

## MGS411 – Operations Management

### Group Homework:

#### Generating an Optimal Political Party Platform:

Market Pulse Research has conducted a study for a political party on several public issues for designing a new party platform. Three public issues were found to be most influential in determining which party is going to win the elections: tax policies (e.g. levels), social concerns (eg. abortion, gay policies), and entitlements (e.g. social security, Medicaid, employment). Listed below are the part-worth ratings for each level for each policy as perceived by 7 potential party constituencies. Part- worth ratings should be 17 or more for each group, in order to obtain the group voting preferences (obtained from actual voters in previous occasions).

Use BIP to help select a winning party platform (i.e. one that maximizes voting support).

	Tax			Social concerns		Entitlements	
Category	No Taxes	Tax Rich	Tax All	Support	Oppose	Maintain	Reduce
Liberals	5	26	20	18	11	17	10
FiscalCons	18	11	5	12	16	15	26
AfricanAm	4	16	22	7	13	11	19
Hispanics	12	8	4	18	9	22	14
Retirees	19	9	3	4	14	30	19
Young	6	15	21	8	17	20	11
Women	9	6	3	13	5	16	28

Include in the Objective Function the number of members represented by each category (i.e. you can assume there are 150 Hispanics, 200 Retirees, etc.). These will be the coefficients of the BIP variables. You can also use percentages. Notice that an individual can belong to more than one category (e.g. a Liberal can be a woman, Hispanic retiree).

Feel free to change the labels of the categories. You can also exchange values within the groups in a category to make such category more realistic (e.g. for the category Hispanic and Tax policies, instead of 12, 8, 4 you could use 4, 12, 8).

Set up the equations for this BIP, following the examples in the PPT and pages 337+ and solve it using some software of your choice. Prepare a short report with your recommendations. BTW, all these ratings are fictitious. The application is not.

**Homework Solution:**

**Group 4 Homework: Original Selection of the Optimal Political Strategy**

**11/15/2012**

**Pol. Party Platform**

Category		# of members	Tax Policies			Social Concerns		Entitlements		Weight
			No Taxes y11	Tax Rich y21	Tax All y31	Support y12	Oppose y22	Maintain y13	Reduce y23	
Liberals	X1	100	5	26	20	18	11	17	10	50
FiscalCons	X2	225	18	11	5	12	16	15	26	
AfricanAm	X3	125	4	16	22	7	13	11	19	
Hispanics	X4	150	12	8	4	18	9	22	14	
Retirees	X5	120	19	9	3	4	14	30	19	
Young	X6	175	6	15	21	8	17	20	11	
Women	X7	450	9	6	3	13	5	16	28	

Tot(\*) 1000

Let  $y_{ij} = 1$  if level  $i$  is chosen for attribute  $j$ , 0 otherwise

Let  $X_k = 1$  if voting party  $k$  favors the platform, 0 otherwise

**Objective** Maximize Voting Support

**Function:**  $\max 100X_1 + 225X_2 + 125X_3 + 150X_4 + 200X_5 + 175X_6 + 250X_7$

**Value** 395

X1	X2	X3	X4	X5	X6	X7	y11	y21	y31	y12
1	0	0	0	1	1	0	0	1	0	0

<b>S.T.</b>	$5y_{11} + 26y_{21} + 20y_{31} + 18y_{12} + 11y_{22} + 17y_{13} + 10y_{23} - 50X_1$	$\geq$	1
<b>Constraints:</b>	$18y_{11} + 11y_{21} + 5y_{31} + 12y_{12} + 16y_{22} + 15y_{13} + 26y_{23} - 50X_2$	$\geq$	1
	$4y_{11} + 16y_{21} + 22y_{31} + 7y_{12} + 13y_{22} + 11y_{13} + 19y_{23} - 50X_3$	$\geq$	1
	$12y_{11} + 8y_{21} + 4y_{31} + 18y_{12} + 9y_{22} + 22y_{13} + 14y_{23} - 50X_4$	$\geq$	1
	$19y_{11} + 9y_{21} + 3y_{31} + 4y_{12} + 14y_{22} + 30y_{13} + 19y_{23} - 50X_5$	$\geq$	1
	$6y_{11} + 15y_{21} + 21y_{31} + 8y_{12} + 17y_{22} + 20y_{13} + 11y_{23} - 50X_6$	$\geq$	1
	$9y_{11} + 6y_{21} + 3y_{31} + 13y_{12} + 5y_{22} + 16y_{13} + 28y_{23} - 50X_7$	$\geq$	1
	$y_{11} + y_{21} + y_{31}$	$=$	1
	$y_{12} + y_{22}$	$=$	1
	$y_{13} + y_{23}$	$=$	1
	$X_1, X_2, X_3, X_4, X_5, X_6, X_7$	$=$	0,1
	$y_{11}, y_{21}, y_{31}, y_{12}, y_{22}, y_{13}, y_{23}$	$=$	0,1

4	>=	1
42	>=	1
40	>=	1
39	>=	1
3	>=	1
2	>=	1
27	>=	1
1	=	1
1	=	1
1	=	1

The optimal solution has  $X1= X5= X6= 1$ . This indicates that voting parties 1, 5, and 6 will support this platform (i.e. Liberals, Retirees and Young).

Total Voters: 395                      Percent: 39.50

The optimal solution has  $y21= y22= y13= 1$ . This indicates that a party platform with a policy to tax the rich, oppose social concerns and maintain entitlements will maximize voting support.

Note (\*): Categories need not be non-overlapping; e.g. a Hispanic can also be Young or Retired