Informatics and Mathematical Modelling
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STRATEGIC MANAGEMENT

Problem structuring methods

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ABSTRACT

This paper studies how soft Operational Research methods can be addressed at strategic management tasks. Applying these methodologies to strategic decisions in an organisation helps giving a broader view of the problematic situation is being faced, considering not only the company itself but also its environment. When managers deal with decision-making situations, they often find many different aspects to be taken into account. Multimethodology, that is, using more than one method, is a useful tool when working with these different aspects because each method focuses on some special conditions of the problem. So, combining several approaches gives a more accurate view, and therefore a better solution.

RESUMÉ

Denne artikel behandler, hvordan 'soft Operational Research"-metoder kan bruges på opgaver inden for strategisk administration. Anvender man metodikken på organisationens strategiske afgørelser ved ikke blot at betragte virksomheden selv, men også dens omgivelser, opnåes et overordnet syn på de aktuelle problemer. Direktører skal tage hensyn til flere forskellige aspekter i beslutningsprosessen. Multimetodik, dvs. brugen af mere end én metode, er et nyttigt værktøj i arbejdet med de forskellige aspekter, da hver metode fokuserer på en særegen vinkel på problemet. En kombination af flere fremgangsmåder giver altså et mere præcist syn og dermed en bedre løsning.

CONTENTS

INTRODUCTION

Nowadays, the work of managers is becoming more complex because of the complexity of the organisations and the markets in where they are acting. Every decision in a company has to be taken with care, and even more if it is a strategic decision. Many theories and methodologies have arisen for helping in taking these decisions. Among them, Operational Research is becoming a helpful way for analysing and giving the guidelines in the problem structuring and problem solving process. Soft Operational Research methods, in concrete, combine the technical knowledge of engineering with a more social aspect, becoming a suitable tool for decision-making within organisational problematic situation. Soft Operational Research approaches are more appropriate for dealing with situations that combine personal, economic, social and material elements, that is, for real-life management situations.

The main purpose of this paper is to show how soft OR methods and, the combination of them, can help in understanding and analysing messes faced by organisations. For this reason, this paper is structured in different parts. In the first part (Part I), an introduction about the basis of OR is presented. Systems thinking is the point of departure of OR and its foundations are explained. It is also described which are the main OR branches: Hard, Soft and Critical. This part also discuss the role of the OR experts and the ways multimethodology can be applied.

The second part (Part II) presents a description of several methods and studies in depth four of them: the SWOT analysis, the SODA, the SCA and the Scenario methodology. The choice of these four ones is because they are one of the most developed and broadly used in real-world applications.

Finally, Part III gives an example of how the methods can be applied in an organisational situation. The chosen case describes an analysis of the application of the methods in the first stage of a company creation.

PART I

PROBLEM SOLVING AND OPERATIONAL RESEARCH

PROBLEM AND PROBLEMATIC SITUATION

As Ackoff affirmed (1979),

> *"Managers are not confronted with problems that are independent of each other, but with dynamic situations that consist of complex systems of changing problems that interact with each other. I call such situation messes. Problems are abstractions extracted from messes by analysis; they are to messes as atoms are to tables and chairs"*

A problem is a single situation while a mess or a problematic situation is a situation composed by many different problems. Problems are, in fact, components of a mess. Problems may be solves; messes need to be managed (Ackoff, 1981). Therefore, it is not possible to solve a mess adding the solution of each of the problems which is composed. Problematic situations should be seen as a whole and should be dealt with a total view.

For understanding and explaining what a problematic situation is, it is interesting to refer to the explanation of R. V. V. Vidal (2002):

A problematic situation or mess can be characterised as follows:

- Highly complex situations, due to many factors, many actors, lack of structure, many interrelated and objective and subjective aspects, etc.
- Lack of internal transparency, due to many uncertainties about the reactions of the actors, many interrelated communication channels, and internal power relationships.
- Several conflicting goals, due to the lack of agreement about the visions and mission of the organisation.
- A whole network of interrelated problems of change in the organisation.
- Dynamic situation, due to a permanent interplay between the organisation and the environment.
- Lack of technological and methodological expertise in the organisation.
- To deal with them, demands a close interplay between practical knowledge of the work group and the expertise of the facilitator.

In the area of Planning, messes have sometimes been characterised as wicked problems having the following properties:

- Cannot be easily defined so that all actors agree on the problems to be solved.
- Require complex judgements about the level of abstraction at which to define the problem.
- Have not clear stopping rules.
- Have better of worse solutions, never right and wrong ones.
- Have no objective measures of success.
- Require interaction, every trial counts significantly.
- Have not given alternative solutions, these must be discovered.
- Have strong ethical, political and professional dimensions.

Figure 1. Problematic situation. (Source: Vidal, 2002)

Individuals in organisations are involved, as elsewhere, in complicated social relationships where they dislike, like, care about, find boring, are rude to, dismiss, and fear, other members of the organisation. Some of the energy of all members in an organisation is spent in handling these relationships and in developing some understanding of those others in order to do so. Because individuals with distinct perspectives and political concerns rarely reach complete agreement about ends and means, compromise outcomes are often negotiated or bargains struck about favours to be exchanged at different times. Considerable effort and time is spent in finding out what others want and think on a particular issue.

The important topic is that different people interpret the same situation in different ways. So no situation is inherently, objectively a problem. A problem belongs to a person. Because people in organisations are involved in complicated social relationships, and sometimes engage in internal political games of one kind or another, the way a person constructs a problem will also include these aspects of their organisational life. All the elements of a person's problem construction will be crucial to the choices he makes and actions he takes about his problems.

To have a problem is referred as the situation one has when things are not as wanted and one is not sure how to manage them. But often an important and a very difficult question is: "What is the problem?" In fact, if it can be defined what the problem is, this is a very big step towards solving it. This is true with any kind of problem.

Therefore, taking into account the two statements said before, these are essential for defining and knowing the problem. In one hand, the problem has to be defined depending on what is needed to be solved. And in the other hand, it is also important to have in mind whose is the problem, whose is implicated with it and how the problem affects to different people.

It is also important to enumerate the strategies for avoiding solving the wrong problem. They were stated by Mitroff (1998):

- Try to select the right stakeholders, looking for multiplicity of views.
- Expand the opinions, breaking boundaries and producing several problem formulations.
- Phrase the problem correctly, analysing it many times and from many views.
- Expand the problem's boundaries.
- Be systemic, analyse the whole problem and its environment.

Talking about problems is not necessarily thinking about problems in the negative sense. Checking the definition, problem is a situation where someone wanted something to be different from how it is and is not quite sure how to go about in making it so. Indeed, sometimes the situation is not a bad one but something that is needed to improve because it is requested to get to another state which is better than the current one.

SYSTEMS SCIENCE, SYSTEMS THINKING

1. Origins and evolution

Some fundamental terms now used in system science have been in other disciplines for many centuries, while other fundamental concepts have emerged more recently. The field of biology was one of the firsts that has used the concept of system ideas. In the 1940s, Bertalanffy envisage a framework of concepts and theory that would be equally applicable to many fields of interest. This original work is named General Systems Theory (GST) and is still in use. GST is based on the idea that homologies exist between disciplines that have traditionally been considered separated by their different subject matters. GST is defined as a metatheory.

The Second World War helped the growth of system science because of its problems of logistics and resource management. From these studies emerged Operations Research and Management Science (ORMS), which will be broadly explained in next sections. In the next figure it is represented the evolutionary process of system science.

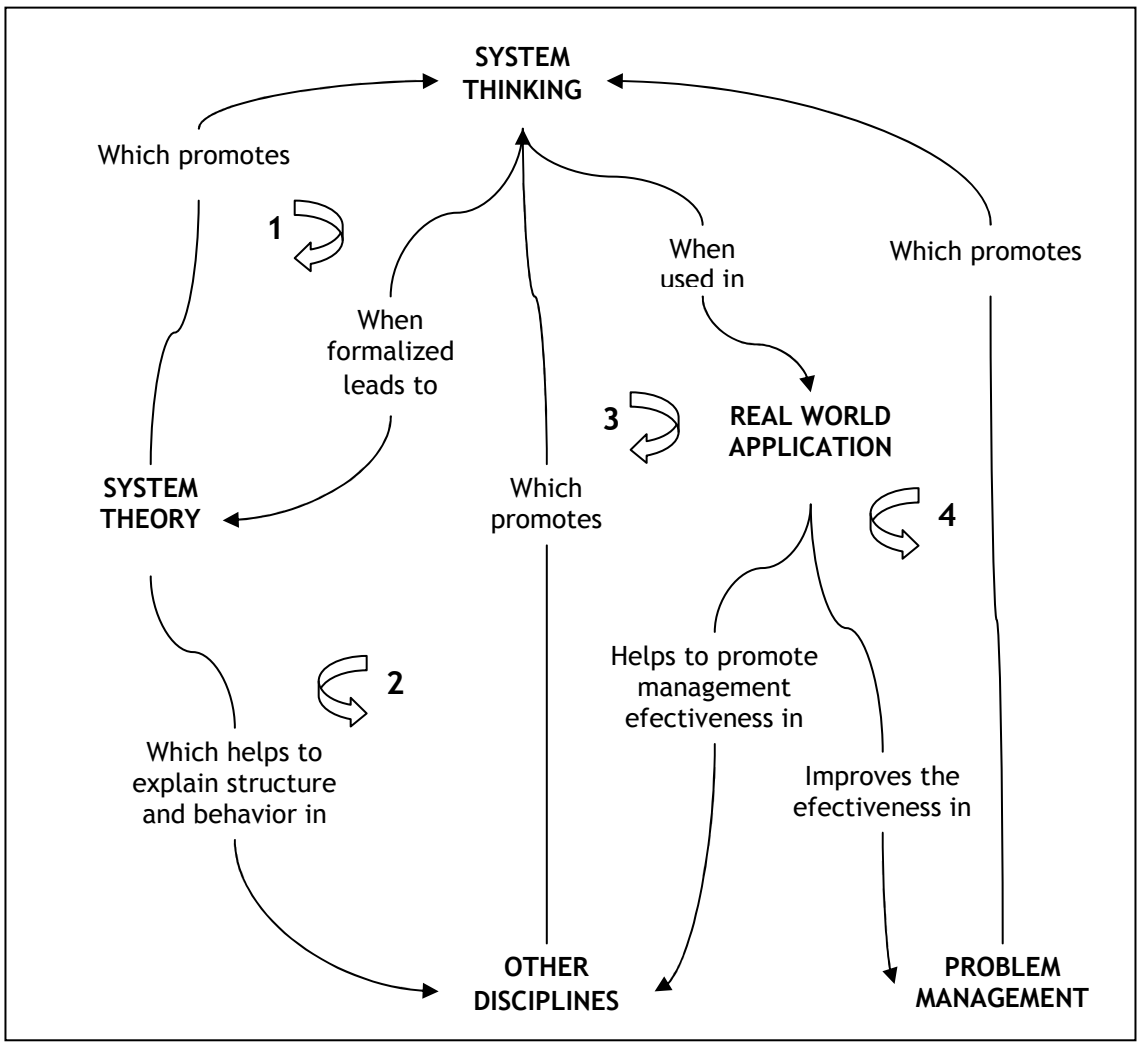


Figure 2. The process of systems thinking. **(**Source: Flood and Carson, 1988)

As is it known, systems thinking is a structure of thought that helps us dealing with complex situations in a holistic way. The first development cycle shows that systems thinking become systems theory after a formalization. In the second cycle, becomes evident that systems theory helps explaining other disciplines. These two development cycles helped explaining situations of different disciplines in a single operation.

The third development cycle takes into account the real-world, that is to say the practical application of system science. It includes modelling approaches for studying the complexity in structured situations. Finally, the last development cycle shows the application of systems thinking to problem management. Systems thinking and systems theory has been successful in design and decision making.

2. Concepts

There are some important concepts to keep in mind for understanding systems. First of all the concept of **element** refers to anything with its own behaviour and properties that may change. Between two elements it can be a **relationship** that explains how one is influenced by the other and vice versa. A group of elements and its relationships is a **system**. The external part of a system is the **environment** and these two concepts define the boundaries of the system.

Related to the environment it is possible to have an **open system**, which exchanges material, information or energy with its environment; or **closed system**, where relationships do not exist between elements of a system and everything external to it. It also important to define the **structure** of a system, this is the way in which elements are related to each other providing the supporting framework in which processes occur.

In any systems study it is important to ensure that an appropriate level of resolution has been chosen. This requires that a system scientist has to be a *holist* (looking at the system as a whole) and also a *reductionist* (converting the system into many smaller bites) at the same time (M´Pherson, 1974). Systems thinking defends that most of the essential properties of a system are lost when taken apart. That is why *expansionism* has an important role in systems thinking. Expansionism brings the holistic mode of thought, where something to be explained is viewed as part of a larger system and is explained in terms of its position in the bigger system. Another crucial term in systems thinking is *teleology*. In *teleological* thinking behaviour is described by what produced it or by what is intended to produce.

The word "system" itself has two adjectives: **systemic** and **systematic**. The first one is related to a holistic thinking as it is explained above. The second brings the bases for a methodological thinking; this is a process in steps for helping during problem management. As it will be explained in next chapters, it is possible to define two types of situations: hard and soft. The first ones are well-structured and easy to measure and qualify. Soft situations, on the contrary, are purely-structured and hence difficult to attach numbers to them.

3. Complexity

Systems are situations perceived by people because even the most concrete situation can be seen from a variety of perspectives. It can be said that perception is about the way people build up models in their minds. So complexity is related to people. Definitions of complexity from *Webster's Third International Dictionary* are as follows:

1. Having many varied interrelated parts, patterns, or elements and consequently hard to understand fully
2. Being marked by an involvement of many parts, aspects, details, notions, and necessitating earnest study or examination to understand or cope with.

It is possible to conclude that complexity is something related to the number of elements, of relationships between them and of people's perception. In this sense, the larger number of elements and relationships between them we have, the more complex is a system. And to this statement we have to add the perception of who is analyzing the system.

Well then, related to what has been said above, in dealing with problematic situations, it is advantageous to use some principles of the area of systems thinking (R. V. V. Vidal, 2002). Firstly, structure the situation from a holistic and systemic view. Interrelations of the problem are often more important than problems their selves. Secondly, share ideas between the work group (practical knowledge) and the experts (theoretical and methodological knowledge). This can be done by several techniques like dialogues, interviews, workshops, etc. Thirdly, focus in the problem identifying its limits. Fourthly, expand that limits to reach a new view of the problem and reformulate it. Finally, develop an approach for solving the problem that uses methods and tools.

OPERATIONAL RESEARCH

1. Introduction

When facing real-world problems it is not enough pure science. Problems in laboratories are well defined and bounded. However, problems of management are more a practice than a science.

The manager process is concerned with deciding to do or not to do something, with planning, with considering alternatives, with monitoring performance, with collaborating with other people, etc. It is the process of taking decisions in social systems in the face of problems which may not be self-generated. This alienation of the pure science to solve real-world problems was the basis for Operational Research (**OR**). OR Society officially defines OR as follows:

> *"OR is the application of the methods of science to complex problems arising in the direction and management of large system of men, machines, materials and money in industry, business, government, and defence. The distinctive approach is to develop a scientific model of the system, incorporating measurements of factors such as chance and risk, with which to predict and compare the outcomes of alternative decisions, strategies or controls. The purpose is to help management determine its policy and actions scientifically."*

OR has applied the methods of the science to parts of the real-world. The strategy is to build a model of the process of study, then improve that model and finally to transfer the solution derived from the model to the real-world situation.

2. Origins

OR goes back to Second World War, in that time became urgently necessary to solve some logistic and resource assignment problem. Military administrations of England and United States of America asked some scientist to apply the scientific method to strategic and tactic problems. They were the first OR team.

After the war, the success of OR generated interest in other fields like industry, business and government. Since then, this discipline has rapidly evolved and has had an important impact in many organisations all over the world.

3. Organisations and OR

Any kind of organisations is characterised because its purpose is to achieve a task. Different organisations have different tasks to achieve and sometimes organisations experiment problems trying to achieve their tasks. These problematic

situations can appear because of several reasons. Often because of objectives required or new technologies introduced.

Operational Research's aim is to deal with these problematic situations in an organisational context. The actors in this problem solving process are the decision-makers, the stakeholders and the work group. The task of the **work-group** is to propose alternative actions for solving the problem. These actions have to be approved by the **decision-makers**. The so-called **stakeholders** are individuals who affect or can be affected by those actions; they can be part of the organisation or outside it.

Often an operational researcher (usually named **facilitator**) is required for helping the group in finding possible solutions. This OR expert provides technical expertise and support the process with some approaches, methods and tools. All this process can be represented in the next figure.

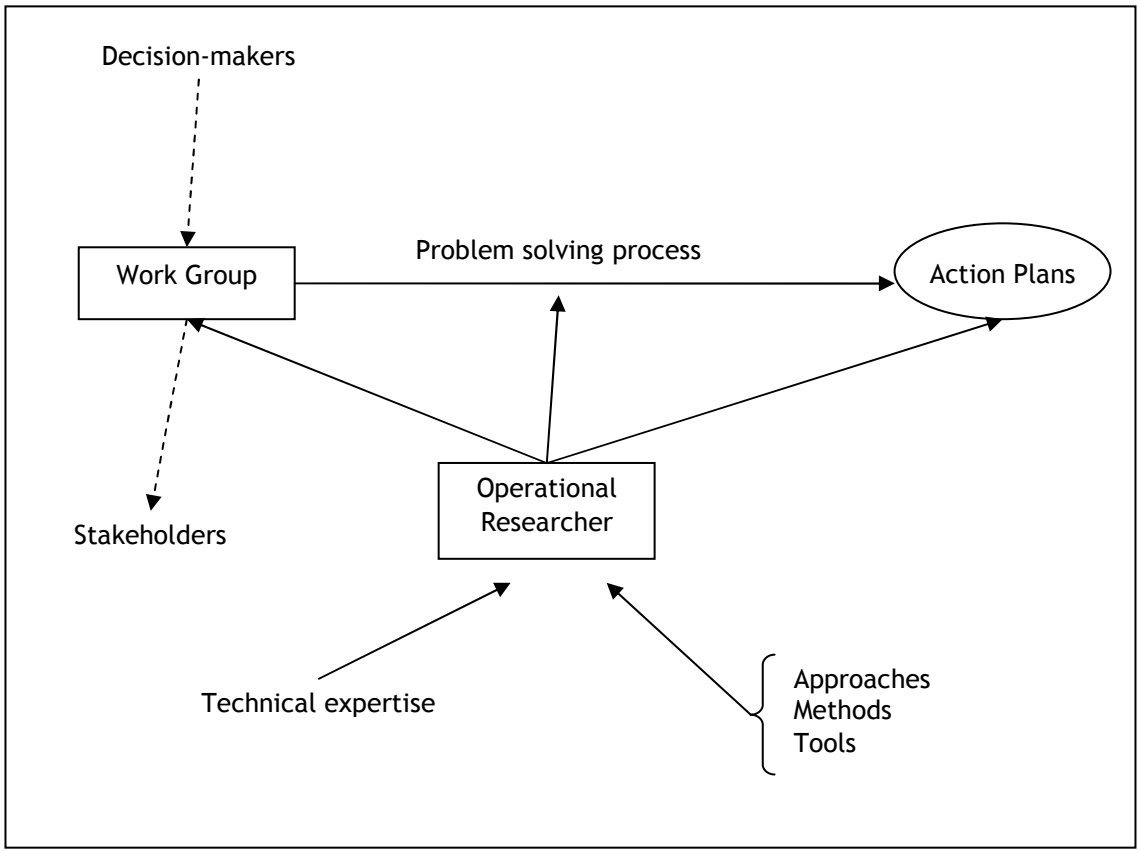


Figure 3. The problem solving process in OR. (Source: Vidal, 2002)

OR can be described as the art and science of problem solving. When dealing with problematic situations, rational, critical and intuitive approaches will be emphasised. Likewise, knowledge and expertise from both theory (the experts) and practise (the clients), as well as their interplay based in real-life problem solving, will be central in this field enhancing participation and dialogue.

There are different types of methodologies supporting the problem solving process: the hard one, a more quantitative one, the soft one, more qualitative, the

critical, more participative, the creative, more innovative or a combination of some of them called multimethodology. They will be explained in next sections.

There are two fundamental characteristics of the OR approach (Vidal), which are problem structuring of the mess and modelling as a tool for problem solving. It is also important to know who are the clients of the OR expert. It is necessary to define to whom he or she is working for. Clients can be of very different kinds, sometimes the client can be the top management of a company and other times can be oppressed groups and others.

4. Hard or Technical OR

Hard OR, also known as technical OR or traditional OR, was the original one. It is dated back, as it has been explained before, to the Second World War. Problems in tactical decisions drove the governments of England and USA to call some scientists to apply their methods in logistic problems.

Technical OR is characterised by the following stipulations (Vidal, R. V. V.):

- ✓ Problem structuring using the principles of Machine Age thinking,
- ✓ Modelling using the principles of Natural Sciences (objectivisation and empiricism), and
- ✓ Working for a highly hierarchical organisation in close contact with top management, i.e. e. the operational researcher is an expert and an adviser.

An important aspect of traditional OR is that is totally focused on quantitative and measurable variables, separating itself from the human knowledge of the actors. In hard OR, problems are seen in a very objective view as in the laboratories. They are discomposed into smaller parts for its analysis, that is to say problems follow the principles of natural sciences.

The term Machine Age thinking, in reference to the stipulations said before, was formulated by Ackoff (1974). This term concerns to the analytical basis of hard OR because it is based on *reductionism* and *mechanism*. The first concept, *reductionism*, denote that everything can be broken into smaller parts. This is a typical characteristic of the Science; its aim is to find out the indivisible parts (elements) of all objects and explain their behaviour. In technical OR is believed that explaining the conduct and properties of the elements of something, it is possible to spread to the totality. So, concentrating in problem solving, messes are reduced in several smaller problems easier to solve. Each of the solutions is assembled to build the final solution of the whole problem.

This concept lead to the second one: *mechanism*. Organisations are considered as big complex machines, closed and without relationship with its environment. Organisation's behaviour is totally determined by its own structure and the way its parts act and react.

Therefore, a hard operational researcher has to understand how organisations work by discovering the functioning of their parts and build up mathematical models that explain this behaviour. This is the reason why hard OR emphasis is put on economical and technical systems. Since they are working with mathematical models, operational researchers attitudes are strict and without flexibility. Structures used by them are fix and politically conservative, also because they have always been at the service of the top level of the organisations.

Models constructed in hard OR are done to maximize or minimize some functions. They are always quantitative models with some limitations in resources, demands or technical alternatives. It is not always easy to estimate parameters and create functions for all the elements considered in the problem. Real-life problems are difficult to represent with variables and functions, indeed it is complicated to identify subjective concepts with that parameters. Hence solutions found are, in this sense, approximate solutions. Well then, technical OR has success in well-defined problems easy to assess because it is possible to build an accurate mathematical model that represents the situation and find solutions using simulations programs in a computer.

After some years, OR began to be used in other fields. By the 70's, critics to hard OR arose among some research associations. They promoted a new and alternative OR, called soft or practical OR.

4.1. Criticism of hard OR

Soft or practical OR started as an alternative for technical OR. Their promoters formulated some criticisms to the hard OR. One of these was that researchers were too concentrated in the model itself and the generation of optimal solutions than in the real-life problem to be solved. So the model becomes more important than the reality. Another criticism was referred to the factors used in the models. Soft operational researchers said that because of using mathematical models, researchers disregard those factors in reality that are difficult to be quantified or sometimes adapted them to the model, changing partially its meaning.

They also criticised that the last users would not be able to understand the contents of the model. Thus, the user will not be able to make changes in it if things differ in the future. It was criticised the lack of relevance given to the human beings too. Soft operational researchers disagreed with hard ones about treating people like components of a machine. They defended the importance of participation "giving individuals a role in making decisions that affect them directly and rewarding them appropriately for improved performance and increased responsibility" (Ackoff, 1974). They thought "such participation produces increased satisfaction and improves organisational performance" (Ackoff, 1974).

Finally, other criticisms point out limitations in real-life problem solving. It is not always clear what the objectives are. In the so-called engineering-type problems it is easy to define which the goals are. But organisational problems are not often of this kind, so technical OR is successful in well-structured problems.

5. Soft OR

Soft OR or practical OR rose during the 70's as an alternative of hard OR. The main concept added by practical OR was taking into account the nature of human beings in decision-making processes in organisations.

There are the stipulations that characterise soft OR (Vidal, R. V. V.):

- ✓ Problem structuring using the principles of Systems Age thinking,
- ✓ Qualitative modelling using the principles of Hermeneutic-Phenomenology (interpretation, conceptual models and intersubjectism), and
- ✓ Working for organisations where all the actors participate actively in the problem structuring and problem solving process, i.e. e. the operational researcher is a facilitator.

In practical OR, analysis and modelling are based in the actors and their knowledge of the organisation and its problem. To succeed in this and get their subjective view are used techniques such interviews, dialogues, discussions, workshops and conferences. It is assumed that people is always in constant interaction with others and bargaining their views of reality.

The word *hermeneutics* is referred to the science of interpretation, while *phenomenology* is an idea meaning that it is more important the mental processes of observers rather than external world. The name Systems Age thinking, used firstly by Ackoff (1974) is referred to the principles of systems thinking explained in earlier sections.

Rosenhead (1989) denominated soft OR approaches as Problem Structuring Methods (PSMs). These methods are based on systems thinking and mostly qualitative. The kind of information used in these methods is either soft or hard, but used in a simple and transparent way thus the process is clear and easy to understand by all the actors. Moreover, these actors will be facilitated by an OR expert through a problem solving process.

These are several approaches in the family of PSMs. They will be broadly explained in the next sections. However, mostly of them have a common structured process that has five phases (Ackoff, 1981):

- Outline the characteristics of the problem by predicting how the system would appear like in the future if no interventions are done.
- Describe how the system is wanted to be in the future by defining the objectives to be achieved.
- Looking for the processes needed to reduce the distance between the current system and the desired one.
- Determine the resources needed to carry out the mentioned process.
- Elaborate an action plan.

All these steps have to be carried out with the knowledge of both, the users (work group) and the expert (facilitator).

Two main complications can be defined in these PSMs. On the one hand, in practice they are not as easy to apply as their creators affirm. And on the other hand, in some of them, the method is too strict and no creativity can be introduced.

5.1. Criticism of soft OR

Some criticisms have been made to this kind of OR. An important one is that made of hermeneutics saying that social properties and concerns are difficult to control and understand by a single group of people. Likewise, some people disagree with the fact that any conflict situation can be solved by negotiation and discussion until reaching consensus. They think that some conflicts are permanent and usually related to the use of power in the organisations. Also related to the power, some critics affirm that participation is not always possible. Soft OR is based in democratic organisations but this is not real. In real life, less privileged will not be able to participate equally in the problem solving process. These groups will be under the sway of the dominant level. This means that the results obtained in soft OR approaches will favour the powerful. This happens because soft OR workers are usually working for managers and these managers can powerfully impose agreement to oppressed groups.

6. Critical OR

This theory arose as a compensation of the lacks found in hard and soft OR. The most important characteristic is that it is essentially oriented towards taking action within specific problematic situations.

Critical approaches are usually rational and creative. They are related to social interrelations where all the parts are interested in the process. Users and facilitator request participative methods to achieve changes. These critical approaches are always related with community work seeking to build up a real democratic and participative society. Any hard or soft method can be used like a critical approach, but the distinctive aspect is that they must be used with transparency and simplicity. Anyway, Ulrich's Critical Systems Heuristics has been an important contribution to critical approaches, focused on participation problems.

Ulrich (1983) criticises the way soft OR uses systems ideas with the purpose of deciding *how to do things*. He affirms that the question to be answered must be *what ought to be done*. The name Critical Systems Heuristics is referred to the concepts given by Kant. Firstly, *critical* due to the attitude of criticising and discussing all propositions. Secondly, the word *systems* means that the attention has to be in the whole system. Finally, *heuristics* due to the constant review of all presupposition.

Critical Systems Heuristics give a step forward for generating critical awareness in social planning. But the main limitation of this approach is its lack of social and political awareness; it disregards how both the political and the social systems work in real-life. Thanks to these lacks, radical OR appeared. This approach is

a branch of the critical one but addressed to oppressed groups. Radical operational researches try to study the consequences of OR projects in oppressed groups. Experts defend the interests of those groups without power and sometimes join other groups with similar purposes.

7. Multimethodology

Adopting only one method analyses only a limited view of the particular situation. Otherwise, multimethodolgy gives a wider view of the real-world problem. Habermas (1984) developed a framework that explains clearly the three dimensions of the world: the material world, the personal world and the social world. This is represented in the next figure.

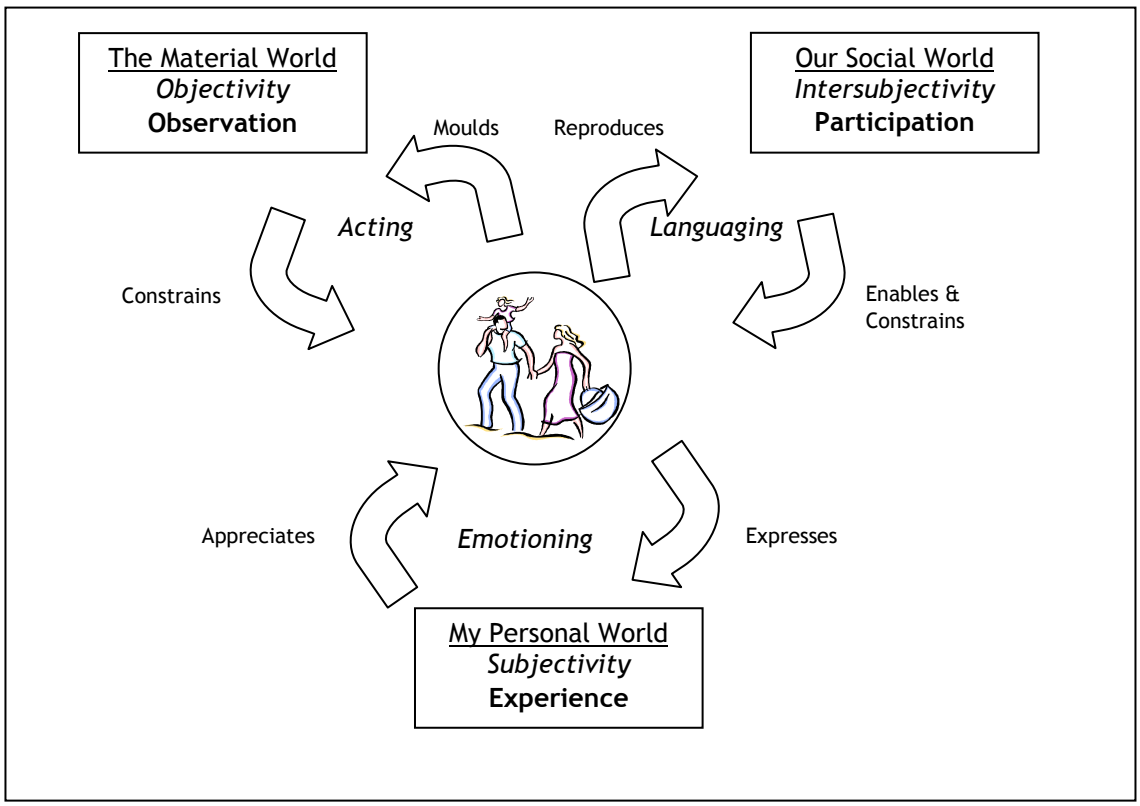


Figure 4. The three dimensions of the world. (Source: Habermas , 1984)

The material world is independent of human beings. Our relationship with it is about observation; thereby we can say that is an objective world. But our observations are related to its limitations and depend on the process we make to observe them. The personal world is the subjective one. It includes our thoughts, feelings, values, beliefs and experience. Finally, the social world is the intersubjective one where we participate and interplay with other people through the language.

Related to this theory, any real-world situation can be composed by elements of each different world and some method will match better with each situation.

Each method of every OR approach is usually focused on specific aspects of problem. Therefore, combining together several methods in the same situation will help in achieving a better solution. This is the reason why multimethodology means combining different methods in dealing with problematic situations.

A principal aspect for using multimethodology is that real-life problems have always several dimensions. Problems are always complex, in the sense that many aspects have to be taken into account (economic, social, political, technical, etc.). Hence, mixing different methods that are concentrated in those different aspects will be an effective solution. Not only because of the different aspects of a problem, but also because of different stages in a social intervention need diverse methods. Each method will match better with each stage in the whole process. Another relevant advantage given by multimethodology is that using various approaches and techniques can generate new ideas for a given situation.

7.1. Choosing methods

First of all, the decision of using one or more than one method has to be done. In deciding it, there are three main aspects to take into account (S. Cropper, 1990):

- The nature of the problem or task being addressed.
- The degree to which formalism is employed.
- The personal style of the consultant and the way in which the method is used with the clients.

Often, the selection of a type of method depends on the specific and explicit need of the values. In his case, the consultant chooses what data he or she wants to emerge and in what form. Other times, the selection of the method is decided due to the consultant's style.

After, when the decision of choosing several methods is taken, the question about which methods to use appears. Deciding which the best ones to apply in each problematic situation are can be very hard. There are many methods and choosing a few among all them requires knowing their differences, limits and strengths. There will be times when the match between problem and method is clearly obvious. But more usually there will be no dominant structure but rather some aspects which particular methods might help.

There are different ways to combine methods and each one has different purposes. One approach is to use a variety of methods to carry out the same function (mixing in parallel) and then compare the obtained results. Another option is to use different methods for each stage of the problem (mixing in cascade). Methods can also be used to get new insights on the problem. Another idea is to use one method in an unusual way.

7.2. The need of a helper

When people are in a complex situation they usually become too busy and too worried and also too involved in that situation to perceive choices, aspects and particularities of it. Sometimes it is easier to analyse it from outside, from a more objective view. This is one of the main reasons for the need of a helper. Generally the most helpful thing that someone can do for the person who has a problem is to make a suggestion which enables to change the problem and to help finding the solution. However, this suggestion causing a change in the problem can sometimes be rejected because people do not feel comfortable when someone tell them that their problem was not what they thought. In other words, people often reject that kind of help that starts from trying to say that the problem is not really what they believed it was. The professional helper in an organisation has to work within a less-developed relationship with those who are being helped, who do not know him well enough to feel confident that they can defend themselves against his help.

As it has been explained, problems are very individual things in the sense that different persons might see quite different problems in the same situation. This question is aggravated in problems with which several people are concerned, because each one should have different views of the problem. This fact represents an added complication for the agreement between them and another reason for needing a helper.

7.3. The facilitator

The facilitator will support the process of solving the mess. He or she becomes the manager of this process contributing with know-how and technical expertise. For giving this help, the facilitator uses some approaches, methods and tools. To facilitate means to make it easier for the work group to address important issues creatively, co-operatively and collaboratively.

For being helpful, a facilitator has to find ways to help clients to talk as directly as possible about what is that is concerning them. This is not always easy for several reasons. On the one hand, people tend to describe the problem in a way which does not present themselves or his colleagues as unqualified or incapable. On the other hand, and a very important factor, is that people when trying to explain the situation to the facilitator tend to present the facts rather than the feelings or the theories. Often the subjective ideas and impressions are the most significant and important and people tend to avert them because they think are irrelevant. Helpers who let such an inhibition persist will be deprived of most of their clients' important thinking about their situations.

There are three different kinds of giving help by a facilitator depending on his attitude in front of the client (Eden, 1983). The first one is the **coercive approach**. In this one, helpers use their power for telling the client what problem they think the client has. The facilitator defines the problem using his own point of view and the client believe in him as he is an expert. This situation is also named *research-driven* intervention. Secondly, there is the **empathetic approach** in which the helper tries to understand entirely the client's problem. In this case the helper tries not to make

suggestions and let the client express his own opinion. This situation is also named *user-driven* intervention. Finally, there is the **negotiative approach**. This one is a sort of combination of the others. Firstly, the helper listens at the client and understands their concerns and after they negotiate a problem which both can become interested in and committed to. This situation is also named *participative* intervention.

The best form of communication between the facilitator and the work group is an 'adult-adult' relation (B. Mayon-White, 1990). He or she better has to have a role of adviser rather than giving directives. It is usual that the facilitator takes a role of 'parent' in the first stages of the process because the method is being explained. Later, in the design phase a more 'laid-back' attitude is needed to encourage creative thought. And in the final stage of implementation, the facilitator as a leader is needed to support in applying the action plan.

Related to the group work, the facilitator has to manage two processes: the problem solving process and the group process. The first one is about how he or she supports and encourages the group in finding ideas and going through the different stages of the process. This is the *logical/rational* process and the scene of objectivity, where the group is seeking how to achieve the goals. The second one is about facilitator's skills for helping the members working together, communicating with each other and creating social relationships. This is the *intuitive/irrational* process and the scene of subjectivity where chaotic social situations are created by each member or their relationships. For managing this two processes and carry them out successfully, the expert has to facilitate, in the sense of supporting the two processes explained before and guide the work towards synergetic effects between them.

Heron (1999) defined the next guidelines for achieving a successful facilitation:

- Use approaches, for example creative, visual and mapping techniques, to co-ordinate members' thinking.
- Specify a set of objectives ground rules for the group work.
- Build up on the strengths of the group and protect the group against its weakness.
- Balance members' participation.
- Support the group while dealing with conflicts.
- Plan time to close the different social processes.
- Make the group to reflect and evaluate the group dynamics.
- Empower the group.

Sometimes, the role of the facilitator is crucial for the group work. He or she has the responsibility of maintaining the group oriented towards problem solving, of observing the members and readdressing them towards a good direction. The facilitator has to avoid distractions and to point at new insights not still indicated.

The facilitation itself has additional purposes to the management one. Firstly, each participant is a potential facilitator, so learning is an important aspect. Secondly, empowerment and self-organising, the members learn how to work creatively. And finally, the facilitator itself learn with each experience, he or she analyses the results and think about how to improve the possible mistakes for the next time.

New trends have recently introduced the concept of *dynamic facilitation* (J. Rough, 2002). This new thinking defends that the purpose of the facilitator is to promote the self-organising dynamic of change. This kind of facilitators assures choice-creating rather than decision-making. Anyway, the type of facilitation will be defined by the type of mess the organisation is confronting.

7.4. Working in groups

Working with several people gives a larger possibility for success than with single individuals. When there is more than one person deciding on one topic, complementary and supplementary information arise. Another important aspect is that some people think more creatively with the presence of others. And, definitely, working in groups allows detecting individual mistakes and correcting them.

It is important to learn social skills while working in groups because the problem solving process has to be accomplished and for achieving the goals, interaction among members in the group is needed. They have to be supportive and responsible for understanding the ideas of the rest of the members and for explaining their own views. This is the way for getting a creative and a participative process. According to Tuckerman (1965) there are four phases where groups go through:

- **Forming**: in this stage the structure of the group is shaped and the roles of the members are established.
- **Storming**: creative stage in which conflicts are discovered and discussed.
- **Norming**: communication between the members and towards problem solving.
- **Performing**: the task here is to find ways for solving rather than to maintain the group.

Work groups can go forward and back through these steps to reach the final success. For achieving high levels of performance, usually very complex problems have to be faced. In other words, often, the more complicated is a situation, the high level is reached by a team.

Inside the group, there are different roles that can be taken by the members. It is useful to define the roles from the very beginning of the process. There should be roles of encouragers, harmonisers, gatekeepers, feeling expressers, etc. Analogously, each member itself has to play several roles in different moments of the process, for instance, initiator, clarifier, evaluator, summarizer, cause and consequence seeker, etc. A good group has to have people with diverse personalities because personality affects how a person sees complex situations. If all the members have the same one, they will move through one single direction disregarding some insights. So, the more diverse and complete is the members' personality, the more different perspectives they will have.

Finally, another important aspect is related to the ways of communication. Some people communicate in a **transactional** way; this is a simple transmission of the ideas. Some others communicate in a **transformational** way. The main idea here is "how" is said: people and ideas evolve together, building trust and a collectivistic sense.

Radford (1990) defined a three staged model for the process of decision-making. It was based in the earlier model of Simon (1960). The three stages are: intelligence, analysis and interaction between participants. They are represented in the next figure.

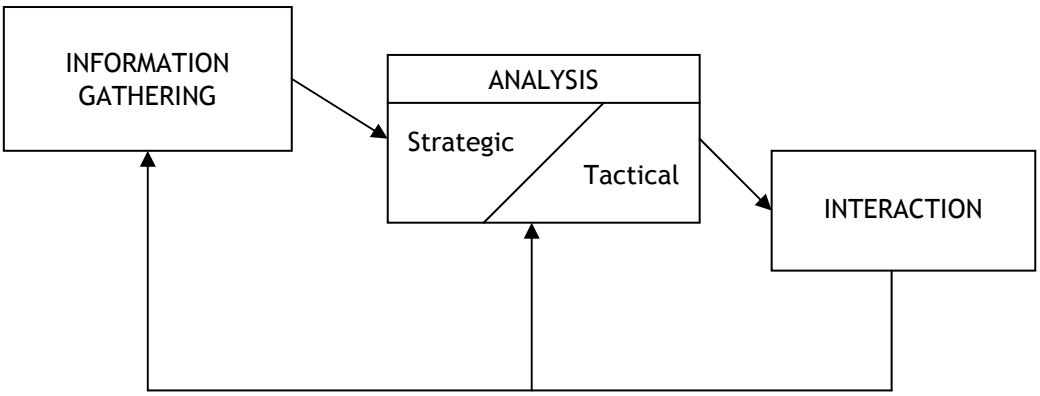


Figure 5. The three-stage model for decision-making. (Source: J. Radford, 1990)

In the first phase, a base of information is built up with collaborations of all the members. In some organisations this is a simple process because of its structure and procedures. But in others this can be a hard and long process. In the second phase, the strategical and the tactical analysis are done. The strategical one concerns possible final outcomes of the decision situation and the participants' preferences for them. The tactical one concerns the choice of courses of action for all the interactions. Finally, the third phase is for interacting using the information and analysis of the first two phases.

PART II

THE METHODS

SWOT

1. Introduction

The Swot analysis is a basic approach used for having an overview of an industry, an organisation or a market, and hence guides it into a development of a strategy. Its central purpose is to identify the strategies that will create a business model that will best match the resources and capabilities of a company (or industry or market) to the demands of the environment in which it operates.

The situation analysis in this case is both, external an internal, which means that the analysis has to be related to micro-environmental and macro-environmental. Therefore, a SWOT analysis captures the **S**trengths, **W**eaknesses, **O**pportunities and **T**hreats of the organisation. This tool is used since years and in many fields because of its ease and applicability.

The SWOT analysis can be an important part of any strategic process. The value of the results obtained with this analysis is often underestimated because of its simplicity. But it's important to point out that everybody can use it, so that means high qualification is not required for carrying out the analysis. This doesn't mean that SWOT analysis doesn't have a methodology. This approach can be supported by techniques, directions and different aspects of usage and, at the end; this is the purpose of this section: to get a methodological explanation of how to do a SWOT analysis and how to understand and manage the results obtained with it.

2. Origins and Background

The background of SWOT lies in the need for organisations to establish business strategies for them to find the most efficient and profitable directions to follow to comply with environmental changes (Sørensen and Vidal, 1999). Therefore, SWOT was firstly applied in private sector because of a need of seeking alternative strategies. Lately, the public sector also began to use the method.

The origins of SWOT analysis can be explained referring to an interview with Albert Humphrey, one of the originators of the SWOT model, published by www.businessballs.com.

Interview with Albert Humphrey (2004)

SWOT analysis came from the research conducted at Stanford Research Institute from 1960-1970. It was developed from research funded by Fortune 500 companies as a way to discover why corporate planning failed. By 1960 every Fortune 500 company had a 'corporate planning manager' and 'associations of long range corporate planners' had sprung up in both the USA and the UK. However a unanimous opinion developed in all of these companies that corporate planning in the shape of long range planning was not working, did not pay off, and was an expensive investment in futility.

Robert F Stewart at SRI in Menlo Park California lead a research team to discover what was going wrong with corporate planning, and then to find some sort of solution, or to create a system for enabling management teams agreed and committed to development work, which today we call 'managing change'. The research carried on from 1960 through 1969. Seven key findings lead to the conclusion that in corporations chief executive should be the chief planner and that his immediate functional directors should be the planning team. Dr Otis Benepe defined the 'Chain of Logic' which became the core of system designed to fix the link for obtaining agreement and commitment.

1. Values; 2. Appraise; 3. Motivation; 4. Search 5. Select; 6. Programme; 7. Act; 8. Monitor and repeat steps 1, 2 and 3

We discovered that we could not change the values of the team nor set the objectives for the team so we started as the first step by asking the appraisal question i.e. what's good and bad about the operation. We began the system by asking what is good and bad about the present and the future. What is good in the present is Satisfactory, good in the future is an Opportunity; bad in the present is a Fault and bad in the future is a Threat. This was called the SOFT analysis.

When this was presented to Urick and Orr in 1964 at the Seminar in Long Range Planning at the Dolder Grand in Zurich Switzerland they changed the F to a W and called it SWOT Analysis.
SWOT was then promoted in Britain by Urick and Orr as an exercise in and of itself. As such it has no benefit. What was necessary was the sorting of the issues into the programme planning categories of:

Product, Process, Customer, Distribution, Finance, Administration

The second step then becomes *'what shall the team do'* about the issues in each of these categories. The planning process was then designed through trial and error and resulted finally in a 17 step process beginning with SOFT/SWOT with each issue recorded separately on a single page called a planning issue.

Figure 6. Interview with Albert Humphrey (2004)

As we can see in the text above, this method began just for helping in planning strategies in private enterprises, later it has been used in different fields and situations. The process has been used successfully ever since. This method can be applied in very different areas and contexts with successful results because of its high level of simplicity, transparency and flexibility.

3. The methodology

3.1. Purpose

SWOT gives us a general view of the organisation and its surroundings. It reveals what are the demands of the market that the organisation must fulfil to survive. So, the central purpose is to identify the external and internal elements influencing the organisation. This is made by listing the four elements of the SWOT analysis.

Even the way of use is simple and can be done by anyone; the analysis includes a methodology that allows understanding the restrictions of the model. This is supported by a number of directions, steps, techniques and different aspects of usage.

3.2. Definition

Before going into the methodology, it is important to describe the four elements of the SWOT analysis: Strengths, Weaknesses, Opportunities and Threats. Below, there is a closer look at the fundamental principles associated with all four of these and also how these elements are related to the creation of a strategy.

Internal analysis: Strengths and Weaknesses
Relative to market needs and competitors' characteristics, a manager must begin to think in terms of what the firm can do well and where it may have deficiencies. Strengths and weaknesses exist internally within a firm, or in key relationships between the firm and its customers. SWOT analysis must be customer focused to gain maximum benefit; a strength is really meaningful only when it is useful in satisfying the needs of a customer. At this point, the strength becomes a capability.

When writing down strengths, it is imperative that they be considered from both the view of the firm as well as from the customers that are dealt with. A well-developed listing of strengths should be able to answer a couple of questions. What are the firm's advantages? What does the firm do well?

Although some weaknesses may be harmless, those that relate to specific customer needs should be minimized if at all possible. It is important that listing of a firm's weaknesses is truthful so that they may be overcome as quickly as possible. Delaying the discovery of weaknesses that already exist within a company will only further hurt the firm. A well-developed listing of weaknesses should be able to answer a few questions. What can be improved? What is done poorly? What should be avoided?

The role of the internal portion of SWOT is to determine where resources are available or lacking so that strengths and weaknesses can be identified. From

this, the manager can then develop strategies that match these strengths with opportunities and thereby create new capabilities. At the same time, the manager can develop strategies to overcome the firm's weaknesses, or find ways to minimize the negative effects of these weaknesses.

External analysis: Opportunities and Threats
The external environmental analysis may reveal certain new opportunities for profit and growth and threats that the managers of the organisation should take into account. If the managers ignore the changes in the external environment an efficient organisation can be no longer effective. These changes can occur in the rate of overall market growth and in the competitive, economic, political/legal, technological, or sociocultural environments.

Related to the competitive environment it is important to analyse the market and its actors in the sense of possible competitors of the company. In the sociocultural environment, these influences change in attitudes, beliefs, norms, customs, and lifestyles. A firm's ability to foresee changes in these areas can prove beneficial while failure to react to these changes can be devastating. Product modifications are often used to take advantage of market opportunities. However, these changes can also create potential new competitive threats. Regulatory actions by government agencies often restrict the activities of companies in affected industries, so that is important information that the managers have to be aware of. Various elements within an organization's internal environment can also have an impact on marketing activities. Changes in the structuring of departments, lines of authority, top management, or internal political climate can all create internal weaknesses that must be considered during the SWOT analysis as well as in the development of the strategy.

In applying the SWOT analysis it is necessary to minimize or avoid both weaknesses and threats. Weaknesses should be looked at in order to convert them into strengths. Likewise, threats should be converted into opportunities. Lastly, strengths and opportunities should be matched to optimize the potential of a firm. Below it is submit an outline identifying the four elements of SWOT analysis with the actions that have to be done.

Elements	**Actions**
Strengths	Maintain, build, leverage
Opportunities	Prioritise, optimise
Weaknesses	Remedy
Threats	Counter

Figure 7. Elements of SWOT analysis and their related actions.

At the end, different examples of the elements can clarify the explanations above.

Strengths	**Weaknesses**
• Capabilities • Competitive advantages • Resources, assets, people • Experience, knowledge, data • Favourable access to distribution • Innovative aspects (product or process) • Location and geographical • Price, value, quality • Accreditations, qualifications, certifications • Processes, systems, IT, communications • Cultural, attitudinal, behavioural • Economies of scale • Good reputation among customers	• Gaps in capabilities • Reputation, presence and reach? • Poor financials • Own known vulnerabilities • Timescales, deadlines and pressures • Continuity, supply chain robustness • Effects on core activities, distraction • Reliability of data, plan predictability • Morale, commitment, leadership • Accreditations • Bad processes and systems • High cost structure • Damaged reputation
Opportunities	**Threats**
• Market developments • Competitors' vulnerabilities • Industry or lifestyle trends • Technology development and innovation • Global influences • New markets (unfulfilled customer needs) • Geographical, export, import • Information and research • Partnerships, agencies, alliances • Volumes, production, economies • Seasonal, weather, fashion influences • Opening to international markets	• Political effects • Legislative effects • Environmental effects • IT developments • Competitor intentions • Market demand • New technologies, services, ideas • Vital contracts and partners • Obstacles faced • Economy - home, abroad • Seasonality, weather effects • Shift in consumer tastes • Substitutive products • Price wars

Figure 8. SWOT points. (Source: businessballs with some modification.)

3.3. The process

Creating a SWOT analysis is a five-step process. Each step has different ways to be carried out but the main structure is always the same. These are the five steps (Sørensen & Vidal, 1999):

1. The working group
2. Use of creativity
3. The SWOT Matrix
4. Prioritising SWOT points
5. Development of Strategies

The working group

The most common way of doing the SWOT analysis is using a group of people of the studied organisation plus a person who knows the method (an expert of the method or of OR in general). This expert will do the role of the facilitator that means conducting the group in the process and towards successful results. It also can be carried out by other kinds of working groups. Sometimes it is done by one person who has an understanding of the organisation and often by a consultants group who had obtained information from interviews with individuals of the organisation. However, the best way and most common is using the first one.

Establishment of the working group is a very important aspect because of each member has a subjective opinion of the organisation's position. In fact, it is important to have a heterogeneous group in the sense of the position they hold in the company. That can give different points of view and add value to the results, achieving a more realistic vision.

Indeed, making a good choice for the working group helps the process going in the right way. This decision will influence in the results obtained.

The facilitator must have an objective view of the topic the group is discussing about. He has to be rational, sensitive to all opinions and he also has to balance the participation of all the members in the group, this means that he has to avoid someone keeping quiet or someone only speaking.

Use of creativity

In this second step the work group must identify the different points of the SWOT elements in the case of study. At this moment it is important that all the ideas crop up without being criticised. It is necessary to take a rich view of the organisation.

There are a lot of different creativity techniques. These methods can help the process of rising ideas. Different techniques help in different ways and for different things. The most common one is brainstorming. The basis of brainstorming is to avoid criticism ideas, all the ideas are valid. All what is said must be written down in some paper or board in order that the whole group can see them. It also should be a person who encourages the group building on the ideas of others, adding new points of view and structuring the process. This facilitator can be part of the group or a person coming from outside. Brainstorming is the most general technique

because its easy of use, others can be used too but they give more concrete results focused on more specific problems.

The SWOT Matrix

Sometimes there are too many SWOT points identified that can hinder the process. Breaking down the analysis into smaller areas can help us enhancing the general view of the process. We can break down the matrix in different ways, for instance separating the problem in more definable areas to concrete the analysis or being critical with some points in order to finish with a more limited set of them.

Strengths	Weaknesses
Opportunities	Threats

Figure 9. The SWOT matrix.

Prioritising SWOT points

This step is mostly used for organising the matrix and the ideas in it. We must perform an assessment of the points and the SWOT elements where we have put these points and if it is necessary reformulate some of them. We must make a selection if there are too many ideas because it will help the last step of the process, develop a strategy.

There is a way of prioritising consisting in evaluate the strengths, weaknesses, opportunities and threats and put them on a two-dimensional scale. This scale measures possibility for change and consequence of each point so it will be easy to develop strategies. This will also help to identify relations between different factors in the matrix.

Development of Strategies

The purpose of this last step is to develop different strategies that the organisation can follow. The method results are some information that managers can use to create his strategies but the results do not give specific guidance as how to develop them.

Strategies in Swot are generally formulated by using statements that oppose the identified points in order to improve the situation of the organisation. There are four different ways of mixing points for formulate strategies:

- *Maxi-maxi strategies:* maximising either the internal strengths or the external opportunities.

- *Maxi-mini strategies:* maximising the opportunities and minimising the internal weaknesses.
- *Mini-maxi strategies:* minimising external threats and maximising internal strengths.
- *Mini-mini strategies:* minimising both threats and weaknesses.

	Strengths	Weaknesses
Opportunities	MAXI-MAXI	MAXI-MINI
Threats	MINI-MAXI	MINI-MINI

Figure 10. The SWOT strategies.

Managers can gather some of these strategies to develop a big one that collect many of them. Developing strategies must be done with rationality, experience and creativity. It may be of value to apply another methodology also with SWOT to get better results.

3.4. Complementing SWOT

SWOT analysis can be complemented with some other methods. Applying another method it may be of value to get better and more complete results. One of the techniques most used for complementing SWOT is the PEST analysis.

PEST analysis is a simple but important and widely-used tool that helps understanding the big picture of the **P**olitical, **E**conomic, **S**ocio-Cultural and **T**echnological environment an organisation operates in. With this analysis it is ensured that what the organisation is doing is aligned positively with the powerful forces of change that are affecting the world around the organisation. Making good use of PEST helps avoiding taking action that is doomed to failure for reasons beyond control of the managers.

Political Factors:

The political arena has a huge influence upon the regulation of businesses, and the spending power of consumers and other businesses.

- Government type and stability
- Freedom of press, rule of law and levels of bureaucracy and corruption
- Regulation and de-regulation trends
- Social and employment legislation
- Tax policy, and trade and tariff controls
- Environmental and consumer-protection legislation
- Likely changes in the political environment

Economic Factors:

Marketers need to consider the state of a trading economy in the short and long-terms. This is especially true when planning for international marketing.

- Stage of business cycle
- Current and project economic growth, inflation and interest rates
- Unemployment and labour supply
- Labour costs
- Levels of disposable income and income distribution
- Impact of globalization
- Likely impact of technological or other change on the economy
- Likely changes in the economic environment

Socio-Cultural Factors:

The social and cultural influences on business vary from country to country. It is very important that such factors are considered.

- Population growth rate and age profile
- Population health, education and social mobility, and attitudes to these
- Population employment patterns, job market freedom and attitudes to work
- Press attitudes, public opinion, social attitudes and social taboos
- Lifestyle choices and attitudes to these
- Socio-Cultural changes

Technological Factors:

Technology is vital for competitive advantage, and is a major driver of globalization.

- Impact of emerging technologies
- Impact of Internet, reduction in communications costs and increased remote working
- Research & Development activity
- Impact of technology transfer

4. Example

Amazon is a company operating all over the world. It is a big online retailer which began selling books and piecemeal has spread offering different products: electronics, toys and more. In the beginning, Amazon was one of the original dotcoms and its growing rate was prodigious because it has been one of the first exploiters of e-commerce. But in the last decade, many online companies have appeared creating a highly competitive market. So, at this point, Amazon needs a reformulation of its business strategy for facing the new competitors.

For obtaining the SWOT points, an internal and external analysis has to be carried out. With the first one, the strengths and the weaknesses will arise, and with the second one, the opportunities and threats.

Analysing the company itself and its relationship with the customers will reveal what the organisation does well and what can be improved. The internal analysis of SWOT will determine where resources are available or lacking. In this sense, there are several relevant points of Amazon. First of all, Amazon is a profitable organisation. Its sales have increased in 26% from second trimester of 2004 to the same period in 2005. Nevertheless, profits for the same period have fallen 32%. This diminution is due to its large initial investments and to its sales promotion of reduced delivery costs to customers.

Amazon had an initially huge success with its book selling and, after some years, it began extending its business with other products as games and electronic devices. One of Amazon advantages is its leading position in the online market. He was one of the first online retailers and that made that its name was broadly recognised and, thereby, customers feel confidence in the brand. Another important characteristic of the company is its relationship with its customers. Amazon has a huge database with information of all the customers. Thanks to Customer Relationship Manager (CRM) and Information Technology (IT), the company has a wide knowledge of the consumers: their needs, their likings, their possibilities and so on. It is calculated that its customer database is about 30 million people. This enables Amazon to offer a more personal service, they can propose to each individual a collection of products that perfectly suit with his preferences.

On the other hand, the fact Amazon is extending its portfolio can damage the brand. The entering in a new market can cause confusion in the customers and devaluate the brand image. Analogously, there is another important factor that is restraining its profits. Until now, Amazon offers free sending to customers and this service entails a significant profit decrease. However, the problem in this point is that customers can go to a local retailer to buy the same products without shipping costs.

Analysing the external environment, many factors have to be taken into account. Amazon has been selling its expertise to major companies. The company is going to join the British retailer Marks & Spencer in order to sell its products online

through Amazon site. Likewise, they will have similar relations with NBA and Toys-R-Us. These agreements will have two essential consequences. On the one hand, Amazon will be able to sell products that could only be sold before in "own brand" stores. On the other hand, Amazon looses some big potential competitors in the market. In this sense, another advantage for the company is the deal with British library. With this collaboration the library catalogue is on the Amazon website, so its customers can search for antique books and Amazon obtains an added value for this.

Amazon has also opened its market to a growing one: the Chinese market. They bought the largest online retailer, Joyo.com, which should bring important profits to the company because it was a very similar organisation operating in China. Chinese costumers of Joyo.com should not feel the difference between the two retailers and Amazon extends its number of costumers.

A big problem for Amazon is the large number of competitors that have been arisen in the last years. Many new companies should try to copy Amazon's model. There are also big competitors like non-online big retailers powerful enough to start with a price war. In an international level, companies in other countries can compete against Amazon through alliances and joints. This fact can damage Amazon and make it loose its top position in some markets. Finally, it is important to emphasise the seasonability of this business. A big portion of the sold products is concentrated in Christmas, especially in West countries.

So, these are the SWOT points.

STRENGTHS	**WEAKNESSES**
1. Good growing percentage of sales. 2. High knowledge of the customers. 3. Good knowledge of IT. 4. Diversity of offered products. 5. Worldwide well-known due to its largeness. 6. Good know-how and expertise. 7. Low prices. 8. Good reputation among customers.	1. Decreasing percentage of profits. 2. Too high delivery costs due to the strategy of free shipping. 3. Confusion of the customers due to the diversity of products. 4. Absence of tangible location. 5. High set up costs not yet paid off.
OPPORTUNITIES	**THREATS**
1. Increasing habits of buying through Internet. 2. Development of new partner relations with well-known companies. 3. Development of collaboration with the public sector 4. Opening to new markets.	1. High competition either dotcom retailers or street retailers. 2. Difficulties for entering new countries due to national competitors. 3. Seasonability of the business. 4. Possible price war.

Figure 1E. The SWOT points.

When the SWOT points are described, the possible strategies have to be created. Combining the different factors some probable strategies should arise. In next boxes there are some strategies shown.

MAXI-MAXI STRATEGIES

1. Offer product diversity in an individualised form taking profit of the customers' knowledge and depending on the country habits. So, thanks to the CRM it is possible to have information of customers and offer them a personalised assortment of products. This knowledge of the people should help in entering new countries.

2. Develop alliances with companies in other countries which study the customers' behaviour in order to enter new markets with information about their inhabitants. The best way for entering in a new market is to know their habits, therefore an agreement or association with an organisation of conduct studies.

MINI-MAXI STRATEGIES

1. Offer the enterprise and know-how to national competitors in new markets in order to create alliances and partnerships with them. In this way, the possible competitors should not feel threatened by Amazon and they should think that collaboration will also favour them.

2. Entering new countries with really low prices that should be compensated with the sales in countries where Amazon is fully established. Being a huge company can be often advantageous because losses in one side can be balanced with profits on the other.

3. Increase diversity of products to avoid seasonability. If the sales are more concentrated on Christmas, offering some products typically consumed in summer should help in this sense.

MAXI-MINI STRATEGIES

1. Create collaborations with important libraries of several countries (like the one with the British library) charging higher delivery costs to customers looking for rare books. Thus, this especial service will be paid more expensive than the common one and will compensate the losses in shipping costs.

2. Avoid confusion among customers restructuring Amazon site in a clearer design even renaming the different product lines, for instance: AmazonBooks or AmazonToys. With this action Amazon should also take profit of the increasing habits of online purchasing.

MINI-MINI STRATEGIES
1. Emphasise advertising activities when sales decrease because of the seasonability. Books are bought mostly in Christmas but another good period is before holidays 2. Entering a new country with only one kind of product in order not to confuse new customers and to concentrate only in one kind of competitor. As always an entrance is a difficult challenge, accessing gradually should be more successful.

Figure 2E. The SWOT strategies.

STRATEGIC OPTIONS DEVELOPMENT AND ANALYSIS

1. Introduction

Strategic Options Development and Analysis (SODA) is another method for working on complex problems. This approach is designed to help OR consultants, acting as facilitators, to aid their clients with difficult problems. The method stands in the construction and analysis of cognitive maps, which assist the negotiation between the members of the group.

SODA can be a useful tool for helping an organisation with the development of a strategy. Opposite to the SWOT analysis, this approach is more complex and needs the intervention of a facilitator. This consultant will lead the process and will guide the working group towards the success.

A SODA consultant must hold some specific skills that will be important for the completion of the whole process. These skills will support the development and contribute in the resolution of messy problems. The SODA approach is a participative one, although it depends on the culture of the organisation, the time available and the resources accessible.

2. Origins and Background

Strategic Options Development and Analysis was originally developed by Colin Eden at the University of Bath (UK) in 1986. The method was a result of many years of studies and consulting experiences.

In the School of Management at University of Bath, he pioneered the research in the application of OR approaches to complex problems in organisations. Along with Fran Ackerman and Steve Cropper, he upgraded the SODA approach and its use within a Group Decision Support Environment.

Now, the use of SODA is spread all over the world in many different fields. The main application of this approach is in the private sector, but it is also used in the public one, mostly in UK and USA.

3. The methodology

3.1. Purpose

The purpose of this method, as it has been described previously, is to deal with problematic situations in a business environment. The method helps facilitators (OR experts) assisting the process of achieving solutions for arduous problems. The approach is 'to proceed flexibly and experimentally from broad concepts to specific commitments, making the latter concrete as late as possible' (Quinn, 1980).

This method sees strategic management in terms of changing thinking and action rather than planning. In SODA, the work tends to be more 'quick and dirty' than 'thorough and complete'

3.2. Definition

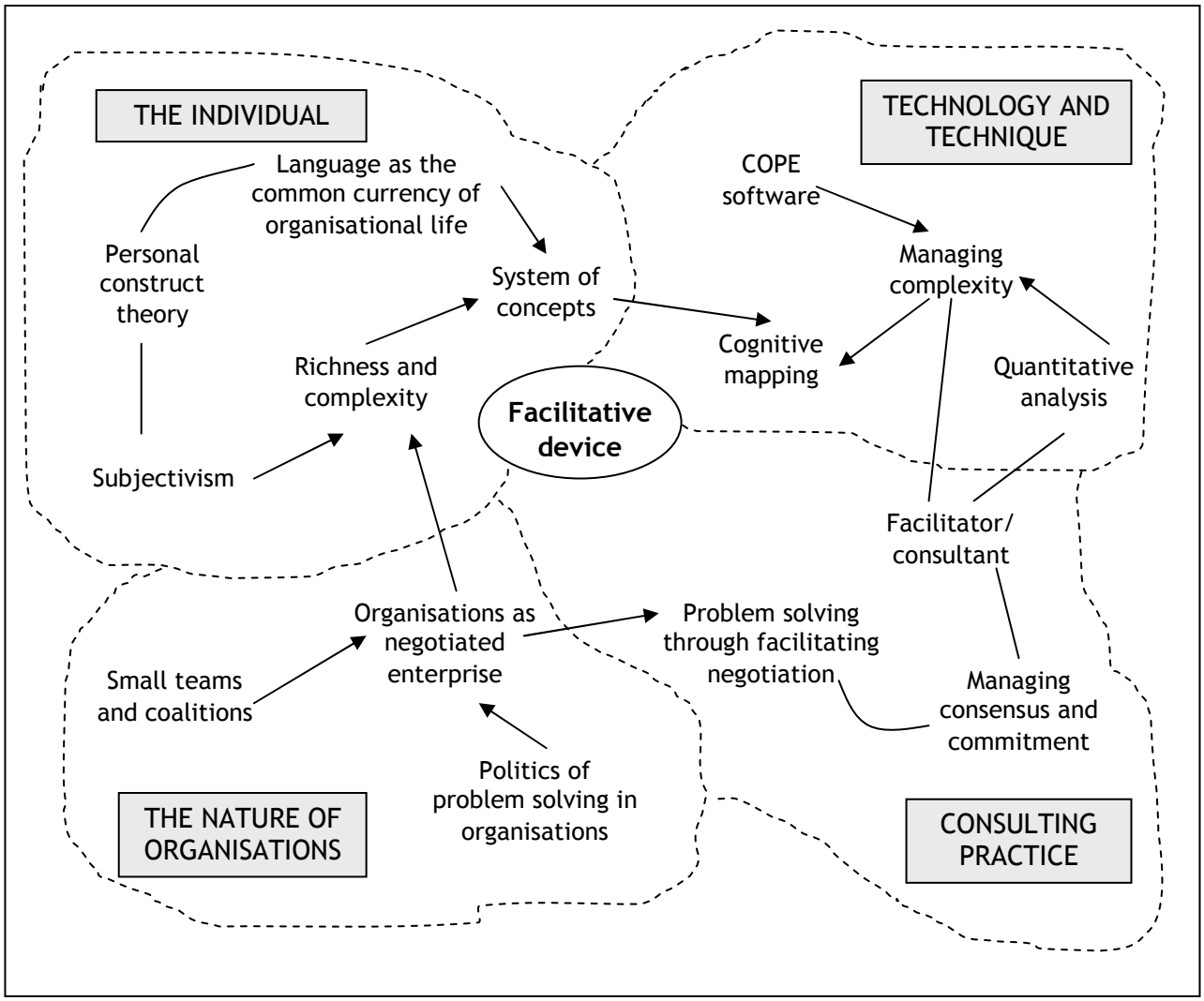


Figure 11. The four perspectives of SODA. (Source: Eden, 1989)

There are four main theoretical perspectives guiding SODA: the individual, the nature of organisations, the consulting practice and the role of technology and technique, as is shown in the figure above.

Firstly, the **individual** aspect is referred to the fact that each member of the group has its own view of the problem. This view depends on the perception each member has of the same issue; this is known as subjectivism. For this reason, the SODA method has its foundation in subjectivism. It is possible to identify several reasons for this fact. One can be that each member of the group has a different position in the company, so each one has different skills and experiences in the subjects studied. All these different viewpoints help reaching creative and richness solutions.

It can turn difficult for the facilitator to get the ideas of the members. That is the reason why he has to be very impartial and try to leave out his own ideas to understand better his or her client ideas. Moreover, the facilitator has to map these client ideas in a schematic way and these maps have to be later understood by all the members of the decision group. Cognitive mapping is the method used to gather and structure client's points of view.

Secondly, a view of organisations which focus the individual will also focus on the organisation as a changing set of coalitions in which politics and power are important explanations of decision making. 'An organisation has a "garbage can" of problems passing it by, out of which individual managers will arbitrary select those that most fulfil their personal ambitions' (Strauss et al., 1963). Participants of an organisation are always negotiating their roles in it. This is the **nature of organisations**.

These two perspectives explained before come together to set up the third aspect in the figure, the **consulting practice**. The consultant is the one who facilitates the whole process. He or she must be able to join different information from the individuals and to help with the problem negotiation. As it is shown in the figure above, the role of the OR expert is to dispense the conditions to reach commitment and consensus, through facilitating negotiation.

Finally, the three aspects explained before come together through **technology and technique**. Technology and technique are the connection between the other three aspects; they are the support for managing complexity and for analyse all the information obtained from the individuals by the facilitator. The most important technique for carrying out the SODA process is Cognitive Mapping, which will be explained in detail in the next section.

3.3. Cognitive Mapping

Cognitive mapping is a tool developed in the study of managerial and organisational cognition (Walsh, 1995). It is used for solving different issues depending on the application environment, but the shared characteristic in all fields is that these maps make conceptual entities more visible. Cognitive mapping facilitate the discussion of cognitive processes that can never be directly observed (Eden, Jones & Sims, 1979).

SODA uses cognitive maps designed by the facilitator usually extracted from individual interviews with each member of the group. These maps will help the decision making group examining the problem. The maps reflect the meaning of each element of the problem by connecting ideas and representing views. Cognitive mapping helps in the elicitation and structure of each of the participants' perspectives. Maps provide a device for exploring meanings –illustrating the issues and also how they fit together- and ensure a degree of equivocality to facilitate negotiation (Eden & Ackerman, 2002). Maps give a means of facilitating conversation and negotiation in a way that seeks to amplify emotional and intellectual commitment. Participants are able to reflect upon the material being explored, consider alternative perspectives and provide the basis for the strategy process.

A cognitive map is a directed graph with aspiration or goals, values and beliefs at the apex, issues in the centre and actions supporting these issues at the base.

Constructing the cognitive map

First of all, an interview with each member of the group is done by the facilitator. The facilitator has to analyse all the points of the interview and represent them in the map. The map must represent individual thinking and it must be composed by his ideas and the links between them. The consultant will write the concepts in his own vocabulary and in an easy form.

There are two kinds of concepts: the goals and the options. Both of them are composed by two poles. The first polo contains the raised idea from the client thinking while the second one is the contradictory or opposite of the first one. For example, one of the options caught by the facilitator in the interview should be to reduce investments in the company. Therefore, the first polo should be this action and the second one should be to keep on with the same level of investment. That will be represented like it is shown in the next figure.

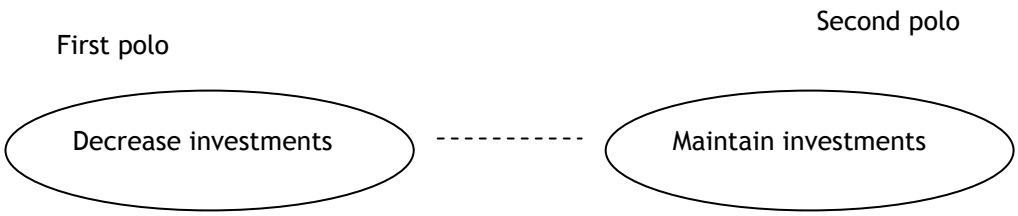


Figure 12. The two poles of an idea.

Arrows are placed between the concepts for pointing out their relation. There are two types of arrows: positive and negative.

The positive one means that the first polo of the origin idea corresponds to the first polo of the destination idea. And the negative arrow means that the first polo of the origin ideas corresponds to the second of the destination idea and vice-versa.

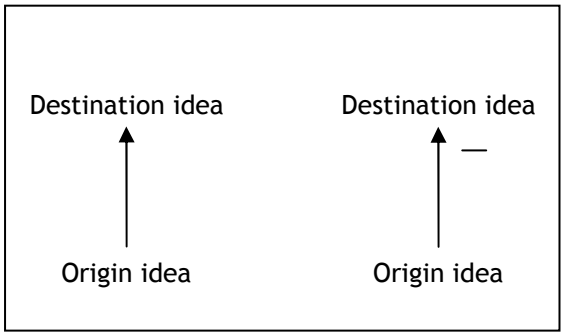


Figure 13. Arrows between ideas.

It will become clearer with an example.

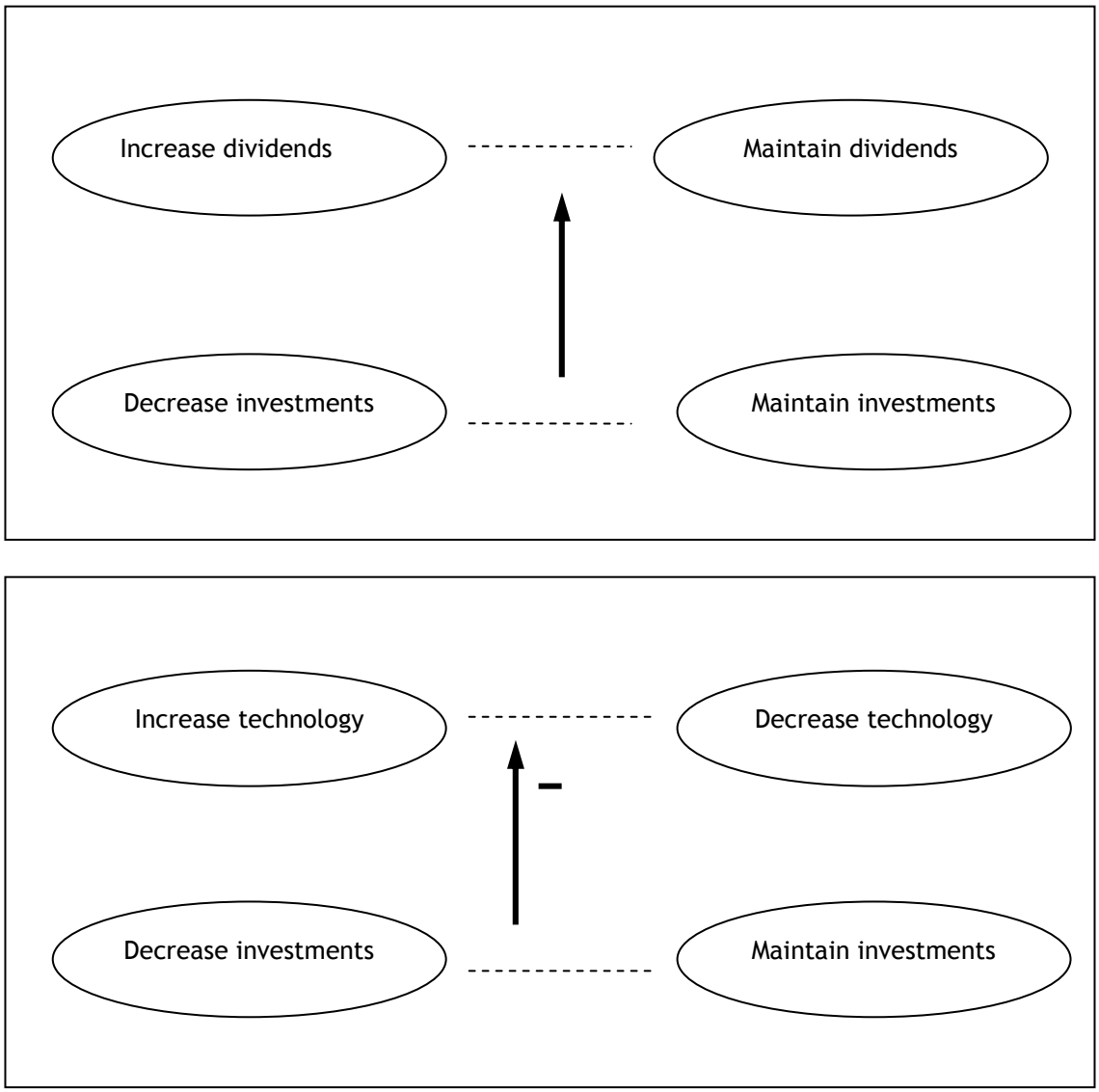


Figure 14. Using arrows in the maps.

In this example it is easy to see the meaning of the arrows in cognitive mapping. In the first picture is represented graphically that one of the consequences of decreasing investments in a company can be a rise of dividends for the partners. In the second example it is also clear the other sign. The negative arrow represents that one of the consequences of decreasing investments can be a diminution on technology for the organisation.

These two kinds of arrows have been created for one reason. In the first polo it always has to be represented the earliest thinking of the client so that it becomes evident to identify the main ideas of the client.

All the concepts have to be joined by the facilitator in one map named strategic map. The objectives of doing these maps are the following:

- Identify similar and different ideas.
- Have a tool for measuring agreement opinions.
- Define the zones with common interests and tensions.

With these maps the facilitator can assist the group discussion; different ideas can be considered by all the group elements and some opinions can be changed. Usually, through this process it is possible to get a good set of results.

A strategic map can be analysed using two different approaches: the top-down approach (goals to options) and the bottom-up approach (options to goals).

In the first approach, the client focuses in elaborating and questioning the goals. The facilitator has to direct the interview towards how to reach the objectives. The goal is known and the facilitator has to ask about the options for getting it. The whole interview has to move in that subject. This approach is better used when the client anticipates the problem and needs to study the ways for prevent it. In this case, the client has the objective of preventing a problem and he needs to think about the available options for reaching his purposes. On the other hand, in the bottom-up approach, the client prefers to find the possibilities for action on the goals. The client looks for available options and move towards the goals analysing all the options. In this case, he wants to do some improvements and is striving to get there.

Adapting cognitive mapping to strategy making

Cognitive and strategic mapping provides some assistance in obtaining and structuring the contributions of all members of the group. The model helps in the later negotiation and changes become more possible. It is easier to see the future clearly and wisely when the paths for achieving it are well described.

After all the interviews are done and all cognitive maps are drawn, it is the time for the facilitator to create the strategic map where all information is grouped in the same graphic. The amalgamation of all cognitive maps form the strategic map and this will be shown to the decision group. This map contains the thinking of many people,

including conflicting views, different slants on the same issues and different perspectives on similar views. These maps also help by prompting managers to focus on contrasting the current with the past, the current with the aspired future direction or the past with the future. By focusing on strategic issues rather than development of idealised scenarios or preferred goals, the process is deliberately designed to get as close as possible to 'theories-in-use' (Argyris and Schon, 1974; Bartunek and Moch, 1987).

3.4. Mapping in groups

Another way of creating the maps is to do it among all the members of the group in the same time. Unlike the individual interviews and the creation of the map by the consultant, this way to build maps is characterised by the incessant participation of the members. Group mapping allows members discuss and reflect upon the organisation and its direction. There are three methods for working with this purpose (Eden, 1989).

- Oval Mapping Technique
- Computer-Supported Mapping
- Network System of Laptop Computers

1. **Oval Mapping Technique (OMT)**
   In the OMT, members in the group write down their ideas in large oval cards and these are shown in a panel. So that members are able to see all the perspectives, add their contributions and watch the strategy map unfold. It is agreed that this process is best applied with groups of up to twelve members. In this case, the facilitator has to organise all the cards in the same manner than in the original method. He has to build the map in the panel so everyone can see it and realise what all the concepts are. With this process all the members will be able to understand different points of view and agree or disagree in the pointed ideas. Moreover it is possible to add more ideas based on the first ones and put them into the map. This procedure enables group members changing their convictions as they can see others within the context of alternative views.

2. **Computer-Supported Mapping**
   This is another method for building and working with strategic maps. The method can be carried on in two ways. On the one hand, the facilitator enters the participants' comments, and on the other hand, the participants themselves enter their own comments (this is an electronic version of the Oval Mapping Technique). In both cases, there is a projector in the room that shows all the ideas so everyone can see them. Computerisation is better because is quicker. All the members can express themselves, adding or editing ideas, and this is seen by everyone in real time. So the process is fast and it is easy to understand all the ideas of the members and in their context. Therefore, the negotiation can start from the very beginning.

3. **Networked System of Laptop Computers**
   In this last case, the maps are built up by every member of the group. This method ensures anonymity because there is a direct entry of contributions via personal laptop that is networked to the public screen. This is the quickest method and it is usually used when there is not time enough for the other ones. In fact, this process does not provide the same level of deep and reflective thinking.

3.5. The role of the facilitator in the phases of the methodology

Like all methodologies, SODA has different ways to be applied depending on the needs of the organisations, the resources available in the process (time, people, material, etc) and the facilitator's style. However, there are several phases to go through that are shared by the different ways of using it.

First of all, the organisation must have a complex situation to deal with. They have to decide asking for help to an expert for solving the problem because they realise that they cannot cope with the problem all alone.

Secondly, the facilitator should examine the situation and get a general view of what is the problem. The facilitator needs information about the company and its environment and, more deeply, about the problematic situation that must be treated. All this information can be obtained in several manners. The most common one is the interview. Interviewing people of the company concerned with the situation gives a better idea of that situation and all the aspects related to it. It is important to interview not only the managers of the organisation, but also people from diverse levels in it. This gives a wider vision of the problem because each person has a way of seeing and analysing the problem and also knows what are the concrete problems in his or her own level related to the big one. The facilitator can also promote discussion among members of the organisation. In this discussion, many aspects of the problem arise and each member is able to give his or her own vision of the problematic situation and the goals he or she thinks are the ones to be achieved.

Then, all the information found in the last phase has to be analysed and collected. In this phase, cognitive mapping becomes the centre of attention. All ideas said must be reflected in the map without censure. Sometimes it is very helpful to cluster the map. When the map is highly complex, clustering is a good method. Clusters are made with similar key issues to get a more manageable view. The construction of the map can be done, as it has been explained before, in different modes. Depending on the facilitator's criteria and the resources of the organisation, the cognitive mapping can be done either by the facilitator alone, or by the entire work group.

When the cognitive map is built, the problem solving process begins. Until this moment, the information collected is about which is the problem. The current situation and the desired one have been described with all their implications and related problems. In this phase, the work group, with the facilitator's help, begins discussing how to go from the current to the desired state. They seek for an agreement of what actions to do for achieving the goals. All these decisions will be represented in the so-called strategic map. This map shows up all the action plans that can be taken for

reaching the objectives. From this point, the members have to discuss all the possibilities and try to agree which are the most important goals and therefore the action plans to implement. This process has to be advised by the facilitator and his or her expertise but without giving strict directives. He or she has to help the group towards decisions.

In all the process it is always possible to go back and forward when new insights arise. There are not fixed phases where the problem has to go through. Creative changes are always welcome if they help better the success. These stages of SODA are the most generalistic ones, it is always important to consider that different organisations and different messes need different ways to proceed. Normally, one way of applying SODA is different from another depending on the problematic situation.

4. Example

To clarify the SODA methodology, some examples of different stages of the process will be explained in this section.

4.1. Constructing a map

In the first stages of the SODA methodology, the facilitator makes some interviews to some key individuals of the company or outside it concerned with the problematic situation. After these interviews, the facilitator builds the cognitive map with the information obtained of them.

In the next figure a cognitive map is represented. The problem situation is about an airport organisation and an analysis of its reputation. The managers are worried about the reputation for safety and security of the airport. They seek the aspects conditioning this reputation and how to improve them. The map shows the important aspects and their relations in different areas of the airport activities. In this example it can be clearly seen which are the consequences and of each statement.

For instance, the statement "*high level of anxiety about missing flight ... welcome routine check*" is caused by the statement "*long queues at x-ray ... 3 minutes or less at x-ray*". This means that the long queues in the x-ray machines make the clients feel anxious about missing their flights. But, in the other side, this statement at the same time has two consequences: "*increase in airport reputation for inefficiency*" and "*passenger frustration with air travel*". So, when customer feels anxious, the reputation of the airport decreases and they feel less confident with travelling by plain.

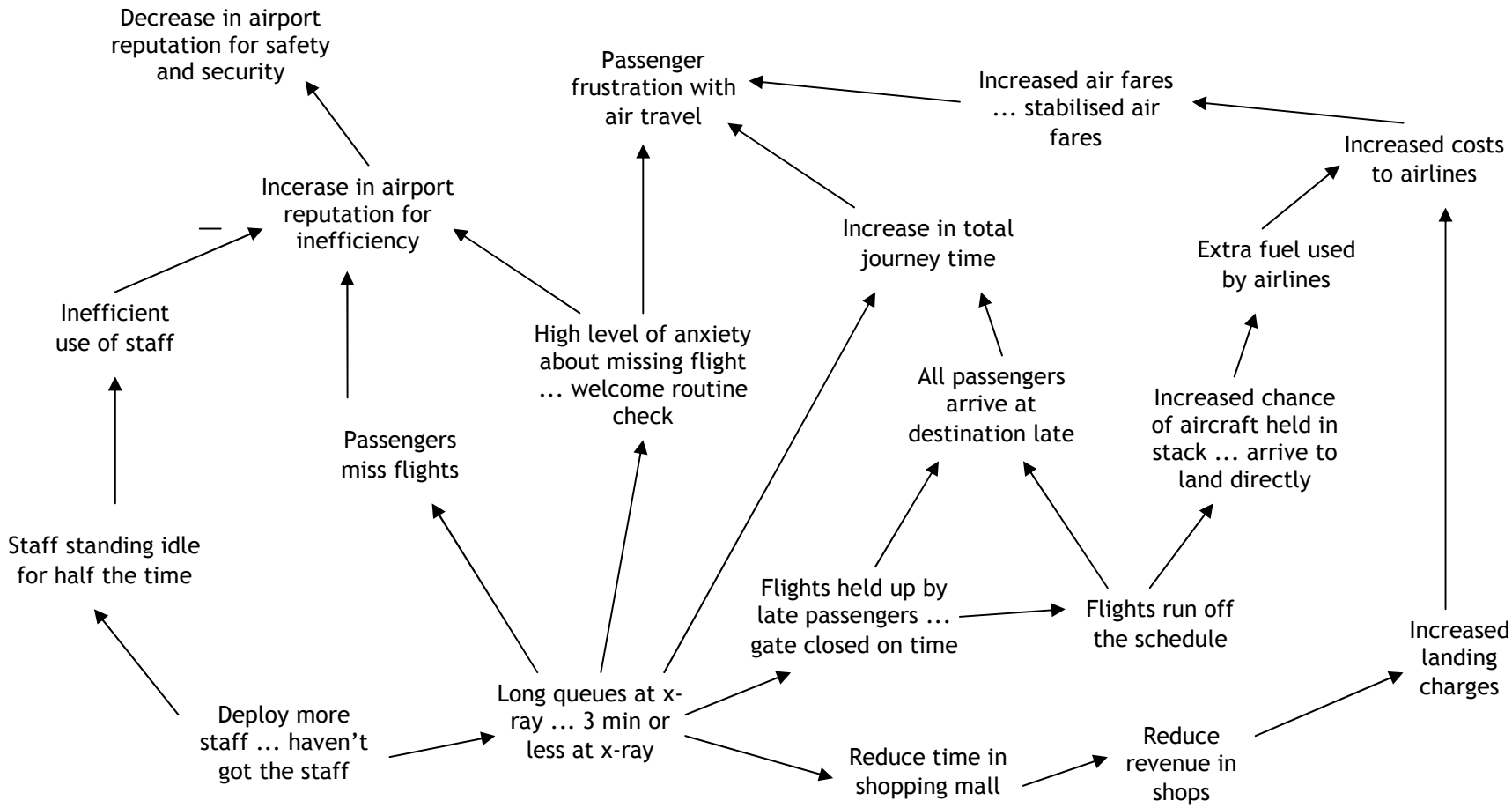


Figure 3E. A strategic map. (Source: Eden and Ackermann, 1998)

4.2. Approaches for building the map

It has been explained that there are two approaches for constructing the strategic map: the top-down and the bottom-up. For a clearer understanding of these two approaches next example should be helpful.

The example is related to the integration of populations. Using Oval Mapping Technique, a group of people concerned with the problem discussed and built up a map with the captured ideas. One set of strategic issues that emerged where centred around this topic: managing the integration and inclusion if all populations effectively. The next two figures show two different parts of the big map illustrating the two approaches commented before.

The first figure represents a top-down approach. It answers the question "how to manage integration and inclusion of all populations effectively?" In this case the goal is known and the map shows the available options for reaching it. The objective is clear and the group has to discuss about how to achieve it. In the map all the arrows finish, at the end, in the goal: "*Manage integration / inclusion of all populations well*".

On the contrary, the second figure represents a bottom-up approach. The map answers the question "what should the goals be?" In the sense of which the consequences will be if the integration and inclusion of all populations is managed effectively. In this case, the possible goals arise from one option; this option is the point of departure of many final consequences.

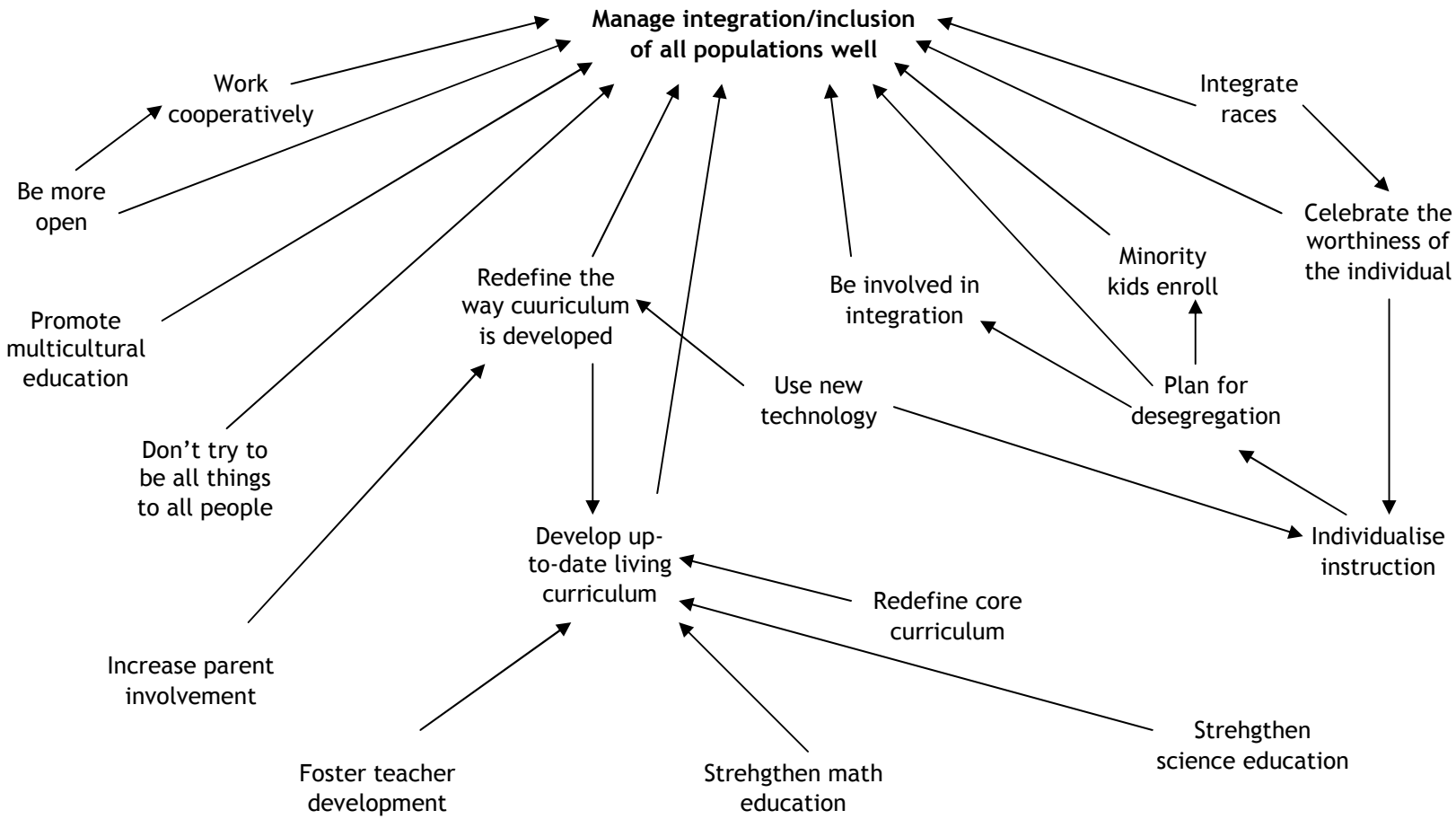


Figure 4E. The top-down approach. (Source: Bryson, Ackermann, Eden and Finn, 1995)

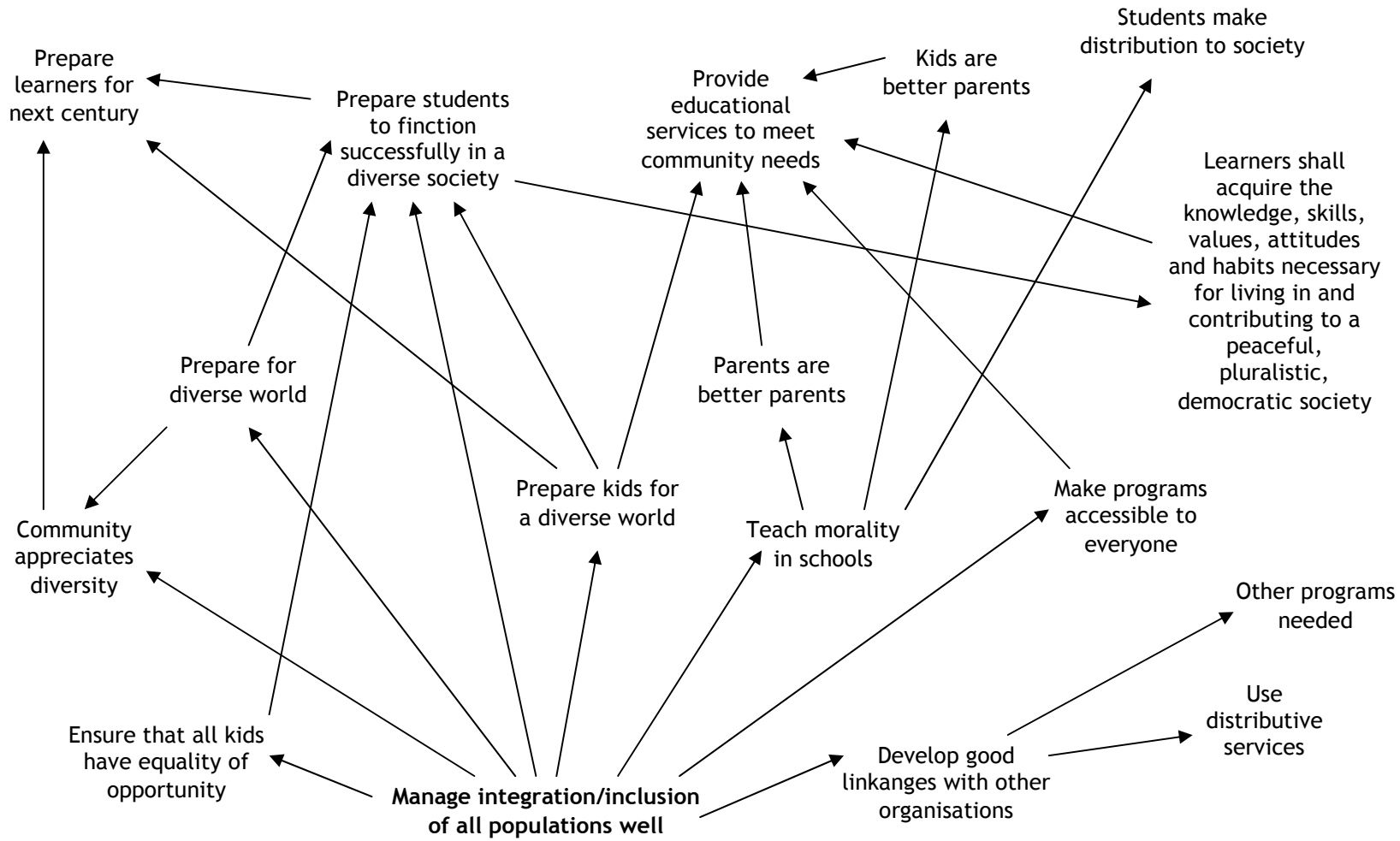


Figure 5E. The bottom-up approach. (Source: Bryson, Ackermann, Eden and Finn, 1995)

4.3. Clustering a map

Often, strategic maps are very complex because they content different insights of different areas of the company. The workshops are carried out with members of different levels and of different departments in the company, and this fact produce considerably complex maps with many aspects of the problematic situation. For this reason, the facilitator should decide to cluster the map, dividing it in different sections with similar key issues. Each cluster is referred to a concrete aspect of the map.

In the next figure, there is an example of clustering a map. The organisation, named Govan Initiative Ltd., is a public one that addresses severe economic problems in some fields. Govan decided to make a strategic review of itself and after some workshops the strategic map was built. The picture represents the map and the clusters in which was divided.

The final goals are out of the clusters area. However, the options or key issues are grouped in six clusters:

- Vision for the future
- Partnerships
- Jobs
- Funding
- Image
- Company performance

Inside each one, all the issues related to it are placed. With this structure it is easier to make a deeper analysis of the situation. The workgroup can centre its attention in one section at a time and go further through the key issues and how to achieve them.

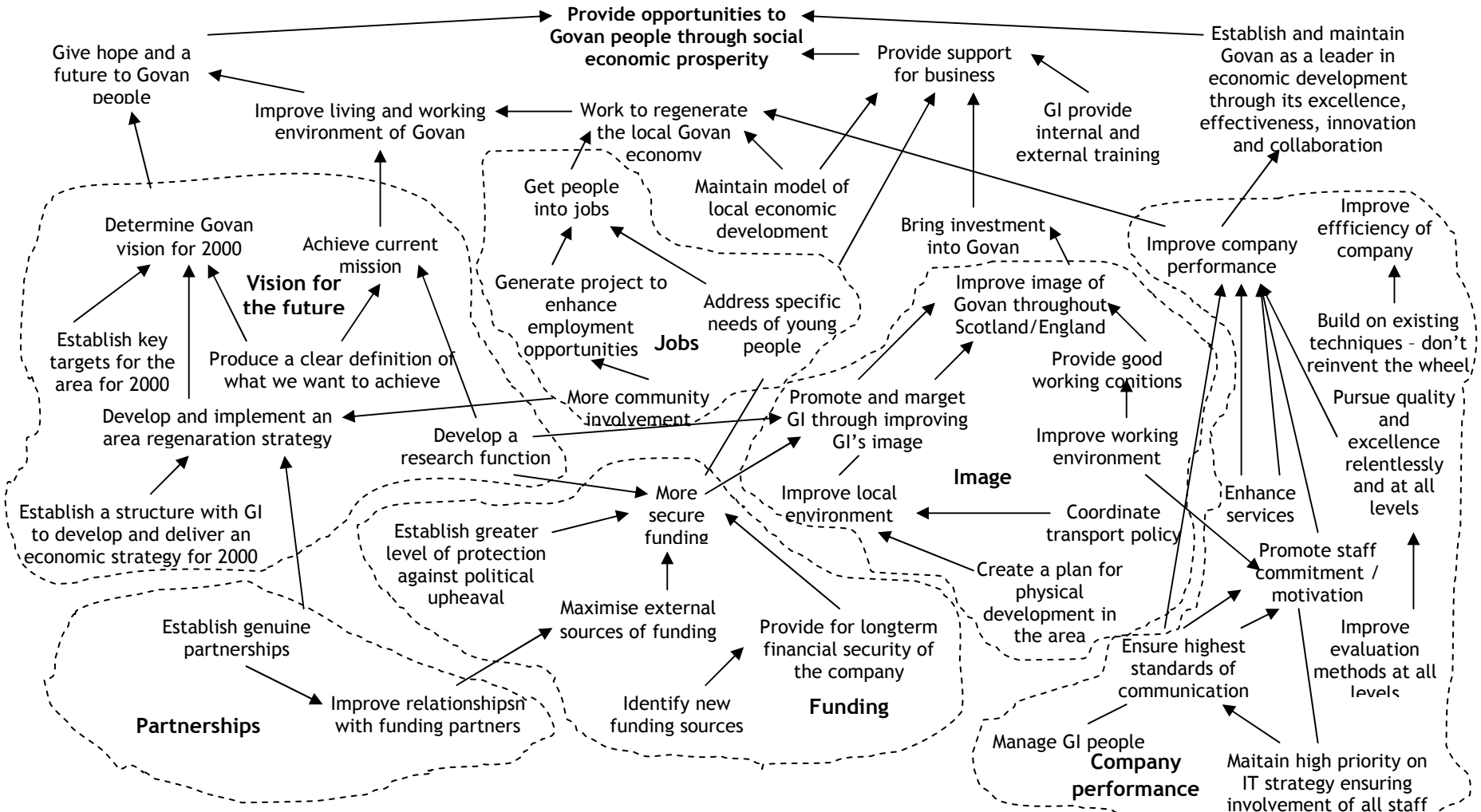


Figure 6E. Clustering a map. (Source: Ackermann and Eden, 1998)

STRATEGIC CHOICE APPROACH

1. Introduction

The Strategic Choice Approach (SCA) is one of the main approaches in the family of Problem Solving Methods.

In strategy formulation there are always choices to be made in all levels of the process. When considering choices, it is important and even necessary to have a general and objective view because the context of the choices can condition final results.

As we can see in the book title "Planning under pressure, the Strategic Choice Approach" (J. Friend and A. Hicking, 1987) this method is destined to make decisions with high level of uncertainty. The main purpose is to manage in a particular planning situation with unknown futures and to choose the strategy that best adjusts with these possible situations.

This method helps users managing uncertainties in different ways. It combines the complexity of the problem with real-time decision making. Indeed these are two important aspects of nowadays companies; they have to face complex problems in a constantly changing environment. That is the reason why Strategic Choice Approach is a very useful tool for strategic management.

2. Origins and Background

When "Planning under pressure, The Strategic Choice Approach" by John Friend and Allen Hickling appeared in 1987, it was the first mature exposition of the Strategic Choice Approach. Since then, the approach has been gathering support among decision makers, while also becoming widely taught in management, planning and policy schools.

Strategic Choice Approach was originally developed in the late 1960's by John Friend and his team in Tavistock. First experiences with the method were carried out in a project of communication in the building industry (Chichton, 1966) and in a project of policy making in the city government (Friend & Jessop, 1977). These two projects were conducted by teams of OR workers and social scientists from the Tavistock Institute of Human Relations.

These pioneering research projects created the basis for participative methods that represent the structure of interrelated decision problems with several points of uncertainty. Increasingly, these methods had spread and now they are used in a variety of organisational settings.

3. The methodology

3.1. Purpose

The purpose of the Strategic Choice Approach is to deal with decision problems interconnected and to make some decisions considering different ways of managing uncertainty. The SCA tries to manage uncertainty in a strategic way.

3.2. Definition

For better understanding of the method it is necessary to define the three kinds of uncertainties: uncertainties pertaining to the working Environment (UE), uncertainties pertaining to guiding Values (UV) and uncertainties pertaining to Related decision fields (UR).

- **UE:** These uncertainties are related to technical nature, called for responses about the working environment. The company cannot predict the consequences of some actions like surveys, investigations, etc.

- **UV:** These uncertainties call for a political response and they are related to guiding values. Decisions are difficult because there are conflicting objectives and interests so it is required to clear them.

- **UR:** This kind of uncertainty is related to the connection between the current decision and others that are being carried out. Some decisions can't be seen isolated because they are interconnected and this makes the decision-making of each one difficult. This situation forces to take a wider view.

Figure 15 shows the three categories of uncertainties with the different kinds of response.

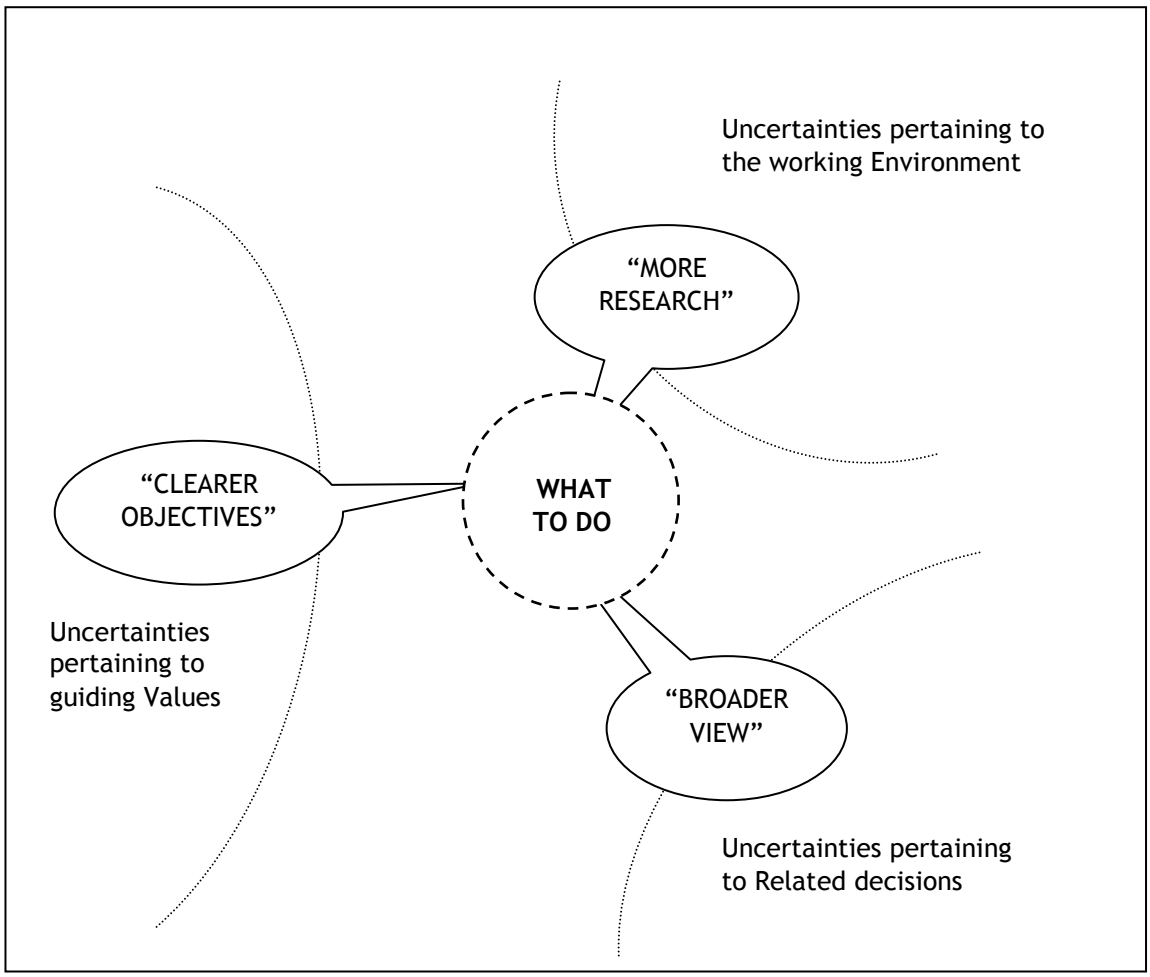


Figure 15. The three categories of uncertainties. (Source: Rosenhead, 2001)

3.3. Dynamics of the Strategic Choice

These are four complementary modes to work in the Strategic Choice Approach. It is common and useful to switch from one mode to another. Even more because decision making is done in groups and people tend to switch rapidly between one mode to another when facing with complex problems.

- **The shaping mode.** In this case, managers debate about how problems should be formulated and which structure can make the decision easier. Sometimes the problems should be broken down in small parts and sometimes it is better to make them converge in a large one.

- **The designing mode.** When using this mode, managers discuss about different courses of action of the current one and suggest some others with different points of view.

- **The comparing mode.** Managers functioning in this mode should compare yhe consequences and other aspects of several courses of action.

- **The choosing mode.** In this mode, decisions should be examined and chosen. Managers also have to think about ways in which the future process might be managed.

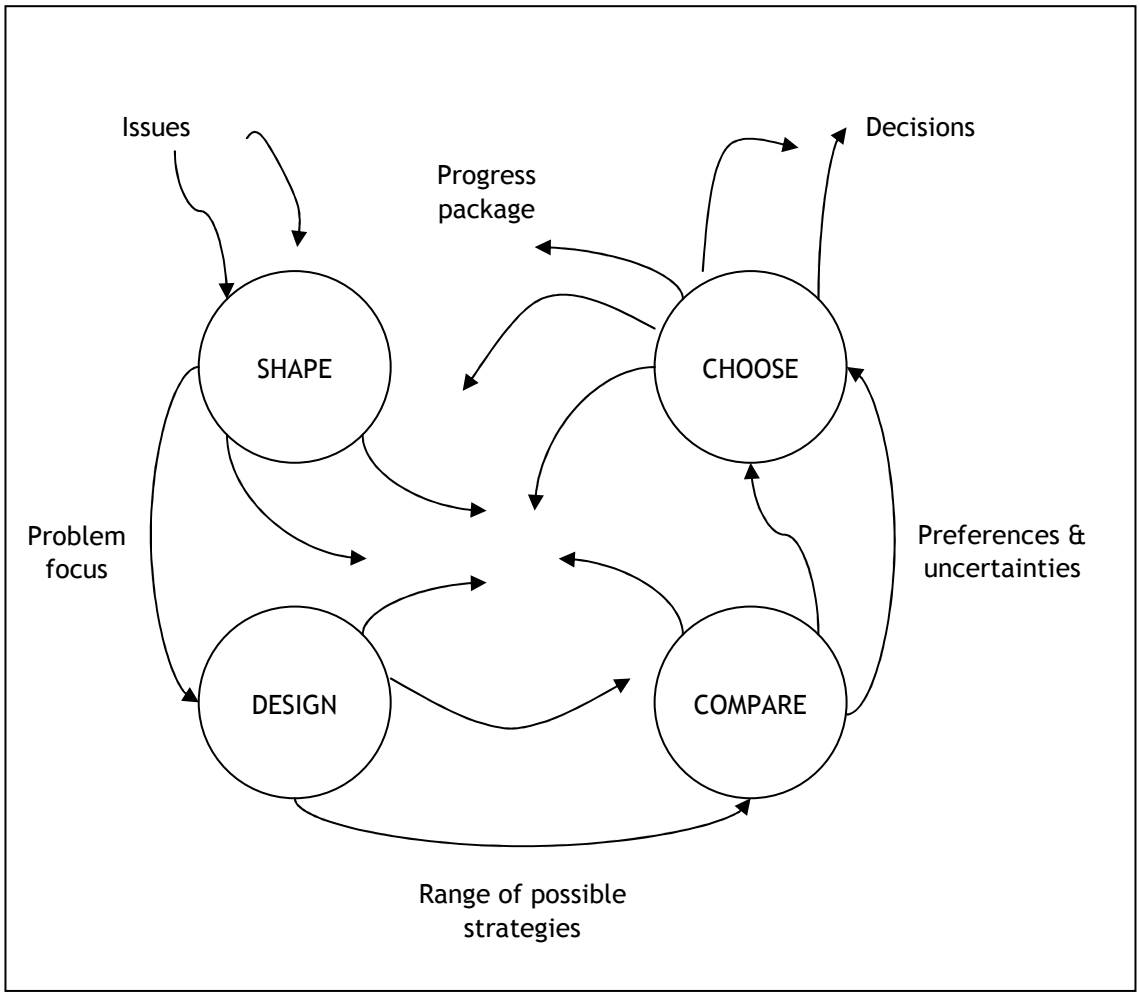


Figure 16. The four modes of the SCA. (Source: Friend and Hickling, 2005)

3.4. Techniques for each mode

- **Techniques for shaping**

In the shaping mode there are several concepts that may help in facing problems. The first important one is the **decision area**. A decision area is an important opportunity for choice in which two or more different courses of action can be considered (J. Friend & A. Hickling, 2005). A list has to be done with a description of the most important decisions and a label that represents each one. An important strength of this concept of decision area is that it allows different kinds of levels to be considered depending of the needs of the analysis. Agreeing the decision areas must be a process in which the working group has to concentrate; every member of the group must give his or her ideas to have a wide view of the problem. That will ensure the success of the process.

After that, it begins to appear connections between the elements listed. Some decision areas are interconnected, that means that can be a difference between considering them jointly instead of separately. The resulted choice would be different if they were considered together than if they were looked at in isolation. These connections are named **decision links**. A decision graph is a diagrammatic representation of a set of decision areas and the relationships between them expressed as decision links (J. Friend & A. Hickling, 2005). In a complex problem with several decision areas all the links that emerge between all them can be represented in a **decision graph**. This graph give a wider view of the structure of the problem and a more comprehensive way of reproduce it. Furthermore, also at this point is important the group work because combination of different people thinking in the same topic helps achieving broader solutions.

Some problems are too large to manage them entirely. In these cases, there is the possibility of focusing on a selected set of decision areas. A **problem focus** is any subset of the decision areas in a decision graph which is selected for closer examination (J. Friend & A. Hickling, 2005). The problem focus can be changed while the work on the problem is being done because some adjustments of this problem can emerge during the process.

In the figure 17 we can see the graph obtained after applying the concepts defined before. In each circle there is a decision area and the decision links are represented with lines. Finally, the problem focus –the selected area for further studies- is contained in the bigger circle.

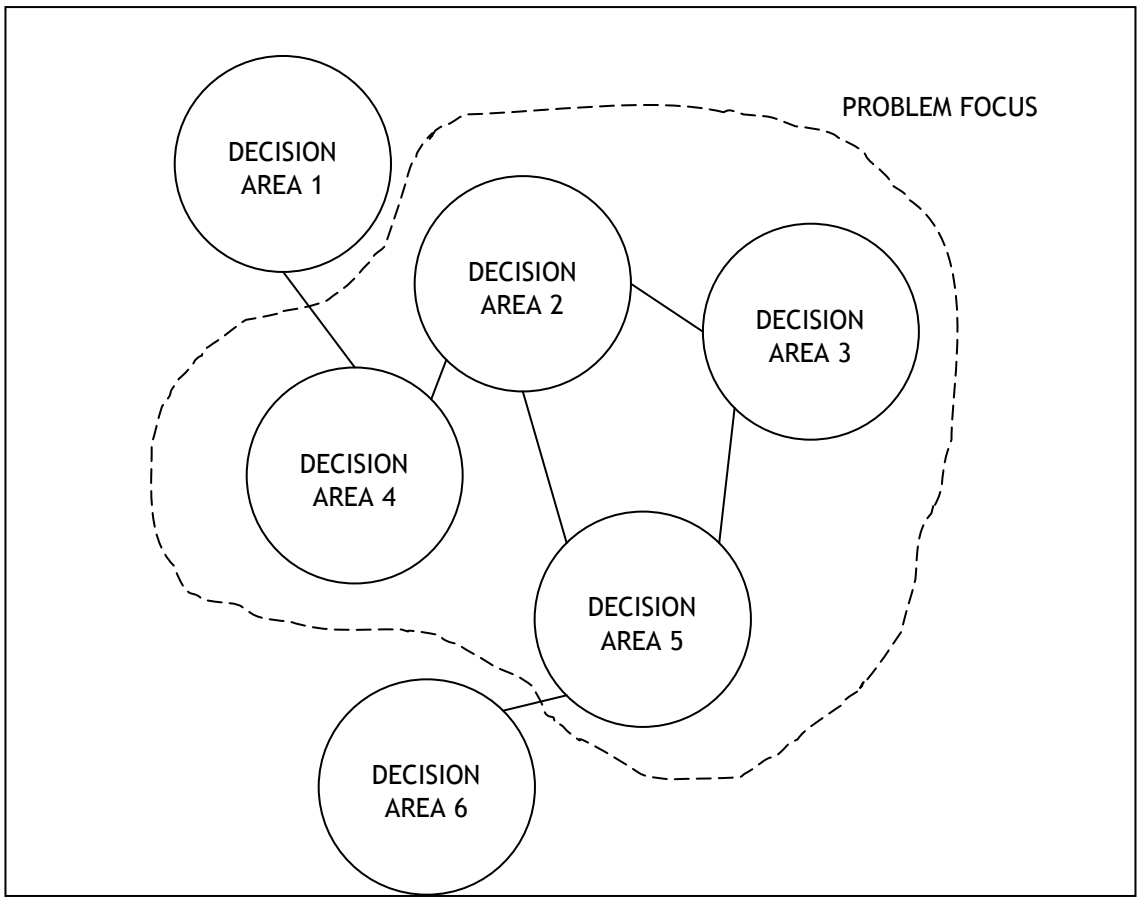


Figure 17. Decision graph. (Based on: Friend and Hickling, 2005)

- **Techniques for designing**

In every decision area listed in the mode before there can be two or more courses of action. These courses of action are named **decision option**. To define the list of decision options for each decision area it would be appropriate to debate it among the working group. It is important to check that the decision options within a decision area are mutually exclusive; otherwise they must be changed or reformulated to enable the options available to be expressed in a different form. After all decision options have been defined it could be useful to give them short labels.

When options have been identified, the next step is to combine options from different decision areas to rule out those that are not possible because of some sort of constraint. It is useful to build a table with combinations between each pair of decision areas in the problem focus; this table is known as **compatibility matrix**. Each relationship of incompatibility is known as an **option bar**. It is usual that members of the working group don't agree at this point, so it would be good to discuss about their different views and look for a consensus to clear the structure of the problem.

Finally, all the information obtained with the matrix and the option bars can be represented in the so called **option graph**. An option graph is a diagrammatic representation of the compatibilities and incompatibilities of options within a problem focus (J. Friend & A. Hickling, 1987). In this kind of graph, are drawn all the option bars instead of the compatibilities because there are few incompatibilities and it is more economical for its use. The figure below represents what can be one of these graphs.

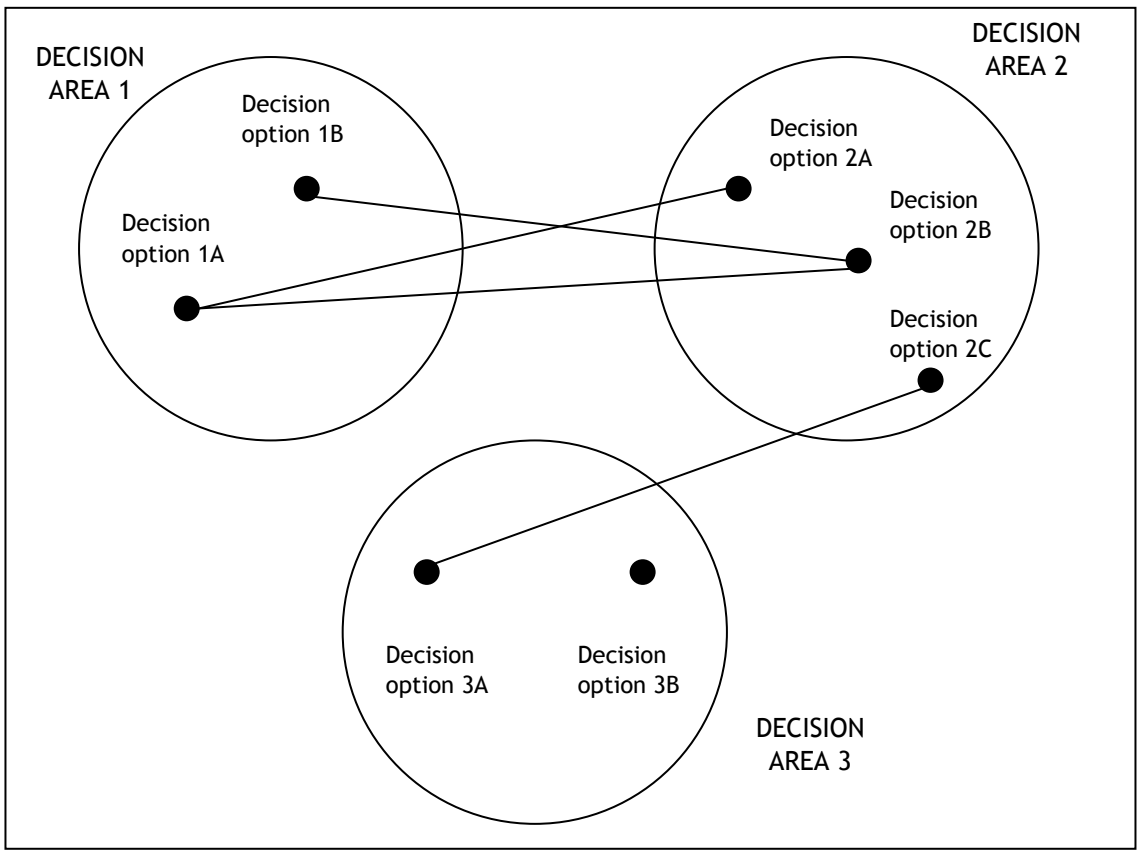


Figure 18. Option graph. (Based on: Friend and Hickling, 2005)

With the option graph it turns easy to make an **option tree** which will allow the working group in understanding the situation of the problem focus. In this tree there have to be shown all the compatible options, this means all the options that do not violate any option bar. An option tree is a representation of all the **decision schemes**. A decision scheme is any feasible combination of options containing one from each of the decision areas within a problem focus.

If we continue with the example in the picture before, the option tree will be the next one, where there are three schemes obtained and the **X**'s mean all the non feasible combinations.

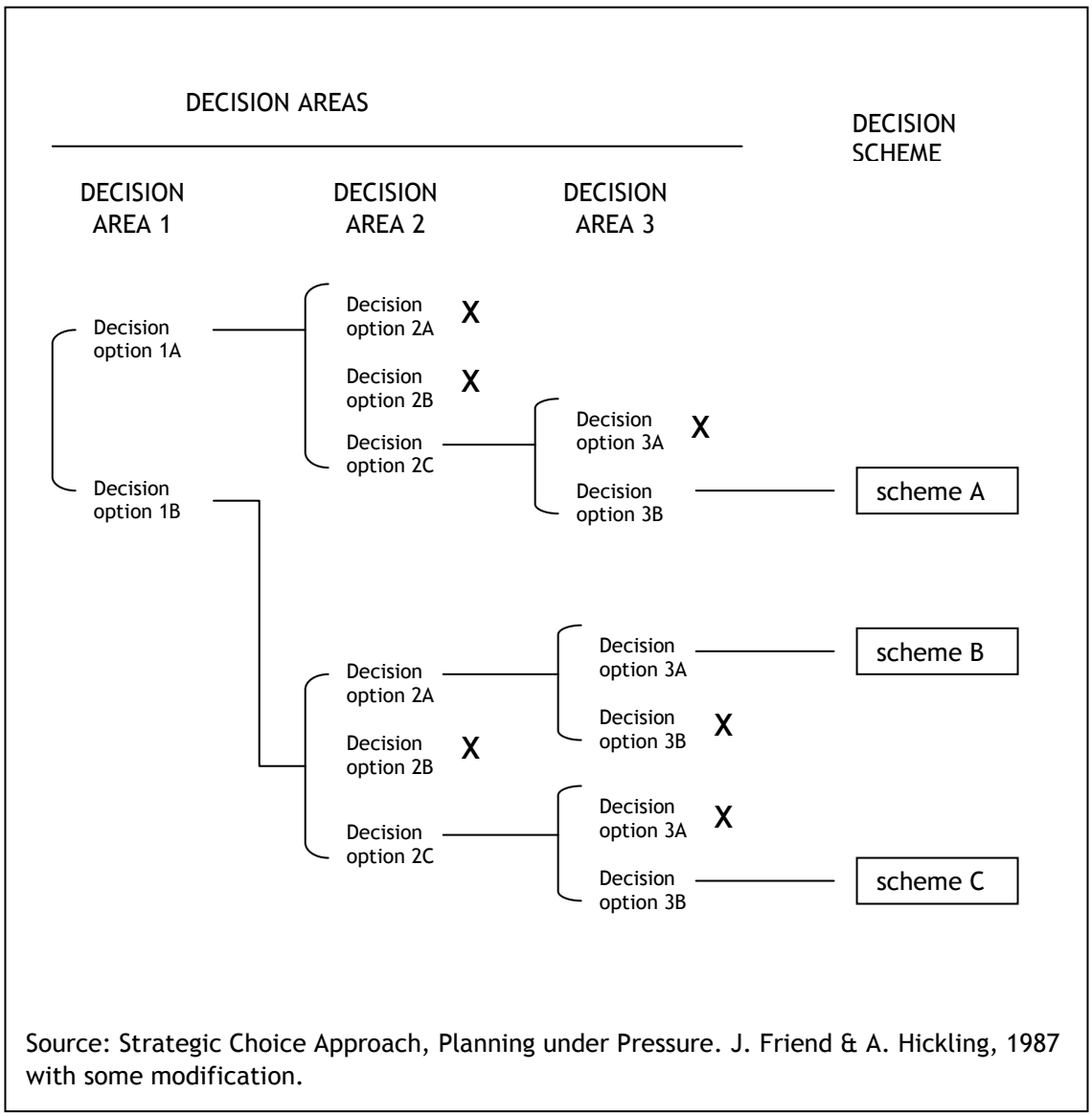


Figure 19. Option tree. (Based on: Friend and Hickling, 2005)

- **Techniques for comparing**

In the comparison mode there are also several concepts that help the decisors in facing the problem and work towards decisions. The first one is the concept of the **comparison area**. Formulate a set of comparison areas is very useful to make progress with the structure of the problem. The working group has to discuss and decide these comparison areas and, furthermore, consider what the consequences of alternative courses of action might be. It would be advantageous to describe a little each area and give them a short label for its easier use. Comparison areas can be quantitative or qualitative depending of the aspects considered in each one; it can be referred to the capital, the number of jobs produced or the image perceived of the company.

Once a set of comparison areas has been chosen, it can be put as a framework for comparing alternative courses of action. The most common way to do it is the **relative assessments**. This is any statement about the consequences within a comparison area of pursuing one course of action instead of another (J. Friend & A. Hickling, 2005). Each scheme is compared with the rest of them and with the results a table is constructed with the assessments of one relative to another one; every pair of scheme has a table. In this evaluation uncertainties are taken into account, because for each comparison area, an assessment is made with some supposition about the consequences of taking one course of action instead of another. With the information of the table of relative assessments it is possible to make a schematic picture with the **advantage comparison** between two schemes. In this picture are represented, for each comparison area, the balances of taking one or another course of action, classifying them in a predetermined scale. This scale must be done by the group work and it can be quantitative (negligible, significant...) or qualitative (in numbers). An example of this can be seen in the figure below.

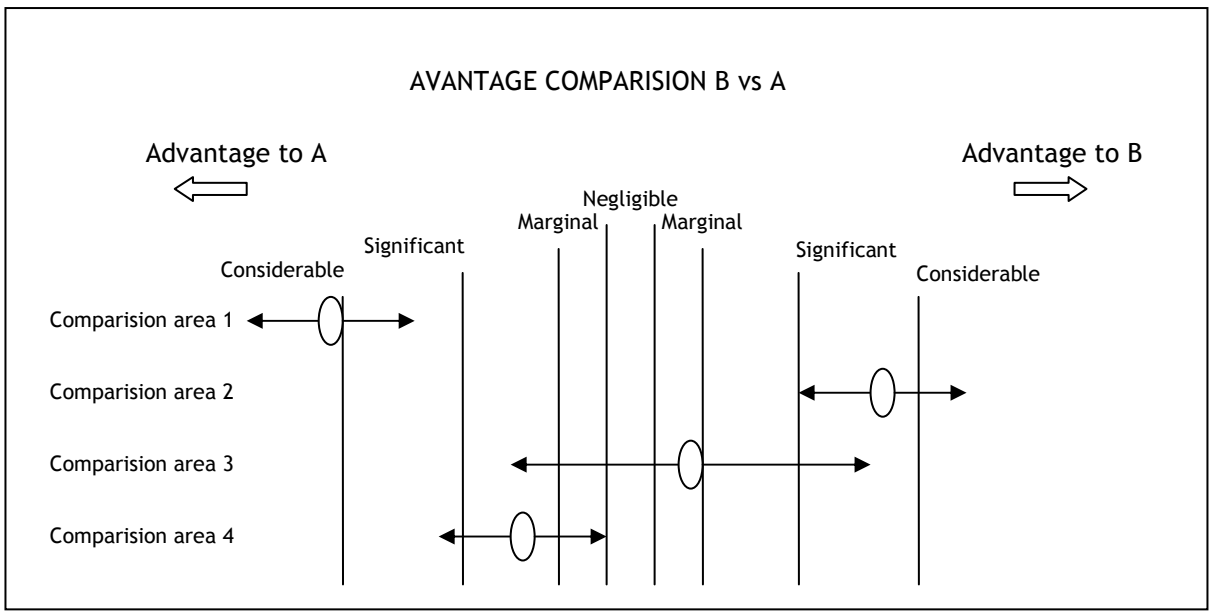


Figure 20. Comparison between two schemes. (Based on: Friend and Hickling, 2005)

For every comparison area there is an oval that represents the best guess and two arrows symbolising the range of uncertainty. This range can vary considerably from one comparison area to another.

Where there are only a few alternative courses of action it may be easy to compare each with every other with the approach of comparing in pairs. But often there are two many alternatives and it turns hard to do it. In general, the longer a list of schemes grows the more essential it becomes to choose some more manageable set of schemes. At this point the concept of **working list** rises. A working list is any subset of decision schemes in which it is intended to compare alternatives more closely (J. Friend & A. Hickling, 2005). To compose this list the working group has to make a ranking for each comparison area for all the schemes. So, the schemes included in the working list would be those best positioned in the average of all the comparison areas. An example of this will clarify the idea.

DEISION SCHEME	SCALE OF NET FLOWS OF INCOME	SCALE OF IMAGE OF THE COMPANY I to IIII (lowest to highest)
Scheme A	2100 2nd	II 3rd
Scheme B	1750 6th	I 5th
Scheme C	1900 4th	IIII 1st
Scheme D	2100 2nd	II 3rd
Scheme E	2350 1st	III 2nd
Scheme F	1850 5th	I 5th

Figure 21. Ranking the schemes. (Based on: Friend and Hickling, 2005)

4. Example

For a clearer explanation of SCA, an example of a commercial medium-sized company will be introduced. The material of this case is based on the study done by Allen Hickling. The core business of the company is to assemble instruments for small boats. Moreover, it has a second business of manufacturing packaging materials for its own use and also for sale to other customers. The two different businesses are carried out in different locations and, at that point, the company faced several location and marketing choices to decide on. For helping in some of these decisions it was decided to use the Strategic Choice Approach. The workshop and the facilitating work will be explained below.

The first point in the shaping mode is to list the *decision areas*. The facilitator encourages the group to build the main areas of choices related to the current situation of the company. In this step of the workshop, the participants begin to know other views of the problem and after some discussion a list is agreed by all members. The facilitator has a very important assignment in this stage. He or she has to listen carefully and ask questions for clarifying the concepts. In the example of the company under study the list of decision areas was the next one.

Decision Area	Label
Which operations to move from present site?	OPSMOVE?
When to invest in new packaging technology?	NEWTECH?
Whether to retain reserved site?	RESVDSITE?
Enter new instrument markets?	INSTMKTS?
Expand market for packaging?	PACKMARKET?
Whether to lease a plot in new industrial park?	INDPARK?
Acquire local transpot firm?	TRANSPORT?
Raise new capital?	NEWCAPITAL?
Change company name?	COMPYNAME?

In this case of study, the company main decisions to face are those about new locations of the factories, how to organise them, whether to spread or not the business, etc. After the group debate, these were the main issues to think about. In the list, an explanation about each decision area and a short label has to be written in a board in a way that every member is able to see it.

When the list is done, the group has to think about the relations between the areas. These relations, named *decision links*, are drawn in the *decision graph* with a connecting line. The decision links indicate that that pair of areas have to be considered together rather than one at a time. Also in this graph, the *problem focus* is displayed. After discussion of the group, they agree some of the decision areas that believe are more important and that will be deeply investigated. Like in the example, it is usual to focus on three or four decision areas because otherwise, the designing and comparing modes would turn too difficult to cope with. Next figure shows the decision graph agreed among the participants of the workshop.

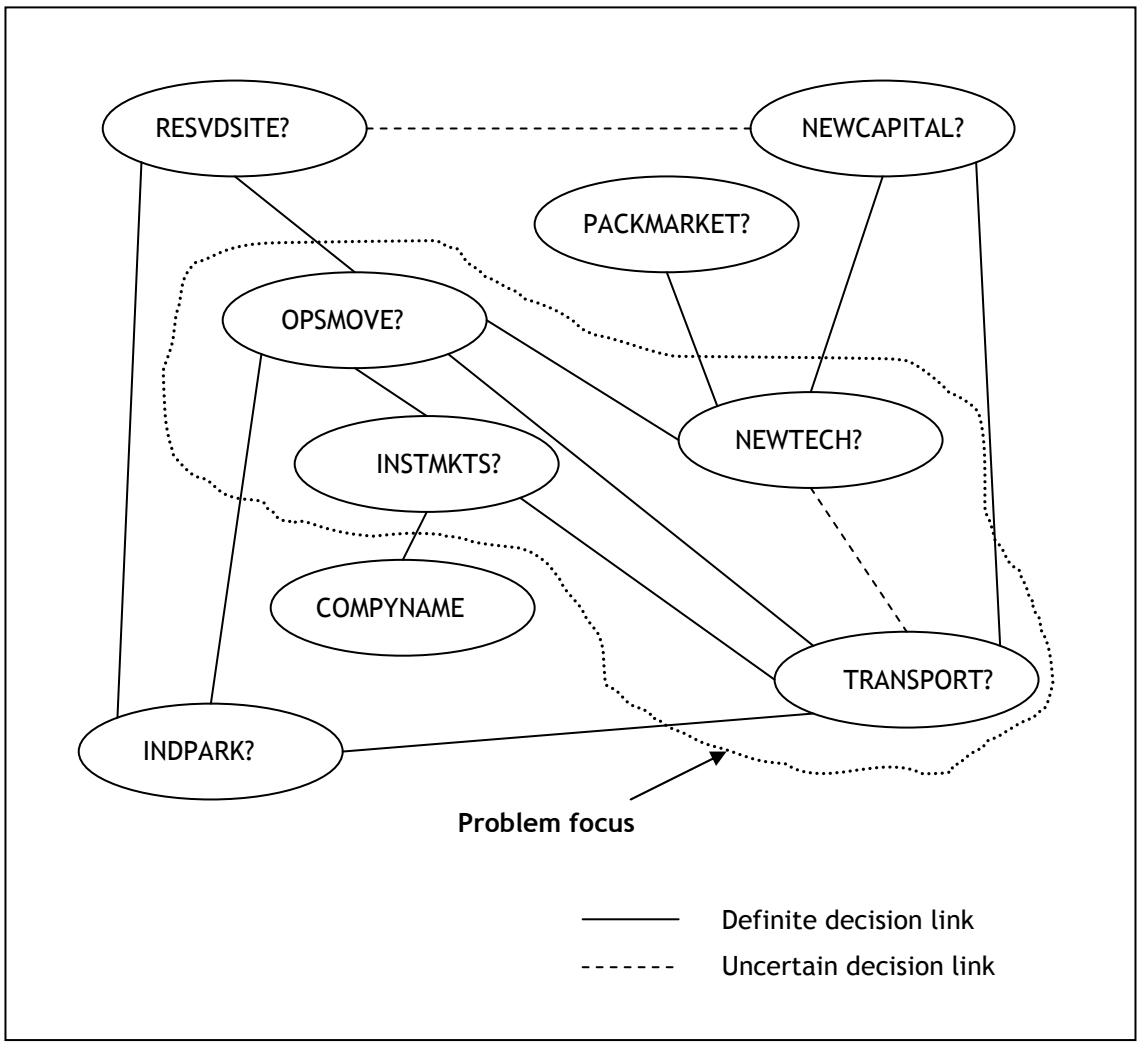


Figure 7E. Decision graph. (Source: Friend and Hickling, 2005)

Decision links only show that there is a relation between the linked areas despite of the type of relation. The link between the choice of which operations to move and the one of when to invest in new packaging technology, shows that it would be worthless if the company installs the new technology now, and relocates the packaging business later. But in the case of the link between enter new instruments markets and

change the name, it reflects that would be better to change the name of the company when some business areas were extended.

In the designing mode, the next step is to discuss and agree a number of options for each decision area of the problem focus. The options have to be mutually exclusive and representative of all the possible choices for each area. In next figure, the options for the four decision areas are shown.

Decision Area	Options
OPSMOVE?	Instruments Packaging Both
INSTMKTS?	Agricultural Aircraft None
NEWTECH?	Now Later
TRANSPORT?	Yes No

In this case, the option of do not move any of the business is not considered because the old site is congested and there is a need of move something from there. The options for each area would not have to be more than four, and if there were more available options they should be better reduced for a more manageable use of future steps. Once the set of options is agreed, the compatibility between them needs to be explored. The workgroup should discuss of which are the incompatibilities between options of different decision areas. These impossible combinations are named *option bars*, they are sometimes because of logic reasons and other times because the group considers them impossible for the company. In the example, there is an option bar between moving the instruments business and do not enter in new instrument markets. If the company decides to move the instrument business, they will have to enter in new markets because otherwise will be worthless to move it.

The information about the compatibility between different options can be represented in two ways. On the one hand, there is the *option graph*. In this graphs, all the option bars are symbolised a line between the two impossible choices. On the other hand, there is the *compatibility matrix*. In this table, all cells represent a relation between two items; if they are compatible a spot is drawn, if they are incompatible, a cross, and, finally a question mark if the compatibility is doubtful. The first option is represented in the next figure.

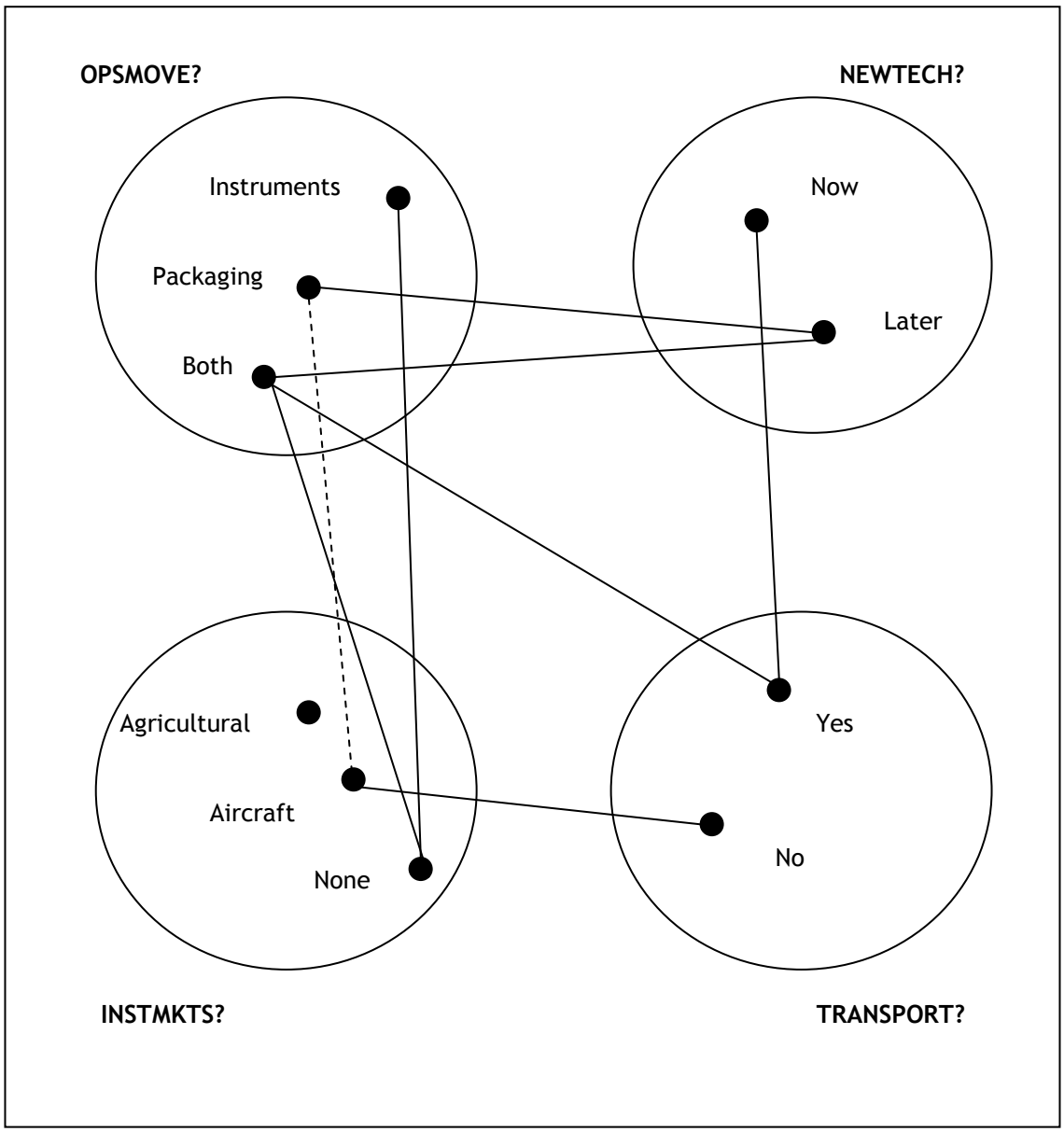


Figure 8E. Option graph. (Source: Friend and Hickling, 2005)

The second option for representing the incompatibilities between the combinations is represented in the figure 9E.

INSTMKTS? **OPSMOVE?**

	Instruments	Packaging	Both
Agricultural	•	•	•
Aircraft	•	?	•
None	X	•	X

NEWTECH? **INSTMKTS?**

	Instruments	Packaging	Both
Now	•	•	•
Later	•	X	X

Agricultural	Aircraft	None
•	•	•
•	•	•

TRANSPORT? **NEWTECH?**

	Instruments	Packaging	Both
Yes	•	•	X
No	•	•	•

Agricultural	Aircraft	None
•	•	•
•	X	•

Now	Later
X	•
•	•

X	Option bar
•	Compatible combination
?	Compatibility doubtful

Figure 9E. Compatibility matrix. (Source: Friend and Hickling, 2005)

After the search and agreement of the option bars, the *option tree* is drawn. This collects all feasible options, that is, the possible combinations of all decision areas. These are named *decision schemes*. In the next figure, the option tree for the example is shown.

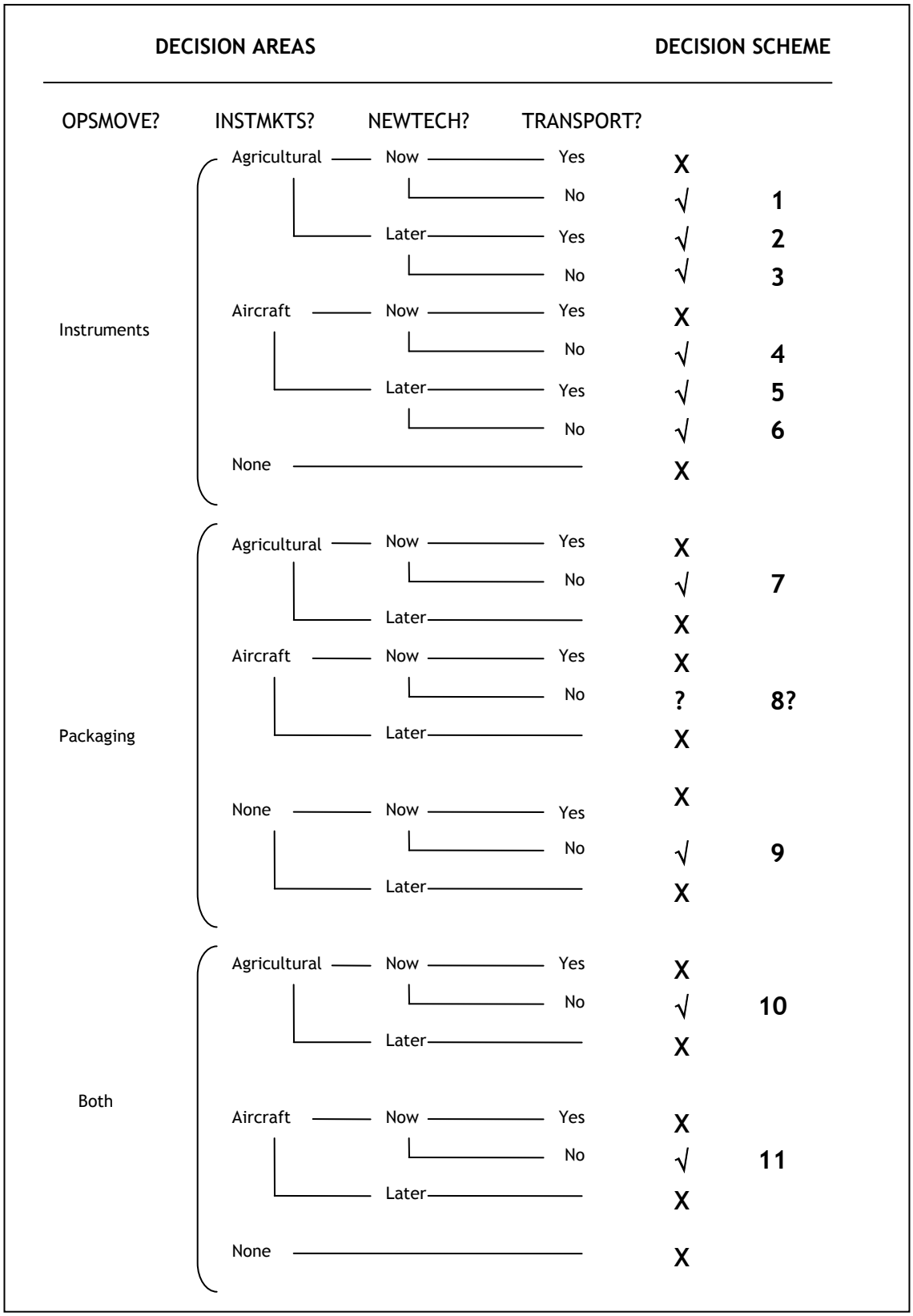


Figure 10E. Option tree. (Source: Friend and Hickling, 2005)

In the case of example, there were found eleven different schemes, each one was a combination of the options of the decision areas. As we can see, the more decision areas are contained in the problem focus, the more decision schemes result. If there are too many schemes, it becomes more complicated to analyse all the possibilities. For an easier examination of the situation, exists another way of represent the schemes very similar to the first one. In this shorter one the dead branches are omitted and, from this representation, it is clearer to go on with further comparisons. In this option tree, only the schemes are listed so only the compatible options are shown. It can be contemplated in next figure.

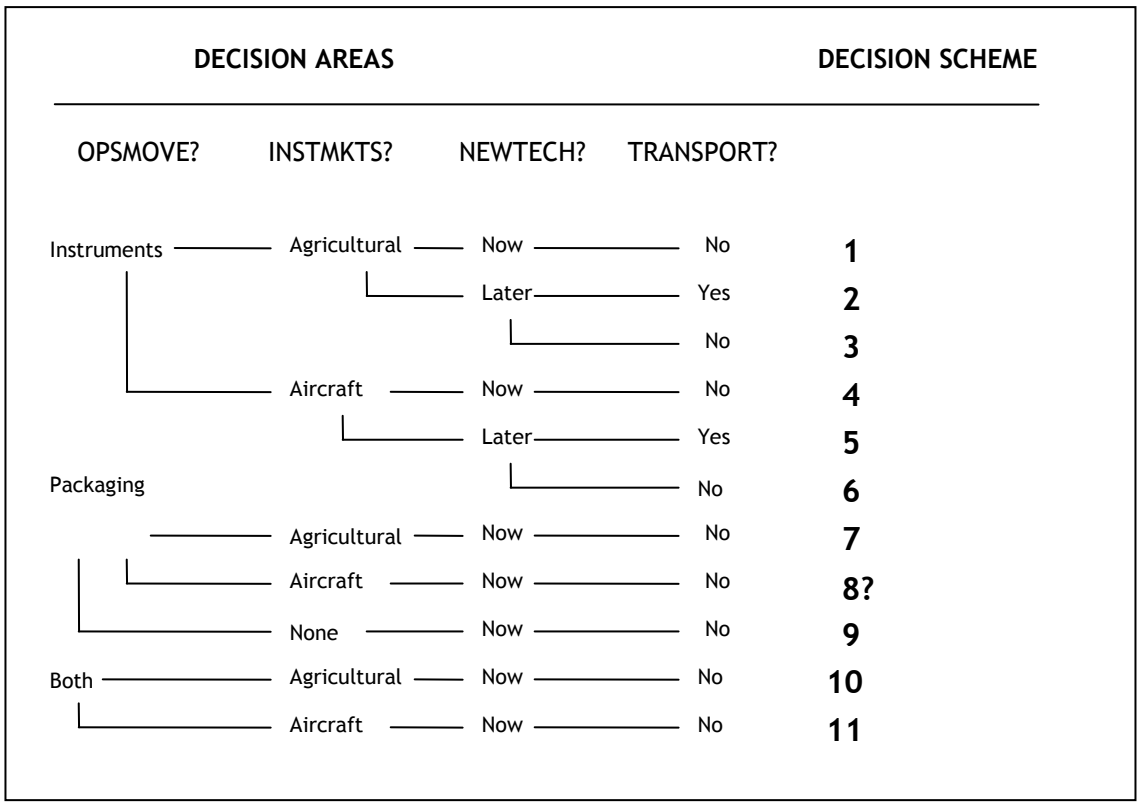


Figure 11E. Option tree reduced. (Source: Friend and Hickling, 2005)

When the option tree is achieved the comparing mode begins. The SCA recognises that choices of any significance mean striking a balance among multiple criteria. In the workshops, different participants defend different interests. So, at this point, members of the group should dissertate and converse for reaching consensus about which have to be the *comparison areas*. These are the basis for future decisions. In the case of study, the set of comparisons was developed through debate and agreed by the group after some discussions and the help of the facilitator. The comparison areas and the labels given to them are described in the next figure.

Comparison Area	Label
Capital outlay:	CAPITAL:
Expansion potential:	EXPANSION:
Acceptability to employees:	EMPLOYEES:
Impact on internal communications:	COMMUNICN:
Impact on company image:	IMAGE:

These comparison areas were analysed related to every scheme found in the designing mode. After that, a short listing with the more important schemes was done. This is done because comparing every scheme with all the others takes too much time, and reduce the list of schemes is necessary for keeping on with the process. Therefore, some schemes are compared in the way it has been explained before. In the next box, the comparison between schemes 5 and 10 is done for every decision area taking into account the expected future for each one and the level of uncertainty.

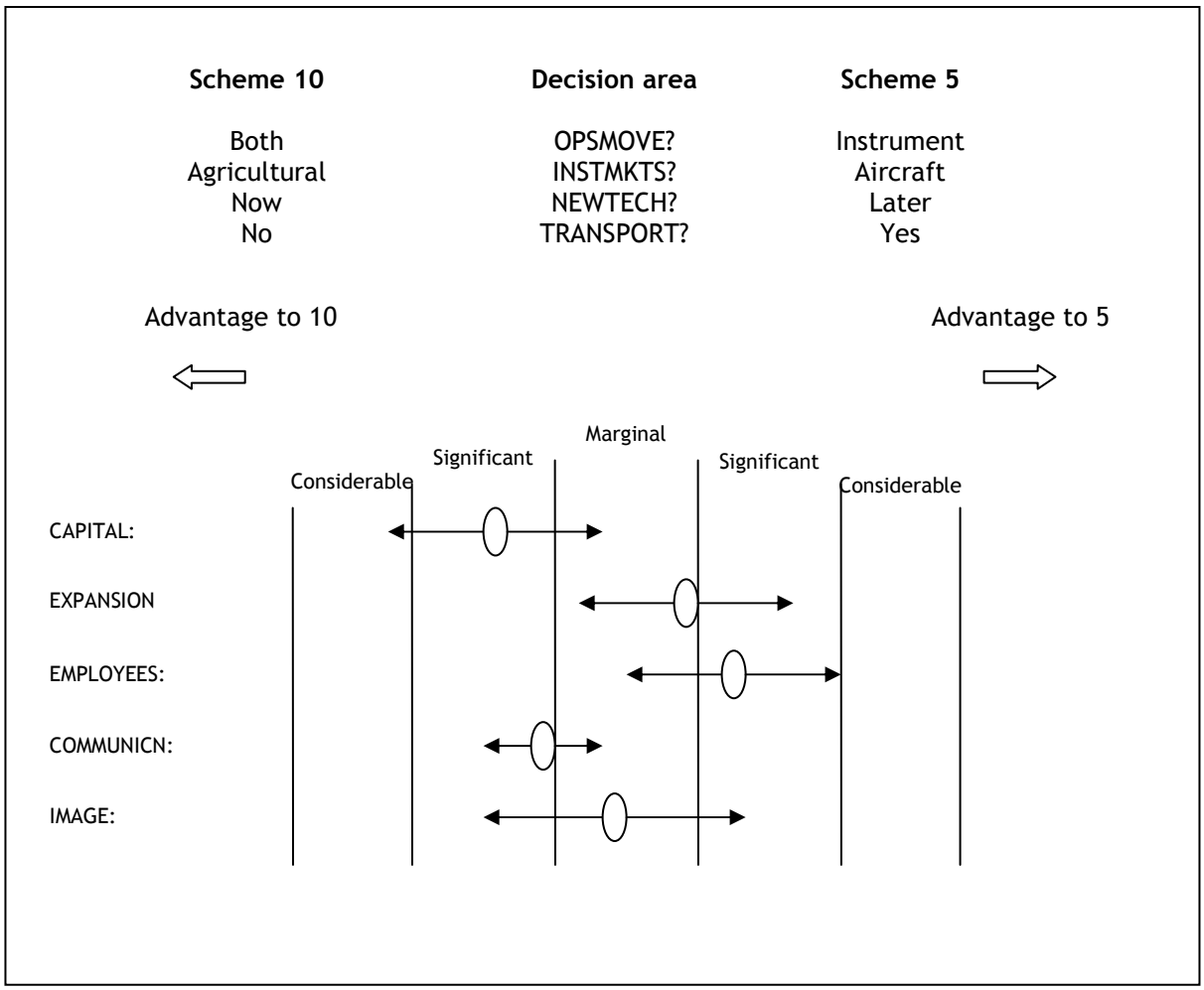


Figure 12E. Comparison between two schemes. (Source: Friend and Hickling, 2005)

Once all the comparisons are done, an important question arises about how to manage uncertainty. The workgroup must find ways to manage uncertainty through time if they are to make progress towards decisions. During the process until arriving to the choosing mode many uncertainties had appeared and it is helpful to write them down in a separate flipchart. So, in this stage, these uncertainty areas are listed with some explanation, a label, the type of uncertainty and the level of importance or prominence. In the figure the uncertainty areas of the example are represented.

Uncertainty Area	Label	Type	Prominence
?Growth potencial of aicraft market	?AIRPOTL	UE	***
?Value of established maritime image	?VALIMAGE	UV	****
?Disposal of disused storage building	?STOREDISP	UR	***
?Gain from investment in new telecoms	?TELECOMS	UR/UV	**
?Extra cost to move instrument factory alone	?INSTMOVEX	UE	*
?What is policy value to company of growth	?VALGROWTH	UV	***
?Marketing strategy of chief competitor	?COMPETITOR	UR	**

One of the most used formats for analysing uncertainties in the SCA is the table shown below. In the left side of it the most prominent areas in descending order are listed. On the right side, the *exploratory options* available for each uncertainty area are written. The first exploratory option of each area is the 'null option', taking this course of action might reduce the level of uncertainty.

Sometimes, there are two kinds of exploratory options: one more formal route and another more informal one. This can be seen in the two first rows of the figure. The informal channels usually reduce uncertainty while taking less time and cost (either in terms money or of energy).

The three columns in the right side are from a criterion normally used in SCA workshops:

- **Cost:** in monetary terms or terms of opportunity cost.
- **Delay:** in terms of pursuit of the option.
- **Gain:** in confidence expected through a reduction in prominence of the uncertainty area.

For example, in the first uncertainty area, the more informal option of consulting key directors reports less cost and delay than the formal one whereas the gain is minor.

Uncertainty Area
?VALIMAGE (UV) (****)
?AIRPOTL (UE) (***)
?STOREDISP (UR) (***)
?VALGROWTH (UV) (***)

Uncertainty Area	Cost	Delay	Gain
No action	…	…	…
Place on board agenda	##	●●●	+
Consult key directors	#	●●	++
No action	…	…	…
Report from consultant	###	●●	++
Phone an expert	#	●	++
No action	…	…	…
Open negotiation	##	●●	++
No action	…	…	…
Ask company owners	###	●●●	+

Figure 13E. Exploratory options. (Source: Friend and Hickling, 2005)

In the comparing mode, another important aspect to take into account the urgency of the decision area in the problem focus. A rearranged option tree is often used for taking it into account. In the case of the example the most urgent decision area is the one related to the acquisition of local transport (maybe because a good opportunity to buy a particular local business) and the second one is the decision of which operation to move. In the next figure is drawn the new option tree.

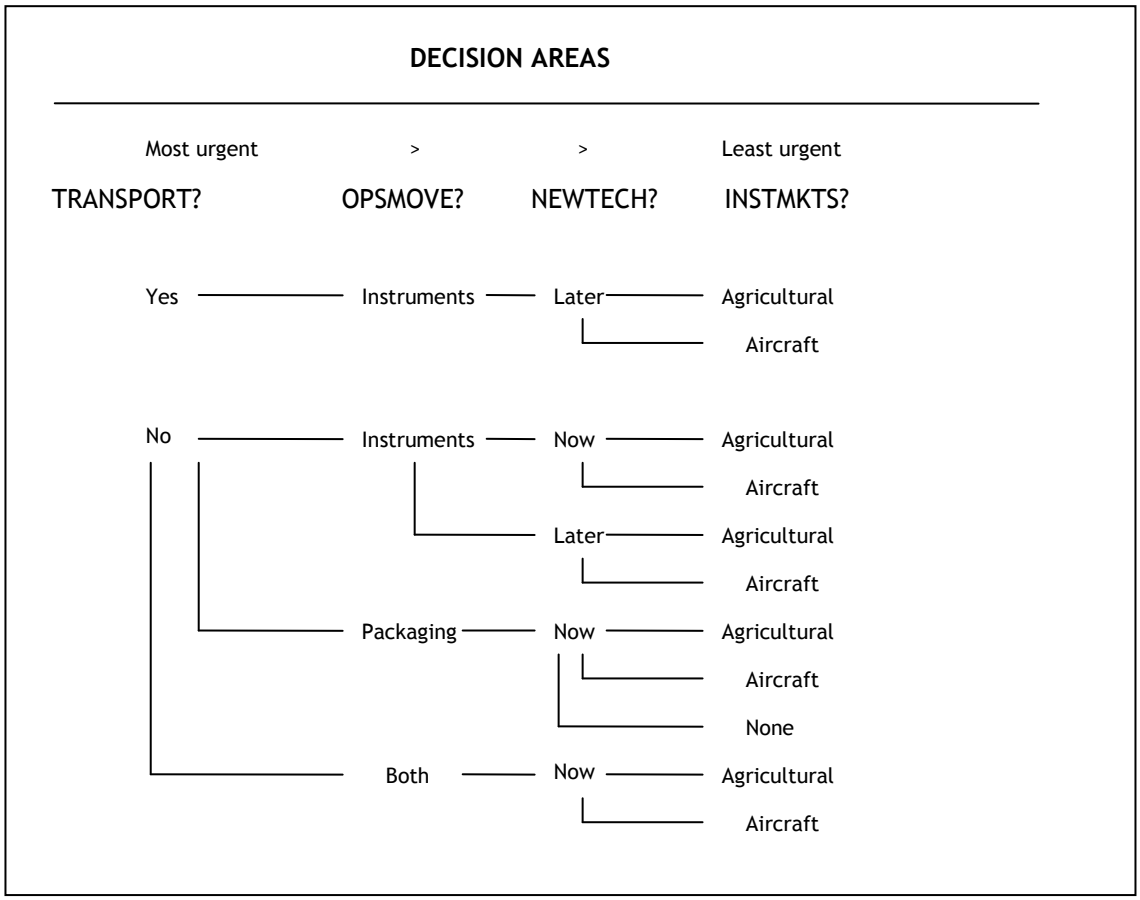


Figure 14E. Option tree rearranged. (Source: Friend and Hickling, 2005)

The figure shows that for the 'Yes' option for transport restricts all the options for OPSMOVE? and NEWTECH?, however the 'No' option for transport opens a wider range of choices.

After this stage, the *commitment package* is crated. The next figure is the commitment package grid for the case of the example. In the left part are the decisions to be taken now and in the right part the ones in the future. The rows are areas of responsibility in the company.

	Decision Areas Actions	**Uncertainty Areas** Explorations	**Decision Areas**	**Uncertainty Areas**
Board		!VALIMAGE ask key	OPSMOVE? COMPYNAME?	?VALGROWTH
Marketing		!AIRPOTL phone expert	INSTMKTS? PACKMARKET?	?COMPETITOR
Finance	TRANSPORT! no		NEWTECH? NEWCAPITAL?	?INSTMOVEX
Estates	RESVDSITE! Retain 2 years	!STOREDISP open negotiation	INDPARK?	
Engineer				?TELEGAIN

Figure 15E. Commitment package. (Source: Friend and Hickling, 2005)

In the workshop, this table is built with Post-it-type stickers in order to change and repositioned them; this makes the process more flexible as the discussion develops. In this case, when the members of the group had agreed the 'No' option for the TRANSPORT? a sticker is positioned in the suitable row of the first column. After, the other decision areas in the problem focus were positioned in the third column and, finally, the rest of decision areas were placed in the grid. If there is an urgent option or an agreed one, this can be placed in the first row because it was considered an action that had to be taken firstly.

Analogously, the uncertainty areas can be positioned in the grid, in the second or fourth column, depending on the level of agreement reached by the group.

So, after all the modes are analysed, the work is not finished. Every stage has to be revised and, in some cases, new important aspects appear. That is why the SCA is defined as a cyclic process; the modes have to be continuously checked.

SCENARIO

1. Introduction

Scenario is another of the soft OR methods used in dealing with the uncertainties of the future in an organisation.

A scenario is the presentation of a possible future and the corresponding path to it. The Scenario method is based on the construction of different possible scenarios for the future of an organisation taking into account its external environment; that is the environment in which the organisation operates.

For creating a strategy it is useful to think about what the future may look like. If managers have an idea about the future they will be able to plan more suitably the strategies for the organisation. The future is usually a highly uncertain domain, so building several scenarios of the future may help in choosing the best course. By studying such scenarios, managers understand the uncertainties and become more prepared to take informed decisions with a range of possible developments (Bunn and Salo, 1993).

There are three main issues that Scenario planning has:

- A summary of information about the most important topics for an organisation.
- A development of a set a possible futures descriptions, that is, a set of scenarios.
- An evaluation of the implications of these scenarios for the organisation today.

Godet, one of the beginners of the French school, identified three main general objectives of the method (1987):

- To identify relationships between the variables of each area in order to look for the key-variables.
- To determine the actors and their strategies.
- To write different scenarios with the most probable future of the key-variables.

The Scenario method has become a very popular approach for creating debate, developing strategies and supporting decision-making. Scenario method gives a base for decision-making since it can be used to value the consequences of previous decisions and deduce the main strategic options to be taken in order to adapt to the expected changes. The method is often divided in two stages: construction of databases and construction of scenarios. Afterwards there are two more stages: the definition of strategies and the choice of strategic options (Vidal, 1996).

2. Origins and Background

The first users of Scenario methodology were the USA researchers in the 50'ies. They tried to solve military and diplomatic problems. In the origins, two main schools appeared: first, the American and later, the French. Americans were the firsts in using the Scenario methodology and it was essentially used on "hard" problems, which are technological or economical. First works with this methodology were carried out by Herman Kahn and his Hudson Institute in defence problems in the 1950s. Afterwards that experience was extended in technological and economical fields. The methodology evolved from an informal to a more formal and complex structures.

The French school appeared later as a criticism to the American ideas. The creation of this school was done in Futurible Institute (a combination between future and possible). The differential characteristic is that French were concentrated in the interrelations of social, political economic and industrial factors. They defended the "prospective" thinking, characterised as being anti-fatal and defending that predicts by the construction of scenarios as the future cannot be determined by simple extrapolation.

Amongst management, scenario planning gained in popularity during the 1970s because many organisations faced problems in their external environment. During the 1980s and the 1990s the industrialised countries began dealing with radical economic and technological changes, due to high competitive markets in the private sector and to political changes in the public sector. All these changes provoked an alteration in the way of doing business from a *reactive* to a *proactive* view. It began to be necessary thinking about the possible futures and the different ways to act with them.

3. The methodology

3.1. Purpose

The Scenario method has been used in strategic management with the following purposes:

- Development of goals and strategies.
- Progressing and analysing organisational identity.
- Re-examining and re-forming existing goals and strategies.
- Evaluating strategic decisions.
- Test short to medium term operative planning.

Related to environmental monitoring, the Scenario methodology has other purposes. This aspect is the connection between the future possibilities and the strategic options oriented to them.

- Structure of an environmental monitoring system.
- Bring into line the master strategy.
- Detect new developments.

It is also important to mention the purposes suggested by von Reinitz (1988):

- Innovation planning.
- Diversification planning.
- Production planning.
- Marketing planning.
- Personnel planning.
- Personnel career planning.

3.2. Definition

Scenario methodology is based on the statement that the future is not exclusively a mathematical manipulation of the past, many forces shape it: past, present and future. The method helps expanding the list of possibilities for the future in an organisational problem. The method divides the knowledge into two areas:

- Things something it is known about
- Uncertain elements

In the first area, the elements are assumptions that can be safely done. Even though, nothing is absolutely certain there are some aspects that people are very confident about, for instance, variables about demographic shifts and substitution

effects of new technologies. In the second component, all those unknown elements are included. These will be the variables that will be forecasted depending on the different possible futures, for instance, interest rates, oil prices and results of political elections.

Scenario method has some differences with other methodologies. One of the more important one is that Scenario explores the joint impact of several uncertainties considering them as equals, instead of other methods that only examine one uncertainty. A big advantage of Scenario methodology is that considers changes in many variables of the situation. While some methods move one variable at a time, keeping everything else constant, Scenario methodology changes various variables without keeping constant any of them. This characteristic makes the study more authentic because in real-life situations it is often impossible that a factor changes without affecting the others. The idea of creating multiple scenarios is the basis of the analysis.

Scenario methodology can be used in many fields and for many usages. But perhaps its best use is in strategic planning and vision building. Following, there is a list of conditions that organisations must face. If they have one of more of these conditions, the Scenario methodology is very appropriate.

- Uncertainty is high relative to managers' ability to predict or adjust.
- Too many costly surprises have occurred in the past.
- The company does not perceive or generate new opportunities.
- The quality of strategic thinking is low (i.e., too routinised or bureaucratic).
- The industry has experienced significant changes or is about to.
- The company wants a common language and framework, without stifling diversity.
- There are strong differences of opinion, with multiple opinions having merit.
- Your competitors are using scenario planning.

Figure 22. Conditions for using Scenario. (Source:Schoemaker, 1998)

3.3. Phases of the methodology

A variety of methods have been created by several authors concerning the development of scenarios. The key characteristic is probably that they seek to develop multiple scenarios, trying to set an adequate number, not too small neither too large.

In Scenario methodology, like in most of the soft OR methods, the first step that has to be done is the problem structuring of the case in study. In this sense, two tasks can be differentiated: the description of the system and the dynamics of the system.

In the description of the system there are two approaches: the inductive and the deductive. In the **inductive** one, the system is discomposed and its factors and interrelations are analysed. Many scenarios appear and some are selected choosing the

key factors needed. This approach uses usually quantitative data, analytical thinking, hard methods and doesn't pay attention to non-measurable factors. On the other hand, in the **deductive** approach, the system is considered as a whole without discomposing it. This approach uses qualitative data and an intuitive thinking and thereby it is more difficult to carry out.

To deal with the dynamics of the system there are also two approaches: the normative and the exploratory. The **normative** ones are backwards approaches because the goals are firstly described, and then, paths for achieving them are found. On the other hand, the **exploratory** ones are called forward approaches because they begin with the current situation and try to imagine what will happen in the future depending on the events that will occur.

For problem structuring the case in study there are different methods. The American school is oriented to more hard models and the French school uses soft methods based on experience, subjectivity and discussion. Since Scenario methodology arose, many authors have been creating and developing the steps needed for the scenario creating process. There are not a generally accepted steps used by every practitioner, each author use his own process. One of the various methodologies that is broadly agreed is the next one with the steps below (O'Brien, 2001).

1. Set the scene.
2. Generate uncertain and predetermined factors.
3. Reduce factors and specify factor ranges.
4. Choose themes and develop scenario details.
5. Check consistency of scenarios.
6. Present scenarios.
7. Assess impact of scenarios.
8. Develop and test strategies.

Step 1. Set the scene. In this step, the current and past information needed has to be prepared, it also has to be established the planning horizon for scenario development.

Step 2. Generate uncertain and predetermined factors. At this point, people are invited to expand their thinking and list, with for example a brainstorming, a minimum of forty uncertain factors and a smaller number of predetermined elements.

Step 3. Reduce factors and specify factor ranges. This step attempt to reduce the factors found before to a manageable number. Ranking the factors in terms of uncertainty and importance for the organisation helps the group in developing a shared understanding of the situation.

Step 4. Choose themes and develop scenario details. In this step, the number of scenarios is established. After, participants must describe their scenarios including in each one all the factors decided in the step before with some description of the factor in each scenario.

Step 5. Check consistency of scenarios. Analyse the coherency of every scenario evaluating their factors and their relations.

Step 6. Present scenarios. This step help people to think about different futures may possibly happen. If scenarios are simply presented in a table, people will find difficult to imagine them. Therefore, a broader explanation of them should be helpful.

Step 7. Assess impact of scenarios. This is an intermediate step between the scenario summarise and the generation of strategies. At this point, the impacts of every scenario for the organisation are studied, thus the creation of strategic options becomes easier.

Step 8. Develop and test strategies. Finally, the set of strategic options is built.

3.4. Basic guidelines

There are some recommendations common to most of the fields where Scenario methodology has been used.

Firstly, it is important to fix the **horizon time** of the scenarios. The characteristics of the approach are more appropriated for long term applications, but it is also suitable for shorter horizons. Von Reibnitz (1988) suggests that it should be (for corporate scenarios) the time a company needs to develop an innovation or develop new business activities, plus five to seven years. Linneman and Klein say that most projects are for a 5-year horizon but other practitioners, like Zentner, use at least a 15-year horizon. Anyhow, the perfect time horizon depends on the industry, product or market under consideration.

Secondly, the **number of scenarios** developed is a discussed point. Some researchers believe that the best way is to create two but this has been criticised since scenarios tend to be classified in good and bad. Defenders of two scenarios say that in this way, the method forces to confront the bad scenario and plan in light of it. A too large number tend to be too complex but is defended by some authors. There seems to be a consensus that three scenarios are the best choice. Wilson criticises the three scenarios because he says that, in this case, the usual way to describe them is as: high, low and middle ground, thus the middle one becomes the selected because is seems the safest one.

Finally, several **types of scenarios** have been used. There are a few more commonly employed in many projects. Wilson (1978) suggested four alternative scenarios.

- A benchmark or surprise free scenario.
- A scenario of “more inward looking” societies.
- A scenario of “more integrated” societies (the best of all worlds).
- A scenario of “more disarrayed” societies (the worst of all worlds).

First of all, a **surprise-free scenario** describes a future where no radical changes will occur. On the contrary, the **surprise scenario** assumes some drastic

alterations in the future. Usually, when a surprise-free scenario is written, two alternative scenarios arise: the one that represents an *optimistic* prediction and the one representing a *pessimistic* view.

There is also another typical scenario named **most likely** or **best estimated scenario**. This label means this is the most probable future to happen. In this sense, some researchers attach probabilities to the different scenarios and rank them by how likely they are to occur. However, many authors disagree with using the most likely scenario (Kahn, Brown, Martel and Zentner) because they defend that having a best estimated scenario provoke that planners pay too much attention to this one.

There also the so-called **borderline** or **extreme scenarios** that are used for describing the extremes of development. These can be defined as, on the one hand, the most optimistic scenario and, on the other hand, the most pessimistic one.

Sometimes, when building scenarios there is a single dominant factor whose outcome is capital for the future situation of the organisation. In these cases, different scenarios will be related to this factor. In other situations, there are many unknown factors and they interact and combine with one another to describe the future. In these cases, each scenario emphasizes an aspect of the future.

3.5. Special techniques

As it has been expounded, the scenario methodology is an open set of approaches based in the work of several researchers. Each one of them suggests different guidelines and stages to build scenarios depending on their background and experiences. So, the best way to use the Scenario methodology is to combine and adapt them depending on the studied situation.

In the figure 23, there is a comparison of different scenario procedures. These procedures are similar in many aspects they begin seeking the factors that should affect the situation under study and give some future values for these factors. However, they differ in the way for reducing the large number of scenarios to a manageable one. Vanston *et al.* Use a deductive approach while Linneman and Kennell and also Becker use an inductive one. McNulty and deKluyer prefer an intuitive approach to integrate the factors into scenarios. The deductive approach risks the elimination of a key scenario whereas the inductive one risks the omission of a key variable.

It is also important to underline some highly qualitative models as the ones described by Kahn and Godet. They criticised the more quantitative models because the forecast is partial and doesn't take into account the non-quantifying factors. Kahn's approach is very simple; it identifies the basic trends of a forecasting problem, constructs a surprise-free scenario and alters some projections of the current situation to create the different scenarios. Analogously, Godet makes a more holistic analysis of the current situation to find the key variables and takes into account all the actors involved.

These different techniques complement each other and are representative of the different areas of application. In every new case of study, the method has to be adapted to the needs and the characteristics of the situation.

	Becker (1983)	deKluyer (1980)	Linneman and Klein (1977)	McNulty (1977)	Vanston *et al*. (1977)	Wilson (1978)	Zentner (1975)
Number of scenarios	3	3	3 or 4	3 or 4	3-6	3 or 4	3
Length of scenarios	-	-	1 or 2 paragraphs	-	7-10 pages	-	<50 pages
Base scenario	Most likely	Most likely	None	Surprise-free	Most likely	Surprise-free	None
Alternative scenarios	Opt./Pess.	Opt./Pess.	Themed	Themed	Themed	Opt./Pess.	Themed
Are probabilities assigned?	No	Yes	No	-	No	No	No
How is the number of factors reduced?	Considers only key factors	Considers only key factors	Considers only key factors	It is not	Considers many factors	Scoring by probability and importance	-
How are the scenarios selected?	Selects plausible combination of key factors	Judgmental translation into opt./pess. and most likely	Selects plausible combinations of key factors	Judgmental integration of trends and intuition	To conform to the themes	Scenario writing and Cross-impact Analysis	-

Figure 23. Comparison of scenario generating procedures. (Source: Schnaars, 1990)

3.6. Participation

The best way to carry out Scenario methodology is using a group rather than a single person. A group of individuals from the organisation plus some expert in the method is the most used configuration. As the method tries to forecast the future, it also can be helpful to ask for the advice of people with knowledge about how the future is supposed to advance. In every case of study, the subjects about this help should change. Sometimes an economist or an engineer, other times an expert of a very concrete field; but indeed the help of people outside the organisation is very valuable. About the duration of the workshops, some researchers believe that a two-day workshop is useful for a narrow topic area and for a group that is used to work together. However, the most common length is a week, this provides time enough to form the group, adapt the roles and use different techniques.

In the first steps of the process, the brainstorming for generating the uncertain factors should be done with the entire group together in a room. The ideas may arose quickly without criticisms and be listed in a board where everybody can see them. In this stage, the facilitator has to give an incentive to the group, helping them achieving a large number of ideas. When this step is done, a big discussion begins for reducing the factors found to a more manageable number of about twelve people in the group have to build a consensus of these final factors. This is the moment for evaluating all ideas written, criticise them (in a positive way) and finally, try to rank them in terms of uncertainty and importance for the situation under study.

When the key factors are defined, the scenario details have to be described. In this stage, the facilitator has to let the components of the group think freely without taking part in it. Some approaches defend that each person should build some scenarios alone and other approaches prefer dividing the work group in various smaller ones to do the work. Despite of different opinions, the aim of this step is to have several scenarios not thoroughly described, that is, only the highlights of each one. At this point, the whole group has to analyse the consistency of each scenario evaluating their factors and relations between them. This work has to finish in a reduced number of scenarios agreed by all group members. In the next step, a more profound presentation of each scenario is done by the group.

When scenarios are finally described and every member has understood all the elements and the consequences of each one, the study of their impact in the organisation begins. With the analysis of the implications that every scenario will provoke in the organisation, the creation of the strategic options starts. The group should discuss about what the organisation should do for managing with the different scenarios in the future.

The whole process is about reaching consensus among the members and the role of the facilitator is helping in this consensus. Anyway, the more distinct are the members of the group (related to their position in the organisation), the best the results are because different points of view help in having a broad vision of the problem.

4. Example

For a greater and clearer explanation of the Scenario methodology, an example about the future of manufacturing system will be described and commented. The example is referred to the workshop organised by the Manufacturing Systems Integration Research Institute of Loughborough University (UK) in 1995. Members of the Institute, of some manufacturing companies in UK and of the government participated in the workshop. The principal aim of the project was to analyse the future of manufacturing systems knowledge of UK in facing global competitive forces.

The Institute decided to use the Scenario methodology because they needed to have a broad vision of the possible futures of this industry. They sought for strategies for facing the future and, as they were feeling that some changes were to come, they thought that the best method to choose was Scenario. The objective was to develop some different scenarios in order to be aware of several possibilities for the future, and be ready for them.

At that time, when the workshop was done, the awareness of a growing industry in the East (mostly China and India) began to arise. Until few years before, people from the West had not really realised about the high competition that this countries were going to become. Indeed, East organisations were growing very fast, they had a major productivity and effectiveness, so at that point, if the West did not take the East into account, East companies would pass West ones on. This situation should change all the bases in the worldwide manufacturing industry. Well then, the workshop was oriented towards a way of showing all the possible influences on the future and to give ideas for researching business strategies and national policy.

The workshop was decided to be of two days and the agenda for those days was as follows.

Agenda for a two-day workshop		
Day 1		
	AM	Meet, introductions
		Review process to be followed
		Brainstorm factors
	PM	Separate out the likely givens from the trends and uncertainties
		Cluster the uncertainties
		Decide on the interesting combinations
Day 2		
	AM	Review the combinations
		Write a scenario story for each chosen combination
	PM	Describe an evolution sequence for each
		Look for turning points
		Discuss the implications

Figure 16E. Agenda for a workshop. (Source: Ringland, 1998)

About the time horizon, members of the work group agreed that a span of ten years was the better one. The problem under study embraced a wide number of participators. Changes in a worldwide level are not as fast as a national level, so in less that ten years the effects of East growing companies will not be noticeable enough.

In the first stages of the process the group listed a large number of factors by doing a brainstorming. After that, they separated the elements named "likely givens", those that they were very confident that would stay constant, from the "trends" for the future. These trends were supposed to affect and influence the future of manufacturing systems. Hence, they got two lists: the first one including the "likely givens" and the second one including the important "trends" of the industry in the next years. They are shown in the following boxes.

LIKELY GIVENS
A higher need globally for manufactured goods
Fully global communications
Environmental issues will play a larger part
A critical role for information systems in manufacturing
More just-in-time at the point of consumption
A higher proportion of old people (in the West)
Less man hours per unit of production
More self-employed people
Greater variety and number of products
High proportion of home working

Figure 17E. List of likely givens. (Source: Ringland, 1998)

IMPORTANT TRENDS
Increasing leisure markets
Products becoming more complex
Growing service component
Systems becoming more modular
Increasing home shopping
Increasing computer use skills
Increasing electronic trading
Decreasing number of people in manufacturing work
Growing gap between "haves" and "have nots"
Increasing electronic modelling of process and products
Increasing proportion of manufacturing being assembly based
Falling product life-cycles
Growing use of virtual rapid prototyping

Figure 18E. List of important trends. (Source: Ringland, 1998)

Afterwards, they took the factors they were more uncertain about. These uncertain factors were consequence of either lack of information, disagreement among workshop members, excess of complexity or dependence on the laws of chaos. The uncertainties were clustered in:

- Socio-political economical environment
- Technology possibilities
- Manufacturing structures
- Customer value

In the next figure, uncertainties found by the group are shown as well as the clusters where were placed.

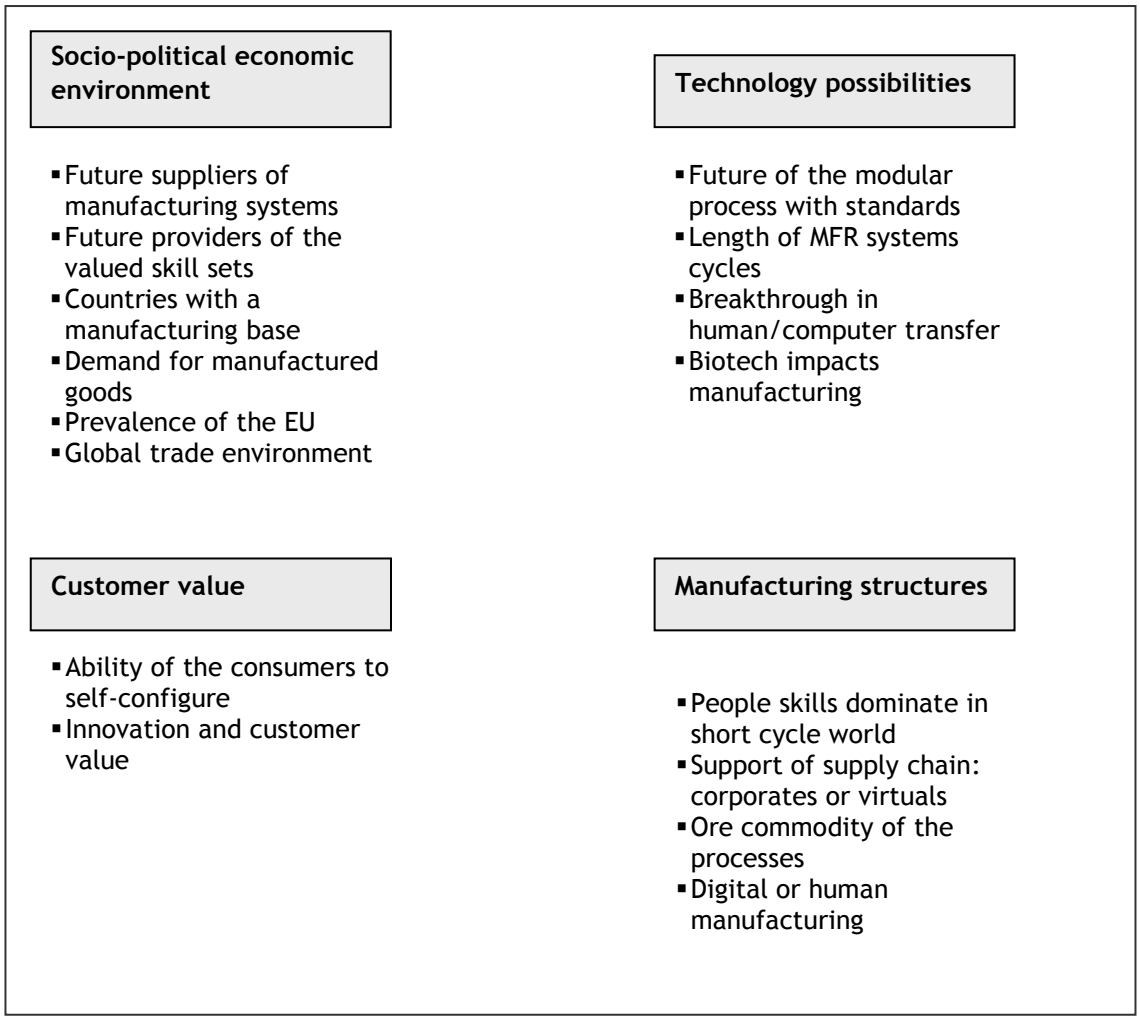


Figure 19E. List of uncertainties. (Source: Ringland, 1998)

In the next stage, people from the group agreed the combination of factors needed for constructing four scenarios. They choose the ones which looked more plausible and interesting. With them, they intended to forecast the future in each of the

four cases. The result was four scenarios for the next decade. They are described in next boxes.

All quiet on the western front
In this case, during the decade 1995-2005 West countries integrate little by little Asian culture. East companies enter with slowness into the western market; they quietly increase the number and finally reach a dominant position in the market. Their culture is progressively introduced in industry and companies, and also their way to combine a holistic model-based system with virtual enterprises.

Enter the dragons
This scenario shows the full penetration of East business in the West. This entrance causes the chaos in the West because the growing countries completely dominate the market by virtual enterprises. The East model for manufacturing industry becomes the current model thanks to retaining the piecemeal automation and a lack of standardisation.

How the West was won
In this context, East companies manage to exclude West importations from East markets. Chinese enterprises ensure this fact by creating fear among its neighbours and combining politically with Taiwan. In this way, they achieve a dominating position.

All quiet on the Western front
In this case, a sort of trade off between East and West is achieved. The West keeps its dominant position in the sense of its business culture, it survives and prevails. Holistic model-based systems are possible and virtual enterprises become the norm for the worldwide market.

Figure 20E. Scenarios for the future. (Source: Ringland, 1998)

OTHER METHODS

Next, a short explanation of several other methods of Soft Operational Research is exhibit.

1. The Future Workshop

The Future Workshops was originated in the 1960s by Robert Jungk, when it became clear that knowledge of the possibilities of the future meant power. It was originally developed as a tool for groups of people with limited resources who wanted to take part of decision making process.

A Future Workshop is divided into three phases:

1. The Critique phase is designed to draw out specific issues and problems about current work practice
2. The Fantasy phase allows the participants to imagine "what if" the workplace could be different
3. The Implementation phase focuses on what changes that are realistic to accomplish and what resources would be needed

The outcome of a Future Workshop is a list of desired changes. Every entry in this list is followed by the required resources. Since the items on this list are visions of the future, the resources and the estimation of the effort of implementing these changes could be arbitrary. More requirement gathering and analysis must be done to really be able to use the outcome.

2. Soft Systems Methodology

Soft Systems Methodology was developed by Peter Checkland at Lancaster University for the express purpose of dealing with problems that were difficult to define. Soft Systems Methodology is an attempt to apply science to human activity systems. It was one the first soft methods that appeared.

The nature of problem situations that SSM deals with are ill structured, messy, changing and poorly defined problems with a large social component. The main advantage of the methodology is that it gives structure to these types of problematic situation which can allow them to be dealt with in an organised manner.

The methodology has seven steps:

1. Finding out about the problem situation.
2. Expressing the problem situation through pictures.
3. Selecting how to view the situation and producing root definitions.

4. Building conceptual models of what the system must do for each root definitions.
5. Comparison of the conceptual models with the real world.
6. Identify feasible and desirable changes.
7. Recommendations for taking action to improve the problem situation.

3. Robustness Analysis

The Robustness Analysis provides a way of supporting decision-making when there is radical uncertainty about the future. It was first developed by Jonathan Rosenhead, professor of OR at London School of Economics.

The specific focus of robustness analysis is on how the distinction between decisions and plans can be exploited to maintain flexibility.

The robustness of any initial decision is the number of acceptable options at the planning horizon with which it is compatible, expressed as a ratio of the total number of acceptable options at the planning horizon.

4. Drama Theory

Drama Theory was developed from the Theory of Games. While Theory of Games provides a structure for understanding and analysing conflicts, Drama Theory seeks to analyse also how they change and develop over time.

A Drama unfolds through episodes in which characters interact. The episode is a period of preplay communication between characters who, after communicating, act as players in a game that's constructed through the dialogue between them. The action that follows the episode is the playing-out of this game; it sets up the next episode.

PART III

THE CASE

1. Introduction

In the case presented in this last part, an application of the four methods explained before will be launch. Firstly, an overview of the case and its background is described. Secondly, the different approaches are applied and finally, a reflection about why each method has been chosen and which sources were needed for developing the case.

The idea of the example used here has been taken from a report in the course *Systemic Operational Research* taught by the teacher René Victor Valqui Vidal in the autumn semester of 2005-2006. I have to thank the students Emilie Agnes Beaumont, Jonathan Janson and Lukasz Kalinowski for their report and their insights in it.

2. Background of the case

In Denmark, and also in all Europe, the price of gasoline is an important issue worrying the society. Nowadays, oil prices are continuously changing and the oil crisis is a current affair. Concretely in Denmark, the price of gasoline varies rapidly and has very big differences depending on the station. These prices change everyday due to continuous negotiation and there is no cheap brand.

This concern affects an important portion of people in Denmark because the number of cars per 100 inhabitants was 32 in 2004 (www.statistikbanken.dk). Moreover, the sales of cars increased in the last year. Even though the taxes on cars in Denmark are very high, about 180% (2004), the number of purchased cars is on the increase year by year. Therefore this means a rising in the consumption of gasoline.

On the other hand in Denmark there were 5.4 millions inhabitants and 83% used the Internet in 2005. In addition, there is a 95% of population with a mobile subscription (www.statistikbanken.dk). Taking into account global trends these percentages today should be considerably higher.

All the statements presented above suit with the idea of creating a business based on an Internet website providing updated gasoline prices of the petrol stations. The business idea is to offer a service in Internet of the different prices of the different petrol stations. The users will be able to consult this information. They will enter data about where they are and where they are going and the webpage will return a list of the petrol stations around and their prices. Offering this service in Denmark can be very profitable because gasoline price is high and Internet and mobile phone prices are quite low compared with other countries. So, I think that the service should interest the Danes. Concretely, for the target population, who are individuals using a car, Internet users and concerned with saving money.

With a first sight to the idea, some doubts about how to carry it out arise. The soft OR methods will help in deciding some important aspects as the coverage of the service, its viability, how the company should be financed, which website model fits better with the environment or how to make the company known.

3. Application of the methods

Starting the study with a SWOT analysis of the whole case, will help to know more about it. With the external and internal evaluation, I will have a view of the business and its environment. The SWOT points are listed below.

Strengths	**Weaknesses**
• Low initial investment. • Knowledge of engineering and marketing techniques. • Easy formulation of the problem situation. • New services, not done before. • Few human resources needed for maintaining the business. • No need of good location. • Helps for young enterprising.	• Low knowledge in web technologies. • Low knowledge in mobile phone technologies. • High qualification of employees needed. • Cost of maintaining the website updated. • Poor financials.
Opportunities	**Threats**
• Oil crisis. • Continuous variation of oil prices in Denmark. • Many petrol stations in Denmark. • Many people concerned with oil prices. • Expected increasing in car sales. • Expected decreasing in taxes on cars. • No initial competitors. • Easy migration to others countries. • Gas stations are self promoted, so probably wanting to cooperate. • High rate of Internet users. • High rate of mobile phone users. • Not seasonal business.	• Expected decreasing in gasoline consumption due to new technologies. • High taxes on cars in Denmark. • Future competitors. • Dependence on collaboration with gas stations. • High bicycle use in Denmark. • Low knowledge about Danish behaviour. • High taxes on business in Denmark.

Figure 1C. The SWOT points.

All these points give a clear view of the enterprise and its possibilities. At this point, these elements have to be combined in a correct way. The solution has to be one that maximizes the strengths and the opportunities and minimises the weaknesses and threats. As this is an early stage of the whole process, trying to develop strategies from here would be useless. I need to obtain more knowledge about the situation and to analyse more deeply all the choices. This is the reason why a SCA is applied.

The SCA will help in choosing some more concrete strategic decisions about the business model and its characteristics. At the very beginning of the methodology, I have to decide which decision areas are the most important ones. The next list shows the chosen decision areas.

Decision Area	Label
Type of Service?	SERVICE?
Geographical Coverage?	GEOGRAPH?
Source of Income ?	INCOME?
Kind of Promotion?	KINDPROMO?
Investment in Promotion?	INVPROMO?
Customers Information?	CUSTOMINFO?

Figure 2C. The decision areas.

The "Type of Service" is referred to how the costumers will check the information of petrol prices. There are several options as consulting the website, sending the information to the e-mail account, sending the information by SMS, etc. The "Geographical Coverage" is referred which place in service will be implanted in. The "Source of Income" is referred to where the money will be obtained from. The "Kind of Promotion" is about how to advertise the company and, related to this topic, another decision is how much to invest in it: the "Investment in Promotion" area. Finally, the "Customers Information" is related to having a database of the customers. There are different models of Internet websites, some of them do not gather information about their users and some others do it for different purposes: selling information to other companies interested in it, using this information for their own use, etc.

With these decision areas I can go on with the next stages in the SCA.

Among all the decision areas that have been described, I will focus the study in these three ones: "Geographical Coverage", "Source of Income" and "Kind of Promotion" as is shown in figure 3C.

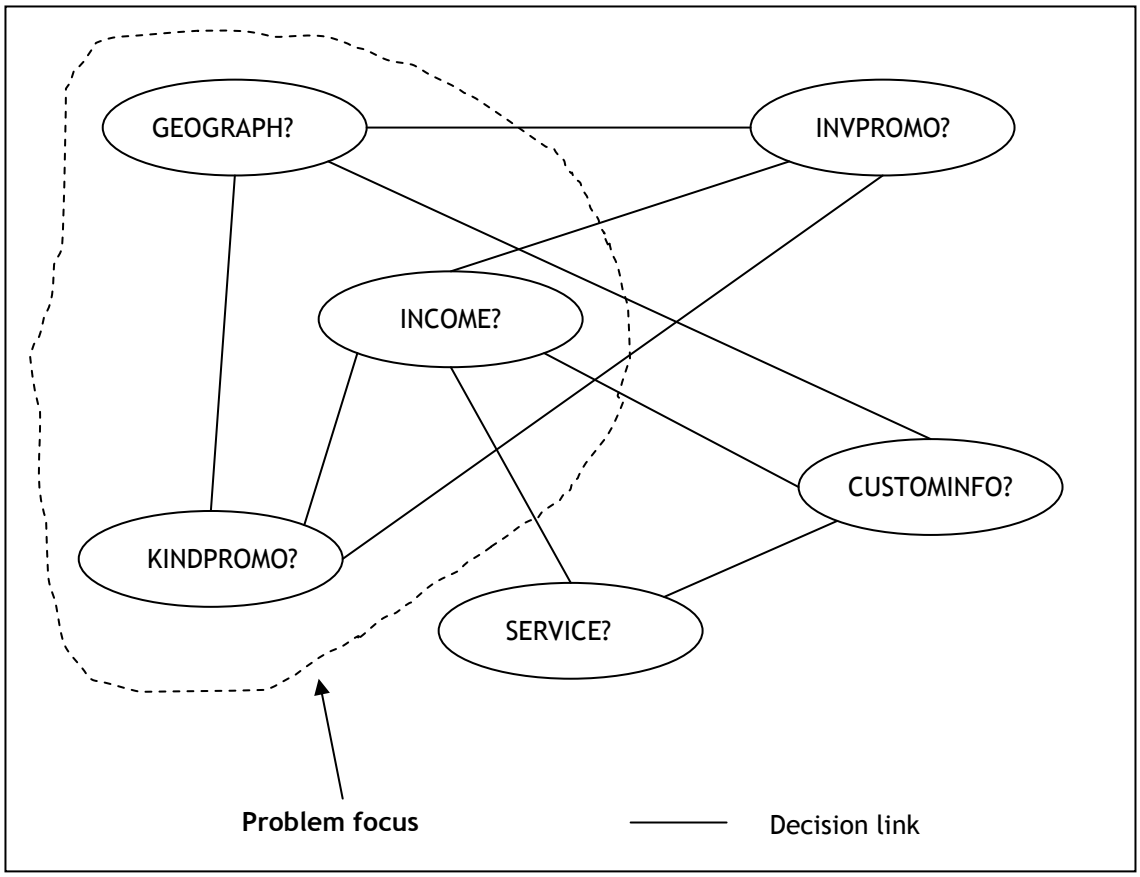


Figure 3C. The decision graph.

The "Type of Service" decision do not enter in the problem focus because, after consulting an expert in Internet and mobile in phone technologies, I realised that offering the service only through Internet would not be enough useful for the users. Therefore, the best option is to offer it also by SMS. Moreover, adding this service does not entail an important increasing in technologies needed.

On of the more important choices in this problematic situation is about where the company will obtain the earnings from. After analysing all the possible options, two arose as the best ones due to their viability and possibility of application. The first option is to make the clients pay a fee (per month or year) for using the service. The second one is to get money from external companies and make customers pay for the SMS service. While analysing the options for incomes, an option of include advertising in the SMS arose but it was ruled out rapidly because of the low effectiveness of advertising in text (SMS). The effectiveness would be greater with the MMS (adding images in the messages) but, nowadays, the percentage of people using this technology is quite low.

There is another important option to decide due to its urgency. This is the one related to the coverage of the service. It is necessary to select if the system will be introduced in all Denmark or only in the area of Copenhagen. Indeed, the information I have to collect of gas station prices will vary a lot depending of this fact.

The other area inside the problem focus is also crucial for the initial launching of the organisation. Where to promote the business is one of the most important topics of any company in its first stages. The bigger number of people knows

the company, the more possibilities of surviving and success it will have. After choosing the problem focus, these are the possible choices for the decision areas.

Decision Area	Options
GEOGRAPH?	Denmark Copenhagen
INCOME?	Client fee External + SMS
KINDPROMO?	Traditional Web

Figure 4C. The decision options.

One of the option bars I find in this case is the incompatibility of making traditional advertising with introducing the service in all Denmark because the investment would be too high for covering the whole market. The other option bar is related to the incompatibility of obtaining the incomes from a client fee and making traditional advertising. If the company earnings are from this fee, the amount of money will be insufficient for invest in a traditional advertising campaign.

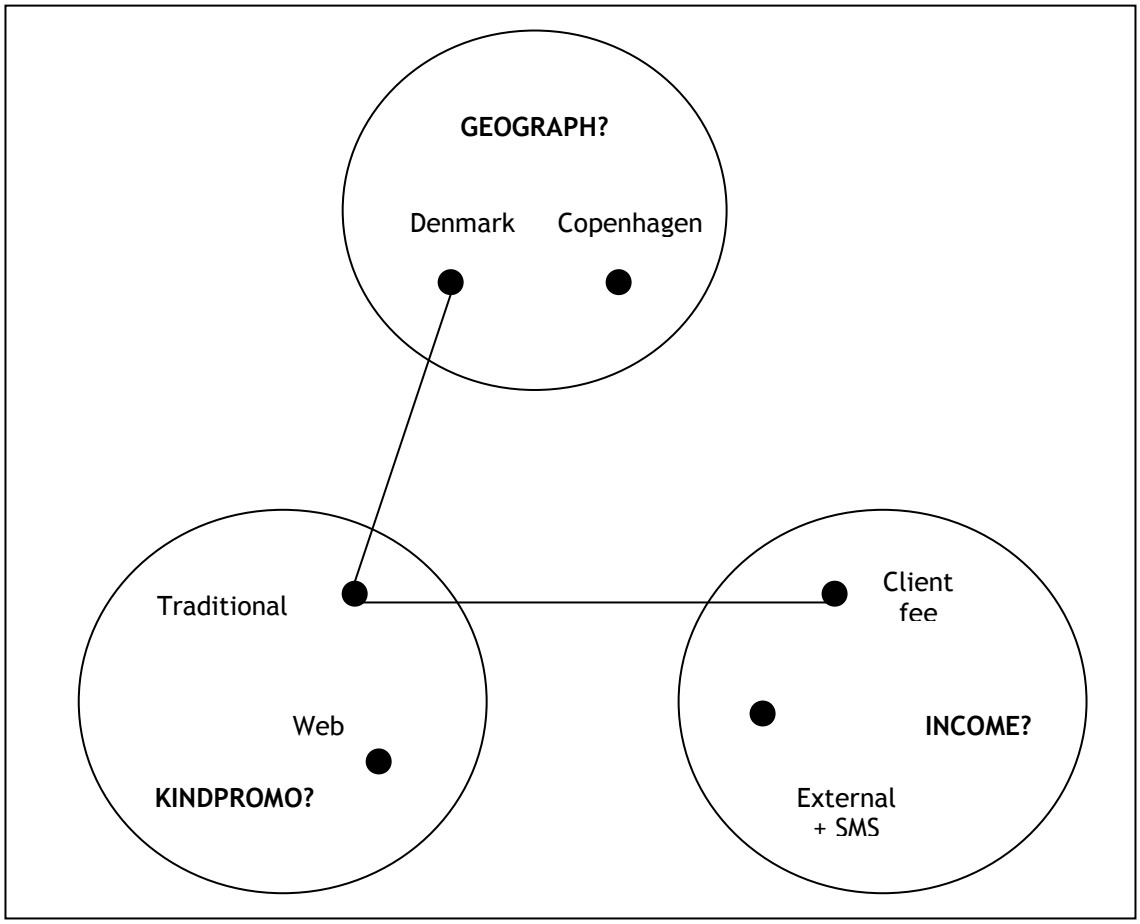


Figure 5C. The option bars.

So, after taking into account all the option bars, the option tree is shown below.

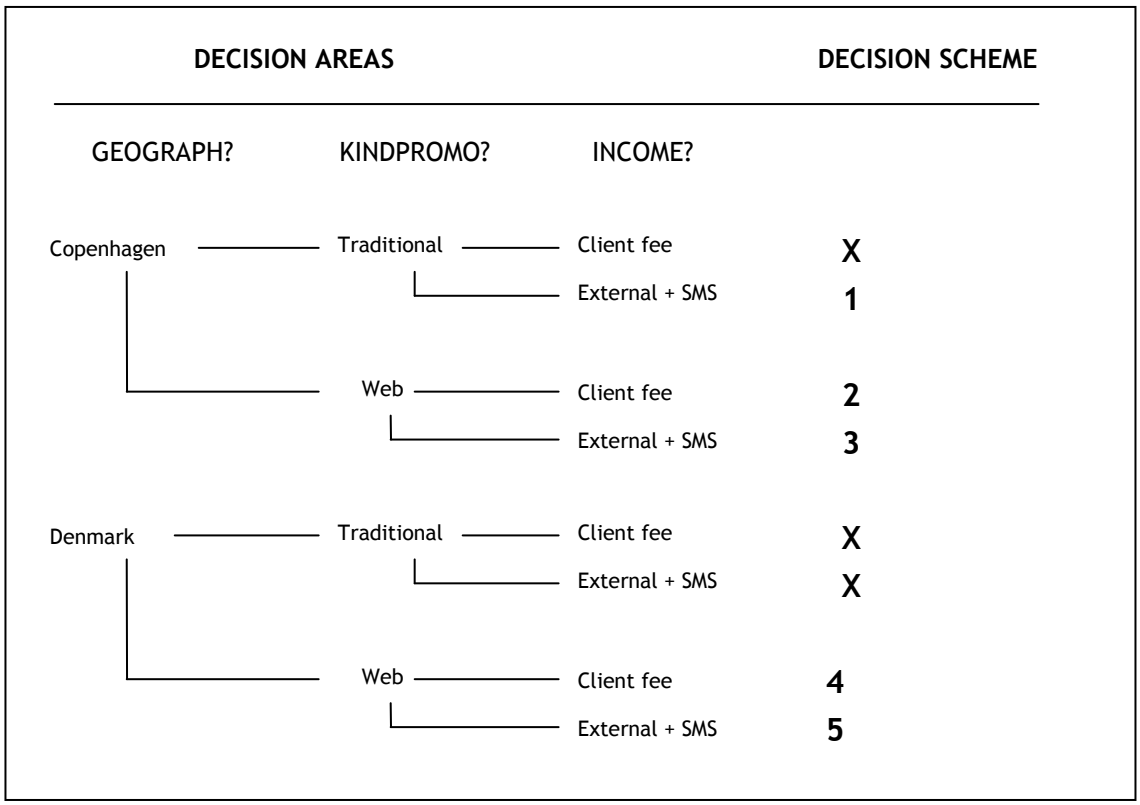


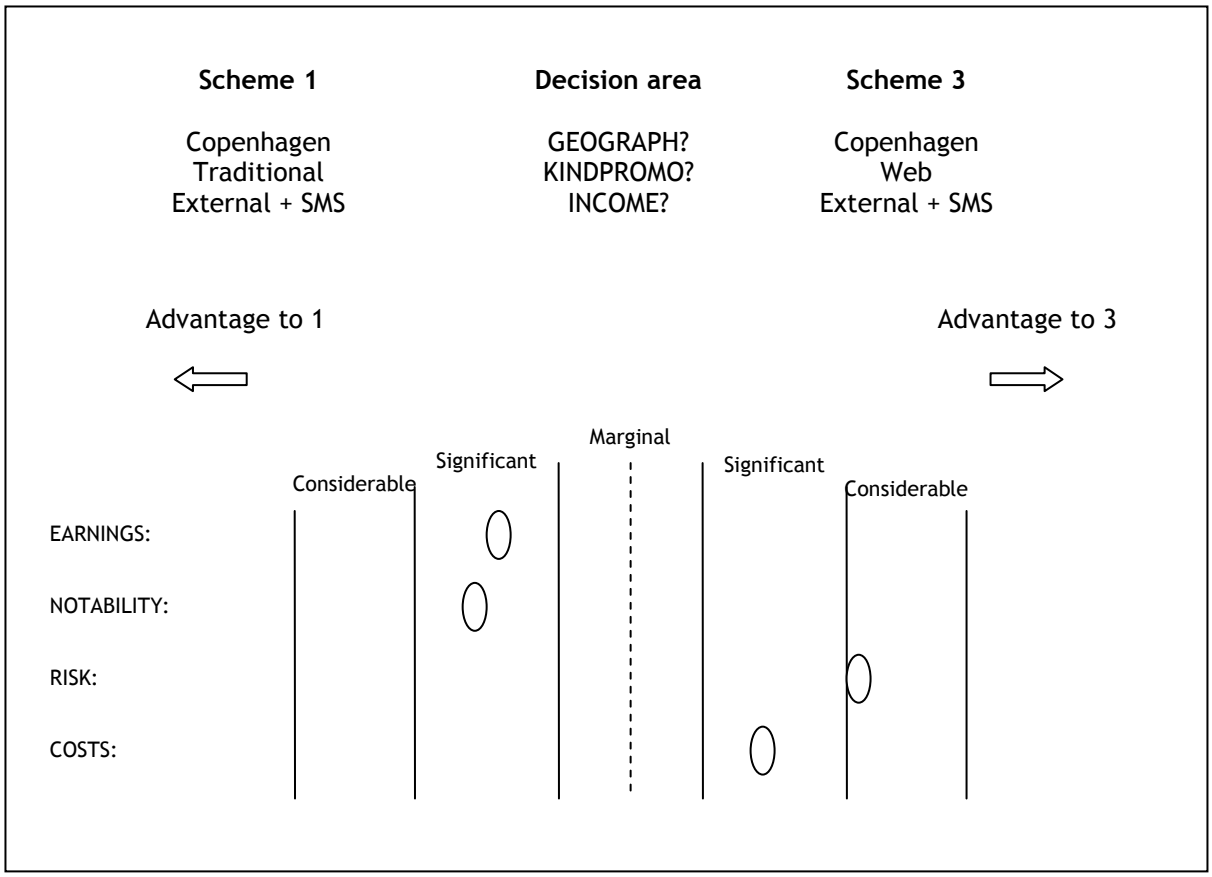
Figure 6C. The option tree.

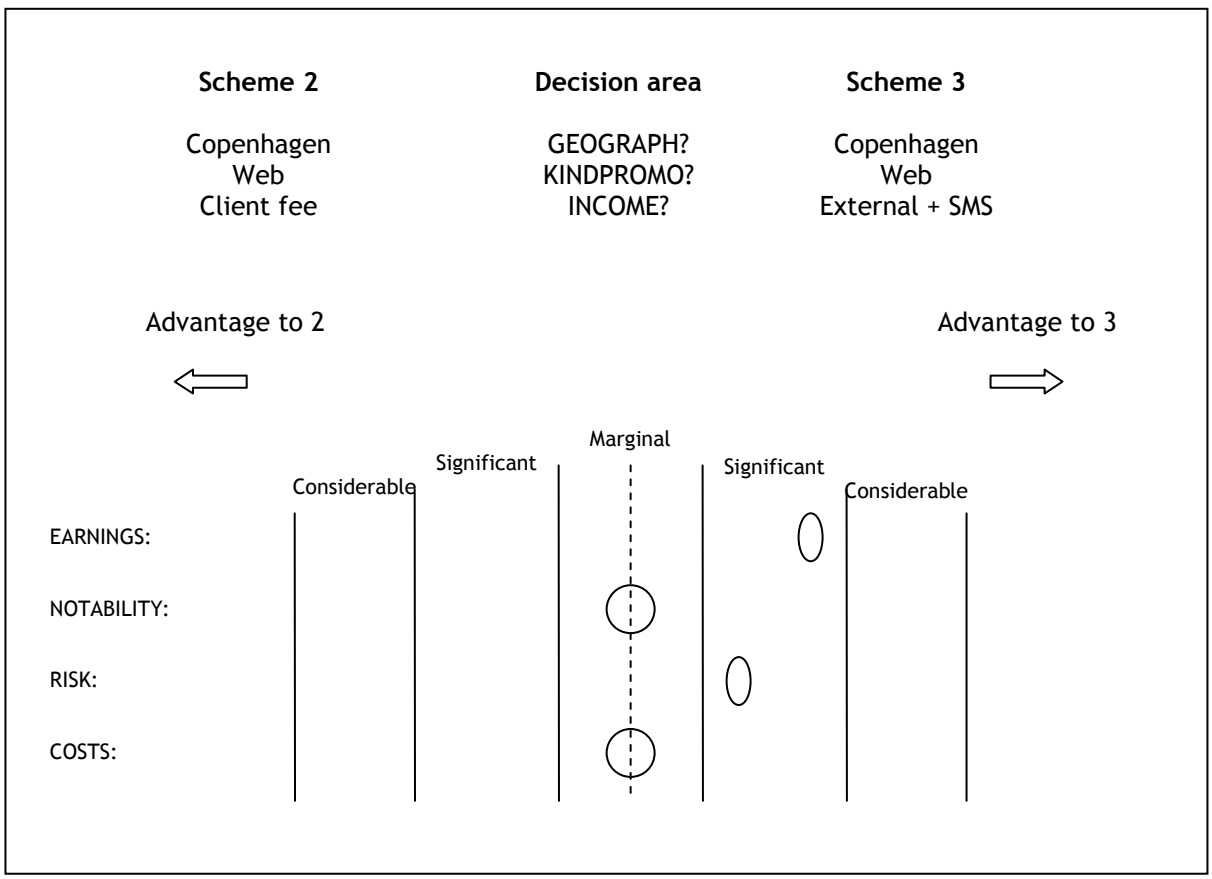
I can see five different schemes for the business. At this point, I have to compare each pair to see which is the most advantageous. The comparison areas will be the ones listed below.

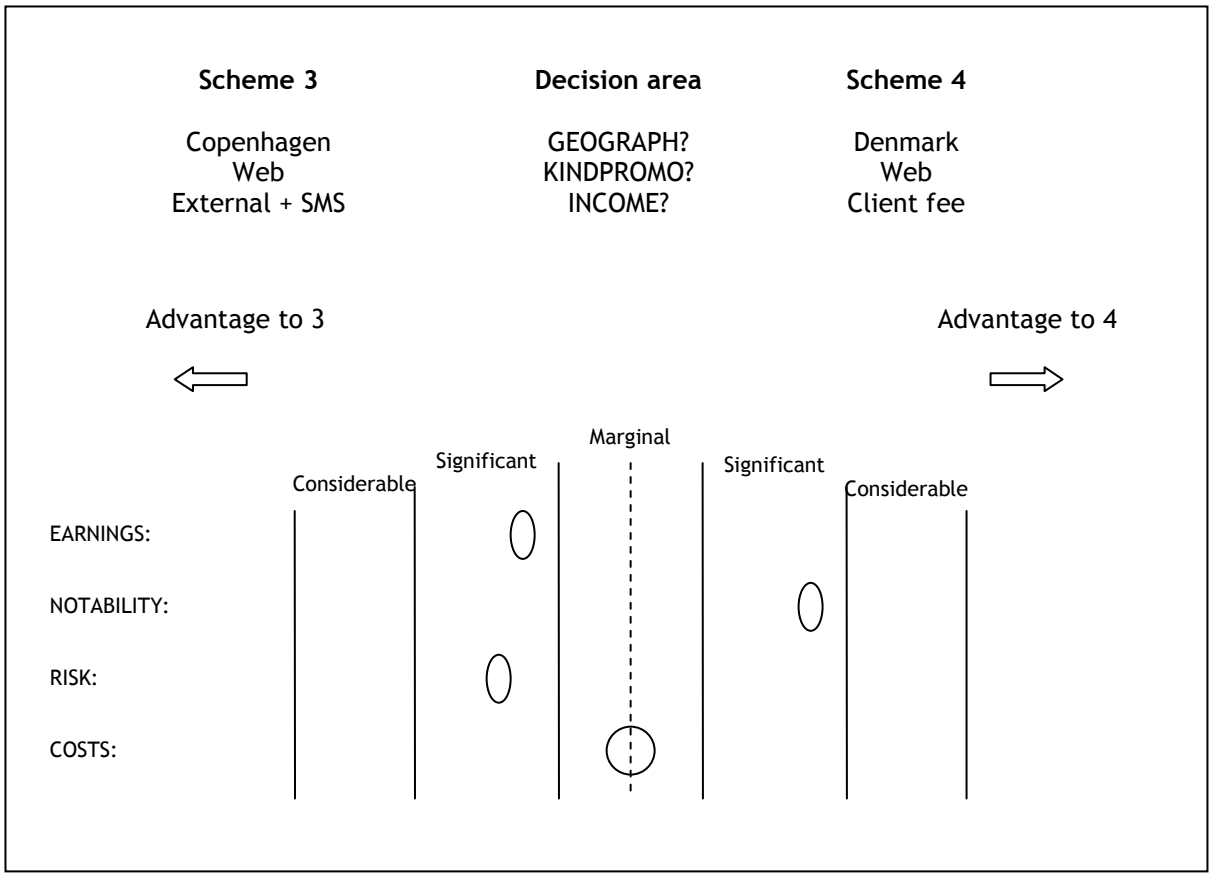
Comparison Area	Label
Level of income:	EARNINGS:
Degree of notoriously of the firm:	NOTABILITY:
Level of risk of the business:	RISK:
Costs of the service:	COSTS:

Figure 7C. The comparison areas.

At this point, I compare each pair of schemes basing it the comparison areas in figure 7C. With the comparisons I will see which appears as the best choice.


Scheme 1
Copenhagen
Traditional
External + SMS
Decision area
GEOGRAPH?
KINDPROMO?
INCOME?
Scheme 3
Copenhagen
Web
External + SMS
Advantage to 1
Advantage to 3
Considerable
Significant
Marginal
Significant
Considerable
EARNINGS:
NOTABILITY:
RISK:
COSTS:


Scheme 2
Copenhagen
Web
Client fee
Decision area
GEOGRAPH?
KINDPROMO?
INCOME?
Scheme 3
Copenhagen
Web
External + SMS
Advantage to 2
Advantage to 3
Considerable
Significant
Marginal
Significant
Considerable
EARNINGS:
NOTABILITY:
RISK:
COSTS:



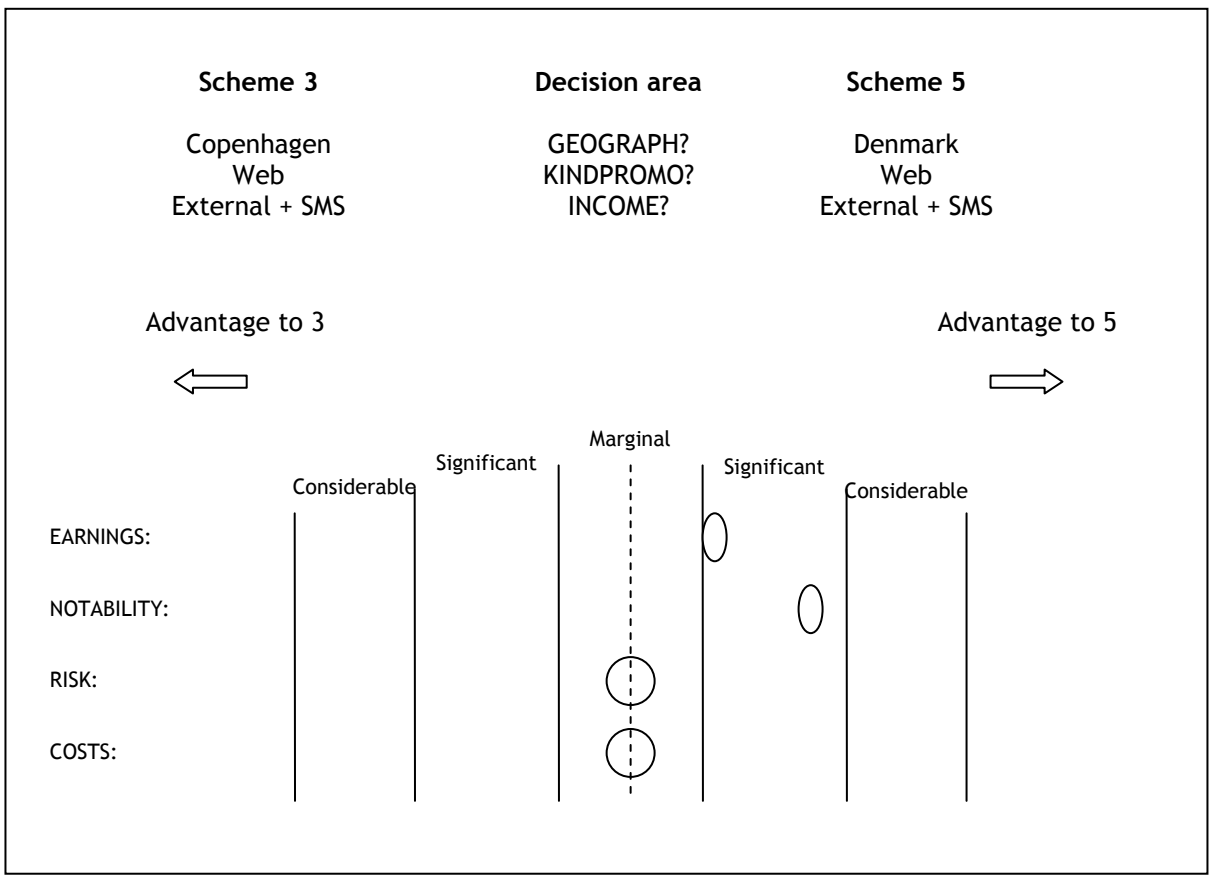


Figure 8C. Comparisons between different schemes.

After the comparison between each pair of schemes is done, it results that the best choice appears to be the *Scheme 5*. This one is defined as implant the service in all Denmark, with advertising of the company through the Internet and earning money from external companies and from SMS clients.

At this point, what the situation is the next one. I want to create website where people can consult prices of different petrol stations without charge and with an extra service of receiving such information in their mobile phone by paying the SMS. The company will make its advertisings in other websites of related topics (maps, rent-a-car enterprises, petrol companies...) and the company will get the money from external companies and from the SMS sent by the customers.

Instead of going ahead with the choosing mode of the SCA, it will be more helpful to use the SODA methodology, as the decision I have to take now is: how will I obtain the money of other companies? There are two main options: advertising in the website (advertising model) or selling the information about customers' habits (infomediary model). To compare these two possibilities I will make a strategic map of each one including all the directions I have to take for achieving the final goal: gain profits.

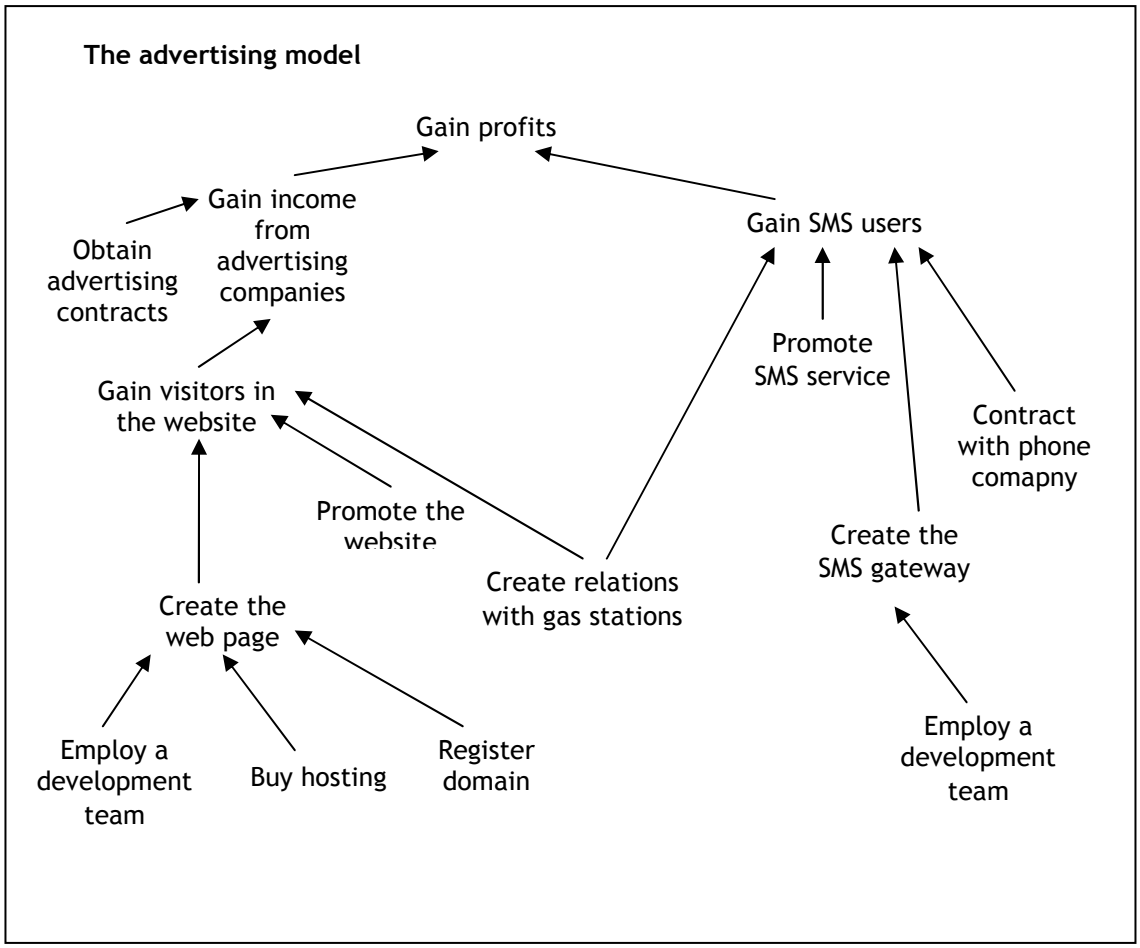


Figure 9C. Strategic map for the advertising model.

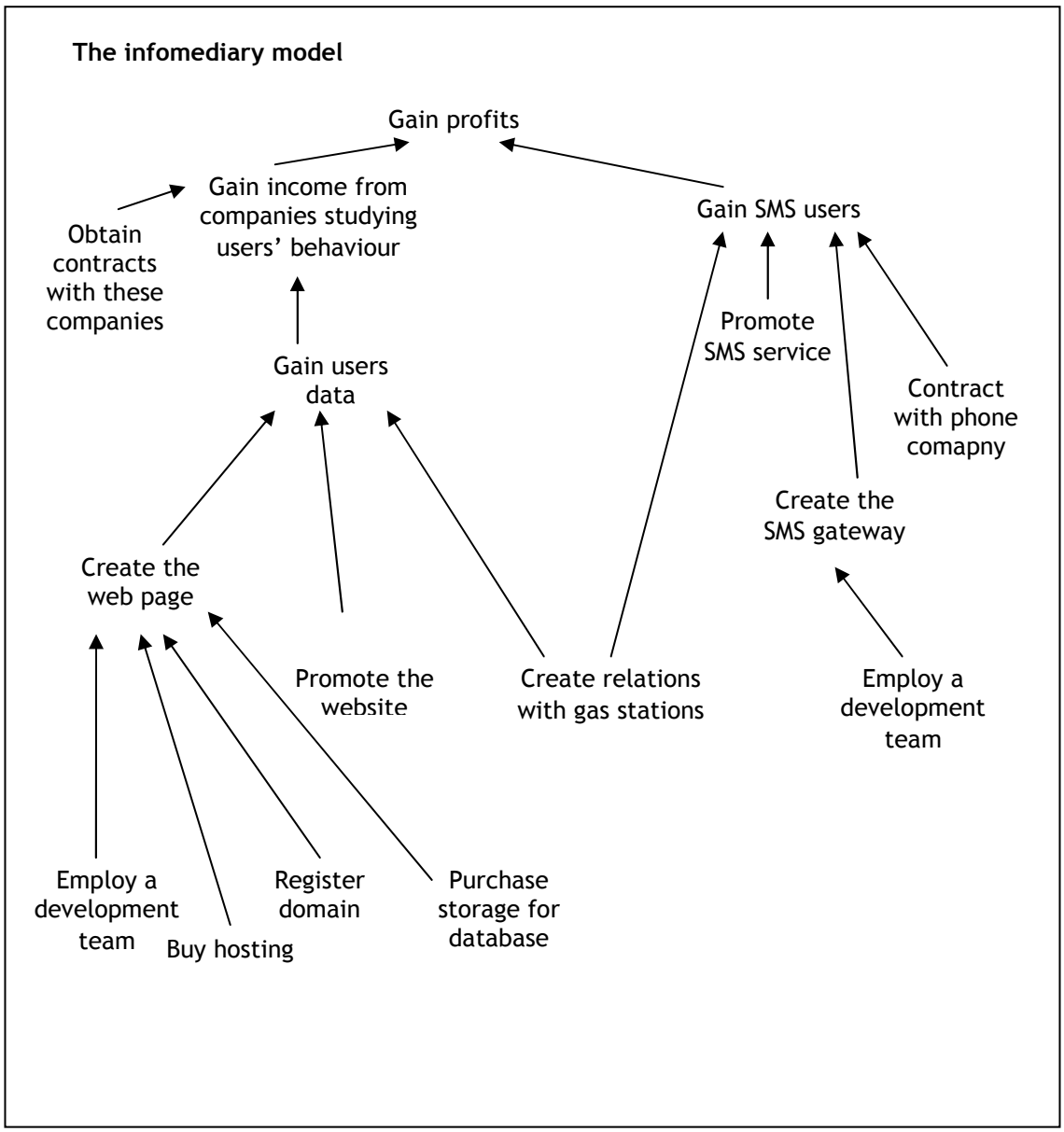


Figure 10C. Strategic map for the infomediary model.

There are few differences between the two models. The important one is the creation of a database for storing the information about the customers in the second model. Technologically, this activity does not represent an important increasing in the work and the investment. Therefore, I have to analyse which the easiest way to get incomes will be. For doing this, another two SWOT analysis will be carried out, considering only aspects about the possible users and the possible contracts with the companies.

Strengths	**Weaknesses**
• Income directly depending on the number of users. • No limit of users.	• Need for a high volume of traffic. • Necessity to have minimum users to sell advertising.
Opportunities	**Threats**
• Internet is a common way to make advertising. • Quite easy to find advertising companies.	• Too much dependence of advertising companies.

Figure 11C. SWOT points for the advertising model.

Strengths	**Weaknesses**
• Knowledge of the users. • Possible fidelity.	• Need for a high volume of people interested in the website. • Reliability of data.
Opportunities	**Threats**
• Increasing filling forms in Internet. • Increasing interest in consumer habits.	• High control of authorities. • People mistrust in registering in websites. • Not easy to find companies buying users' information.

Figure 12C. SWOT points for the infomediary model.

With this analysis, it is possible to conclude that the "advertising model" is the best choice. First of all, it will be easier to find companies wanting to advertise in the website. Moreover, there are some organisations offering this service. In other words, it is possible to contract their services and they provide the advertising appearing in the website.

Likewise, the advertising model does not need the users' registration. This fact makes the model safer because people often do not feel confident about Internet registrations.

Once the model as been chosen and defined, it is important to think about the future. I am not absolutely sure about how the market will evolve but applying a Scenario analysis I can figure out some possible futures in order to be more prepared to take decisions in the future. In this case, I used the French school because the available information is more qualitative and quantitative. The time horizon used is two years; it is a short span but, according to the type of business, the most important stage are the

first years because it is the period when problems are more likely to arise. I choose three different scenarios because when using two, they tend to be classified as the extreme cases and do not represent the reality. On the contrary four scenarios are too much because it becomes to complex for the analysis. Above the three scenarios are described.

The worst-case scenario
• Many competitors • Cars using other energies • No cooperation with gas stations • Decreasing oil crisis • Few users • Few advertising companies • Low fidelity and confidence from clients • Increasing prices of hosting • Increasing phone and Internet prices • Poor relevance in Google • Agreement among gas stations for equal gas prices

The best-case scenario
• Many users • Many companies wanting to advertise in the website • Still using gasoline for cars • Many variations in oil prices • Reducing car taxes • Strong cooperation with gas stations • Fidelity from clients • High relevance in Google

The surprise-free scenario
• Still using for cars • Entrance of new competitors and many costumers split between all of them • Maintaining phone and internet prices • Gas stations interested in cooperate • Oil crisis • People concerned with saving money

Figure 13C. Scenarios for the future.

4. Discussion

In this case, it has been shown how the soft OR methods explained before can be applied in a real-world situation. For the first stage of the process a SWOT analysis has been applied because it gives a broad view of the company and its environment. This analysis has helped in finding the resources and capabilities of the market, and also the demands of the environment. After the SWOT, I had a wider view about which were the possible courses of action and which were the ones that could lead the company to a complicated situation.

After that, I decided to make a brainstorming with a group of people concerned with the topic. I explained to them the case and asked what would be important aspects for them, as users, that could make them use the service or not. I also asked for technical information to an Internet and mobile technologies expert. He explained all the possibilities for creating websites and the types existing, for the technology needed to include SMS services in the website and the ways of Internet hosting. With all this information, I used the SCA approach in order to rule some options out that appeared to be unviable. The SCA leaded me to one business model with two possibilities: the advertising model or the infomediary model.

Using SODA, I built two maps, one for each model to know more clearly which the differences between them were. The strategic maps served to see which the strategic options I had were and the steps to follow in each case for achieving the goals. As the technical differences were not relevant, I focused on other aspects and, for it, I did again a SWOT analysis. One SWOT analysis for each model helped me to clarify the differences between them. On the one hand, I focused on the difficulty to find the incoming sources. On the other hand, I focused on the acceptance of the users, that is, in which case they will feel more confident with the service and therefore, the would use it more.

All the analysis leaded me to decide that the advertising model would be better because of the larger possibility to obtain users and earnings.

Finally, I applied the Scenario methodology to forecast what the future would be in two years. Taking into account all the aspects that could condition the business in the future, I describe three possible scenarios. Thinking about how the future may look like helps in being prepared for the changes.

In the figure 14C, there is a map with the stages and the aspects taking into account during the problem-solving process of the case under study.

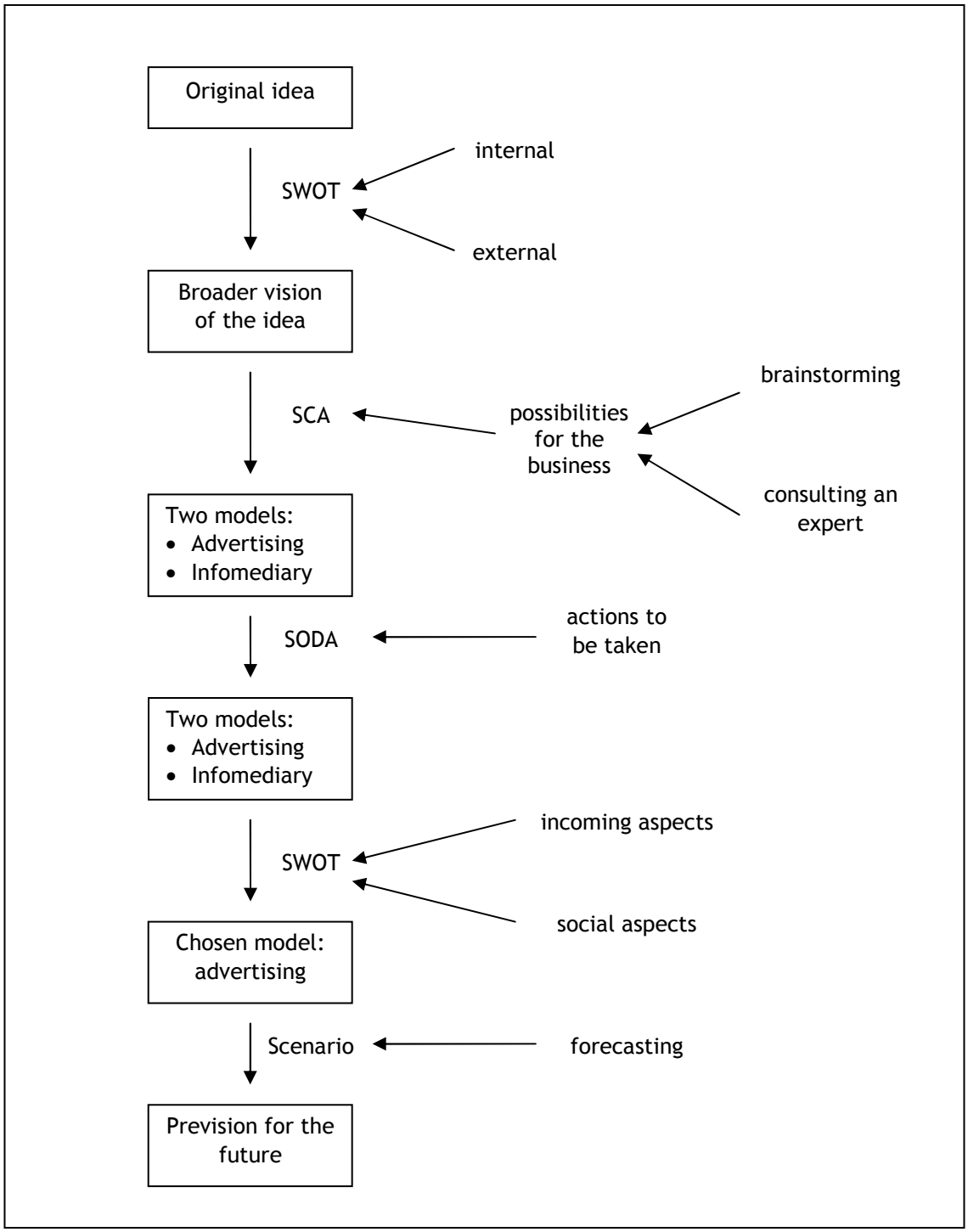


Figure 14C. The map of the process.

CONCLUSIONS

The purpose of this thesis is to apply the soft Operational Research methods to problematic situations in the management field. Concretely, the aim is to use multimethodology -the combination of more than one method- to strategic decisions in an organisation. The objective of the paper is also to show how science can help in management.

First of all, I have presented what Operational Research is and its basis on Systems Thinking. Systems Thinking helps in having a global and holistic view of the situations. As the problems in real-world are not only qualitative, soft Operational Research methods are more appropriate because they take into account social and human aspects of the problem. Secondly, I have described four important approaches. The SWOT analysis helps in the first stages of the decision offering a broad view of the situation and its environment. The Strategic Options Development and Analysis and the Strategic Choice Approach, are useful for the intermediate stages of the decision because they analyse more specifically some aspects that are needed to be considered, taking the uncertainties into account. Finally, the Scenario methodology is used for creating an image of the possible futures and act accordingly.

Finally, the case under study has proved that the application of different methods in different stages of the decision helps in finding the right option to follow in each moment. As it is shown in the case, it is possible to combine successfully the methods for reaching a better solution. Moreover, it has been proved that the methods can be used more than one time in different phases of the problem-solving process.

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INDEX OF FIGURES

Theorical

Examples

Case