THE ROLE OF DECISION SCIENCES IN TACKLING COMPLEX ORGANISATIONAL ISSUES

ŞTEFAN C. LIŢĂ

Abstract

Starting from the point that many organisational issues can be observed through the decision-making lens, the present paper attempts to prove that Decision Sciences provide a broad conceptual, methodological and practical approach useful in tackling both tactical and strategic organisational dilemmas. The paper has three main objectives: (1) to provide a conceptual delimitation regarding decision sciences and strategic management, (2) to investigate the role played by some specific key terms in understanding the meaning of these two concepts, and (3) to discuss how decision sciences could enrich the field of strategy. The paper ends with the conclusion that decision-making expertise represents a fundament to the development and optimisation of any institution and the understanding and use of decision sciences truly has the potential to improve organisational performance.

Cuvinte-cheie: ştiinţe decizionale, management strategic, performanţă organizaţională.

Key words: decision sciences, strategic management, organisational performance.

1. INTRODUCTION

A vivid debate is currently ongoing in the field of management theory and practice addressing the issue of whether the Decision Sciences are better suited to dealing with tactical or strategic problems that arise in organisations. Although there is not a simple and straightforward answer to this question, due to the vast and growing literature on organisation theory, I firmly believe that Decision Sciences provide a broad conceptual, methodological and practical approach useful in tackling both tactical and strategic issues, because there is not a clear distinction between these two aspects. For example, many take the view that a concept like strategy comes from military and implies important things to do, while tactics refers to specific details. But, we could also agree with Rumelt who claimed that “one person’s strategies are another’s tactics” and what is or not strategic depends on both where and when you sit (Mintzberg, et al., 2003).

Therefore, I think that anybody who tries to answer this question, after a thorough investigation of basic literature, arrives at the following two conclusions:

* Operational Research Group, Department of Management, London School of Economics and Political Science.

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a) from a theoretical point of view, if we analyse the content of Decision Sciences, it seems that it is quite technical, sophisticated and detailed-focus area, with difficult concepts, models, theories and methodologies such as: expected utility model (von Neumann, Morgenstern, 1944), subjective expected utility model (Savage, 1954), game theory (Harsanyi, 1967, 1968), multiattribute utility functions (Keeney, Raiffa, 1976), analytic hierarchy process (Saaty, 1980), scoring rules (Matheson, Winkler, 1976), dependence relations among uncertainties (Moskowitz, Sarin, 1983), requisite model (Phillips, 1984), calibration in linear combination schemes (Hora, 2004), as well as other (probability equivalence and certainty equivalence methods, updated prior probabilities, joint conditional distribution, unanimity principle). This road will definitively make us agree that decision sciences are better fitted to deal with tactical issues.

b) from an applied standpoint, if we look at the applications of Decision Sciences, it seems that they are focused on broad problems and extremely important social or organisational dilemmas, such as: funding alternatives for magnetic fusion energy research program of US (North, Stengel, 1982), adverse health effects associated with carbon monoxide emissions (Keeney et al., 1984), risk management for the tiles of the space shuttle (Paté-Cornell, Fischbeck, 1994), tritium-supply alternatives for US government (Von Winterfeldt, Schweitzer, 1998), portfolio management system for oil and gas organisation (Skaf, 1999), development strategy for a cancer drug (Johnson, Petty, 2003), European air traffic management (Grushka-Cockayne, De Reyck, Degraeve, 2008). This perspective might convince us to accept that DS are better fitted to deal with strategic issues.

However, because of space restriction and author’s limited knowledge, the paper attempts to emphasise especially the strategic approach of decision sciences. And, for the sake of conceptual distinctiveness, I will try to achieve the aforementioned goal by addressing mainly the “what” and “why” questions. Therefore, a conceptual delimitation will be provided in the first part in order to understand what decision and strategy mean. Then, I will investigate the role played by few key terms in understanding the meaning of these two concepts. Finally, I will discuss how decision sciences could enrich the field of strategy.

2. SOME USEFUL DELIMITATIONS

This first section aims to highlight different opinions about decision and strategy, shared by the key figures of the field, in order to give a short overview about their current status.

2.1. FROM DECISION THEORY TO DECISION SCIENCES

The term decision has not a very long history, if we analyse the academic sources, but its content has indeed a long past, if we regard it as a human activity and ability. In its current terminology, Decision Sciences (DS) could be regarded as
an interdisciplinary field with roots in philosophy and psychology (Edwards, 1954; Howard, 1966), mathematics and statistics (De Finetti, 1937, Savage, 1954), economics and management (Raiffa, 1968). According to well-known textbooks (Goodwin, Wright, 1998; Clemen, Reilly, 2001; Edwards, Miles, von Winterfeldt, 2007), decision analysis includes a wide variety of methods such as problems structuring methods, multi criteria decision making and multi attribute utility analysis, decision trees and influence diagrams, probabilistic reasoning and Bayesian statistics, sensitivity analysis and group facilitation, resource allocation and prioritisation, scenario planning and simulation. In the same time, among the most relevant concepts used in classical books (Keeney, Raiffa, 1976; von Winterfeldt, Edwards, 1986) are those of objective, alternative, preference, value, choice, consequence, probability, risk, uncertainty, analysis, structure, model, criteria, utility, efficiency, strategy, technique, axiom.

As Winterfeldt (2004) stated, decision analysis should be primarily a prescriptive discipline, helping people make better decisions by using normative models, but with awareness of the limitations and descriptive realities of human judgement. For example, it represents an important tool for the evaluation of major activities in the public sector, while it is not yet widespread in corporations, although some consulting firms use it. The most important applications can be found mainly in areas like medicine, public policy, manufacturing, energy, military, transports, industry, environment (Keefer, Kirkwood, Corner, 2004). Taking into account its current developments, decision science could be also seen as a multi-purposes methodology useful within a great variety of organisations for improving the efficiency of choices, made at different levels, in conditions of conflicting objectives, multiples stakeholders, different perspectives, uncertain future.

2.2. FROM ORGANISATION THEORY TO STRATEGIC MANAGEMENT

The field of strategy has also reflected a tradition of theoretical pluralism because it has borrowed concepts and theories from other disciplines, such as economics, psychology, political and behavioural sciences. The word strategy is probably one of the most known multi-meaning terms, because depending on assumptions and perspectives it has been used implicitly in many different ways.

However, it is interested to notice that many definitions of strategy are stated in terms of decisions. For example, according to David (1998) strategic management can be defined as “the art and science of formulating, implementing and evaluating cross-functional decisions that enable an organisation to achieve its objectives”. The same author state that since ’80 the number of companies that have been using strategic management techniques increased more than three times and, in a large organisation, all the below mentioned strategy activities occur at three hierarchical levels: corporate, divisional and functional.

A similar view is also shared by Chakravarthy and White (2002) who argue that decisions together with actions represent the core elements of the strategy
making and implementation process. Although, in practice, the lines between these two phases of strategy are not always neatly drawn (Mintzberg, et al., 2003), we could also think, for instance, that during the formulation phase we have to deal with choices regarding different approach to strategy, types of information that must be included in the strategic analysis, and also decisions about stopping moments of data collection, whereas in the second phase we have to decide how to use that information, how to implement the direction that is gleaned from it, and what can be done differently.

The field has also few conflicting views, for example, some authors (Simon, 1969) argue that strategy is mainly concerned with question of what and why, while other authors (Bowman, Singh, Thomas, 2002) consider that there are two central questions of strategy (a) why are some organisations more successful than others or what they have done to be so, and (b) how can we make a given organisation more successful.

Nevertheless, strategic management is about superior performance and strategic factors that enhance it, and strategy can be viewed as a series of options in the face of uncertainty.

2.3. A COMPARATIVE ANALYSIS OF DECISION AND STRATEGY

Having established those theoretical delimitations an important backdrop, it seems that decision sciences and strategic management share a considerable variance, therefore it is worthwhile to draw few general conclusions about their similarities and differences.

2.3.1. Similarities

The both disciplines seem to have had a quite common evolution and have used similar ideas.

From a historical standpoint, both decision and strategy fields have advanced substantially in the past 40 years, although there continue to be some gaps between what is known from an academic perspective (more often in the descriptive mode) and what is or can be prescribe to managers (in the normative mode).

From a theoretical point of view in both cases similar key terms have been used, such as objectives, alternatives, threats/risks, rules (policies/techniques), and intuitions.

It is also appropriate to evaluate their effectiveness based on both the product of the decisions/strategies made and the process used for formulating decisions/strategies. Therefore, good decisions/strategies include those choices that support or increase individual and/or organisational performance by following a defined process and meeting specified standards or criteria for each step of the process.

2.3.2. Differences

Even if there is striking evidence regarding their resemblance, the domains have also distinctive features.
In applied context, strategy is usually viewed from a single perspective, whereas for decision analysis the multi-perspective analysis serves as a basic starting point. In defining a strategy, people usually search for good enough solutions, and their view might be often expressed by the quote “I would rather be lucky than good”, while in decision analysis luck is seen as a result of random variables, and people normally attempt to find causal links and optimal solutions.

Measurement remains a little researched area within strategic management, and outcomes are often not included in strategy, while for decision sciences these represent fundamental concepts.

3. KEY LINKS IN UNDERSTANDING DECISION AND STRATEGY INTERPLAY

The issue of whether Decision Sciences are better suited to deal with tactical or strategic problems greatly depends on our own understanding about organisational life. Below, I present just a few examples of how concepts could make a difference in answering such a question.

3.1. THEORETICAL VERSUS APPLIED SETTINGS

Although decision making is sometimes defined in a simple and straightforward way as “an act or process of making a choice or reaching a conclusion among several options” (The Oxford English Dictionary, 2001), everybody should be aware that decision making quickly becomes a difficult and complex process to understand in applied contexts. For instance, if we look at the content of decisions, we may find at least 4 differences between the real organizations decisions and the artificial decisions studied in academic context (Brehmer, 1990). In an applied setting, (1) there is a series of decisions rather than a single decision, (2) the decisions are interdependent, so current decisions constrain future decisions, (3) the environment changes autonomously and as a result of decisions made, (4) it is insufficient for the correct decisions to be made in the correct order – they must also be made at a precise moment in real time. If we also take into account the persons involved, we may find again few differences, such as the subject expertise and motivation, as well as the stakes of decision. It is a similar issue with that encountered in forensic or social psychology when studies are conducted to investigate the human ability to detect lies, because there is no experiment where the subjects should be so motivated and the stake so high to simulate real life situations (deciding, lying), although few classical studies** proved that it works even without such conditions to be met.

** I refer to the studies conducted by Milgram (1963) and Zimbardo (1972) which are presently difficult to implement due to ethical concerns and constrains.
3.2. SCIENCE VERSUS ART

Another area of possible misunderstandings in the field of strategy is related with the role of conscientious decision. Chakravarthy (2002) state that “rational decision making is a cornerstone of the thinking about strategy” and “strategy is essentially a decision making process” because it involves to apply your knowledge in a rational way in order to solve a problem, but he also suggest that strategy involved a thorough understanding of organisational and political process and it is not intently rational or scientific, but at least in part is a work of art. Here, we can also accommodate the distinction between deliberated and emergent aspects of strategies (Mintzberg, et al., 2003).

In the same line of thoughts, Simon (1957) noticed that rational decisions are always inhibited because an individual (a) cannot generated all feasible alternative courses of action, (b) cannot collect and process the information that would predict the consequences of an alternative, and (c) cannot accurately assess the values of anticipated consequences. Therefore, all kinds of managers have severe limitations on the information processing and computing abilities, phenomenon which was called bounded rationality (Morecroft, 1983). This simply implies that they cannot effectively cope with all of the available information and alternatives, and as a consequence, they will always obtain only locally satisfactory solutions. If we share this logical perspective, we might encounter difficulties when try to understand how innovative strategies come about or how organisations discover and learn new logics.

3.3. REACTIVE VERSUS PROACTIVE BEHAVIOUR

Decision making is often a reaction to a particular problem and commonly takes place in a crisis context (Dorner, 1996), that’s why it can be readily equated with problem solving or tactical issue. Proactive decision making is often less explicit than responsive decision making and takes place in advance, thereby it might be equated with planning or strategic issues.

3.4. DECISION VERSUS ACTION

Surprisingly, some authors (Chakravarthy, 2002) claim that many actions are not the results of decisions. Although it is true that in many situations it might be impossible to understand the underlying arguments or information that led to that action, I think it is inappropriate to separate action and decision, unless decision is equated only with the phase of analysis. Nevertheless, it makes sense to say that in many practical situations we must first study streams of actions and then go back and investigate the role of decisions in determining those actions.

3.5. PLANS VERSUS CAPABILITIES

One of the most used definitions of strategy regards it as a unified, comprehensive and integrated plan design to assure that the basic objectives of the
enterprise are achieved. In such a situation, everybody might wonder what is best for a company: (a) to develop plans and then to seek capabilities or (b) to build capabilities and then to encourage the development of plans for exploiting them. Of course, the line between the two approaches will never be too clear.

There are another few couples of terms which could help in understanding both decisions and strategy fields (structured-unstructured problems, analysis-synthesis phase, short-long term change, emotion-cognition interaction, static-dynamic systems and environment), but they will not be cover here due to the limited space of this paper.

4. CONCLUDING REMARKS

The previous sections suggest that the entire strategy process is based on a series of decisions, even if the process of reaching them is not always conscious or rational. If we agree with this assumption, then the role of decisions sciences is obvious.

4.1. WHY STRATEGISTS SHOULD USE THE FINDINGS FROM DECISION SCIENCES

As David (1998) pointed out, managers never have all the information they need to make decisions because it requires too much resources to obtain it in terms of money, time, effort, or it is simply unavailable. Especially when they deal with strategic movements, they have to decide in condition of uncertainty, therefore the methods of decision sciences can be extremely useful.

Probably the most import area of strategy where decision science should play a major role is that of objectives generation and problem structuring methods (Keeney, 1992; Rosenhead, Mingers, 2001). For example, research showed that humans are considerably deficient in utilizing personal knowledge and values to set objectives for the decisions they face, although objectives represent the basis for sound strategy (Bond, Carlson, Keeney, 2008). A lot of applications can be found in area such as military systems acquisition (Buede, Bresnick, 1992), nuclear accident (French, 1996), future space systems (Rayno, et al., 1997), military space technologies (Burk, Parnell, 1997), portfolio selection (Jackson, et al., 1999).

The next essential domain would be that of decision support systems that allow to manipulate a huge amount of data and solutions. For example, Dunning (2001) helped the New York Power Authority develop a 10-year schedule for refuelling its Indian Point 3 Nuclear Power Plant by using software in applying a spectrum of decision analysis tools including strategy tables, an influence diagram, and a decision tree with over 200 million paths.

Another area is related with the education of people about how they should behave in conflict situations and in predicting how they do behave in conflict situations. For instance, in teams people always have individual preferences that shape the basis of the decision problem at hand and all literature on cognitive biases should provide useful insights for managers.
In many organisational contexts, due to the fact that stakes are sufficiently large, a decision maker will seek the opinions of several experts rather than rely solely on the judgement of a single expert or on his or her own expertise. In such a situation, decision analysis can show how to combine these expert opinions to form a consensus distribution to be used in the decision model. It could offer the opportunity to collapse large amounts of information into convenient and parsimonious categories which can be used to test hypotheses and examine relationships.

4.2. FINAL CONCLUSION

Disciplines, such as medicine and psychology, presently use evidence based practice models and attempt to take into account valid knowledge and procedures, therefore if a similar trend will be also followed in management, the concepts, the methods, and the findings from decision sciences would be invaluable.

In organisations, people make decisions almost constantly, and high performing organisations enjoy superior performance because of the unique insights and abilities they controlled when their strategies are selected and executed. Therefore it is reasonable to assume that many organisational issues can be observed through the decision-making lens. From this viewpoint, decision-making expertise may be seen as core to the development and optimisation of organisations and the understanding and use of decision sciences truly has the potential to improve organisational performance.

However, it is important to reiterate that there is no shortcut to error-free decision-making systems for individuals or organisations, because decision making is an incredibly complex human phenomenon.

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**REZUMAT**

Pornind de la constatarea că multe probleme organizaţionale pot fi analizate din perspectiva luării deciziilor, lucrarea prezentă încercă să dovedească faptul că științele decizionale oferă o perspectivă conceptuală, metodologică și practică utilă în abordarea diferitelor dileme organizaţionale, atât la nivel strategic, cât și tactic. Lucrarea are trei obiective: (1) să ofere o delimitare conceptuală între științele decizionale și managementul strategic, (2) să investigheze rolul unor concepte cheie în înțelegerea celor două abordări și (3) să evidențieze modul în care științele decizionale pot îmbogăți domeniul strategiei organizaţionale. Lucrarea se încheie cu concluzia că expertiza în domeniul luării deciziilor reprezintă un fondament pentru dezvoltarea și optimizarea oricărei instituții, iar înțelegerea și utilizarea științelor decizionale are în mod real potențialul de a crește performanța organizațională.