Optimum distribution of Manpower for Application Underwriting process

Agenda

- Objective
- Optimization process
- Recommendations and key findings
  - Calculations
  - Recommendations to each state
  - Key findings
- Appendix
  - Data sources
  - Methodology

Objective

- To find the optimal number of staff for insurance approval application process for the year 2021.

- Number of company staff is a continuous variable also called FTE i.e. Full time equivalent.
  - FTE calculations convert number of employees into hours worked.

- The two manpower sources available with company are:
  - Company staff
  - Outsourcing agency

Optimization Process

Objective function

To optimize the manpower for underwriting process.
Equations:

Salary expense = Salary of the staff + Outsource cost
*Salary of staff = No. of FTEs * 40 * Staff availability *Monthly salary*
*Outsource cost = Unit outsource cost * No. of applications outsourced*

The salary expense equation is to be minimized.

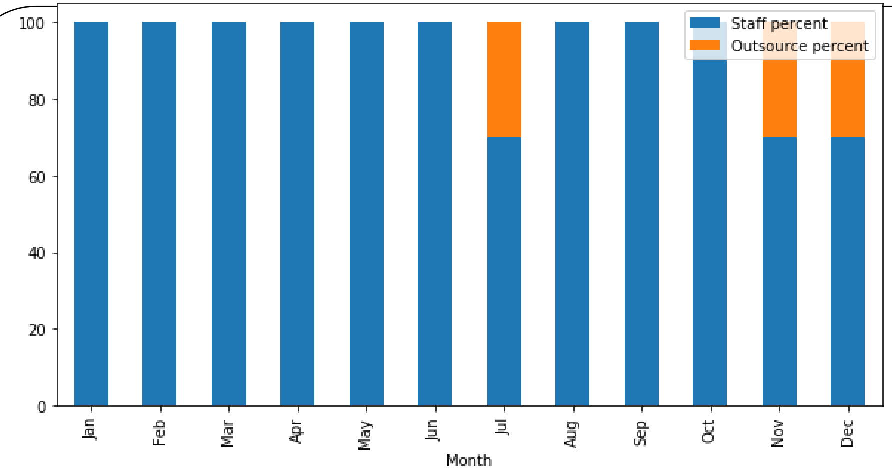
Optimization process

- **Decision variables**
  - No. of FTEs(Full Time equivalents)
  - No. of applications outsourced.
- **Constraints**
  - **Demand Constraints**
    - Total number of applications processed by staff and outsourced must be equal to demand per month.
  - **Outsourcing Constraints**
    - State A: the outsourced insurance applications cannot be more than 30% of the total number of applications for each month.
    - State B: the outsourced insurance applications cannot be more than 40% of the total number of applications for each month.

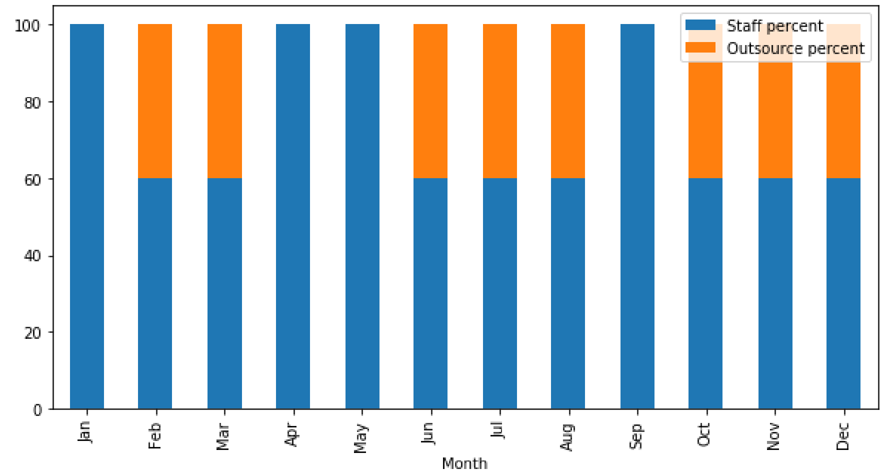
Recommendations and key findings

CALCULATIONS FOR ALL THREE SCENARIOS

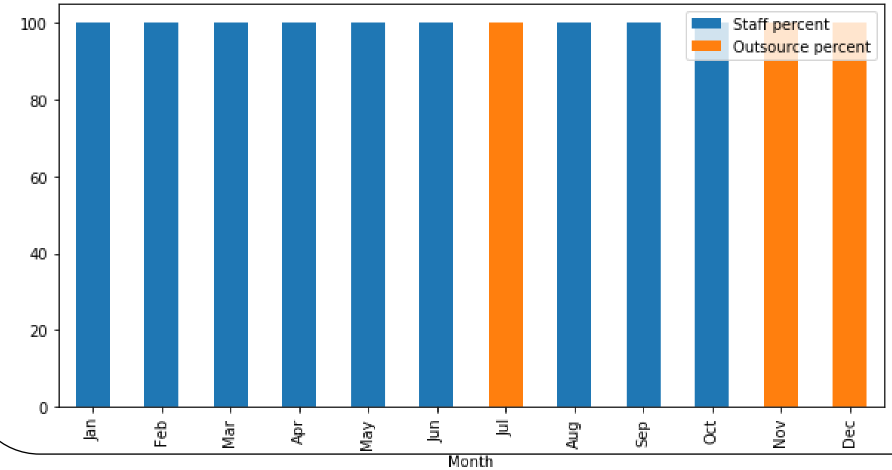
	Optimal scenario	Best case scenario	Worst case scenario
Availability parameter	Average staff availability	Maximum staff availability	Minimum staff availability
Expense	1,79,62,336	1,65,27,535	1,95,99,482
Cost per application	158.54	145	173
Percentage distribution 1. Staff 2. Outsource	 81.69 18.31	 95.89 4.11	 64.86 35.14



- *For State A, it is recommended to that the company outsource 30% of applications for the months of July, November and December and use its staff to process all 100% of applications for rest of months when the staff availability is average.*

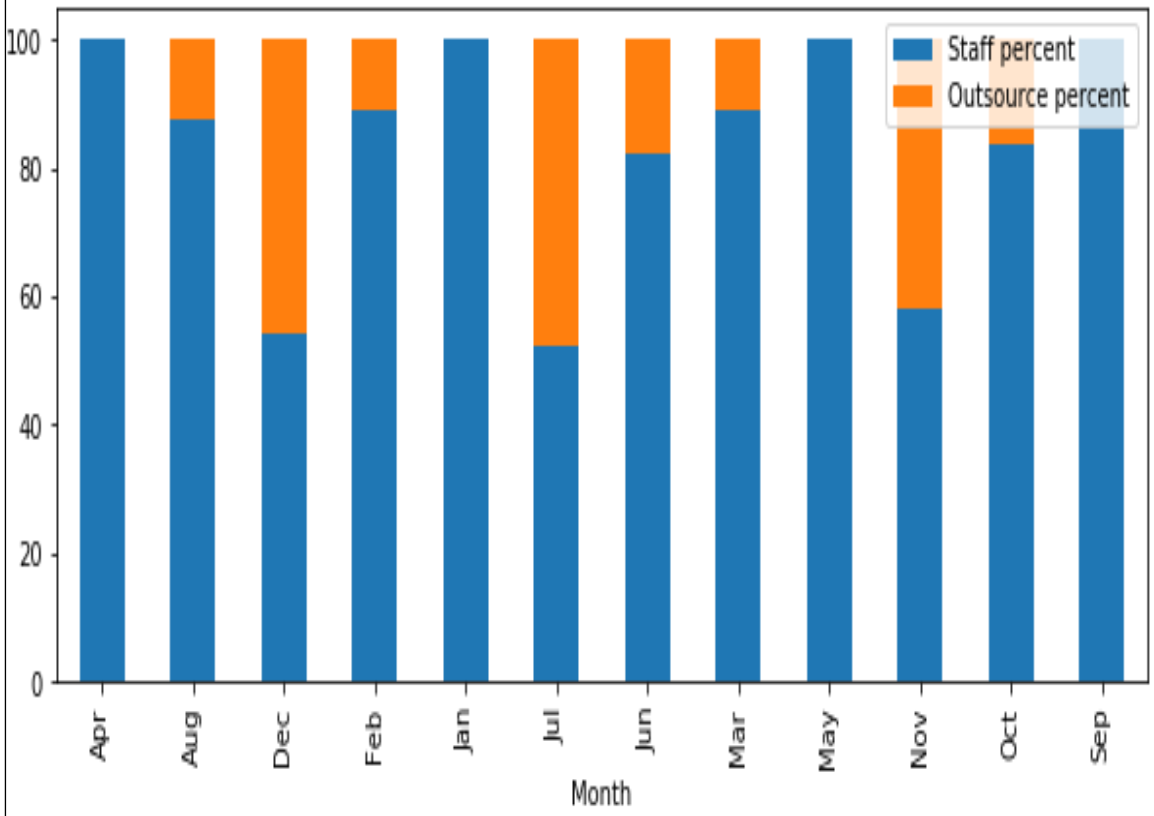


- *For State B, it is recommended to that the company outsource around 40% of applications for the months of Feb, March, June, July, August, October ,November, December and use its staff to process all 100% of applications for rest of months when the staff availability is average.*



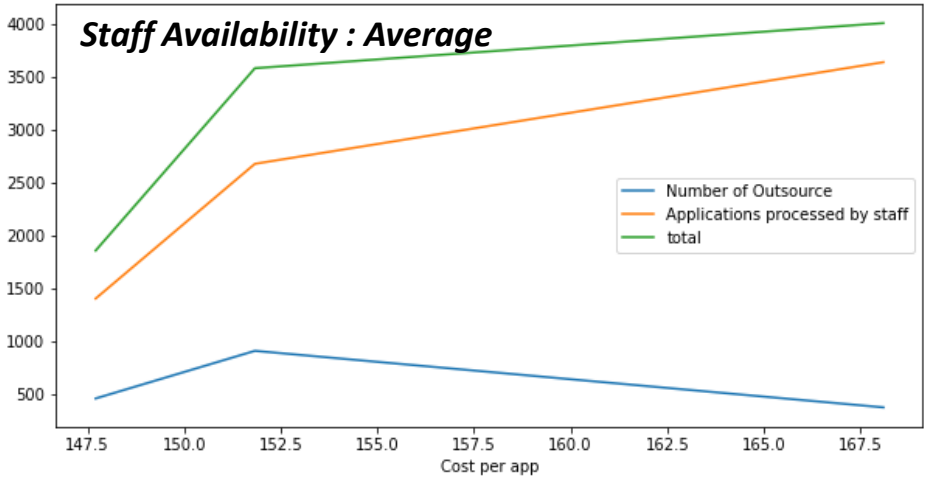
- *For State C, it is recommended to that the company outsource 100% of applications for the months of July, November and December and use its staff to process all 100% of applications for rest of months when the staff availability is average.*

Percent Distribution Of Applications Among Staff And Outsourcing Agency



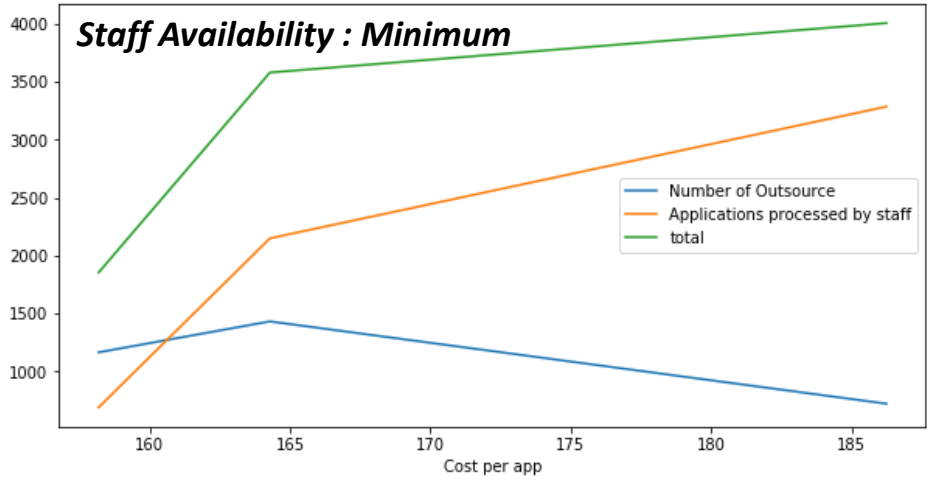
When All Three States Put Together When Staff Availability Is Average

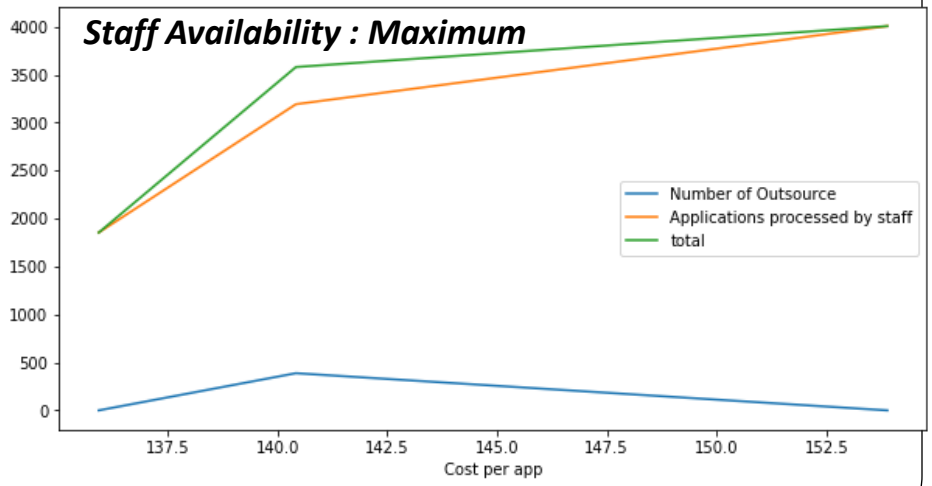
Month	Staff	Outsourced
Jan	100	0
Feb	88.9	11.1
Mar	89	10.99
Apr	100	0
May	100	0
June	82.19	17.8
Jul	52.03	47.93
Aug	87.65	12.35
Sep	100	0
Oct	83.55	16.44
Nov	58.22	41.77
Dec	54	45.9



Key Findings :

- It is noted that Cost per application is lowest when the applications processed by staff is higher than those processed by outsourced agency.
- The cost per application and total expense increases with increase in amount of outsource applications





Appendix- Data Sources

Following data was provided for a year for all three states

- Demand data
- Staff availability data
- Staff salary data
- Unit Outsource data
- Number of applications processed if staff availability is 100%

Appendix - Methodology

- A Concrete model was built
- The model parameters and indexes were defined.
  - Index
    - Location
    - Month
  - Parameters
    - Staff salary
    - Staff availability
    - Unit outsource cost
    - Demand
- The Model objective function, constraints and decision variables were defined for each month and each location.
- The Linear programming solver(glpk) was invoked
- Optimization problem was solved using the solver
- For the best and worst case scenario, upper and lower bounds were used for the staff availability parameters.