MGOC10

Case Report

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Lec 02

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Introduction

In this case, Flamingo Grill, a restaurant wants to plan an advertisement campaign. There are 3 types of advertisement media: television, radio and newspaper. Each of the media has its own exposure rating and new customers can be reached. However, the exposure rating and new customers are not unchanged, it will decrease to another amount if the number of the advertisement reach to a certain number. The company has few constrains, and it wants to maximize the exposure rate.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Original exposure rating | Exposure rating after decrease | Original new customers | New customers after decrease | Cost | When to change |
| TV | 90 | 55 | 4000 | 1500 | 10000 | After 10 |
| Radio | 25 | 20 | 2000 | 1200 | 3000 | After 15 |
| Newspaper | 10 | 5 | 1000 | 800 | 1000 | After 20 |

Constrains

1. Must reach at least 100000 new customers.
2. Radio ads must at least twice as many of TV ads.
3. At most 20 TV ads.
4. At least 140000 spend on TV ads.
5. At most 99000 spend on Radio ads.
6. At least 30000 spend on Newspaper ads.
7. Total spending should less or equal to 279000.

Assumption

Let T be the number of the TV advertisements.

Let R be the number of the Radio advertisements.

Let N be the number of the Newspaper advertisements.

Model

Before setting up the model, we need to know the possible range of T, R and N because in different range it will have different coefficient. From constrain 4, combine with the cost of the TV ads is 10000, we can get we need at least 14 TV ads, which is greater than 10. From constrain 2, combine with the conclusion we just get (at least 14 TV ads), we can get we need at least 28 Radio ads, which is greater than 15. From constrain 6, combine with the cost of the Newspaper ad is 1000, we can get we need at least 30 Newspaper ads, which is greater than 20.

After we get these information, we can now set up the LP model for this case.

*MODEL:*

*[OBJECT]MAX=90\*10+(T-10)\*55+25\*15+(R-15)\*20+10\*20+(N-20)\*5;*

*[NEW\_CUSTOMER\_REQ]4000\*10+(T-10)\*1500+2000\*15+(R-15)\*1200+1000\*20+(N-20)\*800 >= 100000;*

*[RADIO\_REQ]R>=2\*T;*

*[TV\_REQ]T<=20;*

*[TV\_REQ2]10000\*T>=140000;*

*[RADIO\_REQ2]3000\*R<=99000;*

*[NEWSPAPER\_REQ]1000\*N>=30000;*

*[BUDGET]10000\*T+3000\*R+1000\*N<=279000;*

*END*

Managerial Report

Q 1

After solving the model with Lingo, we get following result. Lingo output in appendix.

Recommended number of each media:

|  |  |  |
| --- | --- | --- |
|  | Number | Cost |
| TV | 15 | 150000 |
| Radio | 33 | 99000 |
| Newspaper | 30 | 30000 |
|  |  | 27900 |

Total exposure rate = 2160

Total new customer reached = 127100

Q 2

From the lingo output, we get the dual price of budget requirement is 0.0055.

Therefore, if budget increase by 10000, total exposure rate will increased by

0.0055\*10000 = 55

Q 3

From the range analysis, we can get the range of the coefficient of the objective function.

TV: (50, 66.66)

Radio: (16.5, + ∞)

Newspaper: (- ∞, 5.5)

Therefore, if the coefficient is increasing, the Newspaper is most sensitive, following by TV, and the Radio is not sensitive at all; if the coefficient is decreasing, the Radio is most sensitive, following by TV, and the Newspaper is not sensitive at all.

Q 4

If the company wants to maximize the number of new customer reached, the object function of the model will change to:

*MAX=4000\*10+(T-10)\*1500+2000\*15+(R-15)\*1200+1000\*20+(N-20)\*800;*

After solving the model with Lingo, we get following result. Lingo output in appendix.

Recommended number of each media:

|  |  |  |
| --- | --- | --- |
|  | Number | Cost |
| TV | 14 | 140000 |
| Radio | 28 | 84000 |
| Newspaper | 55 | 55000 |
|  |  | 27900 |

Total exposure rate = 2130

Total new customer reached = 139600

Q 5

I will recommend the company choose the second option (in part 4) for the advertisement campaign.

Because the total exposure rate only decreased by 30 (1.39%), but total number of new customer increased by 12500 (9.83%).

Appendix

Lingo output: