The Study of the Basic Didactic Means through Simulative Modeling at the Microsocial Level of a Faculty

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Abstract

The paper synthetically presents a study of the dynamics of the basic didactic means at the level of a faculty. The scope of the analysis was restricted to the didactic activity spaces, as the other basic means are going to be the object of a different study. The period of the study is 16 years (or four academic cycles). The state and the dynamics of the speciality rooms was analyzed, by categories: lecture rooms, seminar rooms, laboratories, as well as their deficit. The deficit of didactic-purpose rooms involves significant expenditure, which is why reducing it is the main objective of the study.

So, by using simulative modeling, the executive staff of any educational organization can identify the required amount and number of the basic means necessary in future, and hence the financial requirements necessary to ensure them.

Keywords: *basic didactic means, number of shifts, deficit of didactic means, simulative modelling*

JEL classification: I21, I29, M15.

Introduction

Education has to be increasingly oriented towards utilizing the electronic means of information processing, in order to ensure both an increase in the efficiency of the educational and training activities, and especially conducting simulative technological (Raţiu–Suciu, 2001) and social modeling (Stoll & Fink, 1992).

It is only based on knowing and employing the informatized systems that managers can maximize the organization performance in all the economic sectors, as well as all the component parts of the organizations (e.g. maintaining the parameters of the national energy system within limits that are tenable for the consumers with minimal investment, extending sales by using the virtual space with much smaller expenses than the classic ones, etc.) (Raţiu–Suciu, 2001).

The simulative modeling of systems is increasingly used worldwide in order to ensure their structural and functional optimization. The method has acquired a greater and greater extension in the economic and social domains, which makes it possible for it to be introduced and used in educational management and especially in the investment and training optimization in the higher education system.

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To do that, an in-depth conceptual scrutiny of the systemic approach to knowledge and management is necessary (Ghiţescu, 2006).

The essay proposes to show the necessity of its own computers network which should include all the information necessary to the organizational simulative models, also of its departments, as I presented in other works and it doesn't make the subject I treated in this paper. So, I started from the creating of a simulative model of the Faculty of Technique and Technology from University of Pitesti, in order to show how a manager could use such an instrument for efficiencies the wellness of the investments in an educational organization. More accurately I resorted to a case study regarding the flaw of the basic didactic means.

A general theory of organization (or system) managerial modeling is put forward by Forrester (1979), presented by Raţiu–Suciu (2001) and in other papers and studies as a conversational simulative modeling method of *maximal generality and managerial usefulness*.

Any general manager must have a minimal level of professional information coming from all the technological components in order to *correctly understand the functional parameters and their degree of inter-connectivity*, and also in order to have a productive type of communication with the specialists who designed and executed the various expert systems in use, or who are exploiting them (Niculescu & Buda, 2010).

Basing on such comprehension, the manager is able to conceive descriptive, evaluative and integrator models, by means of study, through simulation on computer, the variation of different parameters of internal working at the modification of the interactions with the medium or at different decisional alternatives. This way is achieved a sufficient precise and flexible conversational forecasting of the ways of functional and economic optimisation, available for decisional factors, that avoids significantly the empirical experiments, usually the confusing ones, on the real organisation and of course the implicit or explicit inducted looses.

1. Presentation of the flow of the basic didactic means

A school flows and their signification:

The order and production flow = students flow;
Personnel flow: Employed personnel: didactic, auxiliary didactic, logistic;
Equipment flow: Didactic rooms; Didactic technologies;
Raw material flow: Didactic; Logistic;
Information flow: classic libraries; virtual libraries;
Money flow: -financial sources; -money necessary; -financial obligations**.**

In an educational organization, the basic didactic means include:

- ***The didactic spaces*** (lecture rooms, seminar rooms, laboratories, etc.), which have a different architecture from that of other categories of buildings, so as to observe the didactic norms and the requirements of an efficient educational

activity, which is why they represent the most significant component of the basic didactic technologies. The number of the didactic-purpose rooms varies in accordance with the dynamics of the students, which can be represented as a flow, the input / entry of which are the new spaces needed, and the output is the availability of the unused didactic spaces;

- ***The didactic technologies***, which are different from one type of didactic space to another (lecture room, laboratory, seminar practical and apllication room, etc.), in keeping with the methodology of the disciplines that use those spaces and the creativity of the didactic posts' holders. Due to their diversity, didactic technologies will be modelled only in point of value, as part of the money flow.

We can talk about a flow of the speciality rooms, in the field of simulative modeling (Toffler, 1995), because from one time interval to the next, the number of rooms and halls can be altered; to – and from – the current ones are added, or subtracted, a number of rooms, which gives the image of a virtual shift of the spaces.

The descriptive modelling of the specialty rooms starts from the students' dynamics, the normative loads concerning the organization of the study groups, the number of the hours available daily for the scheduling of the didactic activities, etc.

In the present study, only the dynamics of the specialty rooms will be analyzed, the basic condition for conducting any didactic activity.

2. The descriptive modeling of the dynamics of the didactic rooms

The study was conducted to benefit the Faculty of Mechanics and Technology of the University of Piteşti.

A descriptive model of the dynamics of the laboratories, by categories, could be that presented in Figure 1. The flow of the lecture rooms, seminar rooms, application rooms, etc. can be represented in a similar manner.

The model evinces the fact that, for an oscillating dynamics of the student flow, there necessarily appears a corresponding oscillating dynamics of the need of didactic spaces, by specific destinations: lectures, seminars (and practical applications), laboratory work.

2.1 Working hypotheses

- The needed number of didactic rooms depends on the year's enrolment figure and the number of the student groups as established through the standards of working loads, by didactic categories: lectures, seminars (and practical applications), laboratory work;
- The necessary number of specialty rooms is analyzed at the level of a faculty;
- The deficit of didactic rooms can be ensured by renting rooms in the educational space;
- The number of rooms in excess can be let to the educational milieu;

☞ The laboratories are the didactic-purpose rooms the didactic technology endowment of which is part of the faculty's competence, and directly participates in increasing the graduates' coefficient of energetic amplification;

☞ The dynamics of the didactic technologies is studied only in terms of value, in the money flow, on account of their diversity according to the various disciplines and forms of training and didactic activity (courses of lectures, seminar, laboratory activities, etc.);

☞ All the study years have the same number of annual physical hours in the curriculum;

☞ All the available rooms of the faculty are used for the examinations;

☞ In order to efficiently use the didactic spaces, the laboratories can also be utilized for the classes (i.e. hours) involving seminar activities or applications:

☞ In order to efficiently use the didactic spaces, a number of classes (i.e. hours) can be scheduled daily, in keeping with a shift coefficient of maximum 1.5 [shifts/ day].

⇨ **The significations of the symbols in Figure 1 are as follows:**

DfSlC – deficit of lecture rooms [rooms];
DfSlSm – deficit of seminar rooms [rooms];
SlCDp – available lecture rooms [rooms];
SlSmDp – available seminar rooms [rooms];
TAI – time of adjusting the process of didactic rooms renting [months];
OFzCPlZ – physical lecture course hours scheduled daily [hours];
OCvC– conventional lecture course hours [hours cv.];
CS – enrolment figure [students];
NStGrC – number of students for one group of students [students/group];
OFzCPlZ – physical hours of lecture courses scheduled daily [hours];
NSp – number of the weeks in one year [weeks];
NZSp – number of working days per week [days/week];
NGrC – number of lecture course groups [groups];
NSlC – required number of lecture rooms [rooms];
DpLab – available laboratories [rooms];

2.2 The mathematical model of the flow of the didactic rooms

NSlC.I=ROUNDDOWN()*(OFzCZ/(OFzCPlZ*CfSchZ);0), [rooms], U,1- N
NSlSm.I=ROUNDDOWN()*(OFzSmZ/(OFzSmPlZ*CfSchZ);0), [rooms], U,2-N
NLab.I=ROUNDDOWN()*(OFzLabZ/(OFzLabPlZ*CfSchZ);0), [rooms], U,3-N
RSlC.IJ=(NSlC-SlCPr.I)/TA [rooms/year], U,1-R
RSlSm.IJ=(NSlSm-SlSmPr.I)/TA [rooms/year], U,2-R
RLab.IJ=(NLab-LabPr.I)/TA [rooms/year], U,3-R
Df.SLC.I=(NSlC.I-SlCPr.I) [rooms], U,4-N
DfSlSm.I=(NSlSm.I-SlSmPr.I) [rooms], U,5-N

DpLab.I=(LabPr.I-NLab.I) [rooms], U,6-N
OFzCZ=(OCvC/(OFzCPlZ*NZSp*NSp)) [hours], U,1-A
OFzSmZ=(OCvSm/(OFzSmPlZ*NZSp*NSp)) [hours], U,2-A
OFzLabZ=(OCvLab/(OFzLabPlZ*NZSp*NSp)) [hours], U,3-A

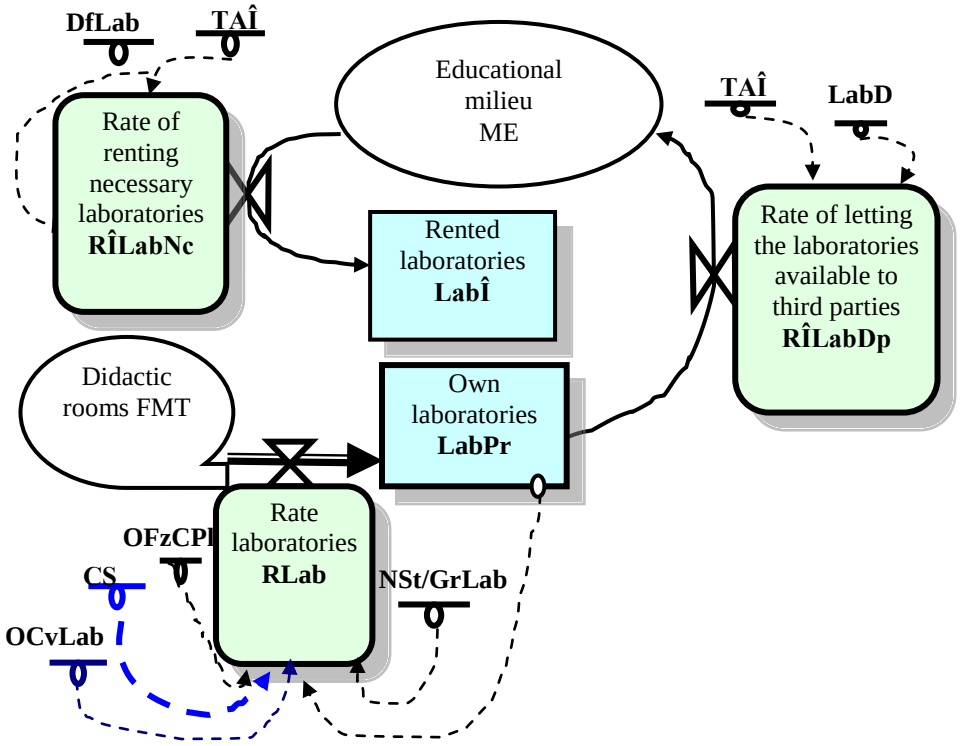

Figure 1: A simplified descriptive model of the flow of the laboratories

In the study, the mathematical model is taken over in Excel, over a 16-year period, for the students' dynamics presented in a previous contribution.

Initial values are established for the variables studied, and the parameters that depend on the leading staff of the faculty are changed, so as to obtain an efficient use of the basic technological means and the funds intended to purchase and maintain them.

The study analyzes the state and the dynamics of the specialty rooms, and their deficit over the next 16 years.

3. Results of the modelling

The results of the simulative modelling are presented in the diagrams in Figures 2 and 3.

Diagram in Figure 2 reflects the state and the dynamics of the specialty rooms over the period of the study, and highlights the very large number of the

own laboratories, as compared to the one needed, calculated at the relative weight of the number of hours allocated to the laboratory activities.

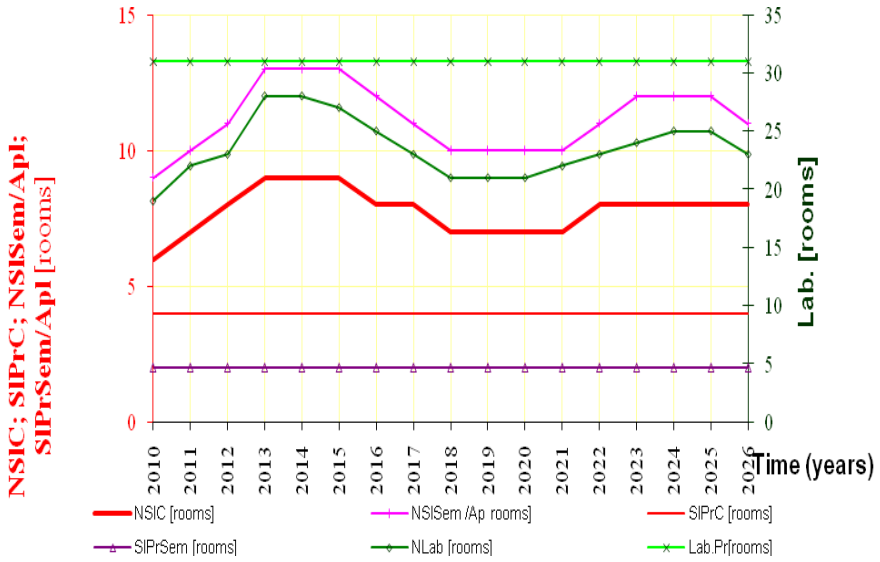

Figure 2: Dynamics of the necessary didactic spaces

This is not in disagreement with the needs of training, since the engineering profile of the future graduates absolutely demands the primarily applicative elements of professional competence, concerning the training of intellectual and motive or active skills and abilities, which can only be achieved in laboratories.

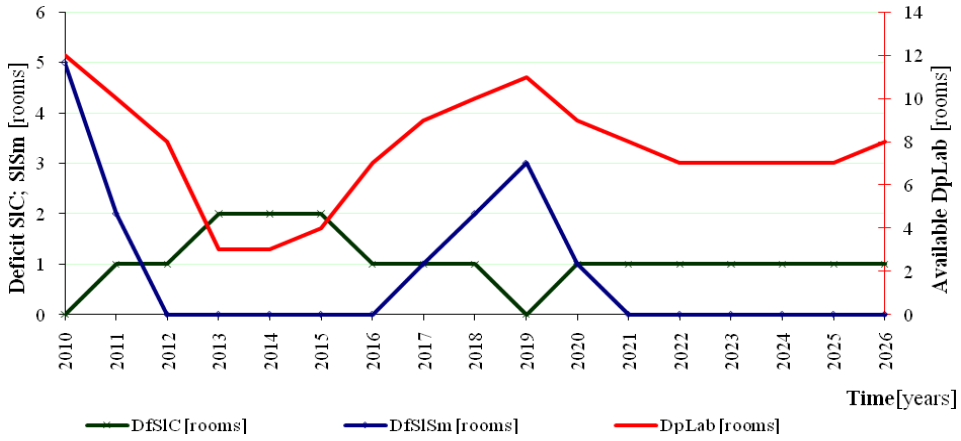

Figure 3: Dynamics of the deficit and available of the didactic spaces for a coefficient of the number of shifts equal to 1,5 [shifts / day]

The large number of laboratories is demanded by the needs of the prevailing weight of the technical disciplines over the total number of the hours allocated to the training programmes, as those disciplines demand the existence of specific laboratories.

In Figure 3 is represented the deficit of specialty rooms for a coefficient of the number of shifts equal to 1.5 [shifts / day], for the lecture activities.

If the laboratory rooms are also used for seminar and application activities in all the disciplines, it can be noticed that the problem of the seminar rooms is solved.

If the educational processes are scheduled only in one shift, a situation that is represented in Figure 4, then the deficit of lecture rooms is very high, which imposes additional expenses for renting spaces in the educational milieu.

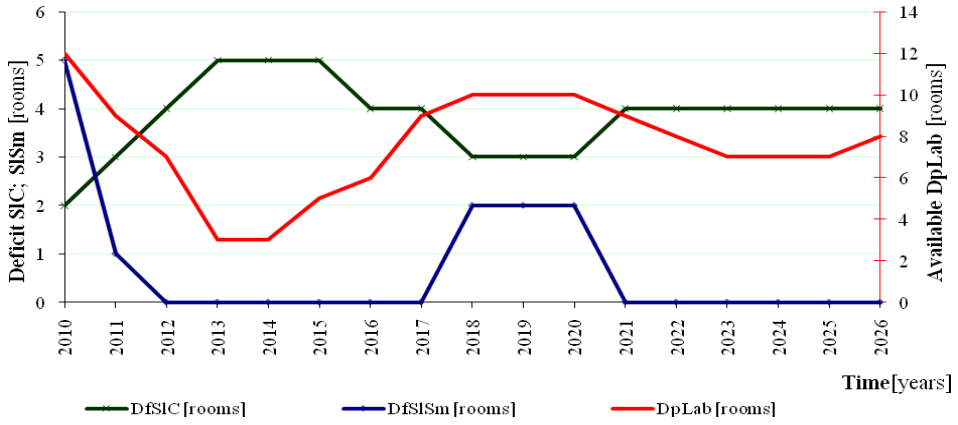

Figure 4: Dynamics of the deficit and available of the didactic spaces for a coefficient of the number of shifts equal to 1 [shifts / day]

The deficit of educational rooms is compensated through either renting space from the educational milieu (in the locations lying outside the district of Argeş), or the efficient use of the spaces available in different faculties that are part of the University of Piteşti.

Our own experience so far has evinced the fact that the deficit of specialty rooms is given by the local branches of the faculty lying in different districts.

Conclusions

☞ It is obvious that, by using simulative modelling, the executive staff of any educational organization can identify the required amount and number of the basic means necessary in future, and hence the financial requirements necessary to ensure them;

☞ Starting from the simulative models, the leading staff and the management of the educational organization can minimize the expenses for didactic spaces, by modifying the number of shifts for the various forms of training (courses, seminars, laboratory activities, etc.);

☞ Under extreme circumstances, scheduling two shifts a day can be considered a viable alternative. A large number of shifts is tiring for both the students and the teaching staff;

☞ Knowledge and management systemic approach is one way of performing not only education but also all managerial, professional and inter-professional activities (Kezner, 2010);

☞ The real systems are of a superior level, and their dynamics is oscillating [3/55]. The possibilities of studying, and maximizing the organizational results through system simulative modeling can be demonstrated by the study of the models currently existing at the Continuous Training Department of our university.

☞ The fact that, in the managerial academic education system in Romania, the simulative organizational modeling is neglected deprives general managers of the most efficient intellectual evaluative instrument: *the system simulative model*. One of the essential causes for not promoting it is the lack of a unitary systemic vision of social and technological realities. Redefining a number of concepts and introducing new ones (Ghiţescu, 2006), as I presented in other published papers, is one of the fit procedures meant to diminish the above-mentioned deficiencies.

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