Production Planning Essay, Research Paper

Production Planning

Introduction

The intention of this project is to demonstrate the function of

production planning in a non – artificial environment. Through this simulation

we are able to forecast, with a degree of certainty the monthly requirements for

end products, subassemblies, parts and raw materials. We are supplied with

information that we are to base our decisions on. The manufacturer depicted in

this simulation was actually a General Electric facility that produced black and

white television sets Syracuse, New York. Unfortunately this plant is no longer

operational, it was closed down and the equipment was shipped off to China. One

can only wonder if the plant manager would have taken Professor Moily’s class in

production management the plant still might be running.

Modern production management or operation management (OM) systems first

came to prominence in the early half of the twentieth century. Frederick W.

Taylor is considered the father of operations management and is credited in the

development of the following principles.

a. Scientific laws govern how much a worker can produce in a day. b. It is the

function of management to discover and use these laws in operation of productive

systems. c. It is the function of the worker to carry out management’s wishes

without question.

Many of today’s method’s of operation management have elements of the

above stated principles. For example, part of Material Requirement Planning

system (MRP) is learning how workers to hire, fire, or lay idle. This is

because it we realize the a worker can only produce so many widgets a day, can

work so many hours a day, and so many days a year.

I will disagree with principle ?c? in that the worker should blindly

carry out the wishes of management. Successful operations are based upon a two-

way flow of thought and suggestions from management to labor. This two-way flow

of ideas is incorporated into another modern system of operations management,

the Just – In – Time system. Eastman Kodak gives monetary rewards to employees

who devises an improvement in a current process or suggests an entirely new

process of manufacturing. Often a small suggestion can yield a big reward when

applied to a mass-produced item.

Body

In this project we are presented with the following information: bounds

for pricing decisions, market share determination, the product explosion matrix,

sales history (units per month at average price), unit value, setup man-hours,

running man hours, initial workforce, value of inventory, on hand units. We

also know that we have eight end products, four subassemblies, eight parts, and

four raw materials. The eight end products are comprised entirely from the

subassemblies, parts, and raw materials. From this information I was able to

determine how many units of each final product, how many units of parts to

produce in a month, how many units of raw material to order every month and how

to price the final products.

The first step that I took in this project was to develop product

structures for each product (please refer to the Appendices for product

structures on all eight products, plus new product nine). This information was

presented in product explosion matrix. For example, I determined that product

one used one subassembly nine and one part thirteen. Part thirteen consisted of

raw material twenty-one. Sub-assembly nine consists of part thirteen (which

includes raw material twenty-one), raw material twenty one and raw material

twenty-four. From this product explosion matrix I have realized that an end

product does not just happen; they consist of many subassemblies, parts and raw

material.

We also determined the minimal direct costs to each of the eight

products. The minimal direct product is the cost of the raw material, plus the

price of the amount of labor for the assembly to end product. For product one

we have a total of three raw material ?twenty-one? which cost ten dollars a

piece and one raw material ?twenty-four? which cost twenty dollars each. We now

have a total of fifty dollars for the price of the parts. Next we calculate the

labor that goes into transforming these parts into a viable end product. We get

a total of six hours of running man hours/unit and an hourly labor rate of $8.50,

which gives us a total of fifty-one dollars. This gives a minimal total cost of

$101 to produce product one. This number is useful in determining how much a

unit actually cost to manufacture and what we must minimally sell the product

for to make a profit. We can than analyze if a product costs to much to make or

the sum of the parts is more than the price of the end product. Product eight

had the lowest direct minimum cost ($89.50) and four had the highest minimal

direct cost.

From a purely economic stand point, it would be beneficial to use as

much of raw material twenty-three ($5 unit) and as little of raw material

twenty-two ($30 unit). This does not consider that raw material twenty-two may

actually be more valuable than raw material twenty-three. Perhaps raw material

twenty two may be gold or silver and raw material twenty-three may be sand or

glass.

I also converted all information in the sales history per month (figure

four of the MANMAN packet). The purpose of this step was so that I could sort

and add the sales numbers to chronicle the past twenty four months. Clearly

product one was the best-selling apparatus, and product three, four and five

where sales laggards.

Entering the information into spreadsheet form was also necessary to

present the eight products in graphical form. Of the following graph types that

where at my disposal (line, bar, circle) to clearly illustrate the upward and

downward trend of each of the eight product I chose the line graph method. A

circle graph is good percentage comparisons or comparison of market share. Bar

graphs can illustrate a snapshot in time but can distort trend data.

At this point our class gathered into groups to discuss which product to

discontinue. Obviously product one was not going to be of the discontinued

products, since it was our volume leader. Based on the sales figure for the

past twenty-four months my group decided to eliminate products three, four and

five. Also, products three, four and five had the highest minimum direct costs

as well. Since these products where expensive to manufacture and where our

lowest selling products a group decision was made to discontinue these products.

The discontinued product was then rolled over into a new product, now

referred to product nine. Unfortunately, we where unable to decide by the

information given if any of the discontinued products was a high margin product,

low volume product (IE 50? big screen color Trinitron tube with oak cabinet and

stereo sound).

Moving right into our next step we began to analyze our bar charts to

make our starting forecast. We viewed sales from each product to see if they

fall under one the following situations: Base (Base + Trend) (Base + Trend) \*

Seasonality

When a product is base the sales alter little each sales period or change

erratically with external market signals. An example of a product that would

fall under the base model would be sand bags. Sand bags sell at the same level

month after month. If a retailer sells a hundred bags in March the will sell a

hundred bags in October. But, in a flood plain after terrantiel downpour, the

sales of sandbags increase exponentially. This is because many people purchase

the sandbags to hold back the rising flood waters. Another example of a product

that would emulate the base model is insulin. There is a limited number of

people with insulin dependant diabetes. The people with insulin dependant

diabetes unfortunately die off, but are replaced with other people who fall ill

to the disease. There is very little movement up or down in the sale of insulin.

The base plus trend model illustrates that a product has a trend of

upward or downward groth in sales. Products at the begining or ending of their

respective product cycles will display this type of performance. Sales of a new

product such as Microsoft Windows95? disk operating system will fall into this

category. The sales of May are expected to be larger than April, the sales of

April will be larger than March and so on. While the sales may decline (or

increase) during a particular time frame, a trend of upward or downward growth

will be apparent.

Lastly, the base plus trend times seasonality attempts to forecast the

swings in demand that are caused by seasonal changes that can be expected to

repeat themselves during a single or consecutive time period. For example,

florists experience a predictable increases in demand each year, both occur at

similiar (or exact) times during the year; Mothers Day and St. Valentines Day.

Florists must forecast demand for roses and other flowers so they can meet this

predictable demand. If I where to construct a ten year historical graph for a

neighborhood florist, there would be clear increase in demand every February and

May, in every one of those years. A caveat to the previous example would be

that in most lines a business forecasting is never this easy. If it was there

would not be a production management class or operations management science!

Some other methods used to forecast demand are: delphi method,

historical analogy, simple moving average, box Jenkins type, exponential

smoothing and regression analysis. Forecasting falls into four basic types:

qualitative, time series analysis, casual relationships and simulation. All of

the proceeding have pluses, minuses and degrees of accuraccy. I often depends

on the precision of previous data. Also, as is often stated in financial

prospectuses ?past performance does not guarantee future results?.

For product one I used base plus trend. The sales started of at 1246

units and gradually increased to 2146 at the end of twenty four months. There

was a slight dip in sales between month nine-teen and month twenty three. This

drop can from internal or external variables.

Product two was little more tricky. The swing where eratic and showed

no detectable trend. I may have been able to use (Base + Trend) \* Seasonality

if there was not a decrease in sales from month eight and an increase in sales

in month sixteen. For this I had to employ the base or simle method.

While I find it hard to comprehend how television sales can be seasonal,

products three, five and six fall under (Base + Trend) \* Seasonality models. I

was able to replicate the wave in demand with my forecast. Perhaps consumers

are buying portable televisions to use at the beach while on vacation, or people

are replacing there old televisions to watch the Superbowl championship game or

world series. Or maybe even watch the Syracuse Orangemen in the NCAA college

basketball championship!

Conceivably, I was reading to much into product six when a decided on

base plus trend model. The way I saw it was that none of the upward or downward

where that substantial when compared with entire data, and sales from month one

(521 units) decreased by almost fifty percent to 242 units.

I felt the same way about product eight that I felt about product two,

this product demostrated eratic swings in no particular trend. I forecasted

demand using the base or simlple method for this product.

From this point I was able to forecast demand. For the safety stock

decision I always tried to error on the side of caution. On average I used a

twenty five percent safety stock level. However, when calculating the MRP or

labor plans I tried to have the minimal amount of surplus. This often means

that I only had safety stock on hand from period to period.

Conclusion

From this project and from the class lectures I have received an

understanding of how how much planning goes into even the most simplest of

manufactured goods. Production managers must employ at least one type of

forecasting method in order to avoid the everyday stock outs, late deliveries

and labor problems that arise. Forecasts are vital to every business

organization and for every significant management decision.

Afterthought

I feel that I could have further reduced costs by reducing some of the

parts, sub assemblies and outsourcing some of the production. Another situation

that I felt was unrealistic was that there was only one source for each part and

when that part was unvailable, there was a stock out. Perhaps in future

projects there can be allowance for this.