Ekonomická
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Jihočeská univerzita
v Českých Budějovicích
University of South Bohemia
in České Budějovice

Data Envelopment Analysis (DEA) – Graphical Solution

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1 Input - 2 Outputs Problems

Prototype Example – Business Chain

The business chain has seven branches. For each branch, it is known the number of employees, number of customers per hour and daily sales (in 10 thousand CzK), see the following table.

Branch	A	B	C	D	E	F	G
Inputs							
employees (x)	2	3	1	1	2	2	4
Outputs							
customers (y_1)	2	6	2	4	8	10	24
sales (y_2)	10	21	3	3	12	10	8

Is it possible to compare the branches and to decide which of them are effective?

First, we need to normalise the data.

Branch	A	B	C	D	E	F	G
Output/input							
customers (y_1/x)	1	1	2	4	4	5	6
sales (y_2/x)	5	7	3	3	6	5	2

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Graphical Solution to 2-1
Problem
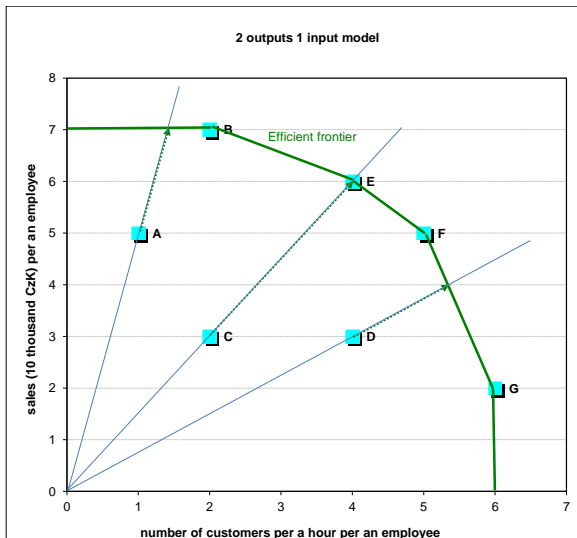
In Prototype example, we denote four branches as effective ones – B, E, F, G. All others are ineffective and can become effective if they change their outputs or input in the way to move itself to the efficient frontier. To measure their inefficiency; we can use the ratio between the distance of the beginning and the branch and between the beginning and its peer branch (image of the branch at the efficient frontier), i.e. for the branch C:

$$\frac{|OC|}{|OE|}.$$

In the case of the branch, C its peer branch exists, and it is the branch E. Generally, the peer unit does not exist, and it is given by a cross over point of the efficient frontier and the line provided by the beginning and the branch.

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2 Inputs - 1 Output problems

[

Prototype Example – Business Chain] The business chain has nine branches. For each branch, we know the number of employees, overhead cost (in thousand CzK) and daily sales (in 10 thousand CzK), see the following table.

Branch	A	B	C	D	E	F	G	H	I
Inputs									
employees (x_1)	12	7	16	8	4	5	18	20	12
cost (x_2)	9	3	2	4	8	2	12	10	5
Outputs									
sales (y)	3	1	2	2	2	1	3	4	2

Is it possible to compare the branches?

Branch	A	B	C	D	E	F	G	H	I
Inputs per unit output									
employees (x_1/y)	4	7	8	4	2	5	6	5	6
cost (x_2/y)	3	3	1	2	4	2	4	2.5	2.5