ITP and INZPLA –
a new theory and a new application system for distributed cooperative budget- planning and - control

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ITP and INZPLA - a new theory and a new application system for distributed cooperative budget-planning and -control

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Abstract

The essay describes INZPLA, a distributed planning and control system for decentralized organizations realizing the theory of 'incremental target planning and control' (ITP). The theory of ITP is based on the leadership style Management By Objectives. It determines INZPLA to be an equation based system, that is a 'decision support system'. However, the equation based system INZPLA is not an attachment to corporate planning systems. Rather it is itself a budgeting and control system that is designed to be applied for entire companies.

Introduction

In the recent time 'organizing companies' has become a frequently discussed subject among economy experts due to increasing complexity of markets as well as the internationalization of many companies. Everywhere in business the trend towards decentralization of responsibility to managers down the line can be observed. Many authors demand the 'entrepreneur within a company' to have autonomous profit responsibility and wide ranging freedom to act. They would like companies to shift towards profit-centre-organizations.

Information-Technology systems must be developed to meet this trend. However, large-scale-development of corporate software must be founded upon thorough economic theory.[1]

This presentation summarizes our efforts to implement a budgeting-system, allowing managers to easily and effectively carry out cooperative budgeting and control in decentralized organizations using network- and database-technology in a distributed environment.

The budgeting system, called INZPLA, is based upon the comprehensive theory of ITP.[2] ITP describes a general theory for budgeting planning and control. It is an extension and exploration of 'Management By Objectives' (MBO) and is especially qualified for budgeting in decentralized organizations.

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1 Scheer, 1990, p. 15.

2 ITP is an abbreviation for 'incremental target planning and control'. The theory of ITP has been developed by Prof. Zwicker, see Zwicker, 1988.

Part one of this essay outlines the theory of ITP. Part two discusses the computer system and the hard- and software applied for the development of INZPLA. Part three, finally, is a summary of this presentation.

1 Theory of 'incremental target planning' (ITP)

1.1 Basic theory

The theory of ITP is based on Management By Objectives (MBO). MBO is a leadership style 'specifying that superiors and those who report to them will jointly establish objectives over a specified time frame, meeting periodically to evaluate their progress in meeting these goals.'[3]

However, ITP is extended and formalized into a consistent and general theory for budgeting planning and control. The ITP-method rests on an incremental-target-planning-model (ITP-model). Exhibit 1 shows its basic structure.

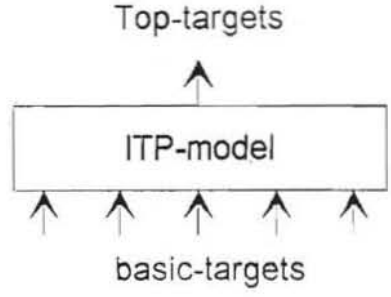

Exhibit 1: ITP-model

The ITP-model consists of equations. The equations link targets of the top-management such as operational profit, ROI or cash-flow, called *top-targets*, with targets of the executing departments (area of responsibility, AOR). These targets are called *basic targets*. Examples are primary purchase prices, demand rates (e.g. in tons per hour) or fixed costs. The basic targets are the 'objectives' as described by MBO.

Exhibit 2 shows a more specified model of ITP for profit-centre-budgeting, called global ITP-model.

A global ITP-model for profit-centre budgeting is always organized hierarchically. There are primary and secondary AOR's. Exhibit 2 shows only one secondary level; however, there can be a hierarchy of secondary levels. The single top level is always the corporate headquarter.

Within the global ITP-model, primary AOR's are executing departments and are defined as independent profit-centres. Each primary AOR has its own equations and forms a self-contained ITP-model (AOR-model) which is subsequentely used for decentralized budgeting.

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3 Rosenberg, 1978, p.281.

Secondary AOR's are leading departments. The highest secondary level always represents the corporate headquarter.

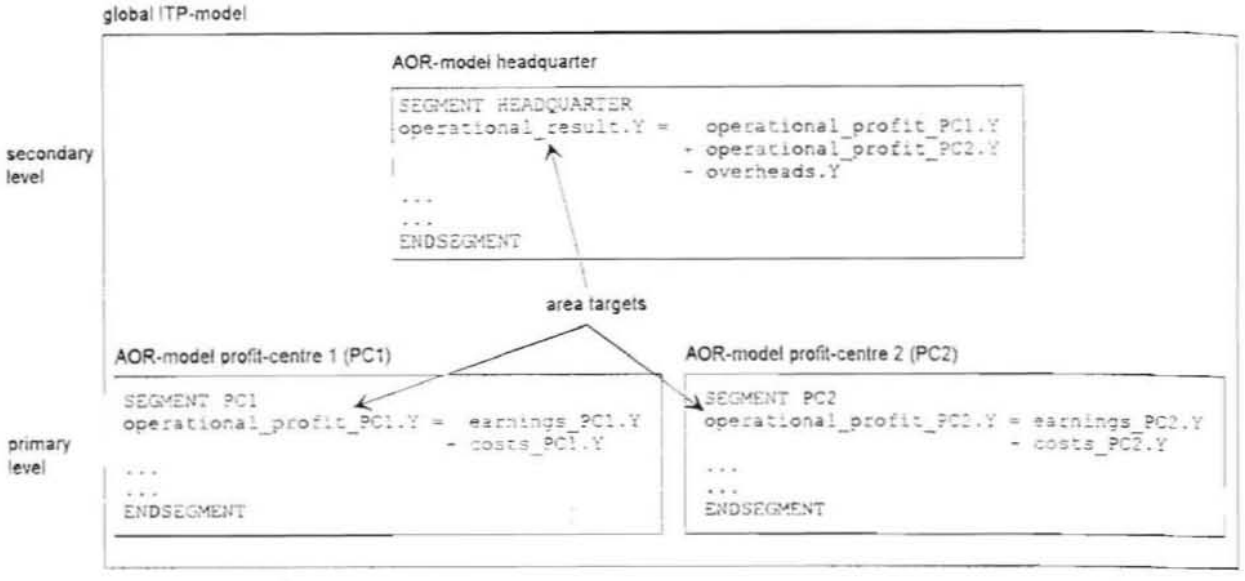

Exhibit 2: ITP-model for profit-centre-budgeting

Each primary and secondary AOR has a single target 'on top' of its AOR-model. It is called area target. The area target of a primary AOR is influenced by all of its basic targets. Thus, in profit-centre-budgeting, not the basic targets but the area target of an AOR is the objective as described by MBO. The area target of a secondary AOR represents the area targets of all those primary AOR's, which are directly subordinated to that secondary AOR.

1.2 Planning procedure

Negotiations between area- and top-management about the objectives for the next planning period are an integral part of MBO.[4] At the outset of negotiations area- and top-management tend to have different opinions about objectives. The ITP-concept provides a special, structured method to reach an agreement between the two groups of interest, using a three step process, named planning-procedure.

The planning procedure includes (1) the bottom-up-step, (2) the top-down-step, (3) the bottom-up-top-down-step (named confrontation).[5]

There are two initial positions in the negotiation process: (1) the position representing the interests of the area-management and (2) the position representing the interests of the top-management.

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4 In terms of ITP the area targets of all AOR's serve as the objectives.

5 There is another 4th step, named post confrontation which allows AOR's decentralized profit-centre budgeting, see chapter 1.4.

In the bottom-up-step the AOR's must provide numerical specifications (bottom-up-values) for their basic targets. These figures represent the AOR's negotiation position.

The top-down-step serves to present the values of the area targets requested by the top-management. The top-management usually postulates a higher operational profit than the one resulting from the bottom-up-planning step. In order to determine the top-down-value of each basic target, the top-management specifies a load margin for each basic target, that is the highest admissible change towards increased load.[6] For example, the sales volume of a certain product can only be raised by +10% due to the limit of maximum market demand. If the basic-target is a cost-target (e.g. supply rate) the additional load-percentage would show a negative direction.

Once the load margins are specified, basic target values are then adapted within their individual load margin in order to reach the top target postulates of the top-management. This is done by an optimization procedure.

In the confrontation, the bottom-up-top-down-step, the final numerical values of the basic targets are then negotiated between top-management and the management of each primary AOR's. Once an agreement is reached, the planning procedure is completed and the area targets have to be achieved.

1.3 Target-control

The above described planning procedure provides specifications for objectives on an annual basis. However, to do the target-control, monthly or quarterly specifications are required. The splitting up of the negotiated yearly values of basic targets into monthly or quarterly values is done by a procedure that will not be described in this essay.

The target control serves to calculate the actual values of area targets as opposed to the planned values. In order to perform this ex-post-control process, the actual values of basic targets are registered. They then serve as parameters in an equation model for the calculation of the operational profit.

1.4 Decentralized budgeting (post-confrontation)

In the post confrontation each AOR has the freedom to assign any numerical values to its basic targets as long as the area target which has been negotiated in the planning procedure, is met. For an objective of 30, for example, an AOR can choose a set of basic targets of 10+10+10 or 12+10+8, etc. The optimal set of basic-targets is calculated by each AOR using its self-contained AOR-model, the profit-centre budgeting model. The AOR's freedom to define sets of basic targets to its best advantage has a motivating effect on an AOR. However, AOR's are not isolated. They are embedded within the corporate cost centre structure and hierarchy. Each variation of numerical values of basic targets affects the amounts of mutual profit centre transfers. Each variation leads to a higher request or release of production capacities of interrelated AOR's. The global ITP-model guarantees the observance of capacitiy restrictions of interrelated AOR's.

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6 The idea of establishing load margins is based on the theory of 'Organizational Slack', see Cyert, R.M., March, J.G., 1963.

2 The INZPLA-system

2.1 Overview

The architecture of the INZPLA planning and control-system is based on requirements established by the ITP theory. One fundamental requirement is that the INZPLA system must be an equation-based system, since all ITP-models consist of equations.

As opposed to other equation based systems, INZPLA is not a further attachment to existing corporate planning systems. It consists in a special corporate budgeting and control procedure. Equation based systems usually work on a highly aggregated level and are therefore used to evaluate aggregated business planning problems (such as the DuPont-System or other management ratio systems[7]). Unlike these systems, INZPLA employs highly disaggregated models to achieve the requirements of a MBO-planning process. In short: although INZPLA is an equation-based system, a complete course of a disaggregated budgeting and control procedure can be conducted.

2.2 Applied hard- and software

The INZPLA-system uses the client-server-architecture of relational database-management-systems. For creating the INZPLA-system the following platform is being employed:

Hardware and operating system: 486 PC-network using Windows-for-Workgroups 3.11 and NOVELL 3.11.

Language interface system: An editor to feed model equations into the system plus a compiler to generate executable libraries (DLL). The compiler processes a non-procedural order of equations and encodes simultanities (e.g. the mutual cost centre charge transfers) by using the Gauss-Seidel-algorithm.

Database (RDBMS): Gupta's SQLBase, Version 5.12.

User interface system: Gupta's SQLWindows 4.01 as object-oriented 4GL to develop all client-applications. Borlands PASCAL 7.1 with SQL-interface to program object-oriented methods. MS-EXCEL and Gupta's ReportWindows as report systems.

The above platform was chosen in order to simplify the implementation of the INZPLA-system in a company by employing the same database technology as many companies and thereby making it possible to integrate company related data.

2.3 The distributed system

INZPLA as a distributed budgeting and control-system is spread throughout the organization of a company. The AOR's use client-frontends to work with their own AOR-model and independent RDBMS. Each AOR-database is a partial copy of the central RDBMS (storing the global ITP-model) and contains all information concerning itself. Mutual updates are performed periodically on an asynchronous basis.

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7 Reichmann, T., 1990, p. 15 ff.

Exhibit 3 shows the structure of an ITP-model for conducting a decentralized profit-centre budgeting process. The ITP-model of a fictitious company consists of 7 AOR-models, 4 primary and 3 secondary ones.

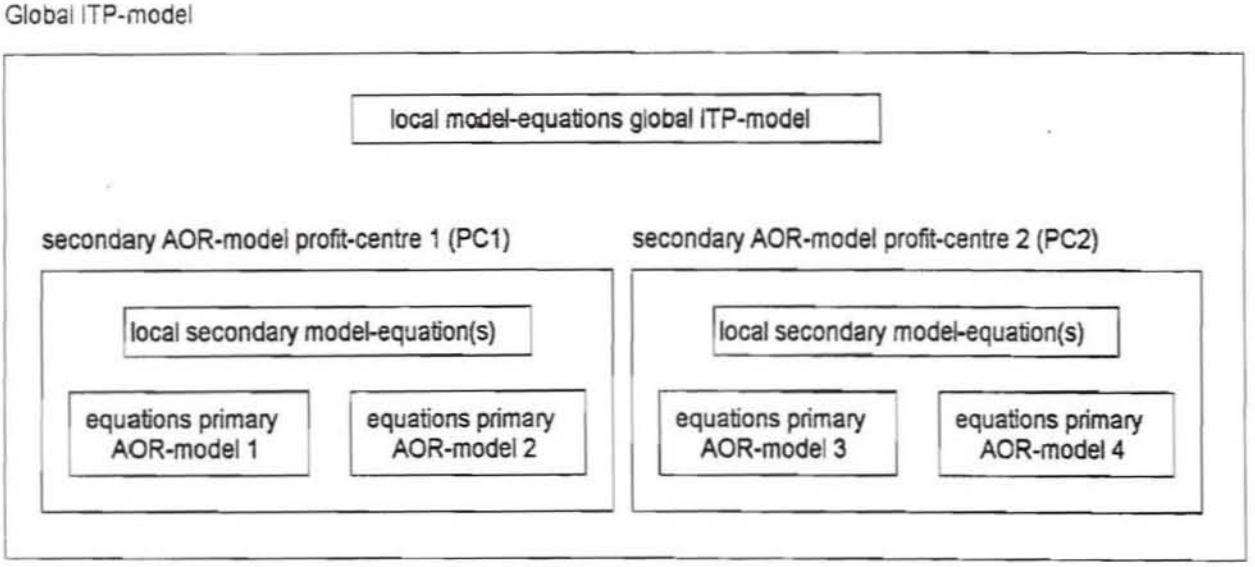

Exhibit 3: ITP-model for decentralized profit-centre-budgeting

All 7 AOR-models form a hierarchy within which the secondary AOR-model consists of all subordinate AOR-models plus local model-equations. Exhibit 4 illustrates a possible configuration of the ITP-model in exhibit 3.

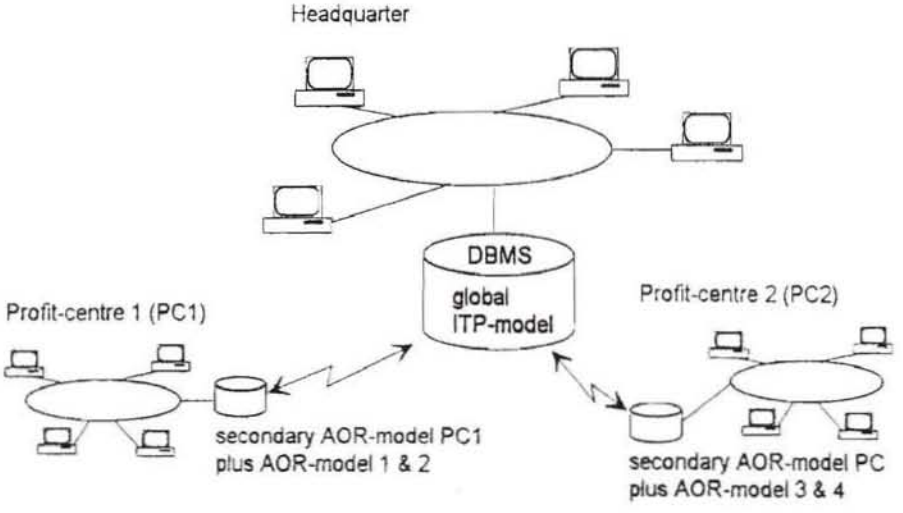

Exhibit 4: Possible configuration of the distributed INZPLA-system

3 Summary

INZPLA is a computer system, that allows managers to carry out cooperative budgeting and control in decentralized organizations applying network- and database-technology in a distributed environment. The INZPLA-system is based upon the theory of incremental target planning and control (ITP).

The theory of ITP determines INZPLA to be an equation based system, that is a 'decision support system'. As opposed to other equation based systems INZPLA is not an attachment to corporate planning systems. Rather, INZPLA itself is a corporate budgeting and control system that is designed to be applied for entire companies.

Finally, it is important to mention, that INZPLA can only be applied when the architecture of the INZPLA-system and the structure of the ITP-model are closely interrelated with the organization of an applicants company. Sometimes it is necessary to introduce organizational changes to a company in order to be able to apply INZPLA (e.g. the creation of a profit-centre organization with consistent hierarchical cost- and profit-centre structures).

INZPLA is a client-server-application based on a relational DBMS.

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