

## EXECUTIVE SUMMARY

### STAFF PLANNING CASE STUDY: INSUREPLUS INSURANCE COMPANY

Based on the Staff Planning data set for the company InsurePlus, we need to have analyzed the following:-

***Q1. The company wants to know the optimized staffing recommendation for the business case described. Write the mathematical model for the deterministic optimization problem. Define and explain your decision variables, objective function and the constraint.***

**Ans:-** As the company wants to know the optimal staffing recommendation for the business the following parameters & decision variable were considered for mathematical calculation and deriving at the solution :-

#### Parameters

- Demand
- Staff Availability percentage
- FTE Salary / month
- Unit Outsourcing cost
- FTE Application Service Rate (40 application per month, if 100% staff is working)

#### Decision Variable:

1. Total Number of Staff Members (FTE)
2. Number of Outsourced Members (Vendors)

#### ***Objective function:-***

To minimize the total cost incurred by the insurance company to process the insurance application as per the demand in each state for the each 2021.

#### Calculation

1. Total annual cost of hiring Staff for application processing
2. Total annual cost of outsourcing the application process to vendor

Minimize Total cost = (1) + (2)

Total Cost = {(Total Number of members in Staffs) x (Salary of Staffs)} + {(Total Number of Outsourced Members) x (Cost of Outsourced members)}

N.B.: 40 x StaffAvPer is number of applications that can be processed by each staff member

#### The Constraints that were observed are as:-

States A and B have a regulatory restriction that the outsourced insurance applications cannot be more than 30% and 40% of the total number of applications for each month, respectively.

Number of Outsourced Members = Number of Outsourced applications

1. Number of Staffs x 40 x (Staff Availability) + (Number of outsourced members) == Demand
2. For state A : Number of Outsourced Members <= 0.3 x (Demand)
3. For state B : Number of Outsourced Members <= 0.4 x (Demand)

*Q2. Code the problem in Python using any optimisation package of your choice.*

**Ans:-** Kindly refer to the solution of the coding provided in the separate Jupyter notebook.

*Q3. The company also wants to know the staffing recommendations for the worst-case and best-case scenarios. As mentioned earlier, there are days that an employee will be unavailable to process applications due to training, off days, etc. This will affect employee availability.*

*Assuming that the distribution is the same across all the states , answer the following questions:*

- *What is the optimal number of staff members for the worst and best cases?*
- *What are the percentages of outsourcing for the worst and best cases?*
- *What is the average cost per application for the worst and best cases?*

**Ans:-** Assuming that the staffing distribution is the same across all the states , please find the details :-

#### **WORST CASE ANALYSIS:-**

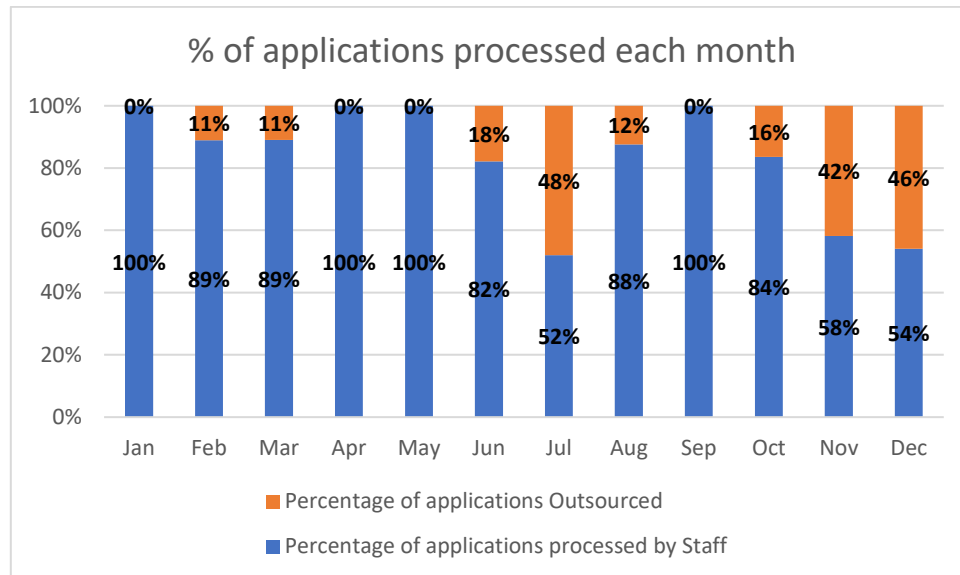
- a)The optimal number of staff members are 2762.
- b) The percentage of outsourcing in this case is 35.4%
- c) The average cost per application is Rs. 173/-.

#### **BEST CASE ANALYSIS:-**

- a)The optimal number of staff members for this case are 3103.
- b) The percentage of outsourcing in this case is 10.27%
- c) The average cost per application is Rs 145.47/-

**Q4.Create the following visualisations using your preferred method (i.e. Python, PowerPoint, Excel, etc.) and add it to your report.**

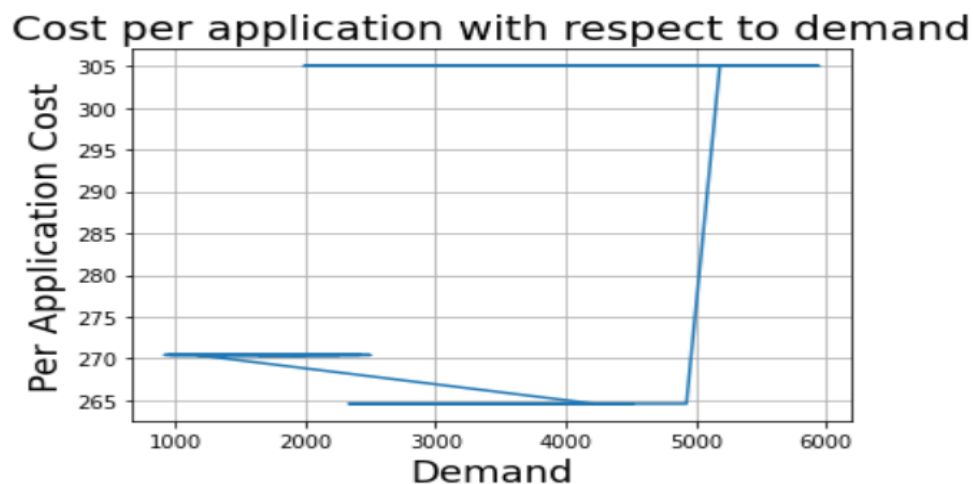
**Ans:-** We have used the stacked column chart that shows the percentage of applications processed by the staff and by the vendor for each month (%staff processed applications+ %vendor processed applications should add up to 100%)



**The following observations are made from the above graph:-**

1. Blue color shows applications processed by FTE
2. Green color shows applications processed by Vendor
3. Month like Jan, April, May, Sep --> 100% applications processed by FTE
4. Maximum share of Outsourced applications is in July with 48% of applications being outsourced. November and December also have ~50% outsourced applications

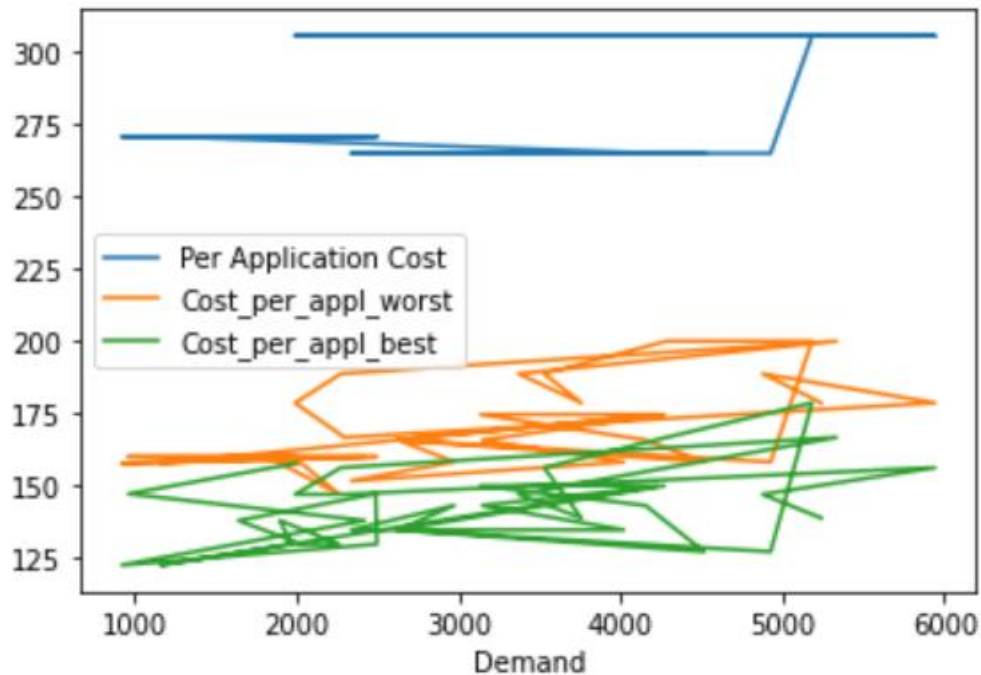
**iv)Cost per application with respect to demand:-**



**As observed from the above graph, there is no impact of any change in parameters.**

**v)Cost per application with respect to worst case as well as best case scenario:-**

<matplotlib.axes.\_subplots.AxesSubplot at 0x7f528c6b4050>



The above graph shows the different, best and worst case per application as per Q2.

Cost per application for worst scenario is represented by orange color.

Cost per application for best scenario is represented by green color.

**THANK YOU.**