

A NOTE ON STRATEGIC MANAGEMENT TRAINING FOR SYSTEM DYNAMICS MODELLERS

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ABSTRACT

This note is a contribution to the discussion of academic training requirements for System Dynamics modellers. In particular, it suggests that training in Strategic Management can provide the System Dynamics modeller with some essential complementary tools and a top management perspective (or systems viewpoint), which is needed to define problems of real managerial interest.

INTRODUCTION

This note is a contribution to the discussion instigated by Fey (1981) as to why System Dynamics has not been more widely accepted and successful, even though it has had nearly 25 years to become established. (J.W. Forrester started the Industrial Dynamics Group at M.I.T. in 1956).

In the related field of Corporate Planning, Naylor (1979, p.266) suggests that one of the major reasons for the limited success of Corporate Planning is inappropriate academic training:

"If management scientists spent 20 per cent less time solving differential equations and inverting matrices during their academic careers, and 20 per cent more time learning how to define problems and interact with management, corporate modelling would take a great forward leap".

Perhaps inappropriate academic training is also one of the major factors restricting the success of System Dynamics. It is suggested here that training in Strategic Management can provide the System Dynamics modeller with some essential complementary tools and the perspective needed to define problems of real managerial interest. Problem definition has been emphasized by Meadows (1981), who notes the generally accepted view that defining a problem is the most important single step in research.

STRATEGIC MANAGEMENT

Strategic Management is the responsibility of top management, and is a continuous process which can help an organisation adapt to a constantly changing external environment. It is defined by Glueck (1980, p.6) as:

"Strategic Management is that set of decisions and actions which leads to the development of an effective strategy or strategies to help achieve corporate objectives".

Strategic Management training can provide a 'top management perspective' (or systems viewpoint) of all the functional parts of an organisation, e.g. finance, marketing, production, personnel, etc., and is, therefore, an extremely useful aid in helping to define problems of real managerial interest.

Glueck (1980, p.20) suggests that:

"Strategic management helps educate managers to become better decision makers. It helps examine the basic problems of a company".

The strategic management (planning) process, (based on Glueck, 1980) includes the following elements:

1. Setting the organisation's objectives.
2. Internal analysis – assessing the strengths and weaknesses of the organisation by systematically examining the following broad areas: internal political structure, organisational structure, present strategies and policies, finance, accounting, marketing, distribution, production, operations, research and development, personnel, labour relations, resources and assets.
3. External analysis – systematically appraising the potential threats and opportunities from the external environment. This requires consideration of the following general areas: factor inputs, product markets, competitors, technological environment, social environment, political and legal environment, and geographic environment.
4. Consideration of alternative strategies – the generation of a number of alternative strategies as a result of matching the environmental threats and opportunities identified by the external analysis, with the organisation's strengths and weaknesses identified by the internal analysis.
5. Choice of the most appropriate strategy – the choice of

the strategy which will best meet the organisation's objectives. This choice involves consideration of selection factors, evaluation of alternatives against these criteria, and the actual choice.

6. Implementation of the strategy – the assignment of managers to match the strategy, development of functional policies and the organisational structure to support the strategy.
7. Evaluation of the strategy – the determination of whether the strategic choice as implemented is meeting the objectives of the enterprise.

SYSTEM DYNAMICS

System Dynamics was developed by Forrester (1961) and others at M.I.T. in the late 1950's, based on developments following World War II in:

- the theory of information feedback systems,
- the understanding of decision making processes,
- the use of mathematical models to simulate complex systems, and
- the development of high speed electronic digital computers as a means of simulating mathematical models.

System Dynamics has been further developed by Coyle (1977) and defined by him (p2) as:

“System Dynamics is a method of analysing problems in which time is an important factor, and which involve the study of how a system can be defended against, or made to benefit from, the shocks which fall upon it from the outside world”.

THE COMPLEMENTARY RELATIONSHIP BETWEEN STRATEGIC MANAGEMENT AND SYSTEM DYNAMICS

Both the strategic management process and the system dynamics method are concerned with guiding an organisation (system) through time in the face of threats and opportunities from a rapidly changing external environment. It can be shown that the two methods complement each other as follows:

- (a) Stages 1–3 of the strategic management process described above, i.e. setting objectives, internal analysis and external analysis, can provide the System Dynamics modeller with a systematic approach to defining problems of real managerial interest, and help in defining the model boundaries.
- (b) A system dynamics model can be most useful in stages 4–7 of the strategic management process, i.e. considering alternative strategies, choosing, implementing and evaluating the strategy. A system dynamics model can be used to explore more systematically the interrelationships between the organisation and its external environment. In particular, a system dynamics model is a very powerful aid in helping to examine the implications of alternative strategies, and in helping to design robust policies and an improved organisational structure, which can help steer the organisation towards meeting its objectives.

Similarly, Drucker (1977, pp. 427-8) comments on the importance of quantitative analysis in decision making:

“Most managers know that they need better tools. Most have learned through bitter experience that intuition is unreliable, if not downright treacherous, if used as the only basis for decision. Indeed, most managers have long suspected what a leading management scientist of today, Jay, W. Forrester of M.I.T. brilliantly demonstrated: complex systems actually behave ‘counter intuitively’; the course of action suggested by common sense tends to be wrong. And markets, technologies, and business are very complex systems indeed”.

SUMMARY

This note has presented a contribution to the discussion of what academic training is necessary for System Dynamics modellers. It was suggested that training in Strategic Management can provide the System Dynamics modeller with some essential complementary tools and a “top management perspective” (or systems viewpoint), which is needed to define problems of real managerial interest. This training is stressed however, because apart from being taught in Management Departments, System Dynamics is also taught in other academic departments, e.g. Engineering, Applied Mathematics, and Economics, where courses in Strategic Management may not be readily available.

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