Group - 15

ME3042 Production and Operations Management

Semester 05

Final Report

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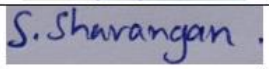
190587L	Sharangan.S		25%
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Executive Summary

Production and operations management aims to produce the intended result or the specified product using the stated processes in order to make the best use of the resources at hand. Therefore, the production management is in charge of using appropriate planning, manpower, materials, and processes to produce the desired product, which has marketability at the lowest cost. Production management needs to make sure that the appropriate things, in the right amount, are delivered at the proper time, place, and cost. When the goal is accomplished, we declare that our Production Management system is effective. To accomplish a set of objectives, we govern our activities and coordinate the resources at our disposal. To survive and develop, each firm must adhere to the Management Principles. The same holds true for production management. The ability to solve organizational difficulties will come through reading and studying production management. We must assess our performance and contribution to achieving both corporate and departmental goals. To establish the benchmarks for the future, this is essential.

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1 Introduction

1.1 Background

Dandy clothing (pvt) Ltd is a clothes manufacturing company, which is located in the Beliatta area in Hambantota district. It is very small company which was started before two one and half year ago. Basically, the company produces shirts and trousers. They buy cloths from local market and design their shirts and trousers. Only 15 labours work there and there are two owners of the company and together they drive the factory with appropriate decisions. Mr.Sachith and Mr. Suraweera are them. They use 8 sewing machines and one large cutting machine, button fixing machine and some other machines production.

Work	Workers
Cutting	1
Sewing	8
Border lining	2
Button fixing	1
Packing	3

They keep their products in a small store and they do not have better plan for next demand.

Figure 1: Dandy clothing product logo

1.2 Problem definition

- **Limitations and issues**

  Considering the weak points of the company, Currently, They buy cloth materials for their products from the local market. They have no enough plan for getting raw materials and transportation facilities even though they have a plan to expand their business and start exporting their products. They do not have any idea of the international market, export procedures. And they face many competitors in domestic market. Therefore they have a big need for order winning qualities. They do not maintain any sustainable production planning for inventory management and labour working. They have small room for storing their products. It is better if they attain a larger space considering their future business plans. Within the manufacturing process garbage scraps are removed from the factory without getting any economical use.

Figure 2: Production equipment

- **Things that can be corrected within the scope of this module**

  We can provide a major production planning according to the labour and time management.

  We can get past information about demand of the products, market competitions and forecast the upcoming demands.

  We can manage to mitigate the cost for inventory management using optimistic plan.

  We can find best locations for raw material collection and factory establishment.

1.3 Project objectives and scope

- **Aim of the project**
  Produce goods and services of the right quality, right quantity, at the right time and at minimum cost and to improve the efficiency.

- **Objectives of the project**
  To make certain a continuous supply of products and stock to make sure that production must not experience at the time of customers need.
  Minimize the working time with effective way using scheduling software.
  Identify good options for location and transport facilities

- **Scope of the work that you intend to tackle**
  Apply management ideas to a factory's production function and Conclude optimistic methods of production planning with labour and time management.

2 Methodology

First, we collect all data we need. By breaking down any task or process into separate parts and looking at them individually, we can analyze each piece in great detail and then aggregate your findings to arrive at a conclusion. If something doesn't make sense when looked at holistically, break it down further and take a closer look so that we can get to the bottom of it. Thus, we will look over the issues and find which can be corrected using this project. And Plan for each optimistic ways for solution. Using calculations and software to get solutions can be a great way to make easier. Instead of spending hours manually crunching through data, you can quickly input the necessary information into any number of programs available online or off the shelf products. Whether we are making budget forecasts or tracking business performance, there is probably a program that can do it for. Effective project management planning requires thoroughly outlining a timeline, budget and scope for the entire project.

A good start is to create a schedule that identifies all of the tasks required to complete your project on time, within budget and meeting all goals. This should include task assignments, dates, dependencies or constraints, cost estimates and resources needed. Providing a management plan schedule acts as an outline of everything you expect to achieve in order to finish our project successfully from setting objectives through review and evaluation of performance at completion.

2.1 Data collection

- **Sort of information we need**

  Layout planning
  Labour working time and management
  Raw materials and required resources
  Production and scheduling
  Inventory cost and management
  Past and current Demand and competitors

- **How we obtain the data**

  We can get labour, working time data from factory workers
  We can collect all inventory data from procurement keeper and records.

- **Collected data**

Table of Demand

Month period	Demand
July-Sep 2021	4032
Oct-Dec 2021	4470
Jan-Mar 2022	4985
Apr-Jun 2022	5607
July-Sep 2022	6378
Oct-Dec 2022	7110

Table of production

Work	Time for unit(mins)	Total Machines
Cutting	60	1
Sewing	180	8
Border lining	20	2
Button fixing	20	1
Packing	15	1

Table of location

Feature	Weight	Location	Cluster
Raw material	0.7	8.53, 79.60	1
Transportation	0.3	8.61, 80.12	1
Raw material	0.7	8.12, 81.43	2
Transportation	0.3	8.23, 81.31	2
Raw material	0.7	6.91, 80.77	3
Transportation	0.3	6.37, 80.54	3

Figure 3 – Problem inspection

2.2 Proposed modifications

- **Changes we suggested**

  Produce goods according to forecasted demand

  Minimize working time in effective method by production planning and inventory control

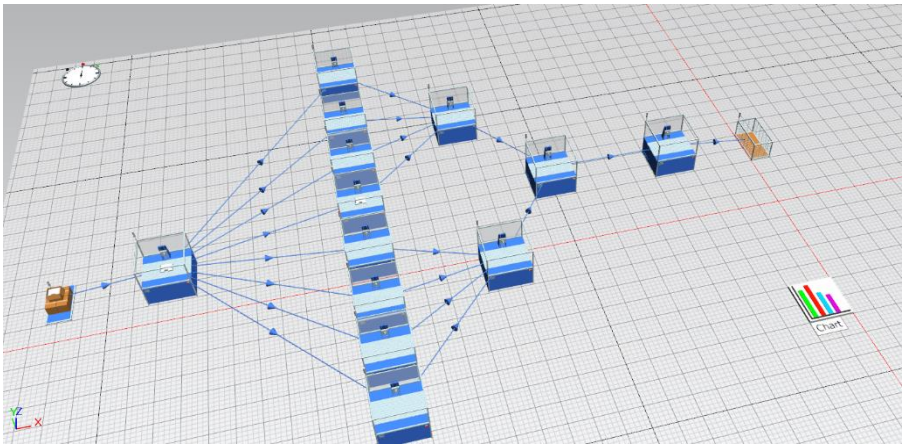
  Try to use new methods and location that are going to be found out

2.3 Simulation and analysis

- **How we plan the analysis to be carried out**
  We implement our current production scheduling and investigate the drawbacks and try to correct them using the help of the software.

- **What software we use**
  Plant simulation software: Tecnomatix

- **How we carry out the simulation**
  Using the software we implement their production layout. And we take them into a chart. According to the chart we find out time for working, setting up, blocking, waiting, failure, powering up/down, unplanned, paused and stopped.



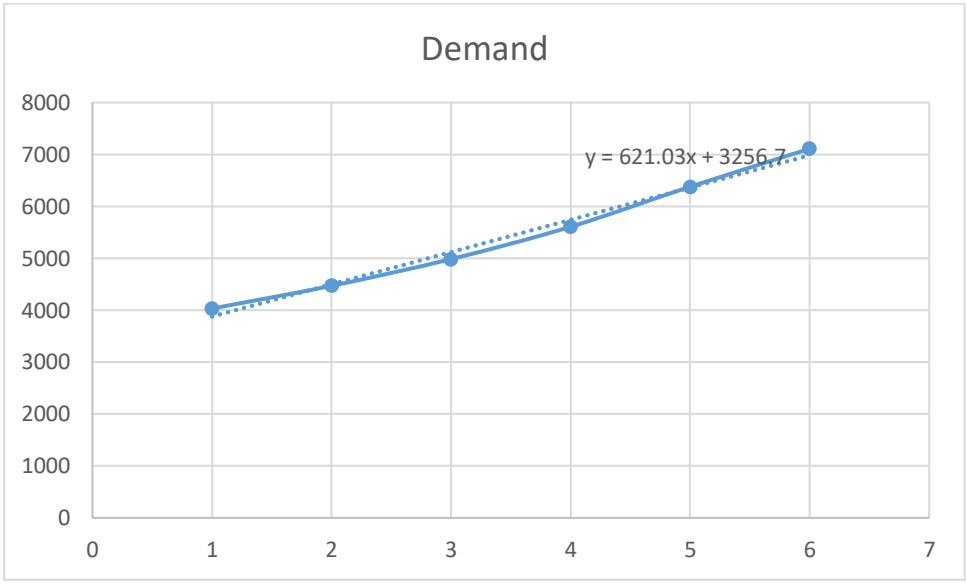
- **Suggested changes**
  Using the software we find out that we can reduce the waiting time of sewing station by adding two cutting stations.
  And due to two borderline stations are working, we can reduce one borderline station and mitigate the blocking time.
  We need one more sewing station for optimistic time scheduling.
  We need to minimize the failure repairing time to make it effective.

3 Findings

- Results

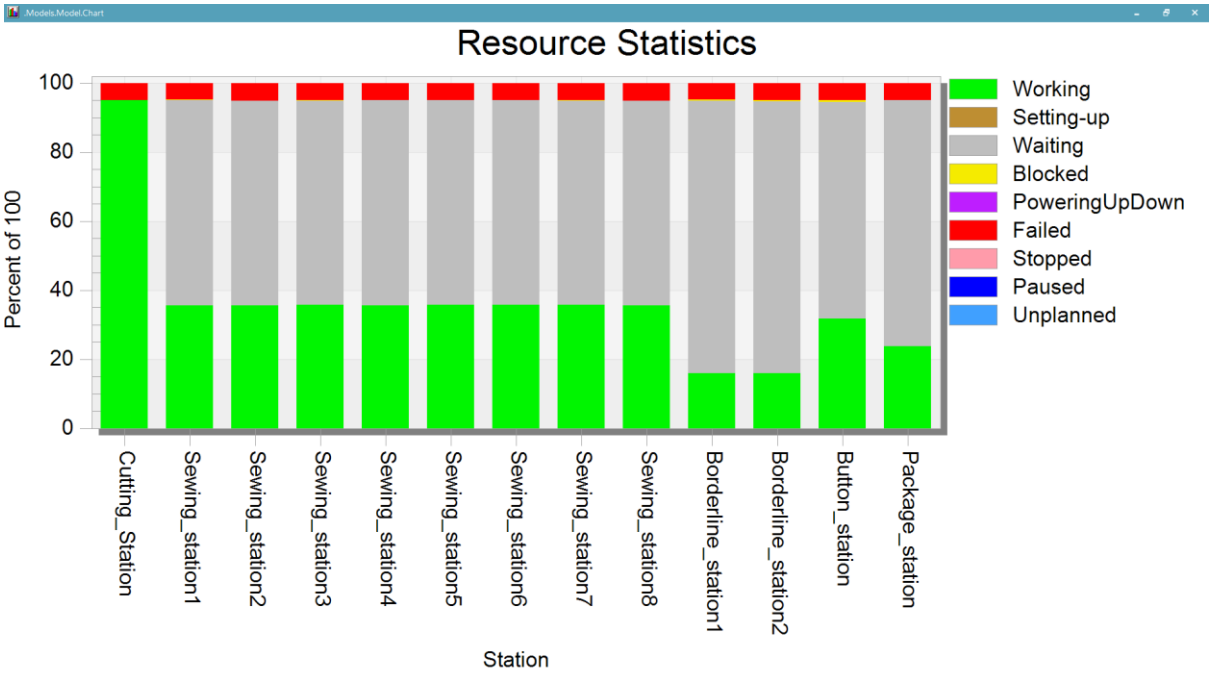
Demand Analysis

Graph



Production Analysis

Timing chart



Location Analysis

Table

Cluster	Center of location
1	8.55, 79.75
2	8.15, 81.39
3	6.74, 80.70

3.1 Discussion and recommendations

- **What can we say based on the results**

Forecasted Demand

According to demand curve it follows a linear pattern as it is well developing company. Demand can be forecasted using linear regression. The regression equation is derived assuming the relationship to be linear.

Regression Equation: Y = 3256.7 + 621.03X.

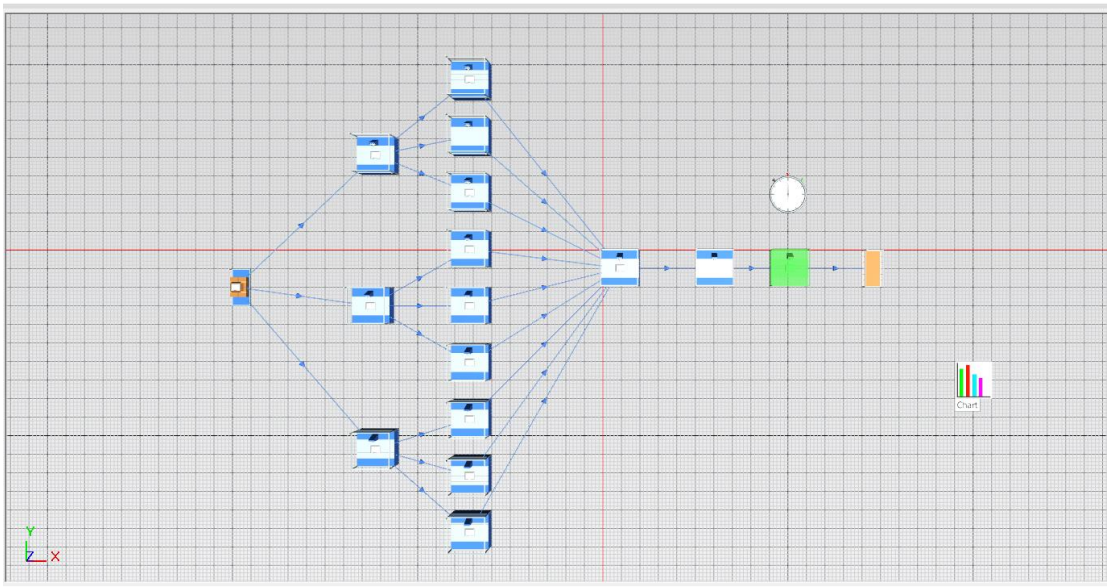
Month Period	F.D
Jan-Mar 2023	7603.9
Apr-Jun 2023	8224.9
July-Sep 2023	8845.9
Oct-Dec 2023	9467

Production scheduling

We can observe that time taken for waiting and blocking were in higher rate in other stations with compare to cutting station. Using the software we can mitigate the waiting and blocking time period by adding and deducting necessary stations.

To do the suggestion made above, we have to adjust stations and workers according to the schedule.

Work stations	Adjusted machine amount	Workers
Cutting	3	3
Sewing	9	9
Border lining	1	1
Button fixing	1	1
Packing	1	1



Location Planning

By using center of gravity method for location, we can finalize some most suitable locations for each clusters.

Cluster	Suitable place
1	Mannar
2	Trincomalee
3	Kandy

- **What actions we recommend for this organisation**

  - By Demand forecasting customer demand and purchasing patterns, companies can better manage their stock levels, plan future purchases, and adjust pricing strategies.

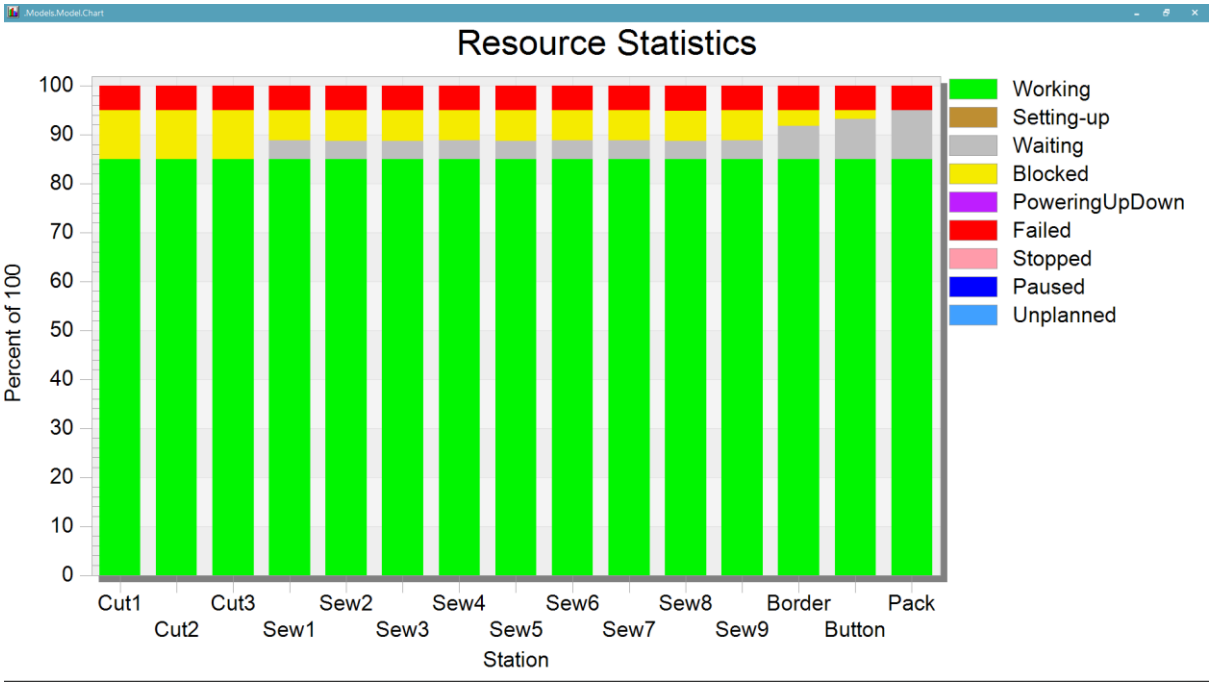
  - We need to do machine sale for borderline machine and purchase for cutting and sewing machine. To reduce repair time, we have to hire a permanent technician for this company.

  - We will need to place our new companies at suggested locations to increase the efficiency and decrease the cost for external factors.

- **Improvements due to the modifications**

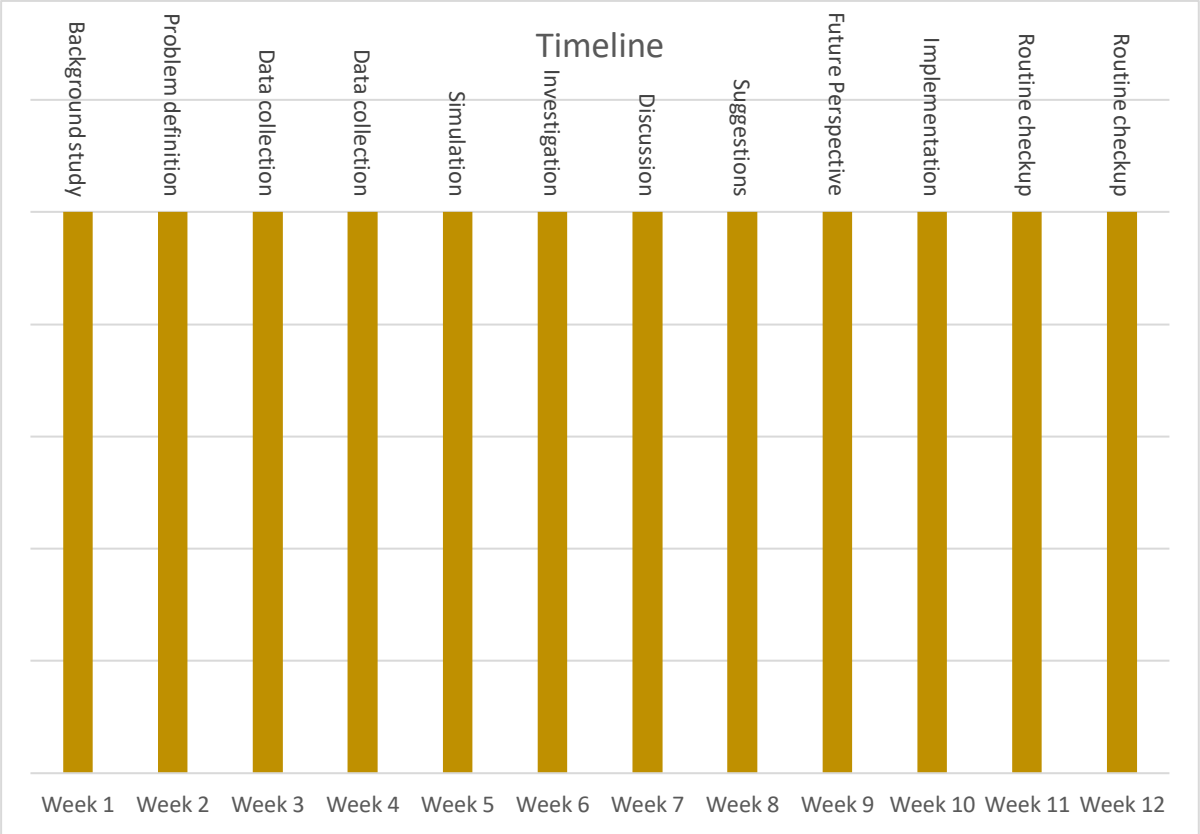
  - Demand forecasting aids in risk mitigation and effective financial decision-making that affects profit margins, cash flow, resource allocation, potential for growth, inventory accounting, operating costs, staffing, and overall expenditure. Demand forecasting is the foundation of all strategic and operational initiatives. This in turn helps them remain competitive in the market and maximize profitability.

  - Waiting time and blocking time of each station can be mitigated. New graph shows the effectiveness of the newly designed schedule. Here we can observe that all machines are working above 80 percentage and pausing time was reduced to below 20 percentage.



- A great location gives customers, skilled workers, and transit access they need. The success of a firm in the contemporary, fiercely competitive global market depends on its location. The best sites will aid your business' progress. You may prevent expensive mistakes with the aid of location data and analytics.

4 Timeline



5 Estimated budget

Budget for current solution

Credit/Debit	Amount(Rs)
Sale of Borderline machine	(25000)
Purchase of sewing machine	50000
Purchase of cutting machine x2	100000
Net cost	125000

Budget for future market extension

Credit/Debit	Amount(Rs)
Purchase of land	20000000
Building cost	10000000
New accessories	650000
Initial costs	1000000
Total	31650000

6 Limitations and future work

- **Limitations in our approach to solving the problems**

  For demand forecasting our forecasts will never be accurate, despite the fact that we have a wonderful methodology in place and forecasting professionals on staff. Simply said, some goods and markets are highly volatile. Additionally, there are countless other variables that affect demand in general. Overstaffing and surplus inventory will result from planning for demand that is higher than what actually materializes. This results in additional labor expenses and even storage expenses for the extra materials you have on hand.

  There are instances when external circumstances beyond the production manager's control restrict the effectiveness of production planning. War breaking out suddenly, governmental control, natural disasters, changes in fashion or technology, etc. are all things that hinder its execution. Only if the original plan has been meticulously designed to employ the manufacturing facilities completely and effectively will the factory operate at its best. Re-planning – Often required in manufacturing.

  These following factors affecting a location decision in operations management are facilities, competition, logistics, labor, community and site, political risk and incentives, according to Reference for Business. These factors can change day to day. Therefore a perfect location planning can not be achieved for long term.

- **What should be done in the future to further improve the facility operations**

  With advanced technologies available today such as AI-based analytics tools, businesses are able to get more accurate forecasts that reduce errors and improve the accuracy of predictions. An effective demand forecasting strategy can give a company the upper hand when it comes to managing resources efficiently while ensuring they can meet customer expectations.

  Advanced technologies will allow for more accurate scheduling, mitigating problems which can arise from inconsistencies in manual tasks. Along with greater efficiency, automated production systems will also be able to handle a greater demand in both volume and complexity that would be too time consuming if left up to human operators. Additionally, due to their predictive ability, these systems can provide insight into future issues or opportunities before they happen - giving companies a competitive edge in the market. All in all, the future looks bright for production scheduling as it takes its first steps into the world of automation.

  The future of facility location planning looks incredibly exciting, with advances in technology allowing businesses to accurately predict consumer behavior and make more informed decisions about where to locate their facilities. This greater access to data will allow businesses to optimize their location choices based on a wide range of criteria such as the cost of doing business, customer convenience and proximity, transportation routes and access points, population density patterns, environmental sustainability practices and many other factors. Ultimately this shift towards a digital infrastructure should make facility location planning increasingly efficient and effective for businesses in the years ahead.

7 References

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2. Lecture on production management https://www.vssut.ac.in/lecture_notes/lecture1429900757 (Accessed on 3rd Jan 2023)
3. Time line creator https://time.graphics/editor (Accessed on 3rd Jan 2023)

Figure 4 - Discussion