

A SYSTEM DYNAMICS APPROACH TO CORPORATE MODELLING

"MDS": A Tool For Rationalisation In Corporate Planning
And Possible Agent Of Change In Company Management

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ABSTRACT

The acronym "MDS" refers to a methodology and a series of computing techniques which are suitable for the simulation of corporate processes. These "Dynamic Models for Corporate Strategies" allow the description of such processes as structures of a unified nature, into which one may insert all the necessary data (real or hypothetical) deriving from the initial and boundary conditions, to clearly define the possible future developments being studied.

With respect to other, currently available, decisional aids, MDS differs both by its purely simulative approach and by its use of a basic descriptive structure capable of completely representing the dynamism of corporate phenomena. Compared to a "company microcosm" description using the now classical methods of Industrial Dynamics, MDS offers open and interactive systems also introducing several "corporate variants". (These correspond both to certain types of sub-division of the complete system into given sub-systems, and to relationships which may also be described in the same terms, such as the "accounts plan", for example).

The main aim of this paper is to analyse the effects of promotional activity - recently developed in Italy amongst medium and large companies - whose main objective is the introduction of MDS as an important instrument in the practice of corporate planning.

1. INTRODUCTION

1.1. A review of the nature and use of models for

strategic management and corporate planning shows the inadequacy of most current modelling approaches.

The System Dynamics program seems to be a better answer to the needs of corporate modelling. In spite of the suitability of the conceptual tools, S.D. has gained a scarce diffusion in corporate applications.

In our opinion, the adoption of the closed boundary principle encounters strong operational limits due to:

- difficulties, time required and high costs in modelling a closed system;
- lack of interactivity with the user and low flexibility of use;
- inadequacy in supporting the cyclical process of strategic planning.

Our hypothesis is to "open" the system in building the models, and then to "close" it by a strict interaction between the users and the computer models. In this way the model corresponds

conceptually to a sectioning of the comprehensive company model, carried out in such a way as to represent all and only those production, marketing and financial aspects regulated by mechanisms that are well-known or at least verifiable directly by experience and objective measurements. The model then constitutes a system closed only by its integration with the user or group of users who, in addition to the initial conditions of the state variables, supply an exogenous data flow related to the significant variables in the external environment and to the "intangible" system variables. On the basis of this hypothesis, the TEMA Spa (ENI Group) has developed the MDS System (1), in cooperation with the Polytechnic of Milan and the RSO Institute. The MDS (Dynamic Models for Strategies) System consists of a methodology for developing and using dynamic simulation models and of a modelling system for interactive model generation, running and data handling.

The features of the MDS approach are:

A) the company is described as an open system;

B) the "invariance section" of the company is identified. This is the set of structural features which do not vary with changes in the firm typology. A "macrolanguage" to analyze and model the section is elaborated;

C) specific descriptive devices and software features are proposed.

1.2. In Italy in recent years a promotional activity has been developed for using the MDS system in corporate planning practices, within the context of medium- and large firms. An analysis of what occurred allows one to consider MDS not only as an instrument for rationalization in the area of corporate planning, but also as a possible "agent for change" in the practice of company management.

2. TYPES OF FIRMS TO WHICH THE MDS INSTRUMENT WAS OFFERED. INITIAL PROBLEMS CONNECTED WITH THE PROPOSAL'S NOVELTY

2.1. Firms were chosen which were large enough for the use of quantitative instruments in aid of strategic planning to be meaningful. The types of firms involved at the promotional stage can be classified according to the following scheme:

1) See bibliographic references

- (1) Large firm with planning practices based on formalized schemes. The firm in question is developing successfully and is able to plan its own strategies.
- (2) Large firm in critical conditions: planning practices, if any, which worked in the past are no longer feasible.
- (3) Medium-sized firm which is developing without well defined planning schemes.

2.2. For the aims of developing the MDS proposal, the state of the informative and organizational system in the firms approached was not unimportant. In all of them there existed a set of stable mechanized procedures (above all of the administrative type, in some cases in support of management in commercial and personnel areas). However it was rare to come across those able to use correctly the characteristic instruments of unstructured computing science (ex. Info-center, personal computing). With regard to organization in the strict sense, almost all the firms contacted were structured according to a logic of functional separation (with the exception of the smaller ones).

- 2.3. Choosing the right interlocutor was no small problem. The MDS instrument, as a strategic planning aid, should be reserved for the top levels of firms and used in an ideal environment, where the "manager" acts as a professional and, as such, has access to adequate instruments, even at a personal level. If these conditions were not present, those in charge of the planning staff were approached (where they existed). In the other cases, an attempt was made to interact with the "secondary levels", more sensitive to the firm's strategic problems. This type of interaction with the customer imposes, above all for the highest levels which can be reached, a consultative approach (in this case, the person proposing the new instrument must be able to interpret of the firm's present situation).
- 2.4. In most cases the type of computing support proposed was a "stand alone" system. This was to high-light the independence of the MDS instrument from procedures systematically based on the firm's informative system. The problem had to be faced of sistematically collecting and filtering a series of "given data" (necessary for initializing the system and determining certain boundary

conditions). Another type of computing problem became evident when the interactive type of interfacing between user and machine had to be defined in each case. The problem was all the more pressing, the more one wanted to avoid a filter of intermediaries between management and system.

3. ANALYSIS OF APPLICATIONS CARRIED OUT

3.1. From what has been said so far the difficulties

which had to be overcome in introducing MDS correctly as an instrument for aiding corporate planning are clear. In firms classified as type 1 resistance was met to changing generally well-defined and tested planning procedures. In these cases management had the use of a high-level support staff, which in practice, acted as intermediary with regard to the MDS offer. In the few cases in which an application was carried out, success (1) was only partial. In practice the existing planning structure accepted

an instrument "in parallel", marginally increasing its own versatility, but without a real impact on the decisional process (tied to well-established practices). On the other hand, in the firms classified as type 2 there was real interest on the part of Top Management. In this case, however, there was a follow-up only when the MDS proposal was received within the context of a top-level consultancy for resolving some problems considered to be particularly critical (2). Also in this case success was partial. The MDS instrument was practically invisible outside the context of particular problems and did not generate any improvement in corporate planning practices. In firms classified as type 3 there was confusion between strategic problems in the strict sense and more particular problems related to certain functions (for ex. commercial, personnel, production and financial). The cases which led to applications were often stimulated by sectorial and short term requirements.

1) the case of Saipem (Italian Company of the ENI group)

2) the case of ANIC, (Italian Company of ENI group) stock levels

However, in some cases, the installation of MDS system has led to a practice of using modern quantitative instruments in top-level professional areas (even if not strictly in the context of strategic planning).

4. PROPOSALS FOR FUTURE DEVELOPMENTS

4.1. Many of the difficulties analyzed in the preceding section could be removed in the near future if a practice was established inside firms of correct personal computing for the top-level professional areas, including those corresponding to Top Management. On the basis of present trends an evolution in this direction can be predicted. It would be sufficient, therefore, to transfer within reasonable periods, the MDS system into suitable computing support structures.

4.2. The consideration presented below also seems of interest. Corporation staff (1), even at the top level, rarely understand corporate

1) Here we refer to the actual situation in medium and large Italian companies.

phenomena in terms of an integrated process, susceptible to rigorous description in quantitative terms. The dominant culture prefers a more detailed approach in particular sectors (and so it is rare, for example, to find technicians operating in production or marketing with administrative or financial knowledge and viceversa). As a result, poor sensitivity can be observed towards those phenomena, for which the interactions between the various corporate functions are responsible and which, in today's context cause apparently incomprehensible and barely controllable situations with traditional systems. A global vision which also takes into account "the transversal" phenomena is a privilege of the few and is gained through experience and intuition. Traditional culture, in fact, does not provide a language to a large number of managers, by means of which it is possible to talk in a rigorous and quantitative manner about all the phenomena relevant to the firm. MDS methodology could fill this gap: the descriptive symbolism proposed has the value of a language accessible to a large number of managers,

with which it is justifiable to represent not only the detail of the various corporate functions, but also the interactions between the various subsystems and the boundary situations (1). Certain about the correctness of this language one can conceive of carrying out a cultural operation on a large scale, which would promote its use among technicians and staff at the middle and upper levels, operating in different company sectors. The success of this operation could have as its consequence, a real quantitative leap forward in the style of running a firm. A suitable professional training plan is a central requirement and could in turn be maintained and developed by the use of the right instruments, hardware and software of personal computing.

- 1) it does not seem out of place here to mention that the MDS methodology has recently been adopted for corporate description in courses for engineering students at the Polytechnic of Milan.

4.3. Finally it is worthwhile pausing to consider the process of rethinking and replanning organisational structure (this process should take place permanently in enterprises). It is clear that such a process plays a strategic role due to the importance and irreversibility of certain decisions. Recent experience has shown that there is considerable interest in using MDS among specialists in corporate organizational planning. One can quote successful applications both as an aid to interpreting given corporate situations, as well as at the stage of defining new restructuring hypotheses. In more precise terms, the experience mentioned refers to situations, in which the critical problem was represented by a correct use of human resources, with implications of reorganisation and internal mobility. The importance of organisational problems suggests the study of new ways of using the MDS system and relative interfaces in support of checking and replanning corporate structures and information systems.

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