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**Statistical Methods for Economists – Week 8**

(Questions and Tasks)

The topic: ***Full factorial experimental plans***

1.) In the framework of full factorial experimental plans, what do we mean by a “factor”?

2.) What is the main idea or aim of a full factorial experimental plan?

3.) Describe the experimental procedure.

4.) Read the Problem 1 (Spring) from [1]: Tosenovsky, F. (2014). *Statistical methods for economists*, pages 108-115. Apply the method for the following problem.

5.) **The Problem**: Consider a local vendor who wants to increase her income from her bakery shop via advertising. She tried three means of advertisement: social media (SM), billboards (B) and TV ads (TV).

Factors and their (two) levels are given as follows in Table 1:

Table 1.

|  |  |  |  |
| --- | --- | --- | --- |
| **Factor** | **Symbol** | **lower level** | **upper level** |
|  |  | - | + |
| social media | SM | facebook | facebook+Instagram+TikTok |
| billboards | B | small billboard | large billboard |
| TV ads | TV | 20 sec ad | 40 sec ad |

Then, the vendor designed and carried out the experimental plan, see the following Table 2. Output 1 and 2 are her earnings in USD (during 1 day).

**Your task**:

a) Evaluate factor effects (see Table 49 in [1]),

b) Evaluate statistical significance of factors’ effects (see Table 50 in [1]),

c) Provide graphical evaluation of factors’ significance (see Figure 12 in [1]).

d) Write down the regression model of the experiment (see page 115[1]).

Table 2.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Run** | **factor 1 (SM)** | **factor 2 (B)** | **factor 3 (TV)** | **Output 1** | **Output 2** | **Average** |
| 1 | - | - | - | 700 | 840 |  |
| 2 | + | - | - | 650 | 690 |  |
| 3 | - | + | - | 720 | 820 |  |
| 4 | - | - | + | 660 | 740 |  |
| 5 | + | + | - | 800 | 830 |  |
| 6 | + | - | + | 860 | 850 |  |
| 7 | - | + | + | 900 | 960 |  |
| 8 | + | + | + | 980 | 940 |  |