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Implications and Solutions to Nike Outsourcing their Manufacturing

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1 **Abstract:**

2 This research paper explores the implications and solutions pertaining to Nike.
3 Technological advancements are reshaping manufacturing processes across multiple goods;
4 however, retail apparel remains a sector that is neglected from these advancements. The study
5 aims to implement the idea of lean manufacturing into Nike's supply chain and how it can
6 advance Nike's ability to keep its dominant position in the apparel market.

7 The research methodology involves a systematic approach to extracting and joining data
8 together to arrive at normalized working conditions, productivity, and efficiency across Nike's
9 factory locations. Data analysis measures are conducted to use statistical analysis to discover
10 relationships between the demographic of Nike's line workers and their efficiency/productivity.
11 This analysis unlocks strong relationships between these variables and provides a more
12 comprehensive understanding behind the numbers.

13 Findings suggest that migrant workers are more likely to seek opportunities in countries that
14 have developed economies and the emergence of technology in their manufacturing processes.
15 Second, the statistical analysis illustrates that as factory hours increase, productivity increases
16 too. However, this does not apply to line workers. This allows us to suggest that technological
17 advancements into the manufacturing process and skilled training of line workers can allow lean
18 manufacturing methodologies to be implemented and increase productivity while limiting labor
19 exploitation.

20 Implications of this study include the costs of technological implementation into these factories
21 and the costs associated with a capital project reformation. However, to provide a sustainable
22 supply chain in the future, these approaches can support Nike in optimizing their labor force and
23 improve their production processes.

In conclusion, this paper provides the transformative potential of Nike's supply chain and calls for Nike to implement strategic initiatives based on the statistical findings in this analysis. If Nike embraces the power of a sustainable image to its stakeholders, it can lead continued success in dominating the retail apparel market.

Keywords:

Lean Manufacturing

Supply Chain Management

Offshoring vs. Onshoring

Line Worker Utilization Rate

Sustainability

1. Introduction / Background

The global practice of offshoring manufacturing is a defining attribute of many leading apparel companies. Acting in the best interest of shareholders, many brands within the apparel industry focus on lowering production costs and increasing efficiency in their supply chain by relocating their manufacturing operations to developing countries. It must be noted that this strategy has yielded economic benefits for these multinational apparel companies at the expense of the lives of these workers, environmental degradation, and economic instability. Now with widespread media outlets, substantial concerns are raised about the sustainability of this method and the use of human exploitation for the sake of profit. Apparel giant, Nike was at one time known for these kinds of production methods.

Nike is a world-renowned athletic footwear and apparel company founded in 1964 by Bill Bowerman and Phil Knight, under the original name of “Blue Ribbon Sports”. Nike received its current title in 1971, named after the Greek goddess of victory. Nike has employed innovative product design, effective marketing, and athletic endorsements to deliver them to the forefront of the industry.

Nike’s day-to-day operations encompass various activities such as design and innovation, manufacturing, marketing and branding, and retail and distribution. At the core of their operations is Nike’s pursuit of innovation. Nike employs designers, engineers, and scientists to create cutting-edge products to enhance athletic performance. Nike relies on extensive research, prototyping, and testing to provide products that push the limits on functionality and performance. Nike outsources all their production to independent contractors which affords them tremendous cost savings. While outsourcing is risky, diversifying suppliers mitigates this risk. Nike relies on 112 factories in 12 different countries. No single factory accounted for more than

1 nine percent of production. Nike is also renowned for their innovative marketing campaigns with
2 elite athletes. Partnering with champion athletes such as Michael Jordan, Cristiano Ronaldo,
3 Serena Williams, and so forth, Nike's partnership with athletes such as the latter continues to
4 demonstrate their commitment to excellence. Nike's retail and distribution system allows them to
5 reach customers in nearly every corner of the globe. Their retail strategy involves establishing
6 immersive shopping experiences that showcase the brand's commitment to innovation.

7 One of the reasons Nike has become so effective in reducing their production cost is their
8 adaptation of a strategy called "lean manufacturing" in 2008. Lean manufacturing is a systematic
9 approach to minimizing waste while maximizing productivity in manufacturing processes. It
10 originated from the Toyota Production System (TPS), developed by Toyota in Japan after World
11 War II after the country was facing limited resources while simultaneously needing to rebuild a
12 global economy. The primary goal of lean manufacturing is to create more value for customers
13 with fewer resources. This form of supply chain management boils down to a continuous focus
14 on identifying and improving inefficiencies within the production process, to limit the time
15 between the production of a good and the moment it transfers into the consumer's hands. Not
16 only does this limit the cost of resources, but it also eliminates the need and cost of holding large
17 amounts of inventory. Overall, lean manufacturing trims the "fat" or deadweight loss from
18 production by finding the optimal wage, number of workers, production hours, resources and
19 transportation inputs that minimize cost and maximize productivity so that no extra or
20 unnecessary inputs are introduced to the cycle. This is made possible due to the company's
21 commitment to continuous and never-ending improvements to each aspect of the supply chain.
22 This means that management needs to work intensely to train workers to adopt this mentality of
23 consistent improvement. Additionally, to make the production process leaner, Nike needs to find

1 a happy medium between finding workers skilled enough to operate improved technology, while
2 not paying too high wages.

4 2. **Project Objective**

5 Nike outsources 100% of their manufacturing to outside contractors. They do this as the
6 are adaptors of the lean manufacturing strategy. This report looks to explore the benefits and
7 ramifications of shifting from large scale external manufacturing and production to localizing the
8 process by way of moving production plants closer to consumers and in large scale economies
9 that can fuel technological advancements. Although outsourcing all manufacturing is extremely
10 cost effective, Nike has faced tremendous scrutiny for their labor standards, or lack thereof.

11 Among the issues present are paying workers below the national living wage, imposing
12 restrictions that restrict workers' restroom and water usage, and so forth. Additionally, lean
13 manufacturing and production would promote employment in the domestic economy and help
14 push back against the stigma that Nike exploits workers and cheap labor. Domestic production
15 can shorten lead times and yield greater flexibility when responding to market demands.
16 Furthermore, lean production can improve quality control and product consistency. By localizing
17 manufacturing and production, Nike can exert greater control over the manufacturing process
18 which will improve product quality and customer satisfaction.

19 Areas of concern in the topic of lean manufacturing in the apparel industry are the
20 significant challenges in labor practices. Poor practices in Asian countries include low wages,
21 excessive working hours, abuse, and safety hazards. However, these types of jobs employ, and
22 feed millions of people trapped in poverty. Although there are cultural differences pertaining to
23 labor practices, human exploitation is a moral dilemma for all cultures. Often poor labor

practices reflect the development of an emerging country. There are several differences in the type of exploitation of working conditions across nations depending on their economic status. Our project's objective is to show that Nike's transition to lean manufacturing can improve their productivity and address labor exploitation and social inequality issues.

3. Data / Problem Analytics

3.1 Methodology

The process of extracting insightful data from the results of lean manufacturing was not an easy feat. Multiple sources were utilized to discover and unlock new insights into Nike's use of offshoring. It was vital for our team to have consistent and accurate data. Given the lack of availability of supply chain data pertaining to offshoring, the data must be reputable, accurate, and scalable. Nike's supply chain is vast across different countries and this large amount of data needs to hold the ability to be extracted and drive meaningful insights from it.

Our methods of data collection revolve around existing datasets and using join techniques to build larger databases. To ensure proper data quality and integrity, the sources of the data were cross-referenced to check for accuracy and consistency. Our first dataset came from Nike, this dataset contained Nike's global manufacturing information, pertaining to factory, state, and factory type the location specialized in. This dataset proved to be the foundation of how the dataset will be built. Other useful information to the manufacturing dataset included employee information. Consistency measures were met by handling missing values, standardizing formats, and transforming variables as needed. This measure was used across all the datasets further.

Secondly, a dataset pulled from *Our World in Data*, a scientific online publication that focuses on global issues. Their dataset contained normalized working hours across the world. The data

was pulled into an excel format, then using join features through SQL and Excel, these normalized hours were joined by factory location dependent on their country. The ability to have normalized working hours per factory location ensured quality measures were being used, that way, over/under-emphasized data can be removed and promote a normalized view of Nike's manufacturing efforts. One drawback is that working hours is dependent on outside factors including culture. However, Nike's use of sub-contracting these factories proves that each country's culture is a viable factor in the hours worked per factory, promoting the accuracy of the hours worked per day at each factory on a normalized scale.

Assumptions were utilized and will be transparent in the next process of our methodology. Given that most retail operations pertaining to the creation of Nike's apparel involve their line workers. A measure was created to discover the 'utilization'(output) at each factory by taking the number of line workers at each factory and multiplying it by the hours worked per day to measure its apparel creation at each factory. The goal of having this measure is to see which factories were being utilized the most for Nike's apparel. For example, one of our questions that inspired the building of this variable was, is Nike utilizing line workers in countries where the normalized working hours were considered low? A second measure was created to see if there was a relationship between productivity and utilization. This was calculated by taking the GDP/per Capita of each factory location and multiplying it by the number of hours worked. The goal of this calculation was to determine the overall economic output of these factory locations and unlock more insights into the living standards of these locations. It also allowed us to see the individual impact each line worker contributed to Nike's manufacturing process and to test their productivity compared to other locations. The final column was created to extract the efficiency of each factory location for Nike's mission of lean

manufacturing. The GDP per Capita values were divided by Total Working Hours per Year to test the efficiency of the hours put in at each factory. This way, we can generate assumptions about the economic value of the labor being used at each factory and further analyze if lean manufacturing methodology approaches would affect Nike's supply chain.

Note that data provides a vital role in decision-making processes at an organization. The creation of this dataset was carefully conducted to ensure that reliable and accurate results can be extracted from this source. The creation of these variables allows for further usability for Nike and the normalized approach negates the influence of outside factors that can hinder the quality and reliability of our data. Thus, using a normalized approach, Nike can use this dataset to improve model performance on their supply chain without worrying about outliers affecting their data.

3.2 Data / Problem Analytics

In order to explore the effect of switching to the lean manufacturing model which aims at addressing inefficiency in productivity and labor conditions, we employed a multiple linear regression model. Multiple linear regression is a statistical technique used to model the relationship between a single dependent variable and two or more independent variables. The dependent variable that our model tests is the factory's *ProductivityMeasure*. Our model will test the influence of the independent variables (*TotalWorkers*, *LineWorkers%*, *%FemaleWorkers*, *%MigrantWorkers*, *GDPperCapita*, and *WorkingHours*) on factory productivity.

TotalWorkers represents the summation of workers for each factory. With many different factory types, the range of total workers is very large, spanning from 7 to 26853. Since Nike has

so many factories worldwide, there are still many that need renovation and still follow the large-scale sweatshop model. Therefore, factories with larger amounts of total workers can indicate a factory that has not adopted lean manufacturing.

The variable *LineWorker%*, represents the percentage of employees that are line workers in each factory. Traditional sweatshop operations employ high amounts of low income lineworkers, with low levels of higher-income management in hopes that they will gain large amounts of output while paying a low wage. Therefore, *LineWorker%* can be used to identify factories that have not yet adopted lean manufacturing.

%FemaleWorkers and *%MigrantWorkers* characterizes the percentage of workers in each factory that are females or migrants respectively. Across the globe, females and migrants are known to accept lower wages than their native male counterparts. Therefore, these variables are beneficial give insight into the effect of paying lower wages on productivity.

GDPperCapita indicates the Gross Domestic Product per capita of the country in which the factory is located. The range for this variable was extensive spanning from \$3481 to \$58543. This range shows that though many Nike manufacturers have relocated to first world countries in recent years, there are still many factories that remain in developing countries where wages are lowest. This variable is important as it indicates factories that are in wealthy countries that can provide investment to improve technological advances.

The variable *WorkingHours* reflects the number of hours in which the factory is operating and producing. One of the main goals of lean manufacturing is to abandon the practice of structured hourly days with large amounts of workers on hand. Instead, it looks to create “teams” which can operate at different shifts of the day. This ensures better working conditions and allows factories to stay open and operate for more hours. Therefore, a higher number of working

hours can help us to identify factories that have adopted lean manufacturing. With a minimum value of 1425, maximum of 2458, and mean of 2068, we can see that more factories are starting to move toward the lean manufacturing model.

Using multiple linear regression to determine the impact of the above independent variables on our dependent variable *ProductivityMeasure*, our model produced the following results:

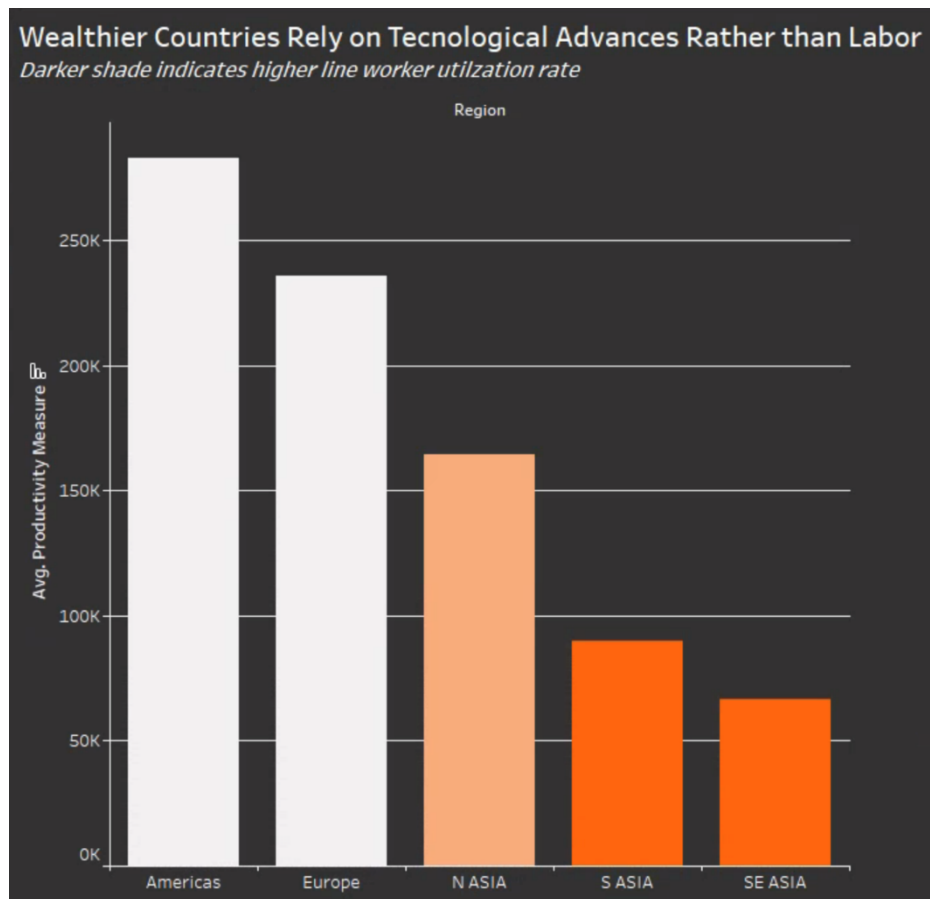
Figure 1: Multiple Linear Regression Results

Regression Statistics									
Multiple R	0.995468								
R Square	0.990957								
Adjusted R Square	0.990834								
Standard Error	10848.89								
Observations	447								
ANOVA									
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>gnificance F</i>				
Regression	6	5.68E+12	9.46E+11	8036.397	0				
Residual	440	5.18E+10	1.18E+08						
Total	446	5.73E+12							
	<i>Coefficients</i>	<i>Standard Err</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>	<i>Lower 95.0%</i>	<i>Upper 95.0%</i>	
Intercept	-139659	8518.401	-16.395	1.71E-47	-156401	-122918	-156401	-122918	
Total Workers	-0.13928	0.141641	-0.9833	0.325998	-0.41765	0.139101	-0.41765	0.139101	
Line Worker %	-13230.3	3130.397	-4.22641	2.89E-05	-19382.7	-7077.95	-19382.7	-7077.95	
% Female Workers	-691.63	2301.423	-0.30052	0.76392	-5214.78	3831.519	-5214.78	3831.519	
% Migrant Workers	9294.595	2767.202	3.358842	0.000851	3856.019	14733.17	3856.019	14733.17	
GDP per Capita	7.576964	0.045608	166.1313	0	7.487327	7.666601	7.487327	7.666601	
Working Hours	74.94766	3.613201	20.74273	3.7E-67	67.84638	82.04894	67.84638	82.04894	

Our model produced a very high Adj. R-Squared of 0.99. This indicates that 99% of the variability in *ProductivityMeasure* can be explained by the independent variables in the model. *LineWorker%*, *%MigrantWorkers*, and *WorkingHours* each have p-value less than 0.05 indicating that they are statically significant at the 5% level. *LineWorker%* has a negative coefficient of 13230.3. Therefore, we can say that when you increase the *LineWorker%* by one

unit, the factory's productivity drops by 13230.3 points. As discussed previously, higher *LineWorker%* is a good indication of a factory that has not adopted lean manufacturing and is still stuck in the sweatshop production method. These results show that advancing technology, which reduces line workers needed, has a staggering positive impact on productivity. This is displayed by the bar graph below. This figure shows Avg. Productivity Measure by Region, with the darker orange color representing a higher Line Worker Utilization Rate. It is apparent that the regions with economic powerhouses such as the America, Europe and China are more productive than regions that still rely on large amounts of cheap labor, due to their ability to invest in improving factory capital.

Figure 2: Avg. Productivity Measure by Region



%MigrantWorkers, has a positive coefficient of 9294.59 meaning that for each unit increase to the percentage of migrant workers, *ProductivityMeasure* increases by 9294.59. Migrant workers are often much “hungrier” to work hard as they may be fleeing poverty, poor living conditions, or discrimination. Not only does the regression indicate that these workers lead to higher productivity, but migrants are often willing to accept lower wages, showing once again how lean manufacturing can solve multiple issues in the production cycle.

WorkingHours has a positive coefficient of 74.95, meaning that for each additional working hour, productivity increases by 74.95 points. This is an extremely significant impact considering the minimum working hours in our data was 1425. *WorkingHours* is an additional variable that represents factories that have adopted the lean manufacturing model and are seeing an increase in productivity as a result.

TotalWorkers and *%FemaleWorkers*, were insignificant however this could indicate that improving machinery may mean the size or physical ability of your labor force may not be as important as one might believe. *GDPperCapita* was also insignificant, which is likely a result of a country's economic prowess not always translating to population size.

4. Findings / Conclusions

Our model yields an Adjusted R-Squared of above 0.99 which indicates that 99% of variability in *ProductivityMeasure*, our dependent variable, can be explained by the independent variables in our model. *TotalWorkers* produced a P-value of 0.33 which indicates that this variable does not have a statistically significant correlation to *ProductivityMeasure*. This illustrates that the size of a firm’s workforce does not necessarily correlate to an increase in productivity. This can also be explained by the theory of diminishing marginal returns.

1 *LineWorker%* yielded a P-value of 0.0000289 which indicates that the percentage of employees
2 that are line workers has a statistically significant influence on *ProductivityMeasure*.

3 Additionally, when *LineWorker%* is increased by one unit, productivity is expected to drop by
4 13230.3 points. Therefore, we can assert that the higher percentage a factory has of line workers
5 to total workers, the less productive the factory will be.

6 *%FemaleWorkers* produced a statistically insignificant P-value of 0.76392 which indicates that
7 gender does not play a significant role in factory productivity. Additionally, female workers have
8 historically accepted lower wages than their male counterparts.

9 *%MigrantWorkers* yielded a P-value 0.000851 which is statistically significant and
10 would indicate that for every unit increase to the percentage of migrant workers,
11 *ProductivityMeasure* increases by 9294.59. Migrant workers are generally willing to accept less
12 optimal roles as they may be fleeing poverty, corruption, discrimination, and so forth, in their
13 home country. Migrant workers also have historically accepted lower wages than native workers.
14 However, female workers are also subject to lower wages. Therefore, it is not necessarily the
15 lower wages that increase productivity. Migrants are more likely to go to countries with growing
16 economies and in turn, countries with advancing technology are receiving migrant workers.

17 *GDPperCapita* was not statistically significant with a P-value of 0. We can conclude that
18 a country's economic size does not correlate directly with productivity.

19 Finally, *WorkingHours* boasts a statistically significant R-squared, illustrated in *Figure 1*,
20 and the positive coefficient of 74.95, meaning that for each additional working hour, productivity
21 increases by 74.95 points. A primary goal of lean manufacturing is to shy away from structured
22 hourly days with many workers. In contrast, lean manufacturing aims to establish teams or
23 groups of workers that can operate at different shifts throughout the day, which therefore extends

factory hours and ensures better working conditions due to the lack of crowding. In turn, according to our regression *WorkingHours* is a statistically significant variable that increases productivity. Lean manufacturing can lead to longer hours a factory operates, which increases productivity due to its nature.

Ultimately, not every variable was statistically significant.

LineWorker%, *%MigrantWorkers*, and *WorkingHours* were all statistically significant. Our regression has led us to conclude that the more workers a factory has that are line workers, or entry level workers, the less productive the factory will be. Similarly, the higher percentage of migrant workers a factory has, the more productive it will be. Since wages are not relevant after considering that female and migrant workers are both generally subject to lower wages, this may be attributed to workers migrating to countries with increasing productivity. From the scope of our analysis, it is impossible to determine if migrant workers are inherently more productive than native workers. Additionally, an increase in working hours translates to a shift towards lean manufacturing. Therefore, lean manufacturing increases productivity which is demonstrated through the additional working hours on *ProductivityMeasurement*. It is also important to note that lean manufacturing boosts productivity and working conditions because the extended working hours and teams of workers prevent crowding of the workplace.

5. Managerial Implications

Like many large companies that rely on offshoring manufacturing, the goal of maximizing profits typically entails unfavorable working conditions for employees. As discussed earlier, Nike is well known for the unethical working conditions found within their manufacturing factories. These decisions on working conditions and the HPM policies are

typically less important for these factories. From a managerial perspective, Nike can use the analytical results that we found to help improve their decision-making process. They can utilize these insights to determine the optimal mix of total workers, migrant workers, and the location of all employees. Although variables such as the percentage of total workers and the gender percentages of the workers were found to be statistically insignificant, the remaining dependent variables were proven to be significant which include, GDP, the migrant workers, and labor hours. With a strong R-squared value which indicates a good fit, our regression model can accommodate the complexity of the various factors within our data. Nike can utilize this regression analysis, even with this specific model and data to optimize their manufacturing project all while minimizing wasted resources. By reducing the percentage of line and migrant workers, from our analysis, we can conclude that it would lead to reduced labor costs. This would improve their work environment's safety, which can help improve productivity and ethical standing.

Additionally, implementing flexible working hours would further reduce costs while also enhancing manufacturing efficiency. This would be possible through more strategic workforce management, which will lead to improved employee satisfaction and retention rates which are critical for maintaining the standards of quality manufacturing and cost-effectiveness.

As previously discussed, it is evident that Nike, in addition to looking to maximize profits, would also benefit from looking to improve other aspects of their manufacturing model. They can use these analyses to more strategically manage their workforce and ensure that labor resources are utilized efficiently. For example, they could adjust the number of lines or migrant workers to find the correct balance of productive and cost-effective manufacturing. They could also find it informative to consistently monitor and analyze the workforce data from these factories to

1 identify any trends that can help the company both hire and train workers. Predictive analytics
2 can also be an aid in creating forecasting models to monitor production demands and recourse
3 allocation. In addition to those findings, it would be helpful to use numerous regression models
4 to further optimize the geographical distribution of these manufacturing facilities. This would
5 help the company narrow down transportation costs and strengthen the resilience of its supply
6 chain. Despite what the data is used for, the company must understand the importance of
7 utilizing data analytics for these business decisions.

8 In the modern day, advancements in manufacturing technology are pivotal in maximizing
9 the efficiency of production as well as assuring safe working environments. Advanced
10 technologies would help streamline production processes and limit labor-conceived tasks. From
11 our findings, we see that working hours are very influential in both production maximization and
12 labor conditions. Understanding and embracing the new, innovative manufacturing technologies
13 will enhance product quality and customization which would give the company a competitive
14 edge as well as ensure improved working conditions.

15 Nike can utilize these analytical insights to help optimize supply chain operations as well.
16 The company can pinpoint locations and relocate factories closer to the consumers and the
17 countries with the largest markets. By doing so, Nike can reduce inventory costs, transportation
18 expenses, and consumer demand response times. This, as we said, comes from relocating their
19 factories from offshore factories in poor nations to wealthier and conveniently located countries.
20 By relocating the factories away from these countries, they would provide access to advanced
21 technologies and skilled labor. This would address the problems and backlash they face about
22 poor labor conditions all while enhancing the performance of their operations.

1 Ultimately, despite the rise in cost, by improving labor conditions, whether through relocations
2 or reduced reliance on cheap labor, Nike can enhance their reputation. By doing so, they would
3 mitigate risks associated with reputational damage. Transitioning away from sweatshops and
4 investing more in lean manufacturing principles, as discussed earlier, would certainly enhance
5 the ethical and operational performance of their manufacturing. This will help ensure long-term
6 sustainability.

7 Although we performed some in-depth analysis, we acknowledge the constraints that are
8 imposed by the limited availability of resources. It would be beneficial to research further into
9 the more specific financial implications of the various factors. For example, it would be
10 constructive for the company to investigate the implications of juggling an increase in working
11 conditions or relocating factories. This would provide valuable insights into making business
12 decisions and more specifically how to make the company rely less on offshore manufacturing
13 while minimizing costs. With that said, with our findings, Nike should closely monitor and
14 evaluate the effectiveness of these strategies. Finding a balance of profit maximization with more
15 ethical working conditions is essential for the company. Using regression insights can help them
16 create a more strategic plan in doing so. For example, they can do so by assessing the correlation
17 between different labor practice metrics reported at each location. These ‘practice’ metrics can
18 include percentages of migrant workers and performance metrics such as employee satisfaction
19 and the quality of the environment. By implementing a monitoring system to ensure ethical
20 standards are being met by analyzing employee feedback, they can make improved operational
21 decisions. With access to modern-day technology, the company no longer needs to rely solely on
22 offshore, sweatshop manufacturing. Based on the regression findings, more specifically the
23 lower income and working hour variables, the company can do so relatively conveniently. By

1 remaining flexible and committed to improving, they can adapt to the ever-changing market and
2 continue to have a competitive advantage.

3 4 6. **Idea Sharing**

5 From this project, we have come to a new understanding of just how complex decision-
6 making can be in these real-world business scenarios. Although we only dealt with a fraction of
7 what the company managers must deal with, we saw just how many factors go into making
8 decisions for these large corporations. Nike's manufacturing operations consider many factors.
9 These factors include supply chain and production dynamics, ethical considerations and the
10 overall labor composition. We learned of the challenges they face when balancing their
11 economic and ethical responsibilities. We have learned that each one of these factors plays a
12 substantial role in business outcomes, which is why they are crucial in making business
13 decisions.

14 Through this project, we also came to understand the importance of data-driven decision-
15 making. Data has emerged as a necessity for any informative business decisions. We learned and
16 now value the importance of data in business decisions. By analyzing the trends within the data,
17 conclusions are made. Using balancing techniques to understand trade-offs in decision-making
18 requires very thoughtful consideration of all factors involved and, in this case, it was mainly the
19 factors of ethical responsibility and cost-effectiveness.

20 It is important to understand and find a balance for the 'trade-offs' within every business
21 decision. For example, if they were to reduce migrant line workers, their costs would decrease,
22 but in turn, it would raise ethical questions. We have learned that there is no easy answer to these
23 decisions but rather it is finding a balance in these decisions. As previously explained, decisions

1 made regarding working conditions are a separate subset of decisions factories make. They can
2 be considered as the basic human resource management policies. When making these policies,
3 they typically conflict with both national and international standards. With that said many
4 manufacturers are more concerned about the logistics of the economics within a given factory.

5 Human resource policies play a pivotal role in these factories. Their main role is to
6 protect the works but from what we have seen, this is not always the case. The policies are also
7 very important in creating incentives that motivate the workers. By relocating manufacturing,
8 there will be access to much more sustainable and advanced human resource policies and
9 regulations. Although it may come at more of a direct cost to the company, it would boost
10 incentives, and ethical standards, all while enhancing product quality.

11 For future research, we understand that further analysis is needed to completely grasp the
12 complexity of this data. The continuous monitoring of manufacturing data, predictive analytics
13 for monitoring forecasting demands, and the optimization of facility distribution are all important
14 areas of research in the future. Predictive and regression analytic models could prove to be
15 valuable in helping to adjust resource allocation, management, and utilization. This would help
16 the company narrow down and make business decisions. In conclusion, this project has
17 illustrated the significance of all data-driven decisions, the importance of balancing trade-offs,
18 and the importance and feasibility of establishing a balance when making business decisions.

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Appendix

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March 28, 2024	Dataset Methodology, and Analysis
April 4, 2024	Further Analysis, Model Creation, Visualizations
April 11, 2024	Findings, Conclusions, and Managerial Implications
April 18, 2024	Final Project Paper Submission and Final Project Presentation