COMPETITIVE STRATEGY ANALYSIS USING COMPUTER SOFTWARE

H. Igor Ansoff

It is impractical to expect busy senior managers to devote much time to learning intricacies of modern strategic analysis. But much analytic expertise can be built into a computer programme. This article describes ANSPLAN-A, a programme that can integrate the analytic expertise of a computer with experience and wisdom of executives.

Since the 1990s, two important trends have been changing the manner in which firms develop their business strategies. The first trend is a shift from a “buy” to a “make” approach. Increasingly, firms are developing internal strategy analysis capabilities and thus are reducing their analytical dependence on external consultants.

The reasons for this trend are several:

1. Many large firms are finding that they have to pay continuous, rather than periodic, attention to their strategies. When this occurs, either the firm must virtually keep an external consultancy on its payroll, or it can reduce its need for consultancy by developing an internal do-it-yourself strategic analysis capability.

2. Numerous firms have found that whenever the recommendations given by external consultancies require difficult and organizationally wrenching changes within the firm, the recommendations are frequently resisted or even rejected by the organization.

3. In many large firms, the internal planning staffs have become knowledgeable and skilled in strategic analysis.

4. Small and medium sized firms are increasingly feeling the need for continual preoccupation with their strategic future. But the fee structure of the leading consultancies are beyond the means of most such firms. Hence, they have no choice but to be more self-sufficient when developing their own strategies.

The trend toward internalizing strategy formulation is accompanied by a trend to involve line managers, who are responsible for strategy implementation, in the process of analyzing and developing strategies. The reasons for this are again several:

1. Paralysis by analysis. Experience has repeatedly shown that, whenever difficult organization wrenching strategies are formulated by the internal staff, they fare even worse than strategies formulated by external consultants. In practice, a typical result has become known as “paralysis by analysis” - results of annual planning exercises remain on paper and gather dust on the corporate planner’s shelves.

2. Seasoned judgment. Perhaps the most compelling conditions for involvement of line management in strategy formulation are encountered in turbulent environments in which the future is highly unpredictable and analysis must be based as much (or more) on seasoned judgment of experienced managers as on historically based models and predictions developed by staffs.

3. Acceptance of change. Both experience and academic research show that, if managers are to accept the imperative need of novel threatening changes, they must convince...
themselves of the necessity of these changes. And personal involvement in analyzing strategy imperatives (as opposed to responding to staff generated analyses) is a powerful influence toward acceptance of the need and inevitability of change.

4. Risk assessment. Novel changes require that managers take large-scale entrepreneurial risks in reorienting the firm. Typically, the probable outcomes of novel changes cannot be fully evaluated quantitatively. After all the available quantitative data has been brought to bear on the decision, there remain large areas of uncertainty. Thus, the decision must be based on “soft data” and entrepreneurial flair. Such decisions are difficult to make, unless the responsible managers have involved themselves in the analysis and gained a clear understanding where “soft data” and uncertainties lie.

Enter the Computer Programme

Hence, there has been a dual trend toward internalizing strategy formulation within the firm and involving line managers from the first day of the process. But if line managers are to become active participants in strategy analysis, they need both training and help.

They need training because strategy analysis has moved far beyond the stage at which all managers have to do is write answers to three questions: “Where have we been?”, “Where are we?” and “Where do we want to go?”.

The discontinuities in economic growth, the complexity of the global marketplace, the pervasive impact of technology, the growing importance of sociopolitical variables in business decisions - all these trends have made it both naive and impossible to rely on the three questions as the sole tools for deciding what the firm can and needs to do in the murky and complex future.

Fortunately, thanks to major consulting firms, academics and staff within leading business firms, modern logic of strategic decision making, as well as analytic instruments, have been developed for mastering the strategic challenges of today. But while every manager responsible for strategy must master the logic, it is impractical to expect busy senior managers to devote the time to learning intricacies of modern strategy analysis.

In recent years, we see the emergence of software tools which makes it unnecessary for managers to become experts in strategy analysis. Much of the analytic expertise can be built into a computer programme, and the programme can be used by managers who understand the basic logic of strategic thought, but are not experts in analysis. The following describes such a programme.

Turbulent Environments

The programme, called ANSPLAN-A, is designed especially for strategy analysis in turbulent environments. The characteristics of turbulent environments are:

- Growth doesn't extrapolate;
- Historical strategies are suspect;
- Profitability doesn't follow growth;
- The future is highly uncertain; and
- The environment is full of surprises.

In models of turbulent environments, analyses and recommendations that are based on extrapolation of historical successes are not only suspect but potentially dangerous. History is full of instances in which managers have made the near-fatal errors of adhering to their historical success strategies when environments had become turbulent. A classic example is Henry Ford I, who lost his undisputed leadership in the automotive industry by insisting on “giving it [the Model T] to them in any color so long as it was black” at a time when the automotive industry moved into the turbulent marketing oriented phase of growth.

But, even today not all environments will be turbulent. Some firms will be fortunate in finding themselves in markets in which past successes provide a valid basis for extrapolation into the future.
Exhibit I illustrates the two possible types of future environments. As the exhibit shows, when the future environment is expected to be strategically continuous, a number of analytic techniques developed during the past thirty years are applicable to strategic analysis. These techniques can be incorporated into what in management science are called what-if computer model. When different strategies under consideration by management are entered into such models, the computer evaluates their probable outcomes and displays and compares the results of numerous alternatives.

However, when the environment is turbulent and models based on historical experience become problematic, new scenarios of future possibilities and their consequences have to be created. And the best sources of data and judgment for constructing such scenarios are the seasoned and experienced line managers, not only because of their superior knowledge of the environment, but also because of their need to understand the hard and the soft inputs that go into the scenarios, if they are to make major risk decisions.

The computer model appropriate for this purpose is significantly different from the what-if model. It is called the symbiotic model because managers and the computer work side by side. Its key difference from the what-if model is that it involves managers in constructing a scenario of the future and guides them toward selection of the preferred strategy. Thus, in interaction with the computer software, managers are both the builders and the users of the model.

The symbiotic interactions between managers and the software are illustrated in Exhibit 2. As the exhibit shows, the historical data is not discarded. It is entered in the computer and provides a base from which future departures from extrapolation are estimated.

Once the historical data is entered, a team of managers use the combined judgments of the team members to estimate the range of future possibilities that will be available to the firm in the competitive environment. At one extreme, as might be the case in a small firm, the future possibility estimates are based solely on the judgments of the managers participating in the exercise.

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*While the division into two types of environment is too crude for describing the range of significantly different possibilities, it is adequate for the present discussion.*
But, as Exhibit 2 suggests, all relevant staff studies, forecasts, scenarios and impact analyses which may be available to the firm can be brought to bear on the judgments made by the managers.

Using the future possibility estimates, the computer next guides managers through a complex process that enables them to choose the future strategic course of action for the firm (labeled "action choice" in Exhibit 2).

The computer's contribution is, first, in the role of a friendly interlocutor, who guides complex analysis step by step, but (as the feedback arrows on the right of the exhibit show) leaves the managers in control of the process. At any stage of the process, if the results contradict the managers' judgments, the computer invites them to reanalyze and reappraise the preceding steps in the programme.

The computer's second role is in performing multi-alternative calculations. The data handling capacity of the computer enables managers to deal with greater complexity than is possible in unassisted decision making.

Exhibit 2 shows the generic nature of the symbiotic model. The particular model that was built by this author is called ANSPLAN-A. The following sections describe this model.

### The Logic of ANSPLAN-A

ANSPLAN-A was designed for use in competitive environments that are expected to be turbulent and require personal involvement of responsible managers in the analysis and decision process.

However, it can also be used in extrapolative environments by managers who want to gain a deeper understanding of the analyses and action recommendations prepared by staff analysts or external consultants. The overall logic of ANSPLAN-A is illustrated in Exhibit 3.

The "SBA" shown in the exhibit stands for "Strategic Business Area," which is a distinctive area of business opportunity (strategic market segment) in which the firm either does or contemplates doing business. This is an overview of the steps for ANSPLAN-A:

- **Module 1**

Following current practice, the prospects which will be available in a SBA, are analyzed first. During this analysis, the firm's historical and present performance in the SBA, as well as its products and strategies, are held in abeyance. The focus is on the question: "What threats, opportunities, growth/profitability prospects will be available in the SBA to successful competitors?"

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**EXHIBIT 3: Competitive Posture Analysis in Turbulent Environments**

<table>
<thead>
<tr>
<th>Firm</th>
<th>SBA</th>
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<tbody>
<tr>
<td>Extrapolated Competitive Position (Module 2)</td>
<td>Prospects (Module 1)</td>
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<tr>
<td></td>
<td>Course of Action (Module 3)</td>
</tr>
<tr>
<td>Gradual Commitment (Module 3a)</td>
<td>Immediate Commitment (Module 3b)</td>
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<tr>
<td></td>
<td>Preferred Strategy (Module 4)</td>
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</table>
Module 2
Following analysis of prospects, the second step is to estimate how well the firm will perform in the SBA if it continues to use its present strategy. In Exhibit 3, this is called the "extrapolated competitive position".

In turbulent environments, it is difficult to make confident estimates of both prospects and competitive position. In ANSPLAN-A, the participants are encouraged to take full account of the future uncertainties by making a range of forecasts from pessimistic to optimistic.

Module 3
The results of the first two steps are combined in step 3, and the managers are helped to make a key decision between two approaches to the SBA: immediate commitment to a future strategy or gradual commitment, keeping options open as long as possible.

Once this key branching decision is made, the computer leads managers through an analysis of its consequences. If gradual commitment is chosen, managers select the process through which the firm will progressively clarify its position in the SBA. If immediate commitment is chosen, managers select the strategy they will develop, the capabilities they will build to support the strategy and the strategic investment they will make into the SBA.

Module 4
In the final step of ANSPLAN-A, managers identify concrete programmes and projects that must be launched to assure implementation.

The logic and contents of each of these four modules are elaborated in the following.

Module 1
The logic of Module 1 is illustrated in Exhibit 4. As mentioned before, the first step is analysis of prospects in a chosen SBA without, for the moment, concern with the firm's future performance.

This initial focus on the environment instead of the firm, is typically a harsh discipline, which managers find difficult to follow. But it is a vital step toward a critical analysis of the firm's historical successes.

Three prospects of a SBA are analyzed: future growth, future profitability and future turbulence. This is done by identifying the key variables that will determine these prospects and estimating the probable ranges of shifts in the values of these variables during the next five to seven years. The computer combines the variables and the shifts into overall optimistic and pessimistic estimates of the respective prospects.

EXHIBIT 4
Module 1: SBA Priority/Attractiveness

![Diagram of SBA Priority/Attractiveness](chart.png)
As shown in Exhibit 4, the objectives of the firm are an index (on a scale from 0 to 10) of the SBA's future attractiveness to the firm.

Another result of Module 1 is an assignment of the future priority to the chosen SBA, relative to the other SBAs of the firm. This is done by comparing the historical profit contribution by the SBA with its future attractiveness.

**MODULE 2**

Module 2, shown in Exhibit 5, turns one's attention from the SBA's attractiveness to the responsiveness of the firm's present strategy to the future success conditions in the SBA.

In the first phase of Module 2, managers, guided by the computer, perform a detailed analysis of the probable future success factors in the SBA. This includes analysis not only of strategy but also of capabilities and level of strategic investment that will be necessary for success in the SBA. The strategy components analyzed are:

1. **Growth substrategy** - This specifies the method by which successful firms will assure their future growth in the SBA. For example, this might include expanding the geographic market scope, or letting natural growth of demand carry the firm forward.

2. **Market position substrategy** - For example, this could be seeking to become a dominant monopolistic competitor, a member of an oligopoly, or at the other extreme, making a gradual withdrawal from the SBA.

3. **Market differentiation substrategy** - This specifies the market image niche that successful firms will use in the SBA. For example, firms may offer the “best buy for the money” and so forth.

4. **Product differentiation substrategy**. Products may emphasize advanced technology, reliability, aesthetic appeal, etc.

The future success factors of the following supporting capabilities are next analyzed:

- General management
- Finance and accounting
- Marketing
- Research and development
- Production

The computer presents managers with detailed lists of possibilities for both strategy and capabilities, lets them amend the lists, and asks them to estimate the future competitive importance of the respective possibilities. As in estimation of attractiveness,
managers are encouraged to make ranges of probable estimates, rather than try for a single most probable estimate.

In the second phase of Module 2, the profits of the firm's present strategy and capability are identified.

In the third phase, the future success factors are compared with the firm's profiles to obtain an overall estimate of the firm's present responsiveness to the future success factors. This is called the extrapolated competitive position (ECP) in Exhibit 5.

**MODULE 3**

The results of Modules 1 and 2 are combined in a matrix form shown in Exhibit 6. Two cases are illustrated.

Case 1 describes a SBA that holds few future mysteries: The attractiveness is high, the firm's competitive position is excellent, and both fall within a narrow range. As Exhibit 6 illustrates, the firm is well-advised to make an immediate and forceful commitment to improve its strategy to become a top competitor.

Case 2 presents a large region of uncertainty: The ranges of expectation about the attractiveness and the firm's extrapolated competitive position are both wide. The firm is advised to proceed with caution.

The consequences of the respective decisions are shown in Exhibit 7. Case 2 in Exhibit 6 would focus the managers' attention on progressive commitment. The left hand side of Exhibit 7 presents the options which the computer will help managers to analyze.

If, as in Case 1, immediate commitment is indicated, the computer guides the managers' attention to the options shown in the lower right hand part of Exhibit 7. The computer will invite the managers to make a preliminary choice of one of the options. Then the computer will guide them through an estimate of the consequences of that choice.

The key consequence is the change in the return on the investment that the firm would obtain from moving to the chosen competitive position. The computer estimates the marginal change in the return on the investment for each competitive position chosen by the managers.

If the first result appears unattractive, the managers try other options shown at the bottom of Exhibit 7 until they find an option to which they want to commit the firm. Once the commitment is made, the computer proceeds to Module 4.

**EXHIBIT 6**

Module 3: The Region of Uncertainty

![Exhibit 6 Diagram](image-url)
EXHIBIT 7
Module 3: Choosing the Course of Action in SBA

MODULE 4
The logic of Module 4 is illustrated in Exhibit 8. The success factors in the SBA and asks the managers to construct several strategies which will be the most successful in the SBA.

The computer compares each of the success strategies with the firm's present strategy profile to determine the best fit strategy. This would be a success strategy that would require the least modification in the firm's present strategy.

EXHIBIT 8
Module 4: Choosing Strategy/ Capability
Managers next make a judgment on whether the future competitive environment in the SBA will be oligopolistic (in which counter strategies by competitors are important), or whether competitors' strategies will have little direct influence on the firm's success.

In the former case, the computer leads the managers through a competitive matrix analysis shown in Exhibit 8. In the latter case, the best fit strategy becomes the preferred strategy for the firm.

As shown at the bottom of Exhibit 8, the final step in ANSPLAN-A is to develop strategy and capability improvement programmes.

ANSPLAN-A in a Larger Perspective

There are two distinctive approaches using the computer in management decision making. If the decision problem can be described by a series of mathematical relationships, if the input variables can be specified in advance, and if the criteria of choice can also be quantified, the computer can analyze the alternatives, select the optimum decision, and present it to the managers. Such decision problems were termed well-structured by Herbert Simon, an early pioneer in the application of computers to management problems. The distinctive character of well-structured problems comes from the fact that once the problem and objectives are specified by the decision model, the actual decision is made by the computer. Numerous applications of computer programmes to well-structured problems are now found in practice: determining levels of inventory, scheduling production, deploying salespeople, identifying poor credit risks, etc. Computer programmes of well-structured problems are called optimizing programmes.

If the decision problem statement is well-structured, but there is uncertainty about the future values of the input variables, or the decision criteria cannot be quantified, the problem becomes "partially structured". Another type of computer programme, called a what-if programme becomes useful. The decision maker enters the values of input variables he would like to try, the computer evaluates the consequences, and the decision maker chooses an option after having tried several alternatives.

An important difference between the optimizing and what-if models is that the latter puts the manager directly in contact with the computer. Examples of what-if model applications are also numerous: making capital investment decisions, selecting plant location, or evaluating strategies.

Beyond partially structured problems, there are "ill-structured" problems for which neither the model nor the input variables, nor the criteria can be fully specified in advance. In management, this class of problem is typically encountered in turbulent environments when historical experience is suspect as a valid basis for making a decision about the future. These are decision situations in which a manager's judgment, learning ability, creative intuition and entrepreneurial flair all become dominant during the problem-solving process.

At the moment, there is a great deal of interest in the field of artificial intelligence that seeks, ultimately, to produce intelligent computer programmes which stimulate the manager's thinking and learning behaviour and replace him in solving such "ill-structured" problems. The goals of artificial intelligence are ambitious, and it is still not clear whether (and when) the thinking programmes will be constructed for strategic management in turbulent environments. Until such time arrives, there is both room and need for programmes that lie between the what-if and the ultimate learning programmes.

ANSPLAN-A is an example of such an intermediate model. As shown in this article, the model puts the manager and the computer into an interactive partnership. The programme is run in "real time" which means that the computer and the manager work side by side through the course of analysis and decision making. The model is symbiotic in the sense that each partner contributes his advantage. The computer contributes its ability to manage complex logical processes and vast amounts of information. The managers contribute their judgment, entrepreneurial flair and the ability to make ill-structured decisions.