase that ratio to face the challenges of the current market financially. Rolls-Royce can do this through a number of initiatives such as training their existing employees in different aspects of the business so they can work in multiple roles, ensuring operations in offices and factories are efficient, having temporary salary cuts, and so forth. While all of these options may not be the best solution for Rolls-Royce, I would encourage them to conduct some more research on what might work best for them.

## LAYOFF IMPACTS (MARKET VIEW)

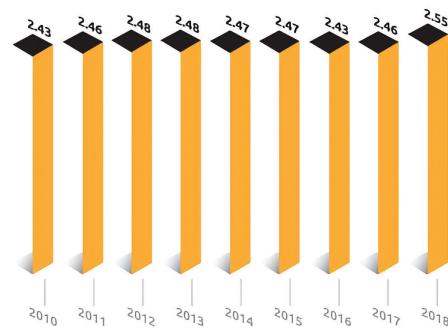
Figures 5 and 6 show us some insight into employment in the A&D industry and the impact that layoffs can have on the market economy as well. It can clearly be seen that commercial aerospace occupies a larger percentage of jobs in the market than defense and national security, according to figure 5 from the Aerospace Industries Association (AIA). It can also be seen from figure 6 that the total employment in the United States in A&D has remained more or less constant with certain drops and rises. While the jobs may have been constant, revenue has been rising in the industry, indicating that there was an increase in productivity or revenue per employee as the same amount of people contributed to higher levels of revenue.

After the impact of COVID-19, this has changed as many workers have been laid off. While these layoffs can be very beneficial for companies from a cost-saving perspective in the short term, it is important to note that this may bring a different set of challenges in the long term. Besides the rise in unemployment and the reputational loss a company goes through during layoffs, a company can also end up incurring more costs than expected by reducing its workforce. A company may have to rehire employees once it has achieved pre-pandemic levels of demand again. It can cost companies a significant amount to go back to their original productivity levels, especially after a recent layoff and with uncertainties in the market about jobs. This retraining and reemploying personnel after crises subside can cost quite a bit. Therefore, it is important to not only think about costs, but also to consider other factors when



**FIGURE 5.** Current A&D industry job breakdown as per the Aerospace Industries Association (AIA).

## TOTAL EMPLOYMENT IN U.S. A&D (jobs in millions)

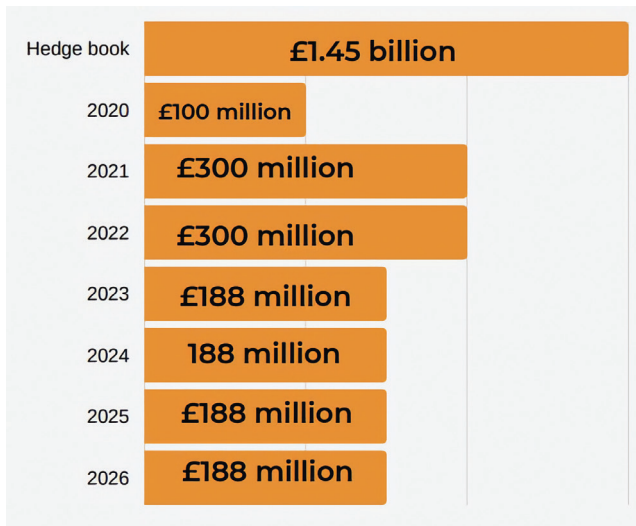


**FIGURE 6.** Total employment in United States in the A&D industry as per the Aerospace Industries Association (AIA).

declaring layoffs. Focusing more on the existing workforce and ensuring that they have the skills necessary to manage multiple functions of the company may be a better investment at times.

## CURRENCY RISKS

While studying the financials of Rolls-Royce, I also discovered that the company had entered foreign currency hedging contracts to protect the company from the volatile currency markets in the future. This was because Rolls-Royce has operations globally and deals with multiple currencies, especially in pounds and dollars. Now, due to the sudden hit of COVID-19, Rolls-Royce will likely experience a shortfall of USD cash receipts over the next seven years compared to its own hedged position.



**FIGURE 7.** Analysis of hedging book settlement by Rolls-Royce over next seven years. Figures taken from Rolls-Royce's H1 Trading report. Hedge book reduced by \$10 billion from \$37 billion to \$27 billion. Costs spread over next six years.

### Hedge Book Cash Settlement Cost Allocation

The best solution in this situation would be to reduce the hedge book to mitigate currency and foreign exchange risks. Fortunately, in a recent trading update published by Rolls-Royce, this strategy has already been implemented by the company very efficiently. The following information gives more insight into how Rolls-Royce mitigated and plans on continuing to mitigate this issue.

Rolls-Royce made a decision of closing out hedges that are no longer needed, and the company cut \$10 billion in its hedge book, from \$37 billion to approximately \$27 billion. In total, this will result in cash settlement costs of around £1.45 billion that will be spread out over the next six years. Approximately £100 million of cash costs have been incurred in the first half of 2020. £300 million will be incurred in each of 2021 and 2022, and the rest of £750 million will be spread over 2023 to 2026, resulting in around £188 million each year.

### INCREASED LEAD TIMES

When looking at the overall industry, there are also some other issues and risks that Rolls-Royce can look into to improve its financial standing currently and in the

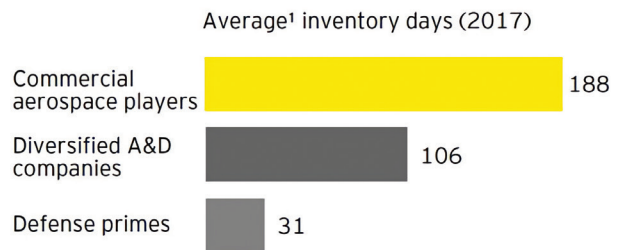
future. In the next section, one of the main issues that the industry is facing, increased lead times, is discussed.

It can be seen in figure 9, by McKinsey, that long lead times actually reflect higher inventory levels for manufacturers/suppliers in the production cycle and it can be seen in figure 8, that commercial aerospace already has a very high amount of inventory days to begin with, compared to defense especially. It is also important to note that diversified A&D companies have a comparatively low inventory turnover ratio.

These higher inventory days lead to an increase in sales and payables outstanding, ultimately slowing down production and reducing the return on investment. These financial impacts of lead times can be pretty high, leading to a heavy backlog, especially in an economy that has been hit with a pandemic. One highly recommended solution to decrease these lead times and minimize losses is to diversify suppliers.

### DEPENDENCY ON SOLE SUPPLIERS

Another major issue that impacted the A&D industry harshly during the COVID-19 pandemic and could have been avoided is the dependency on sole suppliers. The major challenges and key strategies that the A&D industry is currently facing as per this report are portrayed in figure 10. Many of the highlighted challenges and strategies are very similar to strategies adopted by companies in the past during historical global crises and are issues covered in this paper.



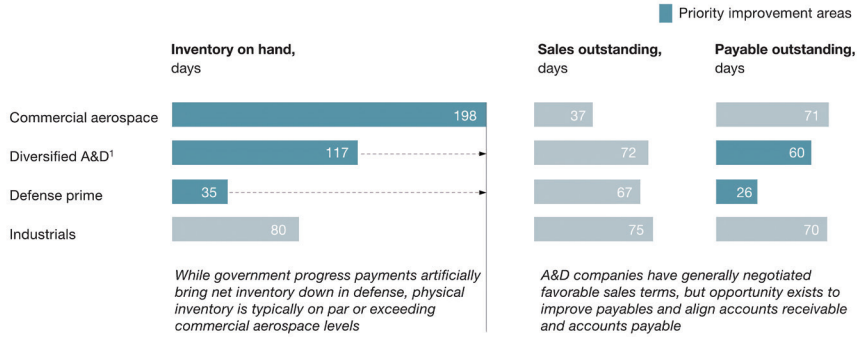
Source: CapitalIQ, EY Analysis

<sup>1</sup>Average of top five players by revenue under each category

**FIGURE 8.** Average inventory days in A&D in 2017 as per CapitalIQ and EY Analysis.

Given that inventory has typically been even less of a focus in defense, we find companies that choose to tackle it often achieve reductions of 50 percent or more.

Working capital, metrics by industry segment



<sup>1</sup>Aerospace and defense.

McKinsey&Company

FIGURE 9. Working capital analysis in A&D by McKinsey & Company.

Major challenges	Dependence on sole-source suppliers	Long lead time	Financial challenges	Large inventory	Management of collaboration across the supply chain	Cyber threats
Key strategies						
Adoption of digital technologies						
Risk-sharing partnerships						
Vertical integration						
Monitoring of the network security of suppliers						
Shared supply chain across common platforms						
Multiple sourcing						
Sales and operations planning and manufacturing readiness assessment						
Inclusion of local players in the global supply network						

High importance
  Moderate importance
  Low importance

February 2018

A&D Edge

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FIGURE 10. A&D supply chain management strategies by EY (A&D Edge Report in 2018).

As shown in this matrix, dependence on sole suppliers, long lead times, and financial challenges are identified as some of the major challenges in this industry. It can also be seen that most of the major issues depicted in the matrix seem to be solved through three main strategies: adoption of digital techniques, risk-sharing partnerships, and vertical integration. Hence, I would recommend Rolls-Royce to look into these strategies to overcome their own supply chain issues, which in turn will help overcome their financial challenges as well.

## FINAL PROPOSAL

After my extensive financial research and risk analysis with the IRIS intelligence software, the top six issues that I recognized to be of utmost importance for Rolls-Royce are decrease in civil aircraft demand, dependency on sole suppliers, increased cost of goods sold, increased lead times, decline in productivity, and currency hedging risks.

I have come to the conclusion that these risks should receive top priority as I studied the financial impact each one would have on the company's operations and created a risk matrix out of this. As per this risk matrix, it is very important for the company to focus on its civil aircraft demand and transition to defense, if necessary. It is also important for Rolls-Royce to not rely on sole suppliers and vertically integrate their supply chain. I would also recommend being mindful of their COGS and trying to reduce fixed costs as much as possible by spreading these costs out over the next four years. Besides this, I would recommend Rolls-Royce to try to reduce their lead times through the adoption of new technology and invest in their existing employees to increase productivity in the workplace. Finally, I would ask them to continue hedging against the currency risks that they face as they are a very global company with a lot of business being conducted internationally.

To read more about this topic, feel free to contact me to read our extended research paper on the aerospace and defense industry and the impact of COVID-19 on Rolls-Royce.

## A NOTE ON THE BOILERMAKER CONSULTING GROUP

The Boilermaker Consulting Group is a STEM consulting firm that is focused on producing well-rounded consultants for the industry. At our core, we are a premier academy that emphasizes the educational knowledge needed to be successful in the consulting industry, while providing opportunities for our consultants to apply these skills and knowledge to client-based projects. We are an interdisciplinary team with team members from various Engineering, Krannert, and Polytechnic disciplines and advisors coming from various industry backgrounds to help us along the way. Website: <https://boilermakerconsult.wixsite.com/mysite>

## APPENDIX: IRIS INTELLIGENCE SOFTWARE WORKINGS

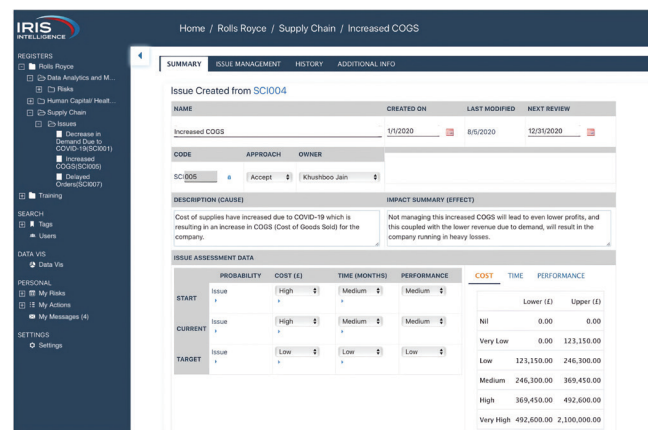


FIGURE 11. IRIS Intelligence dashboard with an example of COGS analysis.



Risk/Issues ID	Title	Likelihood	Impact	Rationale for Likelihood	Rationale for Impact
R001	Increased Lead Times	High	High	Due to COVID-19, it is obvious and can already be seen in multiple articles in our research that this will occur due to reduced logistics, manpower availability, etc.	Rolls Royce already has strategies to mitigate this from before that it needs to focus on since this time, the problem will be slightly worse due to COVID-19.
R002	Increased Cost of Goods Sold	High	Very High	COGS will increase drastically due to backlog in inventory and increased cost of raw materials since COVID-19. Decreased demand, tariffs, supply chain disruptions, etc. are other factors that are also adding to these costs.	Any increase in COGS will have directly proportionate impact on the net profit of the company
R003	Decrease in Civil Aircraft Demand	Very High	Very High	An overall global recession is going to hit and the tourism and travel industry is one that will have the hardest impact.	Civil Aerospace is Rolls Royce's primary business, which will impact the overall company revenue and position greatly.
R004	Hedging Costs	High	Very High	Rolls Royce has already reduced its hedge book by \$10 billion since the demand has drastically decreased and they had to close future hedges that were no longer required.	The costs associated with closing future hedges were approximately 1.45 billion pounds spread over 7 years, which is a very high cost.
R005	Cybersecurity	Low	High	Rolls Royce already has some cybersecurity actions in place but due to the work from home environments, the likelihood of cyber risks have increased with more valuable information being shared, and due to the usage of home networks.	In the event important financial data does leak or get hacked, this will affect the overall functioning of the company greatly.
R006	Dependency on Sole Suppliers	Medium	High	Due to COVID-19, number of suppliers are facing problems, some are even closing down. Hence, the likelihood of this risk has increased and is very high in this market.	If suppliers are not diversified then the inefficient functioning or closing down of the sole suppliers will cause the entire company to suffer huge losses/ the company will have to abide by all demands of the sole supplier.
R007	Reduced Manufacturing	High	Very High	Likelihood is high because health of workers is considered a priority and functioning of factories may reduce drastically as cases of COVID-19 increase.	Not being able to meet the production demands of the company will severely affect the business' current operations.
R008	Restrictions in Hiring and Training	Medium	Low	Due to the reduced demand and reduced workforce, hiring and training for new employees will reduce.	Existing employees will have more pressure, handling more functions of the company but due to the expertise and the ease of implementing solutions, impact may not be too bad.
R009	Decline in Productivity	Medium	Medium	Productivity is declining due to work from home environments, for blue collared workers especially, due to the direct impact of social distancing and not being able to work on site.	Reduced employees working on site will have to work more productively. If not, company's efficiency will decrease, impacting revenue.

**FIGURE 12.** Analysis for risk matrix heat map in Excel for all risks/issues outlined in this report.

### Student Author



**KHUSHBOO JAIN** is a senior in Purdue Honor's College, majoring in finance, with concentrations in data analytics and management consulting. Jain currently serves on the Student Advisory Board for Purdue

under the Vice Provost for Student Life and is the president of the Steps to Leaps Students organization. She was also a part of the Boilermaker Consulting Group (BCG), a premier consulting organization on campus, through which she completed this research project with the mentorship of the Associate Dean of Undergraduate Programs Dr. Charlene Sullivan. In BCG, Jain served as the project manager and had the chance to work with multiple Fortune 500 companies, such as Rolls-Royce and Kraft Heinz. She has previously interned with EY and Morgan Stanley, and will be joining Morgan Stanley full time upon graduation.

### Mentor



**CHARLENE SULLIVAN** joined the Krannert faculty in 1978. Her main teaching interests are corporate financial management, financial institutions and markets, and financial and managerial accounting. She was hon-

ored in 1993–94 and 1987–88 with the Outstanding Undergraduate Teacher Award, and in fall 1993 she received the Most Effective Master's Program Teacher Award, all from within the Krannert School. In 1988–89 she received the Purdue University Outstanding Undergraduate Teaching Award. She is a two-time winner of the Salgo-Noren Award and received a Teaching for Tomorrow Award from Purdue. She has taught in numerous programs offered through the Krannert Executive Education Programs and by the Center for Agri-Business. Her current research interests are personal bankruptcy, the evolution of cost management systems in manufacturing firms, and capital budgeting processes.

### Alumni Mentor



**JEFF POWERS** is a recently retired IBM executive and Krannert alumni. He is an alumni advisor to Purdue consulting clubs. He has been working with Krannert students over the last five years on career plans, interviewing,

and résumé writing. He is passionate about bringing more of an experiential focus on the high-tech industry, along with information management, including business and IT consulting. Powers has substantial experience in helping IBM get started in consulting and systems integration services, now having the largest business and IT advisory firm in the world. Additionally, he has recruited across the United States, and has been the hiring manager of a number of undergrads and MBAs, including those from Krannert. He is certified in IBM's corporate recruiting and staffing methodology for consulting and sales. Powers received his BS from Purdue University and his MBA from Indiana University.