An Evaluation of MS/OR Tools for Use in Strategic Management

Delwyn N Clark and John L Scott
Department of Management Systems
University of Waikato

Abstract

The application of some specific MS/OR tools to support strategic decision making has been recently advocated. However, the areas within Strategic Management which are potentially suitable for MS/OR application have not been described in any detail.

The contribution of MS/OR modelling tools for strategic decision support is examined in this paper. To provide a framework for the analysis, the nature of the Strategic Management process is considered, and the basic organisational and environmental elements identified. A set of 40 MS/OR techniques, tools and approaches is then evaluated by matching their capabilities with the requirements of the strategic tasks. This analysis identifies the potential strategic application areas for each of the MS/OR tools and is part of ongoing research in the area.

1. Introduction

Strategic Management (SM) is concerned with developing and implementing strategies to improve the future prospects and performance of an organisation. In a dynamic environment the Strategic Management tasks are complex, and yet vitally important for establishing direction and co-ordinating resources to maintain a competitive advantage. There is a vast array of techniques, tools and approaches which are available for managers to use in formulating and implementing strategies. As many of the tools are task-specific it is necessary to use a selection of tools to cover all of the Strategic tasks. There have been some attempts to provide guidance for tool selection: Prescott and Grant [1] evaluated 21 competitive analysis techniques and Webster, Reif and Bracker [2] published a Manager’s Guide for a set of 30 Strategic Planning tools. However, a comparative strategic evaluation of the modelling tools from the Management Science/Operations Research (MS/OR) discipline has not been performed, and this paper begins to serve that need.

The application of some specific MS/OR tools to support strategic decision making has been advocated by Wagner [3], Kirkwood [4], Thornton [5] and Lootsma [6]. Detailed papers have been written on some of the tools such as goal programming (Batson, [7]), forecasting (Capon and Hulbert, [8]; [9]), and systems dynamics (Morecroft, [10]). While the strategic applications of MS/OR tools have been reviewed recently (Clark, [11]), the areas within Strategic Management which are potentially suitable for MS/OR tool application have not been described in any detail.
The purpose of this analysis is to evaluate a sample of MS/OR tools to identify the areas within Strategic Management where they can contribute. First, the nature of the SM process will be explored, and the basic elements of SM identified to provide a normative framework for the tool evaluation. The results of the strategic evaluation of the MS/OR tools will be described, and the paper will conclude with recommendations for further research.

2. Strategic Management Process

The essence of Strategic Management within organisations revolves around determining appropriate answers to three fundamental questions: (1) Where are we now? (2) Where are we going? and (3) How do we get there? These questions provide the basic structure for a three phase SM process model which includes: (1) Situation Assessment, (2) Strategic Analysis, and (3) Implementation.

The typical normative SM process model involves a series of activities which are represented sequentially for ease of communication, but which in practice will be overlapping and iterative. Although a simplification, the process model provides a framework or structure for thinking through/understanding the nature and essential elements of SM (Johnson and Scholes, [12]). A list of the basic SM process tasks was developed (Hofer and Schendel, [13]; Wheelen and Hunger, [14]; Pearce and Robinson, [15]), and these activities were then sub-divided according to the three phases. The partitioning of the activities, which is simple and sequential, produces the following three phase SM process model:

<table>
<thead>
<tr>
<th>Phase 1: Situation Assessment</th>
<th>Where are we now?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Evaluation of current position</td>
<td></td>
</tr>
<tr>
<td>2. Identification of strategic issues</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Phase 2: Strategic Analysis</th>
<th>Where are we going?</th>
</tr>
</thead>
<tbody>
<tr>
<td>3. Generation of strategic alternatives</td>
<td></td>
</tr>
<tr>
<td>4. Evaluation of strategic alternatives</td>
<td></td>
</tr>
<tr>
<td>5. Selection of a specific strategy</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Phase 3: Implementation</th>
<th>How do we get there?</th>
</tr>
</thead>
<tbody>
<tr>
<td>6. Development of detailed plans to achieve the strategy</td>
<td></td>
</tr>
<tr>
<td>7. Implementation of the plans</td>
<td></td>
</tr>
<tr>
<td>8. Review/monitoring of performance</td>
<td></td>
</tr>
</tbody>
</table>

This model of the SM process will be used as a framework for evaluating a sample of MS/OR tools. For the Phase 1 assessment of the current position it is necessary to evaluate all of the components of the organisation, as well as the environmental elements. These basic
elements of Strategic Management will be outlined in the next section as they will be included within the Situation Assessment Phase of the analytical framework.

3. Basic Elements of Strategic Management

The basic elements of Strategic Management include the features of the organisation itself and its surrounding environmental influences. Each are now considered.

The organisational elements include both the tangible and intangible components of the system. Wheelen and Hunger [14] describe the internal organisational features as the trio of Structure, Culture and Resources. Bower [16] and Waterman [17] also include top management's leadership Style in their set of components. Waterman, Peters and Phillips [17] add Strategy to the essential organisational elements. The Mission and Objectives of the organisation will also be included in this analysis (Hax and Majluf, [19]). Nine types of Resources have been identified (Wheelen and Hunger, [14]; Johnson and Scholes, [12]) including: administrative systems, financial resources, human resources, information systems, intangible resources, marketing/distribution, production/operations, physical resources, and research & development.

The environment includes the external factors which influence the operations of the organisation directly or indirectly. It can be considered in two areas: (1) the factors in the immediate or Operating Environment (OE), and (2) the more general forces which have an impact on the organisation, known as the Remote Environment (RE). The Operating Environment includes the industry, markets, competitors, customers, suppliers and stakeholders which affect, or are affected by, the major operations of the organisation. The Remote Environment includes the wider factors such as economic, political, legal, social, and technological forces which may impact/impinge on the organisations operations (Wheelen and Hunger, [14]; Johnson and Scholes, [12]). The capabilities of the tools will be evaluated in terms of these organisational and environmental elements in the Phase 1 Situation Assessment.

4. Strategic Evaluation of the MS/OR Toolkit

A sample of 40 MS/OR techniques, tools and approaches was selected for this analysis from the MS/OR literature. The principal source was the International Abstracts in Operations Research (IAOR) technique list, supplemented with tools from a previous literature analysis (Clark, [11]), and surveys, serials and texts. This toolkit contains both the traditional 'hard' techniques such as decision analysis and linear programming, and some of the newer 'soft' approaches e.g. soft systems methodology, and strategic choice. It includes the newer technological tools of spreadsheet modelling, decision support systems, and expert systems, as many MS/OR practitioners are now involved with them (Carter, [20]).

The strategic process model, as outlined, was used as a framework to evaluate the MS/OR tools. Each tool was studied and its contribution to each process step assessed and recorded in a matrix. The cumulative results will be now be presented for each of the 3 SM phases.

4.1 Phase 1: Situation Assessment

For the Situation Assessment phase the specific tools were analysed to see which of the
organisational and environmental elements are usually included in their application. For the general tools, their potential contribution to each element was considered.

### 4.1.1 Organisational Analysis

Figure 1 shows the percentage of the tools which are applicable for each of the organisational elements. In general more of the tools are applicable for the evaluation of Resources than the other organisational elements. Six of the Resource areas are able to be incorporated by at least 75% of the tools. Furthermore the top three areas, which include the Physical (98%), Financial resources (95%), and Production/Operations (93%) reflect the traditional application areas of MS/OR.

![Organisational elements](image)

**Figure 1 Situation Assessment: Organisational Elements**

At the other extreme, only 7 of the tools (18%) include, or are applicable to, the organisational Culture, Management Style, or the Mission. Objectives are incorporated by 23% of the tools, and the Structure by 33% of the sample. The lowest Resource areas were the Intangibles, which are incorporated by 33% of the tools, and Administrative Systems which are able to be evaluated by 43% of the sample.

The average number of the 15 organisational elements which are included by a tool is 8.3 which represents 55% of the set of elements. However, this cumulative average smooths the effects of both high and low results. Ten of the tools include 5 or fewer of the elements; by contrast, there were 15 tools (38%) which incorporate 10 or more of the elements. Finally, the mode for the sample was 6 elements.

These cumulative results show that the major contribution of the MS/OR tools in the Situation Assessment Organisational Analysis lies in the Resource evaluation area. The results for the individual MS/OR tools provide both a comparative evaluation of the tools and a
comprehensive assessment of their contribution to each of the basic organisational elements.

4.1.2 Environmental Analysis

Figure 2 shows the percentage of the tools which are applicable to each of the basic environmental elements. In the Operating Environmental (OE) area the aggregate results are almost uniform. Four of the OE areas (Industries, Competitors, Customers and Suppliers) are able to be addressed by 55% of the tools. The other two OE elements are close to this value, with Markets providing the upper limit of 60% (24 tools), and Stakeholders the lowest value of 45% (18 tools).

![Environmental elements](image)

**Figure 2 Situation Assessment: Environmental Analysis**

In the Remote Environmental (RE) area, three of the five elements (Political issues, Legal and Social developments) are incorporated by 17 or 18 tools which represents 43-45% of the sample. The other two RE elements are higher, with Economical forces at 60% (24 tools) and Technological issues able to be evaluated by 58% of the sample.

The cumulative average of the Operating Environmental elements incorporated by the tools is 54% and for the Remote Environmental elements it is 50%. Sixteen of the tools do not include any of the OE elements, however 18 tools include all 6 OE elements. The result for the RE elements is very similar, with sixteen of the tools not considering any of the RE elements, and 17 tools including all 5 of the RE elements.

4.2 Phase 2: Strategic Analysis

Each of the SM tools was evaluated in terms of the three Strategic Analysis phase activities: (1) generating options or alternative strategies, (2) evaluating the options, and (3) selecting
the best strategy. The cumulative results for the whole sample are summarised in Figure 3.

Thirty seven tools, which represents 93% of the sample, provide a mechanism for evaluating alternative strategies. Generation of the strategic options is a feature of 22 tools (55%). However, the process of making the selection of the best strategy is found in only 10 tools. This is further evidence of the support role provided by analytical tools. Ultimately, the decisions are made by the people involved, combining their judgement with all of the other inputs.

All but one of the MS/OR tools have some involvement with the Strategic Analysis phase activities. Forty eight percent of the sample perform only 1 of these activities; 10 tools (25%) perform 2 of these tasks, and a further 25% involve all 3 of these strategic tasks.

Figure 3 Strategic Management Process: Phases 2 and 3

4.3 Phase 3: Implementation
The Implementation phase activities include (1) developing detailed plans to achieve the chosen strategy, (2) implementation of the plans, and (3) reviewing/monitoring the performance of the organisation in terms of its strategic goals. The Implementation phase results for the total sample are shown in Figure 3.

Thirty six of the tools, which represents 90% of the sample, are able to be applied to the task of developing action plans. Similarly 33% of the tools are applicable for the monitoring and review role. However, only 7 of the tools are specifically concerned with the actual implementation of the strategy.
Only 3 of the MS/OR tools do not have any potential Implementation phase involvement. Twenty four of the tools are concerned with only 1 Implementation task; there are 7 tools which contribute to 2 of these tasks, and a further 6 tools which involve all 3 of the Implementation tasks. In some cases there is a flow-through effect with the evaluative criteria from the earlier analysis providing performance monitoring criteria in Phase 3.

5. Conclusions and Recommendations for Further Research

This strategic evaluation of a sample of MS/OR tools has identified the specific areas within the Strategic Management process where each tool can be applied, and the aggregated results provide an indication of the contributions to each process phase. The general contributions and ideas for further investigation and research will be briefly discussed.

The major contribution of the MS/OR tools in the Situation Assessment phase of SM lies in the Resource evaluation area, as over 75% of the tools can be applied to evaluate 6 of the 9 resource areas. In addition, most of the Operating Environmental elements are addressed by 55% of the tools, and the Economic and Technological RE areas are able to be incorporated by 60% and 58% of the tools, respectively.

In the Strategic Analysis phase, the major role of the MS/OR tools is in evaluating alternative strategies, however 55% of the sample are also involved in the generation of strategic options. Ninety percent of the tools are able to contribute to developing action plans for Implementation of the Strategy, and 33% can be applied to monitor/review the strategic performance.

Therefore the potential coverage is significant, however the effectiveness of the tools has not been included in this evaluation as yet. Further analysis is planned to compare the SM process phase results for the different types of tools within the sample (e.g. general vs specific nature). This normative framework will also be used to evaluate a toolkit of Strategic Management tools for comparative purposes. In the future the framework will be used as a template for an international comparative survey of practitioners to identify actual usage patterns for the tools, how effective the tools are in the Strategic Management phases, and how they might be improved.

References


