

Experiences in Multiobjective Management Processes

By Erik Johnsen*)

1. Summary and Problem Formulation

In the sixties I performed a piece of descriptive and theoretical work with multiobjective problems seen from the point of view of managerial economics/operations research. The result was the book *Studies in Multiobjective Decision Models*, Studentlitteratur, Lund, 1968. The conclusion of the book is that a solution of a multiobjective problem in managerial practice is a continuous process of systems formulation and reconstruction according to what the relevant decisionmakers desire from the resources that they control. In this continuous search-learning process it is wise to draw upon several disciplines, especially the behavioral sciences.

Later on it has become evident that the essence of the managerial role is to help to improve the interplay with others in a goal-oriented direction/goal-oriented directions.

The solution of multiobjective problems in practice is therefore simply to be considered as a part of the problem-complex that must be coped with currently in order that the managerial role can be played.

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It must be solved individually by a proper combination of the general means of the managerial problem-solving role: analysis, interaction and search-learning.

The intention of this article is to review some of our experience in solving the multiobjective problem by combining the managerial and the problem-solving role for the purpose of functioning in a mutual search-learning process. At the individual level, at the group level, at the organizational, and at the national level.

It is furthermore the intention to draw some general conclusions from these studies.

2. Individual Multiobjective Setting

The psychological description of setting multiple objectives is based upon a model that says that individual behavior is a function of environmental stimuli and a combination of three sets of internal properties: motivational, cognitive and emotional. I shall not elaborate on the model at this place, but just mention that the three sets of properties can be made operational, measurable and operative as far as action is concerned.

Usually people do not make their objectives explicit unless they are forced to, either by the decision situation or as a byproduct of a more complex behavioral process which the individual feels that he/she must interfere with in order to get a better steering of future situations, i.e. management of one's own performance.

For example, a psychological analysis of some eighty women sanitors showed that they had *stayed* in this (last) job for the following motivational reasons: activity, security and contact and the following cognitive reasons: can manage the job and plan one's performance, makes a reasonable amount of money, and the working conditions are good compared with others. Furthermore, the job gives status. All in all the job is *preferred* to another job because of a general feeling of satisfaction combined with awareness of a set of conscious objective-like desired properties of motivational/cognitive/emotional nature.

Another example is a top manager who created a situation in which he

could change the nature of his job *in order to* use his remaining time in business to attain other objectives. In this case we have a brilliant well-educated man with a great need for achievement and creative properties above the average. He claimed that his dominant motives (and their related objectives) had been attained over some years and that he would change his job to a consultant-like one in order to have his personal contact and security needs function in closer relation to his family role.

A (young) professor was offered three different chairs at the same time. The situation forced him to formulate his own objectives for the next period of his academic life. He found out that three or four objectives covered his dominant emotional, motivational and cognitive properties: freedom, security and an interesting field of research. He related this finding to his feeling of the home/academic milieu, and his choice was clear.

A professional consultant worked several years as a specialist-consultant in the management field. The pieces of advice he gave made him a reliable consultant and his status in the consultant-firm had been raised.

After a couple of failures he made an analysis of his specific know-how. He found that he had never been conscious of his own social motives as he had normally pleased the client (contact motivation). He found furthermore that in order to get satisfaction from his job he had to form his own power base more firmly in every clientrelationship and – so to speak – *run* the client. He then consciously changed his style from the neutral giving advice to an active interaction (fight) with the client system, his own added objective being based on a power motive resulting in a better satisfaction of his emotional/motivational/cognitive properties.

A younger vice-president left his self-made department in order to get legitimate power over a subsidiary of the parent company. His objective being a higher degree of self-fulfilment in general.

A top manager was forced from his job and had to look for another. He broke the agreement with his old firm and took a similar job in a competing firm realizing that »Sales are my force and my interest«.

In these cases – and a lot of other ones not to be described – the question of objective arises

1. for a specific reason in the job sphere of life options;
2. the person copes with the problem, normally aided by one or more helpers (consultants, sparring partners);
3. the way out of the problem situation is normally of a multi-objective nature seen from the point of view of the person in question;
4. the personal objectives can be formulated in broad qualitative terms that are highly significant for the person;
5. the objectives can normally be related to operative psychological elements of the motivational/cognitive/emotional features and to their combinations.

But this objective formulation process takes time (in the cases referred to normally 2-4 months) and the individual must draw upon important persons in his/her environment.

One necessary property of the individual's managerial role is his ability and willingness to make his own objective space explicit now and then.

3. Group Multiobjective Setting

Group behavior is part of the management process. If group relationships cannot be established, renewed, re-established and kept in a certain span of time, the managerial process does not function.

Our work with objective setting in a group environment is based on the following model. A group must have formulated three sets of objectives. One for the external jobs to be performed and to external interested parties. One set for the internal relations between group members. And one set for each group member as far as his activity in and with the group is concerned.

In order to formulate and attain the objectives, the following group decision variables are used: the actual individuals (number of two to usually nine), their role (job/function), their internal communication, their internal leadership, their mutual reward/sanction system, their status and power relationships, their agreement of replacement of group members, conscious work with specific group norms and the

groups »Policy« in relation to other groups with which it must interact in order to accomplish its objectives.

Formally, setting objectives for a group is more complex. Three sets of objectives combined with nine group dimensions make 27 »boxes« to fill in with relevant information. And this information is to be created as a link in the normal group-dynamic process. Of course, an experienced consultant can speed up the process and make it function »effectively«, but the costs of efficiency in the professional manipulator dimension is an understatement of the group members' own ability to search and learn in their own way, and thereby lack of ability to function as a group. In our experience it takes a couple of years to make a »group« of people function as a group.

Let us look upon an example from a bank:

The top management group consists of two executives, and five functional managers, one from each of the fields of loans, portfolio, marketing, internal organization and personnel. The problem of the functional people is that the group does not function as a group. The problem of the executives is that the functional managers do not live up to the professional expansionistic goals of the executives.

The problem was formulated as setting and agreeing upon external, internal and personal objectives for the whole management group.

We agreed to establish a client-consultant relationship and act partly as specialists in goal formulation and partly as process consultants. In order to control the process we formed a consultant team consisting of two junior consultants and one senior.

It was relatively simple to agree upon the group's external objectives, the key words being growth, market share, profit and a democratic organizational setting with merging partners and customers. These goals were all well defined and operational.

The external goal formulation process was used as a means to come about the internal objectives. Through the use of the role dimension it became clear that »trust« would be an important internal goal as well as »help«.

The status/power dimension showed, however, clearly that the general management was not at all interested in creating a group as such.

The consultants then made an experiment of splitting the seven individuals up in three groups according to their function in relation to the

external objectives and using the whole bunch of group decision variables on each one. This created a mutual understanding among the functional managers that they simply had to stick together in order that their own personal objectives and group-internal objectives should be attained.

During the process (but not due to the process) one of the functional managers left and after eighteen months two groups were created with a mutual power relationship: the executive group and the functional manager group. The first claimed that it was of no use to make its internal objectives explicit. The second agreed upon how to use the group decision variables in order to formulate *current* internal group objectives.

Another example is a manufacturing concern with a parent company and five daughter companies. The six companies functioned relatively independent of each other, but the general resource allocation process created a need for a group-like top management. The overall feeling was that »it would be nice to function as a group in spite of the geographical spread«.

Again the multiobjective approach was agreed upon as a means to have the managerial process function better.

The two top people from each company first worked out the strategic objectives of the concern (= external goals of the total management group). Then each firm worked out its own strategic goals in accordance with the overall strategy. In this process the managers of the six firms became aware of their mutual dependence and could start handling their internal goals and the internal goals in their own home management group. This was spelled out in terms of objectives of the overall organizational policy and the local organizational policy.

Again each participant was of his own free will forced to make his own objectives clear viz a viz his concern group and his local group.

The goals were stated in a meaningful way by the people themselves and made operational in such a way that others could control the attainment of external and internal objectives.

This was a twelve months' project because local management functioned groupwise to a quite considerable extent and because the intensity in the attainment of internal concern, group goals were agreed on being limited.

Let us state one final example. This concerns a team of surgeons and nurses (five persons) at a hospital. They »had never been aware that they ought to function as a group in order to be efficient, because we have always worked the way we do now«.

They were asked to state the criteria they used in various situations and argue for their behavior related to the job. These were then converted to external objectives for the group. They were concerned with the patients, the nursing groups and the resources and relatives to the patients.

It was difficult to state internal goals before an analysis was made of the above group decision variables. Important internal objectives were »to care for each other«, »liasure time for loading up« and possibility of personal professional development.

As the »team« happened to function as a group it took a few days to become aware of external, internal and personal objectives. The explicit statement of these objectives stabilized the group's work as it went into a more stressed outer situation with lack of resources.

We shall not give more examples from practical managerial work, the cases are innumerable. It is, however, possible to draw the following conclusions on the setting of objectives in group environment:

1. Formulation of objectives in group environment is time and effort consuming and the formulation activity results in a complex and heterogenous information;
2. The goal information is primarily possessed by the participants and is changed all the time through the group process, a group-wize search-learning process;
3. The objective information can, however, be reduced to well-specified objective sets: external, internal and personal;
4. The group decision variables can be formulated explicitly as the set of activities leading to current goal attainment; and
5. Some sort of process consultation is a necessary means to reach stated and accepted group goals.

Very much has been written about groups and much effort has been made for example in the form of group-dynamic courses in order to create group behavior. But this very seldom occurs in real organizational life, and especially not in top manament circles.

We have found that when people depend upon each other in a work situation without really knowing it, a »group« goal-setting activity is a reasonable means to create a group. But it takes time, a couple of years. And the risk of not having a capable group as a result is rather high.

On the other hand, a group-like behavior must exist if the managerial process is to proceed, therefore we should try to improve by experience our knowledge about the interaction process of formulating and achieving group goals.

4. Organizational Multiobjective Setting

A classic sentence says that individuals have goals, collectives not. What this sentence does not say is that individuals can perceive collective behavior, i.e. organizational behavior as if the perceived collective had a set of objectives.

This is the basis for coping with organizational objectives.

Without going into details, an organization is here looked upon as a complex behavior that can be described as specific organizational, specific group-like, and specific individual behavior and every combination of these »pure« sets.

This means that it is complicated to create a model of the various sets of objectives in such a way that it contains the enormous information at the same time as it condenses the information to something that can be surveyed.

The model we have used to cope with these matters consists of three interlinked processes.

The first is an analytical/synthesizing process aiming at a description of the organization as a system. Here normal systems theory is used.

The second is a set of interaction processes in which relevant decision-makers work with each other in a group-like continuous way.

The third is a set of search-learning processes. The decision-making group creates its own model of its decision situation and agree internally on means and ends. But as the groups are organized also in an overlapping way, a search-learning process is performed among the decision-making groups at various levels in the organization.

Let us illustrate this approach by a small case from a newspaper.

The newspaper experienced significant changes in its environment, which we according to the stakeholder theory shall define as important interest groups.

The number of newspaper readers fell, personnel organizations demanded more than the organization could produce, the prices of the sellers' products increased, the financial sources from investors stopped due to the policy of the present owners, and the politicians representing the public interests were more interested in TV than in the printed press.

The company decided to search for a solution to its structural problems through a multiobjective study carried out by the relevant decision-makers themselves, the specific aim being to find a course for the future.

The goal formulation process is delineated in the figure, which also is supposed to delineate the general principles in the concluding remarks made below.

The strategic overall objectives were formulated through a long and detailed search process by top management, the board of directors and representatives from various interest groups. Key words were: the right products, growth, profit, cope with competition, but these words were spelled out in great detail giving a most explanatory information about the strategy of the firm.

The strategic objectives were made operational in asking what specific means should be used in order to attain the objectives. The management decided to look upon its three main products and its main functions according to the present organization as the proper means.

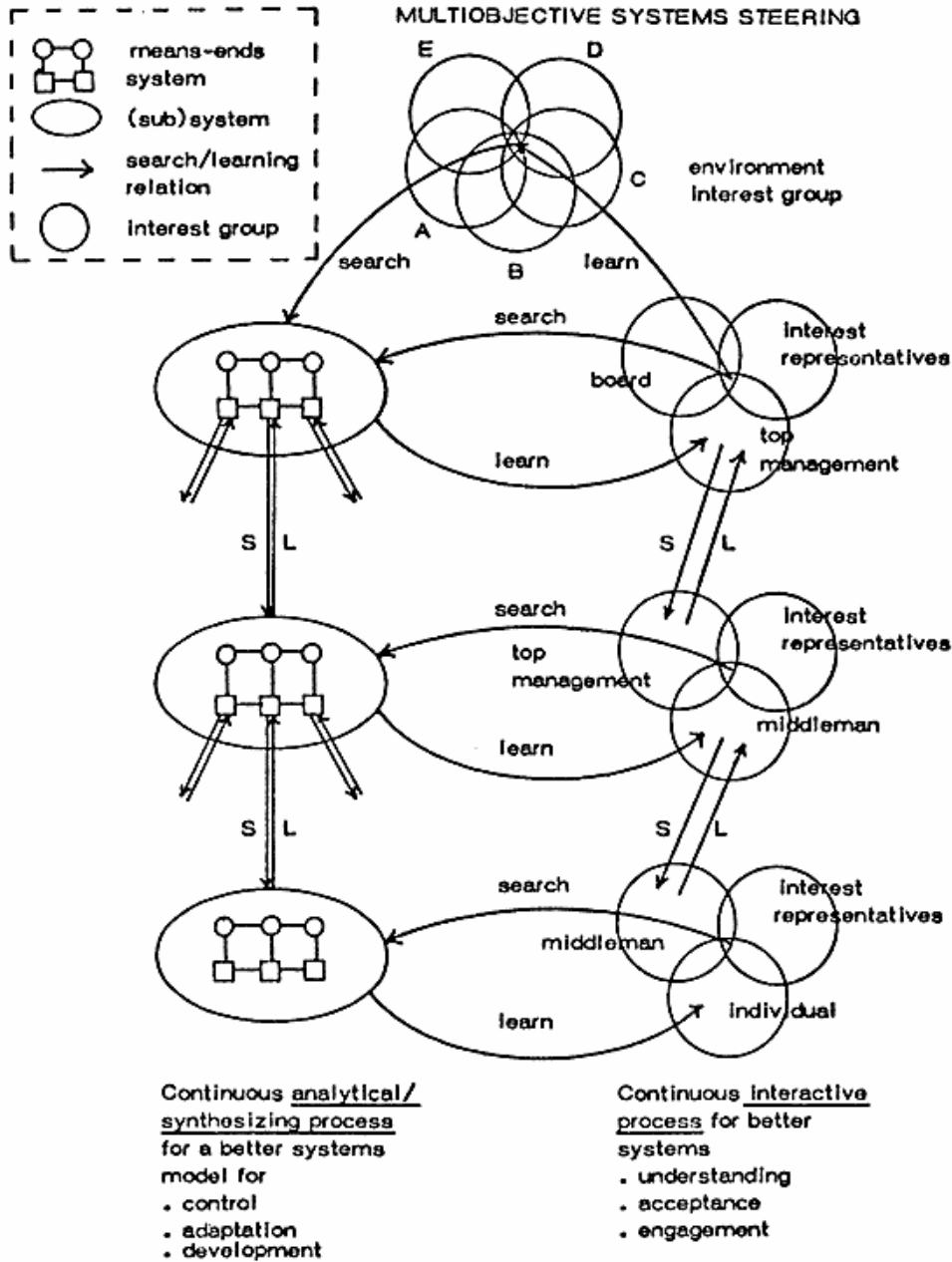
A long analytic/synthetic process was carried out in order to present means and ends in a meaningful way in a systems model. The relevant decision-makers formed their own subsystem according to the strategic objectives and the coordinating politicizing process took place in the group of relevant decision-makers as an interaction process.

Each product and functional manager had now to go through the same process within his own subsystem. The objectives of the subsystem is partly given from the claims of the strategic system and partly from the participants in the subsystem itself.

A detailed systems model is made for every subsystem, again by the relevant decision-makers themselves in a continuous search-learning

A GENERAL METHODOLOGY FOR

MULTIOBJECTIVE SYSTEMS STEERING



A general methodology for multiobjective systems steering.

process. Due to the principle of connecting lines (overlapping groups) the information can flow to and from every group and the negotiating and politicizing process is organized in a proper way.

The tactical goals produced in that way simply form the set of decision criteria which should be used in the various subsystems at least for key decisions. The people have accepted these criteria as they have formulated them themselves, including normal fight for solutions that may not always occur.

The operative goals at the individual level are formulated according to the same principles. The sparring partner for the individual is his nursing group, boss and interest representatives. The individual becomes aware of his worth and his own know-how and his specific desires in his working environment.

The result of this process is *first* general acceptance of a continuous search-learning process, or continuous change, *next* a continuous analyzing/synthesizing process for a better systems model for control, adaption and development, and *third* a continuous interactive process for better systems understanding, acceptance and engagement.

The time and effort spent on this project is considerable. The number of man years is not a proper measure, but it took two years before the total process was functioning in the whole organization helped by one full-time and one part-time consultant/researcher.

A similar case can be mentioned for a political and professional organization, the public hospital system of a county.

Here the political decision-makers, top administrators and interest representatives form the strategic goals of the whole system. These are communicated to the single hospital partly by connecting lines, partly by a well defined and accepted set of objectives combined with the resource budget of the hospital, its investment plans, its service demands etc.

The process repeats itself within the hospital, within the single functions of the hospital ending with the single individual's response, which again has already been articulated by representatives at the top level. At the bottom level it is spelled out in other details.

Several other cases could be mentioned of how to cope with objective problems in large and heterogenous organizations, but they can all be delineated on the model sketched in the figure.

We can now conclude for the organizational objective problems:

1. The process of setting objectives is a proper means to change of the organization, and it can be organized as a continuous search-learning process for the organization as a whole putting the organization in interaction with its environment.
2. The explicit model building becomes a necessity. This concerns partly the systems constructions, partly reconstruction process, and partly the interaction process. Model formulation and reformulation becomes a means in the general organizational learning process.
3. The political factor represented by dominating personalities and groups becomes evident. An objective formulation process can only be a success if due consideration is taken to the political process, i.e. that politics is included in the objective formulation.
4. Organizations normally do not have explicitly stated goals. We find, however, a marked desire by the managing people in an organization to become aware of the organizations objectives and to use them in important decision situations.
5. It is of decisive importance that people construct their own models all the time for problem solving in connection with the managerial process. These models must always include objectives.

5. Objective Setting in Society

It is a well known phenomenon that politicians do not formulate their objectives too operationally. Politicians want power, and in a democratic society power is a function of votes. They know that it becomes more and more difficult to get votes if again they cannot present results in terms of goal attainment along the lines promised before the last election.

We cannot expect explicit objectives for the development of parts of the society.

This does not mean that politicians and top administrators do not

know what they want (parts of) the society to become. The objective information is there. It should only be handled in a specific way according to local political norms and the rules of the game.

We recommend the strategy that politicians, administrators and researchers interact in order to move subsystems of the society in a desired direction.

Let us take an example from the educational policy of the country.

A committee was formed by the Minister of Education in order to find out whether computer science/theory of information as a subject should be included in the public educational system from the primary schools over secondary schools to vocational training and university education and if necessary recommend a systematic education plan which if necessary also should include definition of new jobs in the data-field.

Members of the committee were representatives from the departments of the Ministry of Education, the user's association and an independent chairman/secretary. The last combination chose to play the role of consultant/researcher in the project.

Of course the committee started to ask what the objectives of education were at the various levels. Only very vague statements could be found. Relevant powerful persons were asked, and some information came up, especially information of »what is probably politically possible in the present situation«. Furthermore, information came up about the type »this and that is not only desirable, it is a necessity«.

Then people in the educational system were asked how they actually worked with the new subject and how they intended to proceed.

In addition to that literature and international experience was studied in detail.

Based upon this information the key words in the new subject could be stated as »Communication« and »Problem solving«. Furthermore, it could be said with certainty that anyone in his role as a citizen will be exposed to the »Computer« and that probably most people will have something to do with »Information Science« in his job in a few years.

When relating these facts to the vague objectives of the educational system, it became clear that it is an objective in itself to develop and introduce the new subject as a subject matter and as a trade (discipline).

The question is how?

In order to get answer the committee started a close interaction with relevant decision-makers in the educational system and had them formulate their plans over and over again. This information was then included in the final report which gave an answer to the vaguely stated questions, namely the answer that increased the continuous activity in the system. The recommendation was so to speak carried out by the system itself before it was formally stated.

This is an example of a combined analytical, interaction and search-learning process in a public political system including interaction between politicians, administrators and researchers.

Several other examples could be stated from the public sector.

The objective formulation process takes another shape in that sector, but the basic methods are the same. Our concluding remarks will, therefore, be almost identical to the organizational objective-setting problems stated above.

6. Conclusions

Based upon research and experience we can now state the following about multiobjective managerial processes:

1. People are normally not aware of their objectives but need them in the managerial process.
2. People are willing to and able to cope with objective problems as a link in a normal problem-solving process formed as combinations of analysis, interaction and search-learning.
3. Objectives change all the time, partly due to the situation, and partly because people become more aware of their »true« objectives through the process.
4. Objectives become meaningful only in a process in which they interact with means.
5. The objective-setting process never stops, but it can change its outer form all the time.