

# Garment Factory Analysis

By Adam Gruber

Factories need to be profitable over the long term by operating efficiently. Input costs can creep, and the price for units sold may decrease, but a factory can control the efficiency of production. Efficiency can come from using the minimal amount of inputs or the correct staffing levels. Efficiency should not only be measured based on the actual outputs but also on how close they came to the expectations. Garment factories aim for an industry-standard goal of 75% efficiency(Sakar,2022). They are very labor-intensive and require close management to ensure long-term profitability. Efficiency in the garment industry is calculated with the following formula(Ahmed, 2020).

$$(\text{Output} \times \text{Standard Minute Value of Garment}) / (\text{Manpower} \times \text{Working Minutes}) = \text{Efficiency}$$

The data set includes the efficiency, manpower, standard minute value, and targeted production goal. Efficiency in the data set was referred to as productivity. The median productivity is 75%. The data below comes from the UC Irvine Data Library, where the data set has ten weeks of production. There are 12 production teams, each with its own labor force and efficiency goals. Each team is composed of a sewing team and a finishing team.

Each day, there is a planned productivity level. Accurate planning is important to ensure sales contracts can deliver goods for the agreed prices. Fig 1 shows actual vs planned efficiency. Points below the line are times when actual productivity was lower than planned efficiency. Points above the line were when efficiency was greater than planned. There are a few outliers in the data set where planned efficiency was far lower than expected. The median planned productivity was .75 and the actual productivity was .77, meaning overall, they are exceeding their efficiency goals.

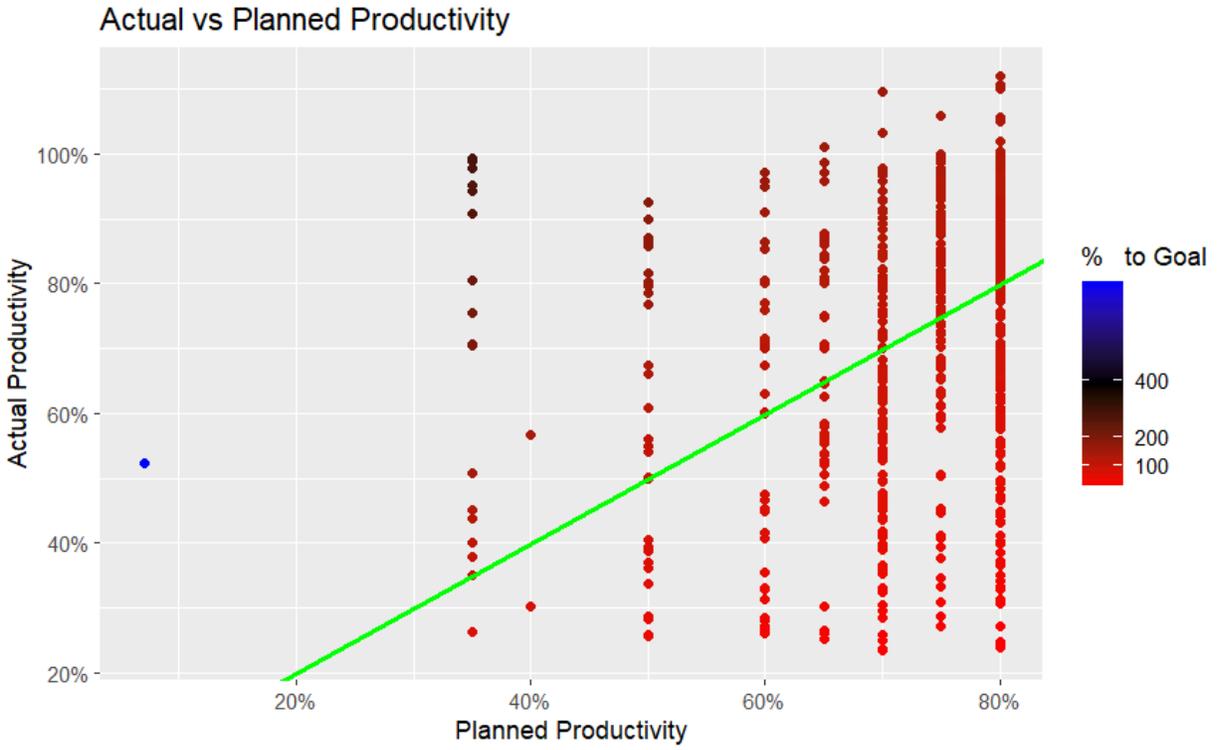


Fig 1

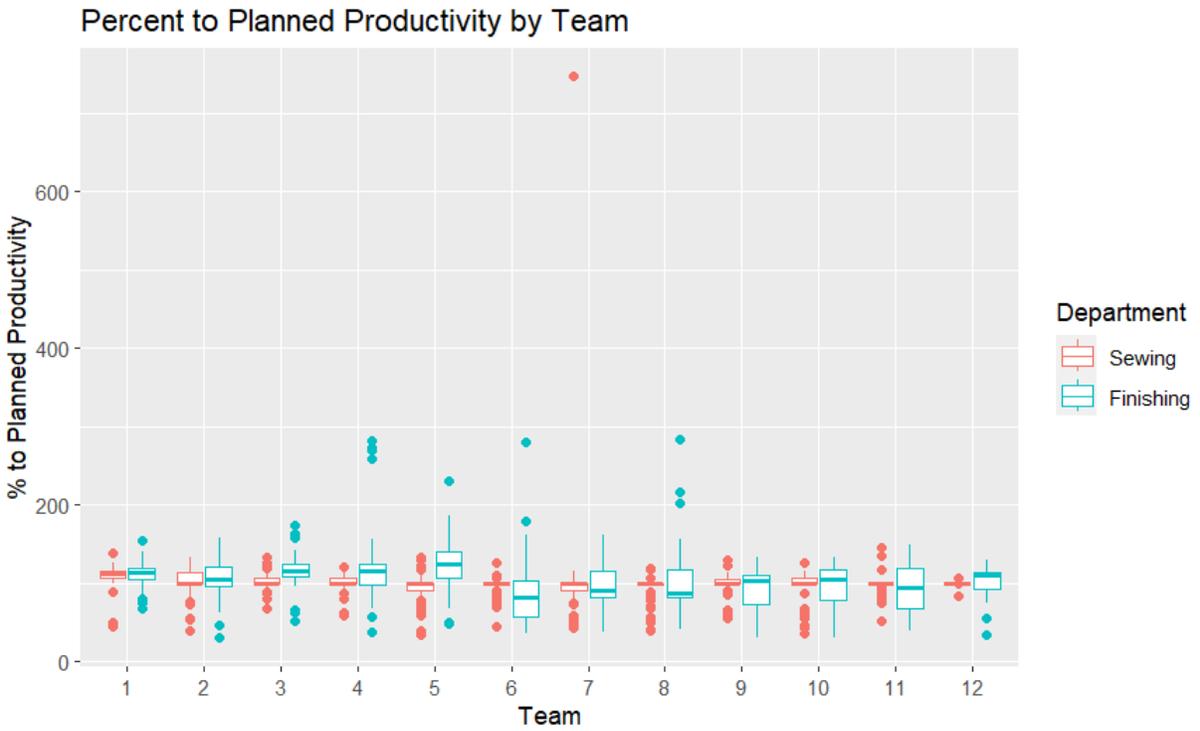


Fig 2

Efficiency planning is very different from team to team and department to department. The finishing team is more prone to outliers from exceeding their planned efficiency. The sewing team has fewer outliers and very closely matches its planned productivity. This could be because of the changing aspects of the clothing. The sewing team focuses on the actual sewing of clothing. The finishing team focuses on the finishing touches, such as attaching price tags, buttons, and boxing the clothes. This can vary wildly depending on style or company. Some companies expect to display their clothes hanging, and others plan to display that clothing as folded. This requires different tags. Some companies provide extra buttons and packaging when shipping. Other companies do not include extra frills.

Fig 2 shows Teams 6,8 and 12 have very little variation in their sewing teams' percent to planned productivity. Team 12 has only two outliers for the sewing team and two for the finishing team. This consistency is a sign they are able to very accurately plan what will be accomplished for Team 12. This is important for long-term planning and ensuring contracts are made that will be both profitable and competitive for the company. This consistency for Team 12's productivity can be seen in Figure 3.

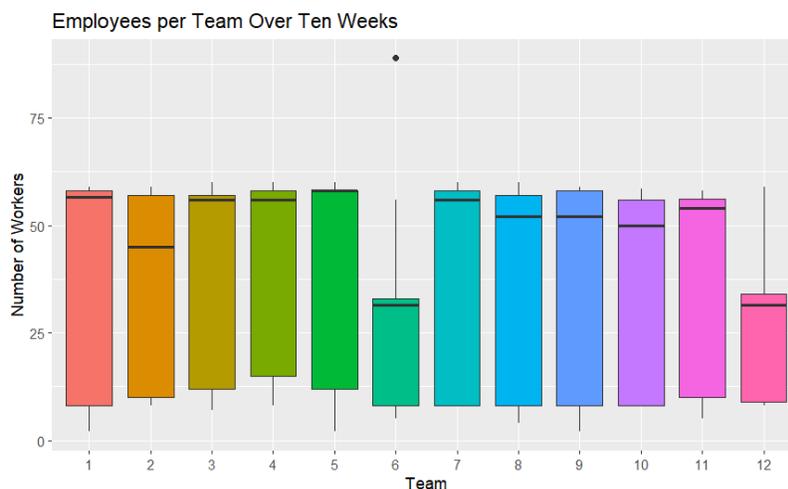


Fig 3

Figure 3 shows a boxplot of the number of employees for each team over the time period. Most of the teams have a median number of employees of over 50. Two teams are

significantly smaller but also more nimble, teams 6 and 12. Those teams have a smaller range between the median employees and the minimum. These two teams have smaller productivity variations compared to their sewing teams' goals.

Sewing is far more labor-intensive compared to finishing and requires a larger team. It appears staffing a larger team over time causes estimates for productivity to be more inaccurate. It is harder to estimate the labor of a larger, varied group compared to a more talented team that has the same consistent people from week to week. Team 5 has a range of 2 employees to 60 employees over the course of 10 weeks. If these employees are lost due to turnover, the learning curve for new employees can greatly affect the productivity of the team. This would lead to them missing goals. Reducing turnover could be the main key to success for Teams 6 and 12. This is further seen in Figure 4.



Fig 4

Figure 4 shows the amount of time to produce a unit for each team. Sewing the item takes longer than finishing across all teams. Team 5 has the highest median time to sew a unit. Team 12 has the lowest time. Data does not specify what clothing items the teams were making,

but assuming all teams have the same items, Teams 6, 11, and 12 have the lowest median time. Team 12 is extremely consistent with their time to produce a unit. Their finishing team is not as efficient but still consistent with the others for a time.

Overtime can rapidly increase the cost per unit, and should be avoided unless absolutely necessary. Ignoring outliers, Teams 6 and 12 had the smallest range for overtime. They are able to more accurately plan their workload and hit their planned productivity. This is seen in Fig 2.

Productivity for all the teams also needs to be planned by the week. The work week for each team runs Saturday through Thursday. They are off every Friday. Fig 5 shows the amount of overtime per day vs the amount of productivity. Thursday, by far, has the most amount of overtime as each team tries to finish up work before the day off. Monday has the least overtime but also the most overtime that contributes to the actual productivity, concentrated around 75%, which is the industry goal.

Thursday not only has the highest productive overtime but also the least effective overtime as well. There is a large portion near 40% of actual productivity. This likely comes from fatigue. The finishing team has less overtime, but they also have fewer employees per team. They also have more accurate goals. Accurate production goals lead to less overtime. High employee turnover and low productivity cause increases over time, making each additional unit produced cost more. This drives up the average cost per unit.

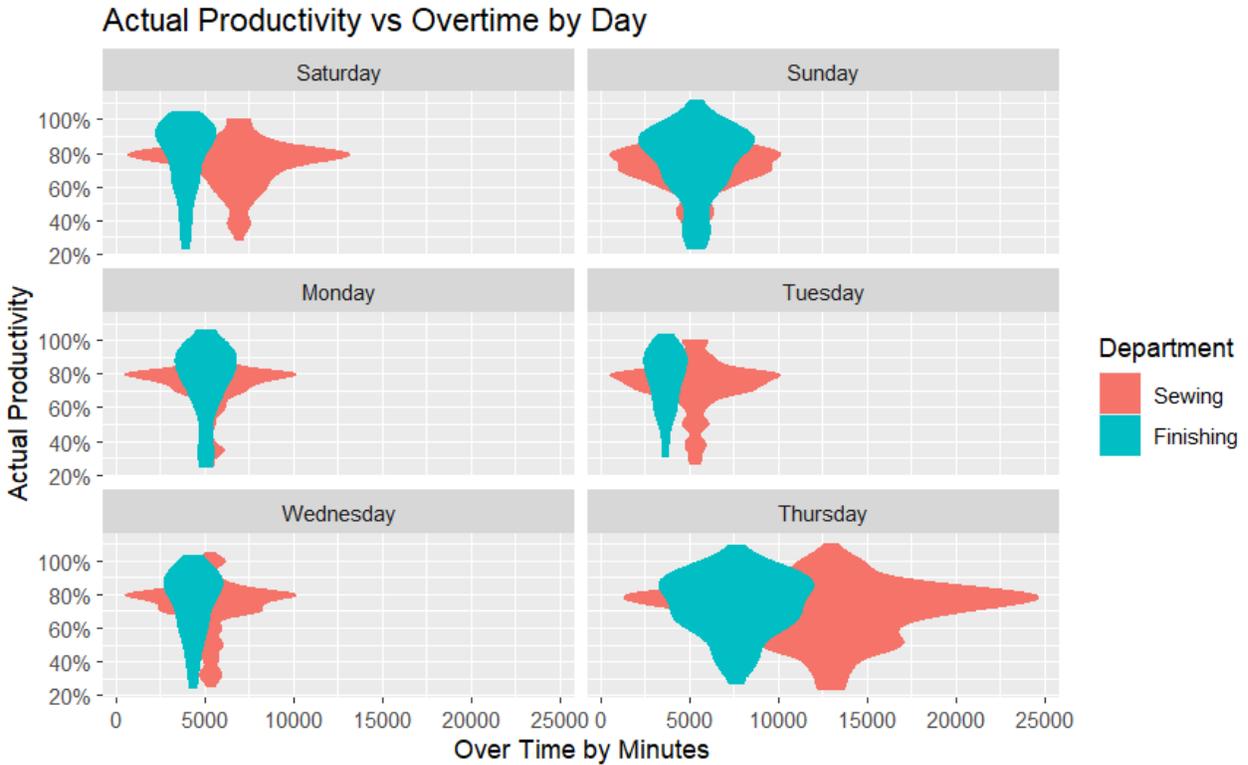


Fig 5

Factory production requires managing the input costs closely. Manufacturing clothing has a high cost due to labor, and this is why most factories were moved to developing nations. A clothing factory anywhere in the world still needs to manage labor costs. Developing well-trained teams with low turnover is clearly the key to success, as seen with teams 6 and 12. This allows accurate goal planning, which can then lead to accurate sales planning and long-term profits.

## References

Ahmed, M. (2020, December 7). How to measure sewing line efficiency?. Online Apparel Study. <https://www.onlineapparelstudy.com/2020/01/How-to-Calculate-Sewing-Line-Efficiency.html>

Productivity Prediction of Garment Employees. (2020). UCI Machine Learning Repository. <https://doi.org/10.24432/C51S6D>.

Sarkar, P. (2022, June 6). Why do garment manufacturers plan efficiency at 75 and not 100 percent?. Online Clothing Study. <https://www.onlineclothingstudy.com/2021/08/why-do-garment-manufacturers-plan.html>