



## OPERATIONS RESEARCH & LOGISTICS

Operations research and Management science both describe a toolbox of mathematical and analytical methods, with the aim to study systems and activities with an operative focus. The goal is often, simply put, to get a better support for important decisions concerning changes, improvements, investments, and other matters than can have a major impact.

What is an operative activity? It is the part of a company or an organisation that works with the daily, "continuously operating" chunk of what is going on – and often the part that "produces" or "realises" what is the mission of the business. The production in an industrial organisation, the transports (and their processes and organisation) for logistical, travelling, or traffic activities, the administration in office-bound companies, the environment employees and customers move around in various service focused operations (restaurants, airports, cinemas, ... and so on) - all are examples of operative environments!

An operative activity can often be divided into subcomponents/-organisations, where each and everyone might be interesting to target. Examples are that a factory can have its production, internal logistics, handling of stock and storage organisation, maintenance processes and so on.

One way to view an operative process is as a combination of Inputs of various kinds, a Transformation of and with the help of this input and finally a resulting Output. All operative processes can be described in this way and also their sub-processes – and their sub-processes and so on! This way to consider an operative activity results in the long run in a complicated network of connected 'Input-Transformation-Output' blocks. In the end it is the complexity that is created by these connected sub-processes – and the fact that it is often hard to judge and forecast how a change in one part of the operation affects another part – that makes Operations research worthwhile!

### Logistics

Logistics is a very wide concept that means different things depending on personal experience and viewpoint. At least the following variants of interpretation can be found (where the semantics might vary):

- Physical logistics – This is quite simply the work needed to move or store products and other entities (the types of tasks where you can drop something on your toes and it hurts!) – and companies in this field are often described as working with logistics.
- Transport logistics – Many automatically relate the concept to pure movements and the transports needed (with truck, train, plane, boat or other means) to fulfil them – as well as analyses in this field.
- Production logistics – This is sometimes used as something of a synonym of Operations research, but with a bit more limited span (the producing activities, of products or services).
- Internal logistics – Is often used to describe movements – and usually storage – within a building (typically a plant). Can often be seen as a subset of Production logistics.
- Strategic logistics – Finally one can with logistics mean "the big picture" and see it as something that describes all the processes that are needed to secure that products are taken from an early customer interest/order to delivery. This way of using the word automatically connects to concepts like Supply Chain Management (SCM) and there are direct links to Operative strategy (see below).

All these interpretations of the word 'logistics' (except possibly the pure physical one), have needs for analyses of various kinds and tools to conduct these. To a large extent, the same toolbox as in Operations research is used – and the two concepts are therefore very much related!

## Methods and toolbox

As has already been mentioned, Operations research is a collection of methods to analyse the problems in question. There is a number of "sub disciplines", where most of them are founded on competence in the field of Applied mathematics. Areas like Queuing theory, Network analysis, Game theory, General optimisation, Decision analysis, Inventory theory, and Simulation can be said to at least make up for a selection of the contents.

Depending on the type of problem you are confronted with, you use different methods and ways to tackle it – and sometimes a combination. According to our experience, the operations that are to be studied and analysed are often so complex – and the problem not a single one, but several that are entangled in each others – that the tool that is most applicable tends to be Simulation. While the other methods can be said to be "analytical" and result in a solution that is the "best" alternative (given the specified assumptions), Simulation is a method that answers the question "What happens if ...?". The method is used to evaluate different options, look at consequences, draw conclusions, note strengths and weaknesses – and based on this take a decision concerning which road that is the "best" to follow! To do this, a model is built to imitate whatever is to be analysed – and then tests (simulations) are made with this model. An advantage with this

alternative is obvious – to conduct similar tests in the real world is often both expensive and troublesome, if it is possible at all!!

## Links to strategic issues

When you work with problems in the field of Operations research, it is more or less inevitable that you study a "larger whole" of the business or activity in question. Working with these issues, you focus on the processes of the company – and processes feel no limitations in crossing organisational boundaries! A process can very well pass through all the functional areas of the company and at the same time touch and affect both the operational and strategic levels in the organisation. This causes us in Trilogik to have both competence and experience working with the "higher levels" of the business with connections to operational activities – and we are happy to offer our services also in these fields. If the issues at the same time have both analytical and strategic components, our strengths as a company are really used!

The conclusion of the above is that we also have competence in what can be called Operations management and Operations strategy. It is partly a matter of taste what you put into these concepts, but one way to see it is that the discipline 'Operations management' focuses upon methods and procedures to operate, handle, and manage an operational activity, limited in space (typically a plant), whereas 'Operations strategy' considers how to best handle several – organisational and/or geographically separated – operative activities (and fields like Supply chain management and Logistics from the transportation perspective can be placed here). In both cases Operations research offers a toolbox for the decisions that are to be taken!

Examples of different types of projects that can be said to belong to these categories are:

- **Process analyses** - And/or process mapping
- **Master plan** - A survey of an operational activity and the production of a plan of action that has a time span of several years (often 3-5)
- **Strategic localisation** - Where should our new factories be situated? Whereto should we move? What plants should be shut down?

## Operational KPI:s (Key Performance Indicators)

You can not work with issues like these without considering what the customer want to achieve and what the business objectives are. Where is one aiming and what performance indicators are used? Sometimes working with questions in this field can lead to the conclusion that the performance indicator portfolio has to be changed or upgraded, to better steer the ship towards the horizon!

Here it is important to in parallel keep track of several indicators with varying focus – a point of view very familiar to anyone used to the "Balanced scorecard" approach. If changes are made that have a positive impact on one indicator, there are almost always areas that have a more negative change – and one has to be aware of these balancings and consequences to be able to make the right decisions.

Connected to key performance indicator issues and measurement in general, there is a saying that claims "You get what you measure" – and this statement is sometimes frighteningly accurate! Questions like these are often important – and sometimes very much more important than the focus they get! That is why it is so important to choose right – to realise where you want to go and follow up those aspects that ensure the correct course of change. A framework of different areas to consider in an operational activity (according to Jack R. Meredith, "The Management Of Operations: A Conceptual Emphasis") is:

- **EFFICIENCY**, "Doing the thing right" – includes e.g. a KPI as Productivity
- **CAPACITY** – The maximal possible volume
- **LEAD/RESPONSE TIME** – How quickly can this result be reached?
- **EFFECTIVENESS**, "Doing the right thing" – Do we get the right results, right output?
- **QUALITY**
- **FLEXIBILITY** – Can other products/services be produced? How fast? How easily?

Operations research can most easily focus on the first three areas, since they are the ones most easily quantified. That does of course not mean, as has already been mentioned, that the other ones can be forgotten, so any changes achieved in the top three categories must be mapped against how this affect the three other ones!

