Demand Analysis

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**Forecasting Techniques**

There are four major forecasting techniques used in any business namely straight line, moving averages, simple regression and multiple linear regression. In a straight line method, annual percentage change in any variable is assumed to be the same. The forecasting is done by multiplying the percentage change with the value of last year. In the current scenario, we cannot use this technique because it is clearly mentioned in the case that daily and monthly sales are not consistent so we cannot predict a uniform percentage change.

Moving averages is a method of smoothing the data and analyzing the pattern within these figures. Forecasts are calculated with the help of least squares keeping time as the independent variable. The major concern of this method is that moving averages do not account for very large or very small values in the data. This makes the forecasts weaker and less reliable (CFI, 2019).

Simple linear regression is another method to forecast future trends or values based on past or historic figures. This method has certain underlying assumptions which will be discussed in the coming lines. Linear regression assumes that there is a linear relationship between dependent and independent variables. This means that the values for both variables form a straight line. The linear relationship is also vulnerable to the presence of outliers in the data so one has to check for outliers. In order to check for the presence of linearity, scatter plots are used. Simple linear regression assumes that all variables are multivariate normal. A histogram can be used to detect whether there is normality in all the variables tested. Another way to check normality is to apply the goodness of fit test, e.g. Kolmogorov-Smirnov test. If the variables are not normal in nature, a log-linear model can be used (Statistics solutions, 2019). A very important assumption in the regression analysis is that there is no multicollinearity in data. In other words, the independent variables are not related to each other. If the independent variables are related to each other, this will affect the relationship between the independent and dependent variables. In order to remove multicollinearity, some variables have to be deleted from the analysis or some new variables have to be added to the analysis. In order to test for multicollinearity, correlation matrix, tolerance and variance inflation factor are used. Presence of autocorrelation in the data will also affect the model which means that residuals are not independent of each other.

Regression analysis has been used to analyze relationship between advertising and espresso beans use. Advertising dollars have been used as the independent variable while use of espresso beans has been used as the dependent variable. The following table shows basic regression statistics for 6 months:

|  |
| --- |
| *Regression Statistics* |
| Multiple R | 0.975396474 |
| R Square | 0.951398282 |
| Adjusted R Square | 0.939247853 |
| Standard Error | 46.73128373 |
| Observations | 6 |

The above table show that regression model is strong and advertising accounts for 95% variation in use of espresso beans.

|  |  |
| --- | --- |
|  |  |
|  | *Coefficients* |
| Intercept | 188.2242424 |
| X Variable 1 | 0.788545455 |

The above table shows intercept and coefficient for regression analysis. Intercept is the value of dependent variable that is obtained by putting the value of independent variable as zero. The other coefficient in the above table shows the change in the dependent variable as a result of one unit change in independent variable. Following equation will depict the relationship between dependent and independent variables.

$$Y=188.22+0.788X$$

For forecasting the amount of espresso beans used in the 7th month, we will put a value of $ 1350 in place of X in the above equation. The value of dependent variable will be 1252 pounds.

Based on the above calculation, we can say that the company will need to prepare approximately 28 espresso beverages per day. This is calculated by dividing 1252 by 1.5 because one cup of espresso needs 1.5 ounces of beans. The resulting figure is then divided by 30 days to get daily requirement of espresso beverages.

Company will need 42 pounds of beans on average every day which is calculated by dividing 1252 by 30 days.

As discussed earlier, the power of regression model shows the extent to which the independent variable predicts the dependent variable. A r-squared of 0.95 or 95% shows that advertising dollars predict 95% variation in the need for espresso beans.

**Inventory management**

There are two basic techniques to manage inventory in any business, namely FIFO and LIFO. These terms refer to first in first out and last in first out systems. The first in first out method is used to analyze the materials costing. This method assumes that materials are issued from the oldest supply first. Advantages of this method include the withdrawal of materials in a logical and systematic manner. It is easy to control the materials efficiently especially when materials can be subject to depreciation or the materials are perishable. It is recommended to use FIFO method when size and cost of units are large, it is easy to identify the materials used in particular product and there is not a very high activity in the company regarding inventory.

 The Last In first Out method is used when company wants to issue materials on the purchase price of the most recent purchase materials. There is a realistic price applied to every unit of inventory issued. Current costs of materials are used to account for the current production costs. The operating profits reported using this method are realistic and stabilized. This is particularly beneficial in industries where prices fluctuate very sharply over a short period of time. However, this method is not considered as an acceptable method according to the international accounting standards. There are much more record keeping requirements in this method than some of the other methods.

 In the light of above discussion, this company will use the First In First Out method of inventory management. Following table will show the calculations for inventory by applying the FIFO inventory management method

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| --- | --- | --- | --- | --- |
| **Q** | **D/Q** | **D/Q\*S** | **q/2\*H** | **Total cost** |
| 50 | 280 | 2520 | 2.25 | 2522.25 |
| 100 | 140 | 1260 | 4.5 | 1264.5 |
| 150 | 93.33333 | 840 | 6.75 | 846.75 |
| 200 | 70 | 630 | 9 | 639 |
| 250 | 56 | 504 | 11.25 | 515.25 |
| 300 | 46.66667 | 420 | 13.5 | 433.5 |
| 350 | 40 | 360 | 15.75 | 375.75 |
| 400 | 35 | 315 | 18 | 333 |
| 450 | 31.11111 | 280 | 20.25 | 300.25 |
| 500 | 28 | 252 | 22.5 | 274.5 |
| 1250 | 11.2 | 100.8 | 56.25 | 157.05 |
| 1300 | 10.76923 | 96.92308 | 58.5 | 155.4231 |
| 1350 | 10.37037 | 93.33333 | 60.75 | 154.0833 |
| 1400 | 10 | 90 | 63 | 153 |
| 1450 | 9.655172 | 86.89655 | 65.25 | 152.1466 |
| 1500 | 9.333333 | 84 | 67.5 | 151.5 |
| 1550 | 9.032258 | 81.29032 | 69.75 | 151.0403 |
| 1600 | 8.75 | 78.75 | 72 | 150.75 |
| 1650 | 8.484848 | 76.36364 | 74.25 | 150.6136 |
| **1700** | **8.235294** | **74.11765** | **76.5** | **150.6176** |
| 1750 | 8 | 72 | 78.75 | 150.75 |
| 1800 | 7.777778 | 70 | 81 | 151 |

The above table shows the calculation of economic order quantity for the inventory. In the first column, we have taken various quantities that can be ordered in a single lot. Second column shows the number of orders that have to be placed in a month given the monthly demand of 14000 units. There is some cost that is fixed with every order and that is shown as S in the above table. In the scenario $9 per pound is the fixed cost associated with every order. Thus, in the third column every value of the second column has been multiplied by 9. The letter H represents the holding cost which is 10% of the minimum order lot of 25. In the fourth column, half of the quantity is multiplied by holding cost. In the last column, total cost is found by adding annual order cost and annual holding costs. The economic order quantity is chosen to be 1700 units because total cost is the minimum at this point and any point above this quantity gives a higher total cost (CFI, 2019).

 There are two scenarios for the company to consider, one is to keep both full time employees and the other where both part time employees are hired. In the lines below, we will discuss the pros and cons of both these options.

#  Pros of Hiring Temporary Employees

## Acquisition of Highly Skilled Workers

Previously, only the low-level workers were available for hiring on a temporary basis. With the advent of modern industrialization, it has become possible for the organizations to find people with high-profile skills to work on contracts for a certain period.

##  Reduction of Hiring Costs

When recruited on contract, the company does not have to pay for any expensive benefits. Therefore, recruiting for short-term is cost effective. There is no need to bear costs of recruiting, training, etc. for the new hires if an organization is using services of an agency.

## Objective Assessment of Performance

The performance of temporarily employed workers will be assessed without having to make commitment for long term. The potential of the worker can be evaluated more precisely because the performance will be based on professional attitude and behavior at work.

# Cons of Hiring Temporary Employees

## Overlooking the Permanent Employees

Temporary employees should be hired only if there are specific areas of work which need specialized skills. Otherwise, this practice will discourage the permanent employees to acquire new skills for career growth. Another situation for hiring people temporarily may be the frequency of arising demands for that particular type of expertise. If there are recurring demands every now and then, the company should appoint a permanent employee to provide continuous support to that function.

##  Other Operational Costs

The recruitment agencies that provide manpower on demand charge fees varying as per the job descriptions. Sometimes, it may become expensive to hire temporary employees. Mostly, the agencies keep a portion of the employee’s salary as their monthly commission. Therefore, the salaries of such professionals are usually higher than the average market offers made for the same positions.

## Interrupted Progress

Every time a new hire is appointed by a company temporarily, there arises a need for orientation to get adjusted to the work environment and understand the job requirements. This is time consuming and hinders the progress of that specific department.

# Benefits of Staffing Permanent Workers

## Devotion

Permanent employees can reach the highest level of devotion towards their organization, as the company cares for their long-term interests and betterment. They can undertake multiple tasks to complete as required sometimes to meet deadlines. They have a kind of emotional attachment towards the company, which is the greatest motivation for productivity.

## Uninterrupted Progress

The permanent employees are well-acquainted with the processes and procedures of their organization. Mostly, they do not need to spend extra time for understanding the background of projects. This ensures an uninterrupted progress of company’s operations.

## Certainty in Decision-Making

The company has enough information about the permanent staff, their capabilities, and commitments. Hence, the management can make strategic decisions with certainty.

# Disadvantages of Staffing Permanent Workers

## Hiring Costs

Hiring employees to work permanently is a time-taking and expensive way of filling the job positions in a company. It requires expenditure on different phases of hiring. Advertising, testing, interviewing, training – all these stages of recruitment demand for time and cost, which are higher than those of hiring temporary employees.

## Higher Packages

For the permanent employees, the companies have to offer remuneration packages that normally comprise incentives, allowances, health insurance, and so on. These compensations are considerably higher than those liable to pay for the temporary workers.

## Increased Overhead Costs

With permanent employees, the company will have to arrange for spatial work environments that need continuous care and maintenance, There may arise need for arranging residences for the staff. Moreover, in many cases, the company has to fulfil regulatory requirements as well.

|  |  |  |  |
| --- | --- | --- | --- |
| 2 Full time employees |  |  |  |
| NB | B | BLNB | BLB | Total Cost NB | Total Cost B |
| 162 | 189 | 21.6 | 25.2 | 183.6 | 214.2 |
| 162 | 189 | 21.6 | 25.2 | 183.6 | 214.2 |
| 162 | 189 | 21.6 | 25.2 | 183.6 | 214.2 |
| 162 | 189 | 21.6 | 25.2 | 183.6 | 214.2 |
| 162 | 189 | 21.6 | 25.2 | 183.6 | 214.2 |
| 162 | 189 | 21.6 | 25.2 | 183.6 | 214.2 |
| 162 | 189 | 21.6 | 25.2 | 183.6 | 214.2 |

|  |  |  |  |
| --- | --- | --- | --- |
| 2 Part time employees |  |  |  |
| NB | B | BLNB | BLB | Total Cost NB | Total Cost B |
| 121.5 | 189 | 21.6 | 25.2 | 143.1 | 214.2 |
| 121.5 | 189 | 21.6 | 25.2 | 143.1 | 214.2 |
| 121.5 | 189 | 21.6 | 25.2 | 143.1 | 214.2 |
| 121.5 | 189 | 21.6 | 25.2 | 143.1 | 214.2 |
| 121.5 | 189 | 21.6 | 25.2 | 143.1 | 214.2 |
| 121.5 | 189 | 21.6 | 25.2 | 143.1 | 214.2 |
| 121.5 | 189 | 21.6 | 25.2 | 143.1 | 214.2 |

The above tables show two different scenarios where company is using two full time employees and two part time employees respectively. In both the scenarios, both baristas will be utilized because the maximum working limit for one barista is 50 hours in a week. So in the first scenario, one barista will work 50 hours for the week and other will work 48 hours in a week. As for the non-barista employees, the full time employee will work 50 hours for the week and 1 part time employee will work 26 hours and another part time employee will work 8 hrs for the week. Thus the full time barista employee will get a max of $ 742 for the week. He will then be replaced by the second barista employee who is full time and he will earn $ 714 for the week. Thus, the total cost for the company will be $ 1456 for the barista workers whereas for the non-barista workers, cost will be $ 960 for the week

 The scenario with all part time employees Is much more complex in nature because they have only 26 hours to work at max for the week so there will be much more calculations done. Each day, there are two over time hours, one at start and one at the end. One employee will have to be kept as full time so we keep the baristas in their place to make coffee drinks. Similarly, we will use a mixture of part time and full time non-barista employees. The difference will be that part time employees will work at the start of week and the left over time will be used by the full time employees. The two part time employees from the non-barista group will use 52 hours in total, the remaining 46 hours will be used by the full time employee. For the part time employees, the payment will total $ 486 while the full time employee will get $ 588 for the week.

# References

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