

IE 102

Lecture 4

Performance Measures

Performance Measures: Definitions

Video Mini Cooper

Kahoot

Mini Cooper Video

Summary of observations:

- Make-to-order – production planning
- Quality Control – 100% Inspection versus sampling
- Stages of Production
- Integrated Logistics Center
- Just-in-time ideas
- Layout - The manner in which physical facilities are laid out
- Final Assembly – moving floor
- “Improvement” revisited: Team Work effort

Mini Cooper Video

Main Issue to ALWAYS remember

- Although it is a manufacturing environment, almost half of the operations are for service (such as service operations in a super-market)
- There is no possible generalization of a work-place for any sector: The type of duties you carry out determines your speciality, not the sector.

Performance Measures: Definitions

Neely et al (2005): Two fundamental dimensions of performance:

- Effectiveness: the extent the requirements are met
- Efficiency: how economically the resources are utilized

Example: airplane - time at the gate

Effectiveness – can we meet the requirements set by safety standards? Always?

Efficiency – are we using the “gate” resource economically? 6

Definitions (continued)

Performance Measurement: Process of quantifying the efficiency and/or effectiveness of an action

Performance Measure: A metric (measure) used to quantify the efficiency and/or effectiveness of an action

USUALLY WE HAVE A COMBINATION

Performance Measures

Consider the new cafeteria (FAMEO)

Potential performance measures:

- Number of people getting coffee in an hour
- Minutes a customer waiting in line to be served
- Minutes the cashier is empty waiting for new customers
-

Performance Measures

Improvements?

- Number of people getting coffee in an hour
- Minutes a customer waiting in line to be served

More people working (one for prep one for cashier)

Different queues (one for coffee, one for food)

...

- Minutes the cashier is empty waiting for new customers

Less people working !

Have the cashier prepare food?

Performance Measures

Efficiency: Are we using resources economically
so that money we spent is min?
other resources as well (like people)

Effectiveness: Related with more expectations

Performance Measures

Blood Donation

Efficiency of nurse: idle time of nurse,

Effectiveness: health standards

Performance Measuring

More abstract:

Why do we measure?

More familiar ones:

- Evaluate – to find the value, to judge the worth
- Control – to direct, to verify by comparison
- Improve – to become better

Why do we measure?

Evaluate: (to find the value) Definitive value

Is this operation efficient?

Total time to complete a task.

Control: (verify by comparison)

Inflation to check stability (success) of the government

Improve: (to become better)

Toast Kaizen

OTHER REASONS?

Performance Measuring (cont.)

Less familiar ones:

- Budget – to put on a budget, to plan
- Motivate – to provide with
- Promote – to raise to a higher rank or position
- Celebrate – to honor publicly
- Learn – to get experienced

Performance Measuring (cont.)

- Relate to our previous examples
- Toast Kaizen? Control, improve?
- Airport Operations? All?

Individual measures

Example: Delay

- ✦ Individual Measure: Average Delay
- ✦ Individual Measure: Maximum Delay

- Depends on the situation
- We have a tendency of selecting it from a list – may not be always meaningful, but always helpful

To set what you want to measure is more important.

Example: Neely et al (2005), p. 1234

Interesting Note

- Neely et al (2005) Manufacturing perspective
- Behn (2003) Public Administration perspective (service)

BOTH ARE SIMILAR, THOUGH WITH
SLIGHTLY DIFFERENT LANGUAGE

How to measure?

Measurement –

- Quantitative
- Decomposing the measurement
- Aim is to reduce the uncertainty on the value

Tools of Measurement

- Use of instrument vs. manual recording
- Use of observation, sampling (a part taken as representative of the whole) – statistics
- Use of models – operations research

A lot of issues on measurement

Tools of Measurement (continued)

- You may not be the first to measure
- Consider the error in measuring
- Relate with the available information while measuring

Decision

Daily word but more structured for IEs

Decision: an input over which the *decision maker* (the person who is going to make the decision) has control in the form of:

1) a single action (do A or B)

It might be a very simple action (going to a movie or not) or complicated one (but still simple idea). For example, a manufacturer can question to produce a part in the factory or buy from somewhere else.

This is called a make or buy decision

Decision

Decision: an input over which the *decision maker* (the person who is going to make the decision) has control in the form of:

2) setting a group of values or assignments. For example you make a production plan for a facility. (product a produced in machine b at time t) Not as simple as a single action but still can be defined as a plan and implemented.

3) rules (or control mechanism), a set of rules that defines what you are going to do.

If X occurs, take action (or a group of actions)

Decision

Decision: an input over which the *decision maker* (the person who is going to make the decision) has control in the form of:

4) Policy, a set of standards.

For example, working for an air mail carrier (UPS) you promise to deliver within 24 hrs.

You obey regardless of what you observe.

While setting these standards, make sure that you are competitive in the market.

Decision

Decision: an input over which the *decision maker* (the person who is going to make the decision) has control in the form of:

5) Setting amount of resources to be used.
For example, number of waiters in a cafe, you have an expensive machine and you decide you will use it 30% of the time for job A and 70% of the time for job B. (allocate the resources)

Decision

Decision: an input over which the *decision maker* (the person who is going to make the decision) has control in the form of:

6) Investment with a combination of the above. In an investment, we are deciding a number of things at the same time, like standards to obey, number of resources ...

KEY is to have control over doing it.

Performance Measure

- Performance measures is an output used to measure the system (environment you are in) performance as a function of the decision.
- Toast Kaizen : He knows that certain decisions he is going to give will change the total time.

An Example

- » The largest soft drink manufacturer and distributor in Turkey (Coca Cola) holds a leading 66% market share in the Turkish carbonated soft drink market. The company makes sales under 12 brands and more than 150 stock keeping units (SKU's) in Turkey, with five manufacturing plants and an annual production capacity of 400 million units. There are more than 500 distributors throughout Turkey.
- » The company has two different sales channels which are traditional and modern. Traditional sales channels include grocery stores, hotels and schools whereas modern sales channels include the national hypermarkets and the local hypermarkets.
- » There are several distributors in every city. Factories ship products to the nearest distributors, which supply these products to both traditional and modern channels. The company makes several campaigns for particular products being sold in modern sales channels for particular dates during the year. The campaign products in the hypermarkets should meet the demand during the campaign process. However, especially in Eastern Anatolia Region, the company faces a problem that there are not enough products in the shelves during the campaign.
- » This is a challenging problem that contains efficiency and effectiveness issues. What are the possible performance measures you would use for this situation? Give two examples, and describe how you are planning to measure each.

An Example

- » The largest soft drink manufacturer and distributor in Turkey (Coca Cola) holds a leading 66% market share in the Turkish carbonated soft drink market. The company makes sales under 12 brands and more than 150 stock keeping units (SKU's) in Turkey, with five manufacturing plants and an annual production capacity of 400 million units. There are more than 500 distributors throughout Turkey.
- » *Distribute to all over Turkey from 5 manufacturing plants*
- » *SKU: Different forms of the same product, can of coke, plastic 1 lt, plastic 2.5 lt are different SKUs. They need to be kept in stock separately. you cannot store as liquid coke.*

An Example

- » The company has two different sales channels which are traditional and modern. Traditional sales channels include grocery stores, hotels and schools whereas modern sales channels include the national hypermarkets and the local hypermarkets.
- » *Traditional : distribution to each grocery stores, restaurants,*
- » *Modern: Distribution to central warehouse of Migros, then redistribute to other Migroses.*

An Example

- » There are several distributors in every city. Factories ship products to the nearest distributors, which supply these products to both traditional and modern channels. The company makes several campaigns for particular products being sold in modern sales channels for particular dates during the year. The campaign products in the hypermarkets should meet the demand during the campaign process. However, especially in Eastern Anatolia Region, the company faces a problem that there are not enough products in the shelves during the campaign.
- » *For hypermarkets like Migros, selling in larger quantities than traditional channel.*
- » *They are facing problems with shipping from factories to distributors in Eastern part of Turkey*

An Example

This is a challenging problem that contains efficiency and effectiveness issues. What are the possible performance measures you would use for this situation? Give two examples, and describe how you are planning to measure each.

An example:

Soft drink manufacturer and distributor

- number of products that are met from stock
- demand that cannot be met on time (we call it “backordered” amount)
- actual inventory level
- average time to transport products to customers
- Measures like demand rate, customer satisfaction (in terms of taste) do not seem to be in accordance with the description of the project
- number of distributors, number of products sold in a hypermarket as a measure, but requires more explanation, as these are decisions!

An Example

- » This is a challenging problem that contains efficiency and effectiveness issues. What are the possible performance measures you would use for this situation? Give two examples, and describe how you are planning to measure each.
- » Number of products met from stock (especially during the period when demand is high)
- » Demand that cannot be met on time
- » Actual inventory level
- » Average time to transport products to customers
- » Number of distributors, number of products sold in a hypermarket can also be measures but requires more explanation as they are also decisions!

An Example

Measures like demand rate, customer satisfaction (in terms of taste) do not seem to be appropriate

We need to differentiate decisions and performance measures.

Reading

Neely et al (2005) (read up-to “Performance measures relating to quality” p.1231)

- Page 1231 – Table II

Behn (2003) Read pp. 586-588 upto Purpose 1.

Then, read parts which are related to Purpose 1, 2, and 8 only (Purpose 1 - pp. 588-589 and 593-594; Purpose 2 - pp. 589-590 and 594; Purpose 8 - pp. 592-593 and 597-598).

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