

MANAGEMENT DECISION SUPPORT BY MANAGERIAL GAMES

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Abstract: *Decisions are occurring in our every-day-life more as we imagine, many decisions are often made without thinking for a long time about it. But a decision can also be more complex, it starts with a difficult personal decision where one has to weigh the outcomes of each alternative until decisions in big organizations which are made for many more than only one individual and which will affect in some cases whole communities or countries.*

As you can see, there are many dimensions of decisions and how to meet them. The aim of the essay is to describe first the most common decision making theories and then show some examples of different situations.

Key words: *Management, decision making, management decisions, decision support, managerial games.*

Introduction

A decision is seen on one hand as the conscious or unconscious choice by one or more decision makers between different alternatives on the basis of certain preferences. On the other hand it means the process of decision activities which extends over a longer time period. [1]

Important for finding a decision are the desired or non-desired consequences of the decision. The decision will be put into action, or at least it will be tried to do so, or else it wouldn't be a decision but only a simulation of thinking. So the decision is the action before the acting. One has to plan his aims and to consider what to do before making the decision.

There is also the alternative of not-deciding, the choice is set to a later point in time, but in this case the alternatives still have to exist.

By means of the results of a certain decision its success can be measured. The quality of the decision how well the consequences of it fulfilled the decision criteria and if they didn't violate the brim conditions.

By reviewing former decisions and analyzing them one can learn of it for future decisions. An intelligent system or individual can learn by former wrong calculations and can advance to better decisions. This is only possible if the environmental aspects which determine the consequences of the decision don't change drastically and if the current situation is comparable to former situations.

Management Decisions

In the background of management decision making is less seen as the choice between different alternatives, but rather as a process of creation and enforcing a will in enterprises.

The theory of bounded rationality has been mostly accepted among all the other theories. Thus, actions of choice are met on a basis of a simplified model of reality and decisions are made in the individual perception of the decision maker. As yet said, it is sufficient if the alternatives are satisfying, only in exceptions there has to be found an optimal solution. If one fails several times in finding satisfying solutions, then the level of aspiration degenerates, and vice versa, if one is successful, then this level rises.

If there are decision procedures in big enterprises, it is recommended to use the composite decision making process. Many persons are involved and they are mainly working in groups. The reason of this is not only the employees' right of co determination, but also the complexity of the decisions, which overextend the solution abilities of a single person.

Decisions can be differentiated according to the situations in which they are made. The main three types of decisions are the routine decision, the adaptive decision and the innovative decision. The situations can be measured by their grade of complexity; they can be trivial (=simple), complicated or complex. Above you can see this illustrated:

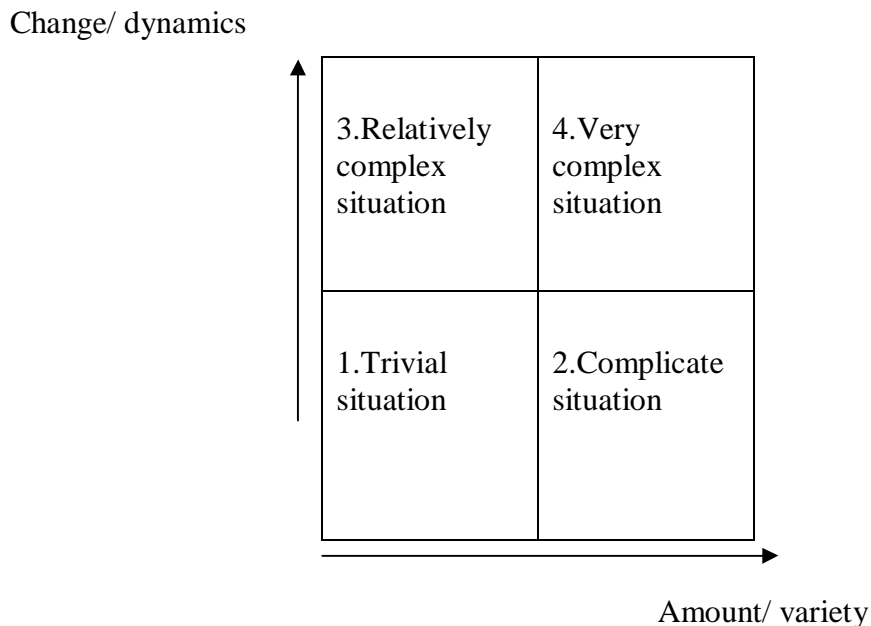


Fig.1: Complicated and complex situations [4]

a. trivial situations

The situation of the routine decision is the following: The tasks are well defined and the decision is repetitive and taken under routine, there yet is a fixed procedure to follow whose outcome is 100% successful. It is like a mathematical equation $y = f(x)$; if you put a variable in, there has to be one predicted and logical solution. An example for this situation may be the handling (tabulating and controlling) of records or write a weekly news bulletin.

b. complicated situations

The complicated situation is marked by big amounts or a great number of variety, like the variety of products, problems or systems. The decision is under risk, which means that there are more possible results, whose appearance is determined by objective (mathematic) and subjective (of intuition and experience) probabilities. The problem is similar to a yet known problem, so the decision makers have to consider how the aspects of the solution of the former similar problem can be adapted.

An example of this situation is the introduction of new products (but in the same product line) into the market. The sales strategy of the yet existing products is known, and so it can be adapted with differences to the new products. If the number of products increases, also the number of production, employees and material increases. Thus, one has to consider all these

aspects, too, and to find procedure programs (which also can be adapted from former similar ones) to increase these numbers effectively.

c. complex situations [4]

Typical for complex situations are the dynamics of the problem. The situation or problem which is handled tends to change (with rising velocity) during the decision making process. This happens because there are influences from the external environment (for example buying resources from providers, sales of products and services in markets), which also lead to chain reactions, and the factors are dependent on each other. Another reason is that the problems neither are predictable nor determinable. An example is a sales analyses; it would take too much time and too much costs (not efficient) to make the complete analyses. So it is sufficient to have incomplete information.

But there are some situations where it is not so easy to find sufficiently satisfying solutions.

The problem in a complex situation also depends on the past, examples are the deregulation of continental markets or the opening of the East.

But after all, the problems can be described and named by means of their parts which serve for a certain function (for example finances, raw materials, immovables, number of employees).

Complex situations are unrulable, but they can be coped with. The characteristics of complexity are no complete descriptiveness, less and ambiguous predictability, the product of complicatedness and dynamics.

When the decision makers are in such a situation, they have to implement new solution strategies for the problem, the solution cannot be referred to a former one. The decision makers have no knowledge of each alternative's outcomes, because they firstly haven't known such a problem before, secondly the situation is changing and in most cases there is a great variety of factors that intervene with the decision and its outcomes.

Managerial Games

In the real world, one of the very natural way of acquiring knowledge in a domain is to be immersed in a situations related to this domain and to practice. This mode of acquisition (the learning by doing) while somewhat very efficient for the passing of operational knowledge, is however difficult to implement in the case of a course room.

In the context of business education, where the amount of operational knowledge to transmit is very important, two solutions have been found: *The business cases* where the idea is to have the content of the course directly related to concert and real world situation. However in this case, the teaching material used for presenting the knowledge remains the text, lectures notes and discussions and second *the business simulation games* [5].

In this case the idea is to recreate concrete situations but by using a more adapted media (than the text) and to run simulations. Historically, the first medium to be used was the play card, followed later (during the '50) by the use of the computer. By now, due to the drop of the cost of computer and the explosion of its functionality (multimedia, networking), the business games domain and the computer should be definitively associated.

The managerial game is a dynamic training approach which uses a model of the business world as a training device. This technique is also known as business simulations. The purpose of these training tools is to improve employee strategic thinking, finance, ratios, market analysis, operations, teamwork and leadership.

They can be either scenario-based or numeric-based and are sometimes simulation games on personal computers or board games.

A) The scenario-based business simulation is played out in a simulated environment and the learner or user is asked to make decisions on how to act in the simulations. Often multiple choice alternatives are used and the scenario is played out following a branching tree based on which decisions the learner makes. Throughout or at certain intervals feedback is provided. These are similar to role-play simulations.

B) The numeric simulation can mimic a whole company on a high level or it can be more detailed and mimic specific organizational units or processes. In a numeric simulation the learner or user makes decisions by pulling levers and dialers as well as through inputting numbers. The decisions are processed and the outcomes are calculated and shown in reports and graphs, e.g. price and volume as well as number of employees can be decisions and the outcome can be viewed in e.g. an income statement, a balance sheet and a cash flow statement. Feedback is given throughout the simulation or at certain intervals e.g. when a year has passed. Many numeric business simulations include elements of competition against other participants or against computer generated competitors.

The actual use of the managerial simulation games is to help managers improve their skills in decision making.

Decision making is the cognitive process leading to the selection of a course of action among alternatives. Every decision making process produces a final choice. It can be an action or an opinion. It begins when we need to do something but we do not know what. Therefore, decision making is a reasoning process which can be rational or irrational, and can be based on explicit assumptions or tacit assumptions. Generally the business decision should be rational and management systems should be set up to allow decision making at the lowest possible level. This low level decision making has its strengths – decisions are made by people close to the level on which the decision acts, so in touch with the real problem - but also it has a major weakness that of requiring more people to know and act in decision making. The actual training of managers is often expensive and can't be made available for everybody but this is where simulation games act. They provide low cost training and more accurate situations for the managers to work on. The managerial games are based on a model.

Management Decision Support by Managerial Games (Case Study)

Imagine you are the owner of a gas station and your best selling product is beer. Every week you sell 4 crates of beer. Every week you get 4 crates of beer from your supplier. Of course you have stored 8 extra crates in your shop, in case of changing demand. You communicate with your supplier only through your orders and checking the lists when receiving the crates. The time from an order to the supply takes 4 weeks. In a similar situation is your supplier, he gets the beer crates from a production factory and they also only communicate by ordering lists.

In one week, the demand of beer rises from 4 to 8. You, as retailer, think, "OK, I should order some more, just for getting sure; but I think the demand will go down again..." without knowing the reason for the rise. You order 8 instead of 4 crates. The next weeks the demand also is 8 instead of 4 crates, and you still haven't received the ordered 8 crates. In the following weeks you order more and more, because your stock is shrinking. Soon you get panic, because the demand is higher than your supply, and one day you are out of beer crates, without having yet received the higher number of ordered crates. 5 weeks later, you see the first results of your orderings, you receive the 8 crates, so at least you have something to sell

now, while you are expecting the other amounts of your orderings. You still keep the number of your orders on a high level (e.g. 24), because you still have very little supply in your store.

And again the same with the following deliveries: you don't receive the ordered number, but many less, and you are wondering why they are so slowly, and you keep the high orders.

Let's look at the provider of the beer you weekly order.

The week where you ordered 8 instead of 4 crates he himself ordered a slight higher number at the production company. Then he receives the higher and higher orders from you, the gas station retailer, and so does he: he orders higher and higher amounts of beer from the production company. Of course, he also doesn't receive the higher orders right on time, so he also defaults. Seeing your high ordered amount and yet not receiving any higher number of beer bottles, he keeps rising his orders to the production company.

When the production company receives the higher number of orders, it rises its production, but of course it cannot come along so quickly, because the ordered numbers rise and rise.

So the gap between the ordered and received amounts keeps rising between every one of these three actors.

Until one week; when the ordered numbers are caught up. Then your provider, and you as retailer, receive some more crates, but in the following weeks, the amount of crates you receive is rising and rising, and it doesn't stop, because now all the crates you ordered in your panic situation are supplied. And if you look on the weekly demand in your gas station, the number of 8 crates per week has been staying the same!

So now you and also your provider (because you are putting the orders now on a very slow level) sit on the too much beer you ordered.

This example is called the "beer distribution game" [3] which was originally developed by the *Sloan System Dynamics Group* at the Massachusetts Institute of Technology (MIT) in the 60's and it became famous through Peter Senge who inserted the game as an example in his book "The fifth discipline", 2001. This essay showed a very simplified version of the beer game.

In this example, the decision makers are faced new situations which they hadn't known before, but the situation is not uncontrollable and the outside influencing factors are limited. The dynamics of the situation is not very high; the demand has changed only one time. So, the retailer and the provider both can learn from this situation. For example, they could have started earlier to reduce the number of the orderings, not only at the time, when the big amounts of ordered beer arrived. [2]

Conclusion

As you see there are many different situations in which it is necessary to make decisions. In the second part of the essay, I divided the problem situations in trivial, complicated and complex situations and assigned the decision making situations (certainty, risk and uncertainty) to these three situations, because I think, in most cases they appear together. Of course, there exist situations, in which the single components are varying, and a situation can be said as complicated, but also yet shows some characteristics of complexity. Take for example the beer game, if the demand of beer had changed every week, and if I had considered other influencing aspects of the outside environment (for example other retailers, the changing price of beer, etc), than the situation would be said more as a complex one.

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