

Assignment Linear Programming, Modelling and Solution 2025

Overview

OptiConsult, a medium-sized consultancy firm, provides expert services across multiple industries. To ensure long-term profitability and efficient service delivery, the firm must optimize its resource allocation, project assignments, and financial management.

Introduction

OptiConsult assigns consultants to client projects while managing costs related to salaries, travel, and outsourced hires. The firm must balance resource constraints, project demands, and financial sustainability while ensuring both client satisfaction and optimal staff utilization.

Consultancy Parameters

The consulting firm works with various clients, establishing project-specific parameters, including daily rates, locations, and required expertise. Costs such as salaries are fixed, while others, like travel expenses, vary based on operations. Profitability is achieved when total income exceeds total costs. Assume all projects start and end simultaneously, lasting six months (20 working days per month).

- **Total Consultants:** 378
- **Home Locations:** London, North England, Scotland
- **Project Locations:** London, North England, Scotland, Republic of Ireland

Consultant Hierarchy and Compensation

Level	Daily Salary (£)	Total consultants	Based in		
			Scotland	London	North England
1- Senior Consulting Manager	423	8	1	6	1
2- Consulting Manager	308	120	32	48	40
3- Senior Consultant	250	100	31	43	26
4- Consultant	170	120	31	43	46
5- Junior Consultant	96	30	8	9	13

Travel Costs & Budget Constraints

Route	Cost per Trip (£)
London to North England	100
London to Scotland	200
London to Ireland	300
North England to Scotland	80
North England to Ireland	250
Scotland to Ireland	220

- **Total Travel Budget:** £80,000

Client Projects and Consultant Demand

- Total Projects: 13
- Total Consultant Demand: 302

Location Projects	Total projects	Project number ID
Scotland	3	1, 2, 3
London	5	4, 5, 6, 7,8
North England	2	9,10
Ireland	3	11, 12, 13

Each client requests several consultants from each hierarchy level, and its daily rate is also related to its level. The company has decided to charge the same daily rate to the same project location. For instance, project 1, 2 and 3 have the same daily rate per consultant.

Project number ID	Consultants demand level				
	1- Senior Consulting Manager	2- Consulting Manager	3- Senior Consultant	4- Consultant	5- Junior Consultant
1	0	6	10	15	1
2	0	13	5	13	0
3	0	13	5	9	0
Daily rate	£ 650.00	£ 516.00	£ 450.00	£ 380.00	£ 205.00
4	0	15	1	10	0
5	2	13	9	5	2
6	0	7	8	12	0
7	0	7	6	11	0
8	0	3	3	3	0
Daily rate	£ 710.00	£ 550.00	£ 490.00	£ 400.00	£ 250.00
9	0	4	5	3	0
10	0	10	5	4	0
Daily rate	£ 680.00	£ 530.00	£ 470.00	£ 390.00	£ 220.00
11	1	2	10	2	1
12	1	3	10	5	2
13	0	4	6	6	1
Daily rate	£ 640.00	£ 495.00	£ 440.00	£ 370.00	£ 190.00

Business Rules & Assumptions

1. Consultants are assigned to one project at a time until completion.
2. Assign consultants to projects in the same location first.
3. Travel costs apply for assignments outside the home location only once per project.
4. Consultants may work at their level or lower but not higher.
5. Unassigned consultants remain on the bench but continue receiving salaries.
6. A maximum bench headcount for all hierarchy level is enforced of 50% except for Junior Consultants.
7. Unfulfillment of demand is allowed

Consultancy Process

Stage 1: Base Case Model Development

OptiConsult's decision-making process involves:

1. **Consultant Allocation:** Assigning consultants to projects based on hierarchy levels.
2. **Cost Management:** Optimizing salaries and travel expenses.
3. **Resource Utilization:** Optimizing consultants' deployment while managing bench capacity.
4. **Profit Optimization:** Ensuring revenue exceeds operational costs.

Decision Variables:

1. Assignment of each consultant to a project.
2. Number of consultants benched per hierarchy level.
3. Travel costs incurred based on assignments.

Objective: Maximize firm profitability while ensuring optimal consultant utilization and client satisfaction, that Maximize the company's profit = (Total revenue – all salaries and all travel costs and any other costs).

Constraints:

1. Consultant availability and location.
2. Travel cost budgets.
3. Hierarchy requirements per project.
4. Maximum bench capacity (unassigned consultants).

Each consultancy team must provide:

1. A 10-minute client presentation outlining resource allocation strategies.
2. A concise report (max 4 pages) detailing findings and recommendations.
3. A Mathematical Model and Data Files for scenario analysis.

Marking Scheme:

Criteria	Weight (%)
Results	20
Modelling & Optimization Skills	20
Report Quality	20
Slide Content & Clarity	10
Report Writing & Structure	10
Presentation Skills	10
Bonus Insights	10