

# Operations management and supply chain management



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## **Introduction.**

Operations management is a process which primarily deals with the area of the production of goods and services. Operations management takes up the liability of making sure that all business operations are efficient and use as little resource as and when required, and ensures its effective in meeting customer requirements. Operations management deals with managing a system that changes inputs such as materials, labor and energy into outputs such as goods and services. Every service we get all around us whether it be in supermarkets, hospitals, police station, schools, etc all have been manufactured through the different processes of Operational Management.

Operations management includes activities such as managing purchases, list control, excellence control, storage space, logistics and evaluations. The core objective is to have a prime focus on competence and the efficiency of the process. Hence, operations management often includes a decent amount of dimension and scrutiny of in-house processes.

Operation Managers are the people who are responsible in taking care of the resources which consist of the different operational functions.

This is an assignment which goes through a case study on Weldon Hand Tools, Europe's one of the most successful hand tool manufacturers, moving into the woodworking tools market.

**Task 1.****Calculation of Number of People need to assemble the Product.****YEAR 1.****1ST QUARTER:**

Sales forecast for no. of units manufactured = 98, 000 units.

It takes 1. 60 standard minutes to assemble and pack one unit.

Therefore total time required to assemble and pack 98, 000 units =

$98, 000 \times 1. 60 = 156800$  mins.

One year has 52 weeks or 4 quarters,

One quarter =  $52 / 4 = 13$  weeks

For the first quarter all new workers for the manufacturing site will have a 2 day training period. This training will include Induction to the Company, Site tour, Risk Assessment, Fire and Safety Hazard Training.

Standard holiday pay package for a permanent full time employee can be put as 4 weeks in a year. Hence we can assume all full time employees will have a week off as Holiday every quarter.

Amount of time lost for Training and holiday = 2 working days + 1 week = 1. 4 weeks.

Since one week has 5 working days, 2 working days is 0. 4 weeks.

Working weeks in 1st Quarter =  $13 - 1.4 = 11.6$

Now assuming full time workers working 40 hours (8 hrs shift X 5 working days) per week, Then one worker can cover =

$40 \text{ hrs} \times 11.6 \text{ Weeks} \times 60 \text{ mins} = 27840 \text{ mins}$  ..... EQUATION : 1

Therefore no. of workforce required for the manufacturing of 98, 000 units =

$156,800 / 27,840 = 5.632 = \text{Approximately } 6 \text{ new workers}$

Hence we can conclude 6 workers working fulltime, i. e. 40 hours each week, for the first quarter will be able to assemble forecasted sale volume.

## **2ND QUARTER:**

Sales forecast for no. of units manufactured = 140, 000 units.

It takes 1.60 standard minutes to assemble and pack one unit.

Therefore total time required to assemble and pack 140, 000 units =

$140,000 \times 1.60 = 224,000 \text{ mins.}$

Standard holiday pay package for a permanent full time employee can be put as 1 week every quarter.

Working weeks in 2nd Quarter =  $13 - 1 = 12$

Now assuming full time workers working 40 hours (8 hrs shift X 5 working days) per week, Then one worker can cover =

$40 \text{ hrs} \times 12 \text{ Weeks} \times 60 \text{ mins} = 28800 \text{ mins}$ ..... EQUATION : 2

This worktime is for existing employees since they don't need any training.

Therefore no. of workforce required for the manufacturing of 140, 000 units

=

$$224, 000 / 28, 800 = 7. 78 = \text{Approximately 8 workers}$$

Currently we have 6 fulltime workers. There is an increment of about 40% in the no. of units manufactured in the preceding quarter.

There are two ways to resolve the shortage of labour. Firstly we can request the existing workers to do overtime and cover the difference. But as we can see the forecast predicts the sale volume going further higher next quarter. Hence the most feasible option would be to hire new workers.

From above calculation (EQUATION 1), new workers can cover 27, 840 mins per quarter. So two new workers will cover:  $27, 840 \times 2 = 55, 680$  mins

$$6 \text{ existing workers will cover} = 6 \times 28, 800 = 172, 800 \text{ mins}$$

Therefore total work time covered by all workers =  $172, 800 + 55, 680$

$$= 228, 480 \text{ mins.}$$

Work time required to manufacture 140, 000 units = 224, 000 mins.

Hence we can conclude 6 existing workers and 2 new workers working fulltime, i. e. 40 hours each week, for the second quarter will be able to assemble forecasted sale volume.

**3rd QUARTER:**

Sales forecast for no. of units manufactured = 140, 000 units. (From Table 7. 3)

It takes 1. 60 standard minutes to assemble and pack one unit.

Therefore total time required to assemble and pack 140, 000 units =

$140, 000 \times 1. 60 = 224, 000$  mins.

Standard holiday pay package for a permanent full time employee can be put as a week off every quarter.

Now assuming full time workers working 40 hours (8 hrs shift X 5 working days) per week, Then one worker can cover =

28800 mins from EQUATION : 2

Therefore no. of existing workforce required for the manufacturing of 140, 000 units =

$224, 000 / 28, 800 = 7. 78 =$  Approximately 8 workers

Hence we can conclude 8 existing workers working fulltime, i. e. 40 hours each week, for the third quarter will be able to assemble forecasted sale volume.

**4th QUARTER:**

Sales forecast for no. of units manufactured = 170, 000 units.

It takes 1. 60 standard minutes to assemble and pack one unit.

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Therefore total time required to assemble and pack 170, 000 units =

$$170, 000 \times 1.60 = 272, 000 \text{ mins.}$$

Standard holiday pay package for a permanent full time employee can be put as a week off every quarter.

Now assuming full time workers working 40 hours (8 hrs shift X 5 working days) per week, Then one worker can cover =

$$28800 \text{ mins from EQUATION : 2}$$

Therefore no. of workforce required for the manufacturing of 170, 000 units with existing employees =

$$272, 000 / 28, 800 = 9.44 \text{ workers}$$

Currently we have 8 fulltime workers. This is about a shortage of 18% in employee work mins.

As said before there are two ways to resolve the shortage of labor. Firstly we can request the existing workers to do overtime and cover the difference or we could hire new workers. Since the sales forecasts suggest that the sale volume may go down next quarter, the more feasible option would be to request the current employees to do overtime.

$$18\% \text{ shortage of } 40 \text{ hours each employee} = 7.2 \text{ hours}$$

Hence we can conclude 8 existing workers working fulltime, i. e. 40 hours each week, and an additional 7 to 10 hours per week have to be requested

by employees in an average cover up the shortage and avoid any future redundancy.

## **YEAR 2.**

### **1ST QUARTER:**

Sales forecast for no. of units manufactured = 140, 000 units.

It takes 1. 60 standard minutes to assemble and pack one unit.

Therefore total time required to assemble and pack 140, 000 units =

$140, 000 \times 1. 60 = 224, 000$  mins.

Standard holiday pay package for a permanent full time employee can be put as a week off every quarter.

In the middle of 1st quarter of the second year a two day Kaizen event is held. Kaizen is a daily activity; its purpose is to improve simple productivity. It is a process that, if done correctly, makes the workplace more humanly, removes overly hard work, and teaches everyone how to perform experiments at work using safe scientific methods. It teaches us to spot and eliminate waste in business processes. Kaizen events suggest a humanized approach to workers and to increasing productivity: The main concept was to take care of the company's human resources as much as it is to praise and encourage participation in kaizen activities. Primarily it requires full participation from workers.

Now assuming full time workers working 40 hours (8 hrs shift X 5 working days) per week, Then one worker can cover (including two days training)=

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27840 mins from EQUATION : 1

Therefore no. of workforce required for the manufacturing of 140, 000 units  
=

$224, 000 / 27840 = 8.05 =$  Approximately 8 workers with a little overtime.

Hence we can conclude 8 existing workers working fulltime, i. e. 40 hours each week, for the first quarter with a little overtime will be able to assemble forecasted sale volume.

## **2nd QUARTER:**

Sales forecast for no. of units manufactured = 170, 000 units. (From Table 7.3)

It takes 1.60 standard minutes to assemble and pack one unit.

Therefore total time required to assemble and pack 170, 000 units =

$170, 000 \times 1.60 = 272, 000$  mins.

Standard holiday pay package for a permanent full time employee can be put as a week off every quarter.

Now assuming full time workers working 40 hours (8 hrs shift X 5 working days) per week, Then one worker can cover =

28800 mins from EQUATION : 2

Therefore no. of workforce required for the manufacturing of 170, 000 units with existing employees =

$$272,000 / 28,800 = 9.44 \text{ workers}$$

Currently we have 8 fulltime workers.

As said before there are two ways to resolve the shortage of labor. Firstly we can request the existing workers to do overtime and cover the difference or we could hire new workers. In this condition the sales forecasts suggest that the sale volume could only go higher next quarter, hence the more feasible option would be to hire two more employees.

From above calculation (EQUATION 1), new workers can cover 27,840 mins per quarter. So two new workers will cover:  $27,840 \times 2 = 55,680$  mins

Therefore total work time covered by all 10 workers =  $(8 \times 28,800) + 55,680$

$$= 286,080 \text{ mins.}$$

Work time required to manufacture 170,000 units = 272,000 mins.

Hence we can conclude 8 existing workers and 2 new workers working fulltime, i. e. 40 hours each week, for the second quarter will be able to assemble in surplus forecasted sale volume.

### **3rd QUARTER:**

Sales forecast for no. of units manufactured = 200,000 units.

It takes 1.60 standard minutes to assemble and pack one unit.

Therefore total time required to assemble and pack 200,000 units =

$200,000 \times 1.60 = 320,000$  mins.

Standard holiday pay package for a permanent full time employee can be put as a week off every quarter.

Now assuming full time workers working 40 hours (8 hrs shift X 5 working days) per week, Then one worker can cover =

28800 mins from EQUATION : 2

In this condition again the sales forecasts suggest that the sale volume is going higher next quarter, hence the more feasible option would be to hire more employees.

From above calculation (EQUATION 1), new workers can cover 27,840 mins per quarter. So two new workers will cover:  $27,840 \times 2 = 55,680$  mins

Therefore total work time covered by all 10 workers =  $(10 \times 28,800) + 55,680$

= 343,680 mins.

Work time required to manufacture 200,000 units = 320,000 mins.

Hence we can conclude 10 existing workers and 2 new workers working fulltime, i. e. 40 hours each week, for the third quarter will be able to assemble in surplus forecasted sale volume.

#### **4th QUARTER:**

Sales forecast for no. of units manufactured = 230,000 units.

It takes 1.60 standard minutes to assemble and pack one unit.

Therefore total time required to assemble and pack 230,000 units =

$$230,000 \times 1.60 = 368,000 \text{ mins.}$$

Standard holiday pay package for a permanent full time employee can be put as a week off every quarter.

Now assuming full time workers working 40 hours (8 hrs shift X 5 working days) per week, Then one worker can cover =

$$28800 \text{ mins from EQUATION : 2}$$

Therefore no. of workforce required for the manufacturing of 170,000 units with existing employees =

$$368,000 / 28,800 = 12.78 \text{ workers}$$

Currently we have 12 fulltime workers. This is about a shortage of 6.5% in employee work mins.

As said before there are two ways to resolve the shortage of labor. Firstly we can request the existing workers to do overtime and cover the difference or we could hire new workers. Since from the sales forecasts suggest that the sale volume may go down next quarter, i. e. the first quarter of year 3 the more feasible option would be to request the current employees to do overtime.

$$6.5\% \text{ shortage of 40 hours each employee} = 2.6 \text{ hours}$$

Hence we can conclude 12 existing workers working fulltime, i. e. 40 hours each week, and an additional 2 to 4 hours each week have to be requested by employees in an average cover up the shortage and avoid any future redundancy.

### **Type of Facilities that the Company need to buy.**

Managing Facilities is an integral process within an organization that helps maintaining and developing the services which support and improve the effectiveness of its primary exercise.

It comprises of multi-disciplinary exercise within the built environment and taking care of their influence upon people and the workplace. It facilitates to the impartment of strategic and operational objectives.

On a microscopic level, effective facilities management provides a safe and efficient business environment, which is important to the realization of any business – whatever its size and scope.

For Weldon Hand Tools, designing the manufacturing operation and selecting the type of facilities is of primary importance since the sales forecast predicts a high demand.

Capacity Planning: The first question which will arise will be considering the size of the facility. Once we have the workforce size of the Operating System, we can start working out the different facilities required to facilitate the effective services which support its primary activities.

Facility Location: The geographic site of the workshop has to be selected in such a way that if demand proves higher than forecast, then there will be enough room to expand the workshop. Analyzing location for the advantageous placement of facilities in order to minimize transportation costs, avoid placing hazardous materials near housing, outperform competitors' facilities, etc.

The company will need to have setup a research on customer requirement in order to be successful and surface the growing demand for the product. Customers nowadays are more demanding; they want better quality at the same price. There could be a rapid change in the composition of customers and their preferences. An ambiguous and changeable economic climate, customer needs constantly evolving, and upcoming technology continually shakes up market turbulence.

Raw materials are one of the major factors of production along with labor and capital. Raw materials are so important to the production process that the success of a company's business and economy can be found by the amount of natural resources the company owns to provide for manufacturing. In this case it would be the pricing for the piece parts used to assemble into the product.

An active human resource management with e-recruiting, training and education is also very important since the size of the sales forecast predicts a considerable amount of inflation and deflation.

Product promotion, creating new sales channels, internet sales are some of the ways to provide Marketing opportunity to the company.

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With the increase in sales managing inventory, and having a warehouse could become imperative.

All business faces competition. Knowing our competitors can help improve our products, services and marketing. It will enable us to set our prices competitively and help to respond to rival marketing and promotional campaigns with our own initiatives.

## **Task 2.**

### **Layout of the Assembly Operations.**

The layout of an operation is the most important within the general area design in operations management. This is because the way facilities are placed in relation to each other has an important effect on so many aspects of operations. Considering all the facilities, machines, equipment, and etc layout is the first thing we notice because it governs the appearance of a company. Layout determines the flow of customers, materials and information within the operation. All these factors affect the total distance travelled by materials, which in turn affect the cost, the general effectiveness and the quality of the operation.

The strategic objectives of an operation depend on a layout. There are certain general objectives pertaining to all operations which should be considered while doing a layout. They are:

Any process which could pose a danger to the staff or the customers should not be accessible to unauthorized.

Measures to be taken to minimize the flow of materials or information.

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Flow of materials should be well signposted, clear and evident to staff.

Any noisy or unpleasant part of an operation should be located away from staff.

There should be coordination for the supervision and communication of the location assisted by equipments aiding it.

All machines and equipments should be maintained and cleaned properly.

Space should be used precisely.

The most important factor to consider the layout to be done here is long term flexibility. If the demand keeps going higher based on the sales forecast there should be plenty of room for expansion within the workshop.

### **For Total Work Content: All Time in Standard Minutes (SM)**

Element A: Assemble poke subassembly 0. 12

Element B: Fit poke subassembly to frog 0. 10

Element C: Rivet adjusting level to frog 0. 15

Element D: Press adjusting nut screw to frog 0. 08

Element E: Fit adjusting nut to frog 0. 15

Element F: Fit frog screw to frog 0. 05

Element G: Fit knob to base 0. 15



Element H: Fit handle to base 0. 17

Element I: Fit frog subassembly to base 0. 15

Element J: Assemble blade subassembly 0. 08

Element K: Assemble blade subassembly,

clamp and label to base and adjust 0. 20

Element L: Make up box and wrap plane,

pack and stock 0. 20

There are four quarters each year. 52 weeks makes up a year.

Hence in each quarter there will be:  $52 / 4 = 13$  weeks.

Now let's assume that a full time employee would work 40 hours per week.

Therefore total time put in for one cycle =  $13\text{weeks} \times 40\text{hrs} \times 60\text{mins} = 31,200$  mins

No. of units for 1st quarter = 98, 000

The required cycle time =  $31,200 / 98,000 = 0.31837$

The required no. of stages = the total work content / the required cycle time

$1.60 \text{ mins} / 0.31837 \text{ mins} = 5$  approximately

**This means 5 stages.**

Now looking at the assembly, different tasks could be further differentiated and grouped into different work stations. For example assembling poke assembly does not depend on fitting the knob to the base. All the dependant jobs can be put into same workstation. Hence looking at the different tasks we can group them into five workstations.

Let's name them as Workstations 1, 2, 3, 4 and 5.

**Workstation 1:**

Workstation 1 will comprise of all the jobs entailing with the assembling of components of frog subassembly. Element A, B, C, D, E and F.

This will include:

Assemble poke subassembly

Fit poke subassembly to frog

Rivet adjusting level to frog

Press adjusting nut screw to frog

Fit adjusting nut to frog

Fit frog screw to frog

**Workstation 2:**

Workstation 2 will comprise of all the jobs entailing with the assembling of components of base subassembly. Element G, H and I.

This will include:

Fit knob to base

Fit handle to base

Fit frog subassembly to base

### **Workstation 3:**

Workstation 3 will comprise of all the jobs entailing with the assembling of components of blade subassembly. Element J.

This will include:

Assemble blade subassembly

### **Workstation 4:**

Workstation 4 will comprise of all the jobs entailing with the assembling of all the subassemblies. Element K.

This will include:

Assemble blade subassembly, clamp and label to base and adjust

### **Workstation 5:**

Workstation 5 will comprise of all the jobs entailing with packaging. Element L.

This will include:

Make up box and wrap plane, pack and stock.

The flowchart above shows the final allocation after breaking down the process into different stages of the long thin arrangement, which is easy to manage. This arrangement makes materials handling simple and the operation becomes a lot more efficient.

The layout will need to be adjusted in terms of the design of the products, since this is one of the two main significant factors in deciding on which control values would be useful, the manufacture resources concerning adjustability and capability being the other. The layout proposed is a very simple yet very efficient one. From the layout it could be seen the three sub-assembly workshops are just adjacent to the assembly workshop. Lying just beside the assembly workshop and the packaging workshop is the Inventory. This arrangement would save time from transporting the product back and forth. The Inventory also helps us to keep some of the product in a well maintained stock. Plenty of free space is available around the manufacturing site to enable us to expand our workshops if the demand of our product requires so. The main building with all the different facilities is located just on the other side of the manufacturing site. Previously the effectiveness of a mechanism was exclusively measured by the numeral of processed units per hour. A further focus has been put on the quickness and sharpness of the machine. There still exist numerous high proficient machines with low sharpness even though they are time consuming to set up amid the diverse products. However, Weldon Hand Tools may detach the products into standard, whereby it is processed in the old machine, and special. As a result the quantity of special products will be so little that a flexible machine with a comparatively low capacity may be adequate to encounter any competition.

**Conclusion.**

In the current market situation companies manufacturing furniture are put through a lot of difficult situation which includes short business cycles, lack of technical knowledge, and delayed returns. The organization itself is very outdated. Hence examining and studying all these issues put together with the high prices of commodities and supplies, state laws, only puts the whole organization into a position where they have work on low income and revenue.