
SYSTEM DYNAMICS FOR BUDGET PLANNING EVALUATION IN PUBLIC ENVIRONMENT

Habib Sedehi

HELP Auditing Informatico
Via Livio Andronico, 75
00136 ROME (ITALY)

ABSTRACT

To the date, Budget Plan definition in Italian public companies is approached with insufficient deepness. We believe this is common to other countries too.

Indeed, most public organizations develop the Budget Plan basing themselves only upon the available data and not upon knowledge acquired in years of experience. Balance sheet data are therefore obtained simply adding to the previous information, an amount established, for example, on the expected inflation rate.

This approach although "trivial" supports the budget responsible ,because during the budget presentation, very few elements can be effectively criticized.

It is commonly accepted that also public companies find themselves in turbulent environments. This is due to both the increased number of endogenous variables, and to the complexity of exogenous parameters. Therefore the Budget Plan definition becomes always more critical, and consequential difficulty of its evaluation assumes relevant importance.

The paper describes an experiment carried out by an Italian Public company which is adopting a dynamic economic - financial model for both , Budget Plan definition and for its evaluation.

The model is based upon System Dynamics approach and evaluates a series of scenarios providing support to the budget definition responsables in taking strategic policy decisions, and better "explaining" the effects of decisions undertaken.

INTRODUCTION

It would seem almost superfluous to have to stress the demand, if not indeed the absolute requirement, for systems (instruments + methodology) to support all those activities that can be classed as complex corporation procedures. While this approach is already widely adopted in the private sector, it is still in the experimental stage in the Italian public sector.



The development of modern economics -- together with the growing complexity and unpredictability of the decision-making process, which are particularly evident in the public sector, characterized, on the one hand, by a state of flux deriving from both internal and external factors and, on the other, technological opportunities represented by the use of computers -- has created the ideal environment for experimenting with and testing "new" approaches to dealing with everything from budget planning to long-range planning for public enterprises.

The "new" approach must bear in mind the following factors:

- The interaction of variables in the system with outside parameters, and hence extension of the boundaries of the specific environment being analyzed.
- The whole series of economic and social phenomena, which are characterized by chance and this indirectly influence business decisions.
- The dynamic nature of the internal and external environment and the relative influences and feedback in the various sectors and stages of the life of an enterprise.
- The weight of business management, both in the company's structure and organization and in its strategic planning.

The "new" approach that seems to offer the characteristics necessary to handle the problem of creating, managing, and evaluating budget plans is the "dynamic modelling" approach.

One such instrument, and one which is supported by well-tested methodology, is certainly that referred to as "systems dynamics".

Here we have analyzed the process of creating a budget plan using the systems dynamics methodology. In addition, a dynamic model is now being readied for evaluation of the hypotheses formulated for a budget plan for an Italian public enterprise.

METHODOLOGICAL APPROACH

During the construction of the model, every effort was made to apply the basic principle of systems dynamics as a concept, constantly checking on the development of the model through close interaction between user and the model itself, as shown in fig.1.

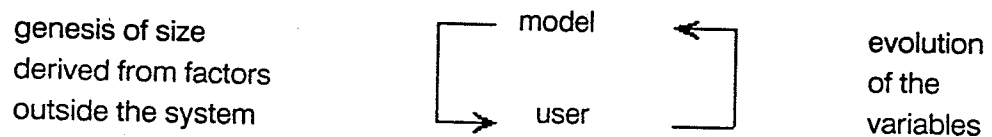


Fig. 1

In this way, the model should respond better to those mechanisms of the company that are either well known or else are verifiable directly from user experience or through objective measurements.

The aim of this approach is to weld the descriptive strengths of the system dynamics theory to the pragmatic requirements of the enterprise, with respect to both policies and alternative environmental scenarios for business performance.

BUDGET PLAN

In a service company, whether public or private, the drafting of a budget plan ought to involve all the major departments of the company:

- The technical area, which produces services, with respect to forecasts concerning operating programs.
- The personnel area, for forecasts of the manpower needed to meet the objectives of the operating programs.
- The materials and/or services purchasing area, for planning purchases and forecasting the supply of services.
- The business affairs area, for the planning of sales of products and/or services.

Moreover, the whole process should be supported by the company's administrative management, which in turn must bring into play both its economic and its financial sectors so that there can be constant reciprocal involvement.

Last but not least, every effort must be made to involve the area that has the greatest decision-making power, i.e., the strategy planning management, which ought to supervise the whole budget planning process.

Thus we can see that, if properly and fully integrated, the creation of a budget becomes a very complex process.

Fig. 2 shows, in aggregate form, a cause-effect flow diagram for the creation of a budget plan for a typical service company.



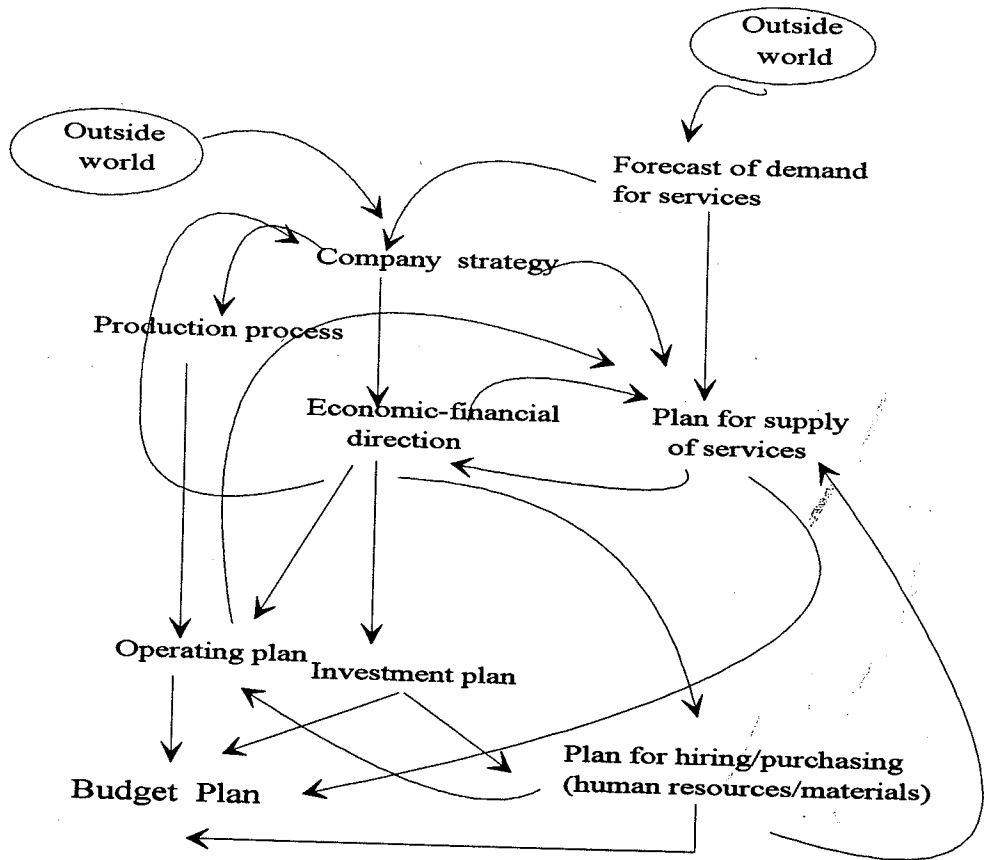


Fig. 2

Generally speaking, three separate subsystems can be seen in the model:

- Materials purchasing and services production subsystem.
- Human resources (personnel) subsystem.
- Economic and financial subsystem.

For the purposes of our work here, we shall concentrate mainly on the economic-financial subsystem, bringing in the variables of the other subsystems as externally generated parameters, so as to have better control of the principal variables in the construction and management of a budget plan.

ECONOMIC-FINANCIAL SUBSYSTEM

The economic-financial subsystem represents a meaningful projection of the actual position of the enterprise and includes, in monetary terms, all those aspects that combine to formulate the company's budget plan.

In this subsystem, the state variables (Levels) represent primarily the standard items referring to the company's holdings, while (Rates) represent simply administrative movement.

Before embarking on a full description of the economic-financial subsystem, we would like to provide examples, with two feedback loops (one positive and one negative), of two business phenomena, one strictly financial and the other economic.

- Debit feedback loop involving financing:

the need for financing, especially for a public enterprise, is one of the fundamental problems. The dynamic representation of this phenomenon, through a feedback loop, can be exemplified as follows (fig.3):

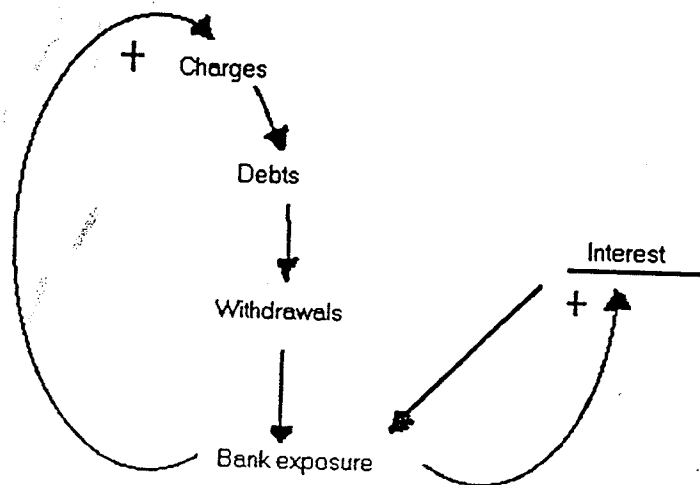


Fig. 3



- Credit collection feedback loop:

This process, which is common to all businesses, can be shown as follows (fig.4):

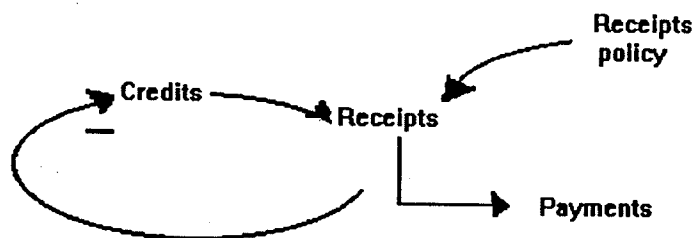


Fig. 4

It appears clear that the positive feedback, which is associated with interest due (fig.3), tends to augment the imbalance created between exbursement rates. This imbalance, which originates in the difference between receipts and exbursements, is in turn influenced by the attenuation of delays generated with respect to accounts receivable policies (fig.4).

It can thus be easily imagined how moderate delays in receipts of accounts and lengthy extensions of debt payments can strongly influence the imbalance between receipts and exbursements in a manner that is favorable to the company.

THE COMPANY MODEL

The objective of the company in question is to administrate the public financing in the best way possible so as to supply the services for which is it responsible.

Since we are dealing with a company that must operate under price controls, the primary aspect of application lies in the possibility of evaluating the overall economic effects, in company terms, associated with determining hypotheses about the prices for services rendered.

All this makes it possible to formulate hypotheses and to propose variations in prices, when there have been significant changes in the external context and in order to safeguard the economic-financial balance.

Moreover, by means of the budget plan, it is possible to evaluate the economic-financial consequences deriving from the imposition, on the part of control bodies, of price policies in relation to more general economic-social objectives.

The overall model for our public company fans out around two hubs in the economic-financial subsystem. These are the "economic balance" and the "current assets" (fig.5).

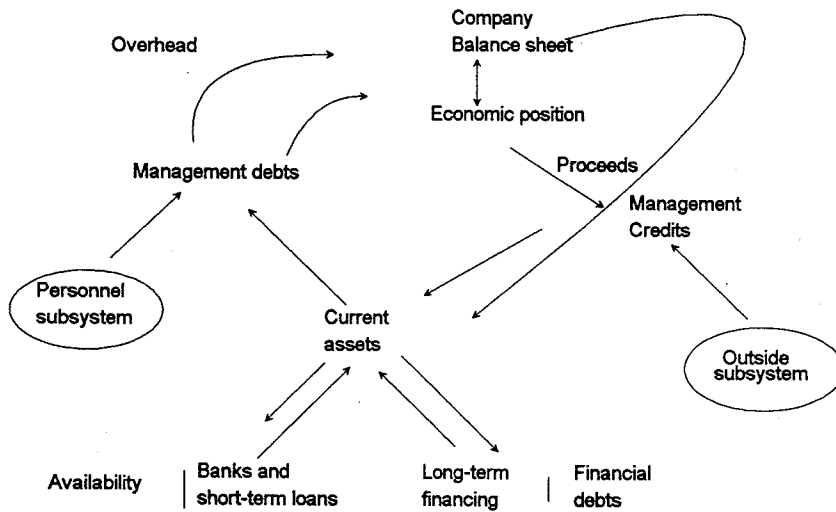


Fig. 5 The Company Model



RESULTS ANTICIPATED

While the model is currently under completion, a determination has been made of the hypotheses to be evaluated and to which the model is expected to provide answers.

The principal "what if" questions involve the following:

- Economic-financial consequences of variations in inflation rates.
- Effects of variations in the cost of money, in currency exchange rates, and in different financing terms.
- Economic-financial effect on the company's balance sheet of the cost of manpower and salary/wage levels.
- Degree of influence played by variations in international and domestic costs on the costs of the services.
- Effectiveness of investments in new services.

REFERENCES

Ansoff H.I 1979. *Strategic Management* The Mac Millan Press, London

MDS - Tema [Eni] 1983. *Modelli per le decisioni strategiche aziendali*. Franco Angeli Editore, Milano - Italy.

Minati G., Sedehi H., 1986. *Knowledge, Management, Computer.....* Edizioni Soiel International, Milano - Italy.

Roberts Edward B. 1984. *Managerial Applications of System Dynamics*. The MIT Press Cambridge, Mass.

