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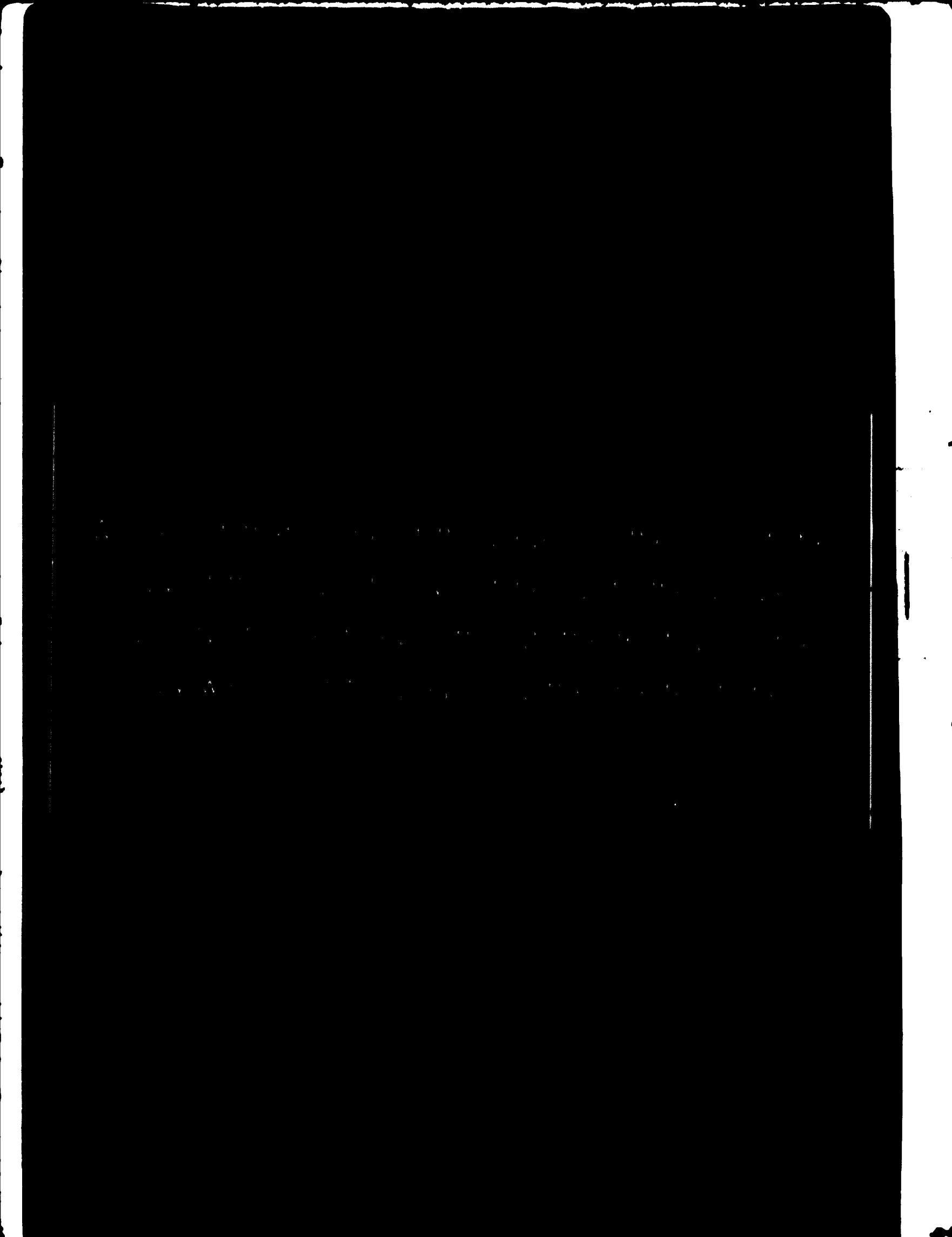
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07424



Distr.  
LIMITED

ID/WG.23Q/10 1/  
14 February 1977

ENGLISH

**United Nations Industrial Development Organization**

Consultation Panel on the Use of Management  
Information Systems (MIS) for Raising  
Industrial Performance

Budapest, Hungary, 29 November - 3 December 1976.

EXCERPT.

ORGANIZATIONAL PRECONDITIONS OF THE REALIZATION OF  
MANAGEMENT BY EXCEPTION, AND ITS NEW POSSIBILITIES  
BY COMPUTERIZATION<sup>1/</sup>.

by

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<sup>1/</sup> This is an excerpt of Dr. Ládó's paper which was originally done in Hungarian. The views and opinions expressed in this paper are those of the author and do not necessarily reflect the views of the secretariat of UNIDO. This document has been reproduced without formal editing.

In simple cases, management by exceptions can be successfully used without the help of computing in various fields. It has been used for a long time in the traffic branch; the method is spreading over industry and trade too. However, the possibilities lying in the main principle of the method can efficiently be exploited only with the use of computing, if the following situations exist: the companies of various branches are large and/or they produce or sell many kinds of products, they are spread over large territories, their production and selling systems are differentiated, etc. Without striving for having complete list, there are several states of development to differentiate with regard to the use of computers in this field. These are the following:

When the use of computing is of first state of development, the company's plan is elaborated manually, or only parts of it are computed, but the data of the plan are stored in the computer's memory. The specification and completeness of the stored data is naturally very different.

In case of industrial companies for example, the storage of data about the daily production, income, sold products, proportional costs of production is minimum requirement. The related actual figures are loaded into the computer too, via primary information medias. There can be used various methods too. Depending on the existing configuration, the preparation and processing of paper tapes or punched cards may be necessary, but an on-the-line data input is also possible via various input machines. The computer compares the actual numbers with the planned figures, calculates the difference, and - taking the interpretation of deviations, and the tolerancy zones into consideration - it determines the real deviations, and the very managerial level too, which is competent to deal with them.

The simplest form is, if the computer prints the calculated results out, giving thus one kind of information for the primary user. A more sophisticated form is, if the computer distinguishes between users, and calculates information sets for different users, taking their various

aspects into consideration. When using up to date terminal systems, data are available on the working place of the user in a printed form, and/or on CRT's.

Naturally, the computer should store the data, and it is easy to arrange that not only daily but monthly cumulative data be stored.

It should be emphasized that a great part of the data of the above data processing system should be stored not only for managerial purposes, but for meeting several accounting demands, e.g. for the sake of a good inventory control.

The first state of development discussed shortly above, can be characterized mainly by the fact that the use of the computer is restricted exclusively to the comparison of planned and actual figures and to storage, cumulation and comparison of relevant data. The technical solution is determined by the previously installed system. It should be mentioned that there is no special demand towards memory size, because the information related to the different fields/production, sale, accounting, etc., can be processed sequentially, using primary data from tape-memories.

Using the second state of development, the computer with the help of a data base any special programmes - indicates the expectable effect of the registered deviations on the whole system, and at the same time it makes the determination of those main numerical data possible, which are characteristic for an intervention, being eventually necessary due to a given situation. In order to solve these two tasks, the computer should store all main, relevant informations about the given company. The character of this information-collection is shown on the page 14, by a system-matrix of an industrial company. This contains the resources of the company/system, their available quantities, the potential products which can be produced, coefficients characteristic for the use of resources - e.g. related to working hours, machine hours, energy, material, the possible

maximum of sale, the maximum sale which the company is obliged to, and the values of specific coverage which are characteristic for the economical effectiveness of the products. It is an important feature of the system-matrix, that the resource restrictions of those organizational parts, which are stochastically related to the changes in the quantity of production, are separately emphasised. The system-matrix shown is optimum-profit-oriented, and does not give an entire picture of the whole system. Various data, connected to customers, deliverers, final product stocks, prices are needed by all means.

SYSTEM - MATRIX

1. Part

Resource - Product Matrix  
(Operational Field of Production)

Resources, directly related to the production (1. Group)	Products						Value of the resource (machine hour/month)
	T <sub>1</sub>	T <sub>2</sub>	..	T <sub>j</sub>	..	T <sub>m</sub>	
	Coefficients for the specific usage of resources						
RI <sub>1</sub>	a <sub>11</sub>	a <sub>12</sub>	..	a <sub>1j</sub>	..	a <sub>1m</sub>	b <sub>1</sub>
RI <sub>2</sub>	a <sub>21</sub>	a <sub>22</sub>	..	a <sub>2j</sub>	..	a <sub>2m</sub>	b <sub>2</sub>
	⋮	⋮		⋮		⋮	
RI <sub>i</sub>	a <sub>i1</sub>	a <sub>i2</sub>	..	a <sub>ij</sub>	..	a <sub>im</sub>	b <sub>j</sub>
	⋮	⋮		⋮		⋮	
RI <sub>n</sub>	a <sub>n1</sub>	a <sub>n2</sub>	..	a <sub>nj</sub>	..	a <sub>nm</sub>	b <sub>n</sub>

2. Part

(machine hour/pos)

Configuration of the system

Resources, directly not related to the production (2. Group)	Name and dimension of the feature	Value of the restriction	
		lower	upper
RII <sub>1</sub>			
RII <sub>2</sub>			
⋮			

Resources, directly not related to the production /2. group/	Name and dimension of the feature	Value of the restriction	
		lower	upper
MII <sub>1</sub>			
⋮			
MII <sub>n</sub>			

3. Part

Operational Field of Sale

Min /pos/month/			..		..	
Max /pos/month/			..		..	

4. Part

Specific coverages

	..		..		
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Several deviations may occur during the life of a company, which have unambiguous influence on the output. Such case is for example, when a given product should be sold with reduction. Besides these types there may be deviations, which have various annulative effects: for example, a machine falls out from the production, which is a crucial point of the system, from various products' point of view. In this case problems occur not only in workshops, but in connection with obligations, stocks, employment, etc. too. However, it can be proved, that the fields - or block diagrams -, which are effected in such a multiplying manner by different deviation-types, can be systematically determined. The competent persons can be determined too, and therefore the management is informed very quickly on the facts, and at the same time on the different numerical data, characteristic for the given deviation. It should be added, that calculations of this kind are only useful, if the company provides for the maintenance of the used programs and data in all certainty. If there is no appropriate maintenance, the determination of the influences by computing can be very dangerous.

If the system of an enterprise is simulated on a computer, the possibility naturally does exist for calculating the numerical data of managerial interventions, which may eventually be necessary. In this case a man-machine communication is needed, because after having been informed on the multiplying effects of the given disturbance, the manager should decide on the character of his intervention, which aims at restoring the planned situation. The intervention can be the use of outer help, reorganization within the company, modification of obligations towards customers by granting allowances, etc. It is obvious that every possible intervention has different effects on time, cost, profit, losses, etc. If the various output effects can be quickly calculated, the manager is in a favourable situation, i.e. he can realise the best solution. At this state of computing the system-matrixes are generally large, and the data within the matrix should be directly accessible, there are precautions regarding memory size, and access time.

When using the third state of development in computing, the corporate planning is done by the machine as well. Consequently the basis which the actual numbers are compared with is much better established.

A special architectural phase is when a computerised process-control is realised in given parts of the system, which is however connected to the management information system of the whole enterprise.

Companies, having applied several office machines (booking, accounting, etc.) and punched card systems for decades, generally changed for computing step-by-step, based on these old techniques, and therefore they use their computers primarily for accounting purposes. These companies generally have well established systems for calculating wages, stocks, direct or bank accounts toward customers and sellers. Consequently, these firms build up the system of Management by Exceptions based on the mentioned procedures. Computerisation of the order book, and the various technical and economical data of production is a new task for them.

Experience show, that if an enterprise has no such "historical" precedents, and begins with building up his information system objective-oriented, should not follow the way, which is determined by old techniques. There are such kinds of equipments available today, which promote the solution of the most important tasks of a company. A good example is the ticket reservation system of traffic enterprises. In case of industrial companies it is often reasonable to begin with computerisation of administrative tasks related to orders, and achieving step-by-step the last phase of the accounting procedure connected to sold final products. From organisational points of views these informations should be kept in mind, which have special value for the whole company. (The situation with a given obligation is generally much more important than the accounting related to the purchase of several mass-produced auxiliary materials.) During the above procedure there should naturally be a strive for almost-entirely computerised accountancy. Anyway, it can be

recommended that the characteristic features and requirements of a management information system should be taken into consideration when investing computers at least to an extent, by which the possibility for comparing the actual and planned figures, for making their differences, and for analysing them is provided. If we do not think of the preconditions (informations media, programming and organizational aspects, memory size, etc.), which are necessary for the introduction of the Management of Exception method, we can cause considerable over-work, and over-costs later, when the method is intended to be introduced.


The amounts of coverage of a product has been mentioned before, connected to the system-matrix, (coverage of a product = price - proportional cost). The first part of the system-matrix contains deterministic and linear connections between products and resources. If there is a need for calculating the financial effects too in case of optimum calculations, then linear financial indicators should be used. These indicators are in case of products the price, proportional costs, and their difference, the coverage. Every change in the coverage of a product has a direct influence on the profit of the whole enterprise. Therefore, it is always recommended, that the coverages, and the two factors determining them, the prices and proportional costs should be operatively observed. If the company uses the direct costing method, than the usage of the "Price-Cost-Coverage-Profit structure" is also reasonable, which promotes the planning, operative control and analysis to a great extent. The scheme of this structure is the following:

Income
- Proportional costs
-----
Coverage
- Fixed costs
-----
Profit

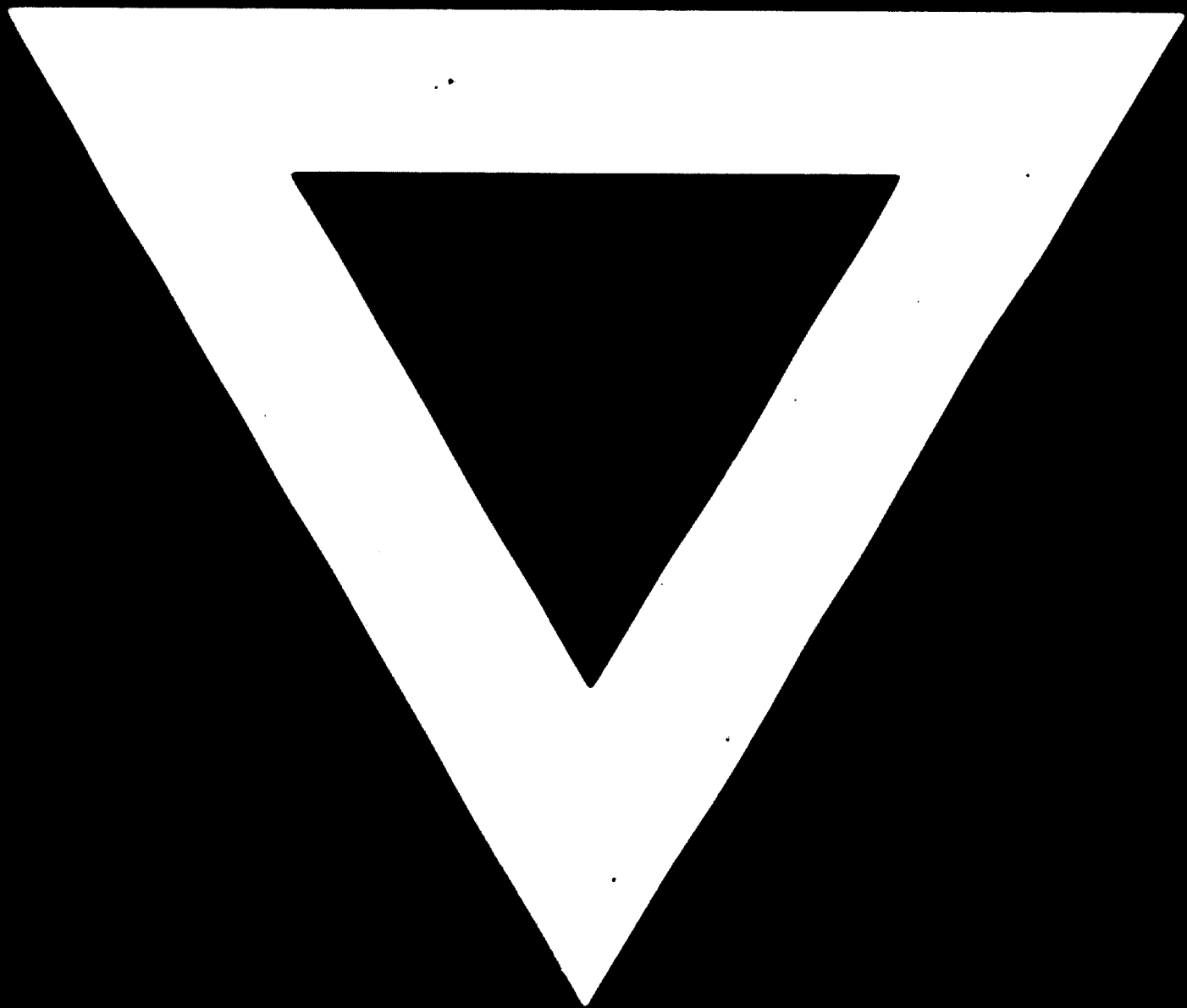
When mentioning the direct costing procedure we only wanted to show, that the application of the Management by Exception system requires the use of special methods in various fields of activity. This demand is not restricted

to the mentioned costing problem. New methods are needed in the same way for planning and observation of various stocks, for planning control and analysing the quality, or for operative control of production too. All the methods have a common feature: they all aim at raising the work's efficiency, and at giving the managers those informations, which promote their important work to the possible largest extent.

Last, but not least the table, on the next page, is aimed to make it clear, what kind of compilation can serve for informing upper level management of an industrial company about the result of a current period.

Considered fields, activities, events, conditions	Deviations from proportionate fulfillment, or norms						Real or expected effect on monthly profit			Remarks / primarily influenced organizational departments/
	Previous daily			Cumulated monthly						
	+	-	Σ	+	-	Σ	+	-	Σ	
<u>Order-book</u> - Main groups of products <u>Production</u> - Main groups of products <u>Deviation at proportionate costs of production</u>										
<u>Utilization of capacities</u> - Main plants, factories <u>Final product stock</u> - Main groups of products <u>Semi-final product stock</u> - Determining sorts <u>Material-energy stores or supply</u> - Main sorts <u>Influences of changes in prices of materials</u>										 - real effect on profit
<u>Debt to the suppliers</u> <u>Mannover condition</u> - Main categories <u>Sale /delivered/ incomes /quant. deviation/</u>										
<u>Effects of allowances, changes of prices</u> <u>Change of coverage</u>										
<u>Debt of customers</u> <u>Bank account currents</u> <u>Credits</u> <u>Change of interest rate</u>										
<u>Change connected to other company costs</u>										
<u>Other changes, connected to assets and liabilities</u>										
	-	-	-	-	-	Σ				

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**77.09.15**