QUANTITATIVE MANAGEMENT MODELING- FINAL EXAM

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ABSTRACT

This research utilizes mathematical optimization modeling to optimize group formation and project success, employing R's randomization function to consider GPA, Experience, and interest in the project offering a structured framework for decision-making in collaborative learning environments. The mathematical model, with non-negativity components and constraints, provides quantitative insights into the interplay of these factors with group dynamics and project outcomes.

GOAL

Form groups from a pool of 15 students, each comprising three members to optimize each group's chances of success.

DATA GENERATION

Generating random data for each student across these three factors. To generate values for GPA, experience, and the interest factor for 15 students, we utilized R command to randomly generate sets of 15 values each

Student Name	GPA	Experience	Interest
1	3.57	4	1
2	3.18	4	1
3	2.02	1	0
4	1.69	4	0
5	2.62	2	0
6	3.55	2	1
7	3.57	2	1
8	0.71	3	1
9	1.03	0	1
10	0.45	1	1
11	3.19	3	1
12	0.44	1	1
13	3.32	3	1
14	3.08	1	1
15	3.77	2	1

GROUP ASSIGNMENT

Each student is assigned a weighted average to determine their placement in specific groups.

Student Name	GPA	Experience	Interest	Weighted_avg
1	3.57	4	1	0.95
2	3.18	4	1	0.9
3	2.02	1	0	0.33
4	1.69	4	0	0.51
5	2.62	2	0	0.48
6	3.55	2	1	0.79
7	3.57	2	1	0.8
8	0.71	3	1	0.51
9	1.03	0	1	0.33
10	0.45	1	1	0.33
11	3.19	3	1	0.82
12	0.44	1	1	0.33
13	3.32	3	1	0.84
14	3.08	1	1	0.66
15	3.77	2	1	0.82

CONSTRAINTS

We have defined the following constraints to build the model

- Group Constraints- The total number of students in each group must be 3.

- Student Constraints- : Each student should be assigned to one and only one group.

- GPA Constraints for all five groups- GPA of students in the group should be greater than the average GPA.

- Experience Constraints for all five groups- Experience of students in the group should be greater than the average Experience.

- Interest Factor Constraints for all five groups- Interest of students in the group should be greater than the average interest.

MODEL

We have chosen Linear Programming (LP) as the model as it proves to be optimal function for optimizing the success probability of each group.

FINDINGS

To find the optimal solution for enhancing group success, the project teams should be organized in the following way.

Group 1: Students 6, 11, and 15

Group 2: Students 7, 8, and 14

Group 3: Students 1, 2, and 13

Group 4: Students 4, 5, and 12

Group 5: Students 3, 9, and 10

THANK YOU