

ERP-system: A Commercial Goods Planning Module

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Abstract: This paper discusses the problems concerning the commercial goods planning at trade objects (stores) of the companies with a branch structure and a huge nomenclature base. A principle of optimality for amount on hand is defined. Some approaches to resemble it are proposed. The occurrences “temporary locality” and “space locality” are discussed and the algorithm for correction of inferior limits lists is presented. The report considers the main functions of Registry_S module during its implementation at the company dealing with electronic components and systems import and trade.

Key words: ER -systems, Decision-makers.

INTRODUCTION

One of the most important decisions which the managers at the trade-oriented companies have to take concerns the amount on hand planning in stores. The problem comes especially substantial if:

- the company has a huge stock items base;
- the company has a branch net covering the whole country;
- the store’s area is very small.

In this situation every wrong decision regarding the maintaining of minimum amount on hand from every stock item in every store could causes unprognosticated losses. The **principle** of optimality in this case requires such a stock items quantity in the store as it can sell till the next supplement time. The overstocking causes unnecessary expenses and ineffective usage of the store’s area and the luck – losing of potential clients. Therefore it is very important for the future company progress to have an ERP-system, which can plan the necessary amount on hand in all stores.

A typical relations scheme at the company with one center and a set of geographic remote stores is shown on Fig.1.

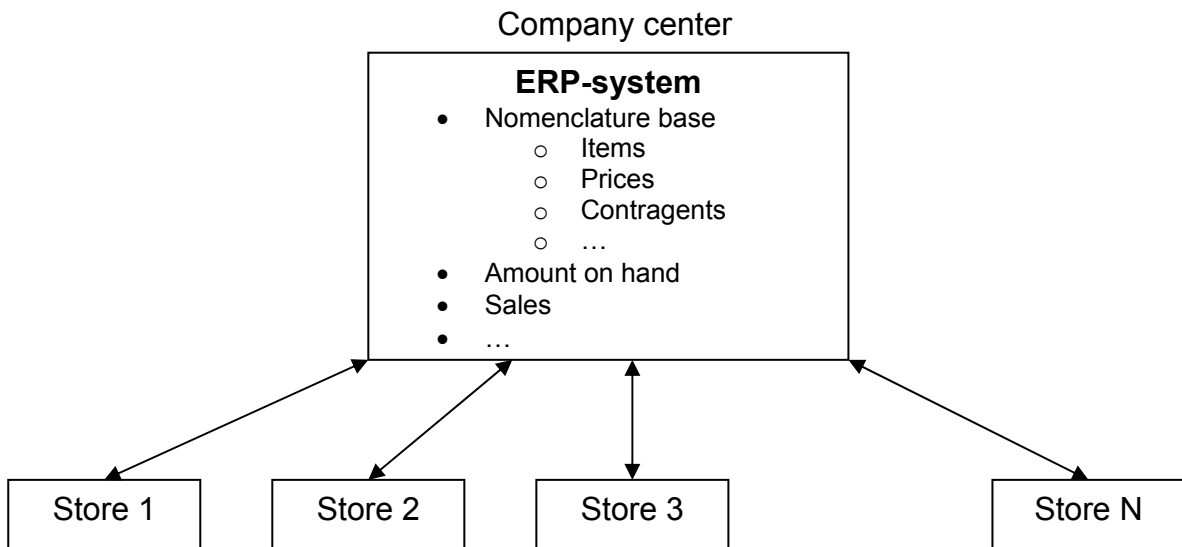


Fig.1. Relations schemata at a company with branch structure

The center sends to stores both stock items and information about changes in prices, descriptions and other item’s attributes. At stores closing, backward to the center, a detailed information about the sales done and the orders for new supplies is sent. On basis of the integrated information at the center the ERP-system has to plan the next stores supplying.

A COMMERCIAL GOODS PLANNING MODULE Registry_S

The considered module Registry_S is a part of the ERP-system implemented at a company dealing with electronic components and systems import and trade. The main business characteristics are the huge nomenclature base and countrywide net of stores. The stores supplement depends on inferior limits determined to selected stock items. In order to provide a maximum correspondence to regional markets features every store could have its own inferior limits list. These lists creation and modification is shown on Fig.2.

Обект	
▶ МАГАЗИН АСЕНОВГРАД	
МАГАЗИН БЯЛА	
МАГАЗИН БАРНА	
МАГАЗИН ВЕЛИКО ТЪРНОВО	
МАГАЗИН ВРАЦА	
МАГАЗИН Г.ОРЯХОВИЦА1	
МАГАЗИН Г.ОРЯХОВИЦА2	
МАГАЗИН ГАБРОВО	
МАГАЗИН ДИМИТРОВГРАД	
МАГАЗИН КАЗАНЛЪК	
МАГАЗИН ЛОВЕЧ	
МАГАЗИН МОНТАНА	
МАГАЗИН ПАЗАРДЖИК	
МАГАЗИН ПЕРНИК	
МАГАЗИН ПЛЕВЕН	
МАГАЗИН ПЛОВДИВ 1	
МАГАЗИН ПЛОВДИВ 2	
МАГАЗИН ПЛОВДИВ 3	

Лимитирани артикули		Лимит
▶ КАБ.ОБ УВКА		20
STRF6653		1
STR86706		2
МУФА F КОНЕКТОР		14
ПРЕХОДНИК 220V		2

Fig.2. Form for inferior limits lists creation and modification

The out of stock check (see Fig.3) can be done either for all stores or for the selected only. It starts after the daily sales integration. If the amount on hand of a particular stock item is less than the inferior limit then it is included in the order for store supplement. The ordered quantity complements the amount on hand to the inferior limit but it could be modified additionally. Once they are generated and confirmed the order lists of all the stores are ready for accomplishment and the stores supplement could be started as soon as possible.

This operation (although it takes a lot of time and resources) is routine, whereas the main problem remains the determination of values in the inferior limits lists. The purpose is to resemble to the principle of optimality, as it is clear that its real measure up is impossible. Some of algorithms for prognostication of necessary amounts on hand in stores during the different periods of the year are described below.

Изчерпаност

Обект: МАГАЗИН АСЕНОВГРАД Артикул: Сортировка: Обекти Артикули

Обект	Артикул	П-ка	Лимит	Налич.
▶ МАГАЗИН АСЕНОВГРАД	БАТ MAXELL 6F22K	1	2	1
МАГАЗИН АСЕНОВГРАД	БАТ MAXELL LR6 XL	4	8	4
МАГАЗИН АСЕНОВГРАД	БАТ MAXELL R03	5	20	15
МАГАЗИН АСЕНОВГРАД	БАТ MAXELL R20	2	6	4
МАГАЗИН АСЕНОВГРАД	БАТ OSEL R03	2	2	0
МАГАЗИН АСЕНОВГРАД	БАТ OSEL R06P	1	1	0
МАГАЗИН АСЕНОВГРАД	БАТ PANAS 6F22K	3	4	1
МАГАЗИН АСЕНОВГРАД	БАТ PANAS R6SPEC	7	16	9
МАГАЗИН АСЕНОВГРАД	БАТ PANASONIC R03	2	12	10
МАГАЗИН АСЕНОВГРАД	БАТ VARTA-4018	1	1	0
МАГАЗИН АСЕНОВГРАД	БАТ XL6F22HD	1	1	0
МАГАЗИН АСЕНОВГРАД	БУТОН ЧЕРВЕН	1	1	0
МАГАЗИН АСЕНОВГРАД	ВАКУУМПОМПА 1PK-366J	1	1	0
МАГАЗИН АСЕНОВГРАД	ВАКУУМПОМПА 1PK-366A	1	1	0
МАГАЗИН АСЕНОВГРАД	ВАКУУМПОМПА 1PK-366C	1	1	0

Fig.3. Form for out of stock ascertainment and orders generation

STRATEGIC PLANNING OF COMMERSIAL GOODS

This approach is based on year cyclic recurrence at the market behavior. The regional sales of a particular stock item during the previous year are analyzed and the amount of inferior limit is calculated. Daily average sales (DAS) of the particular stock item for every month are computed, i.e. the total amount of sales for every month is divided to the number of workdays.

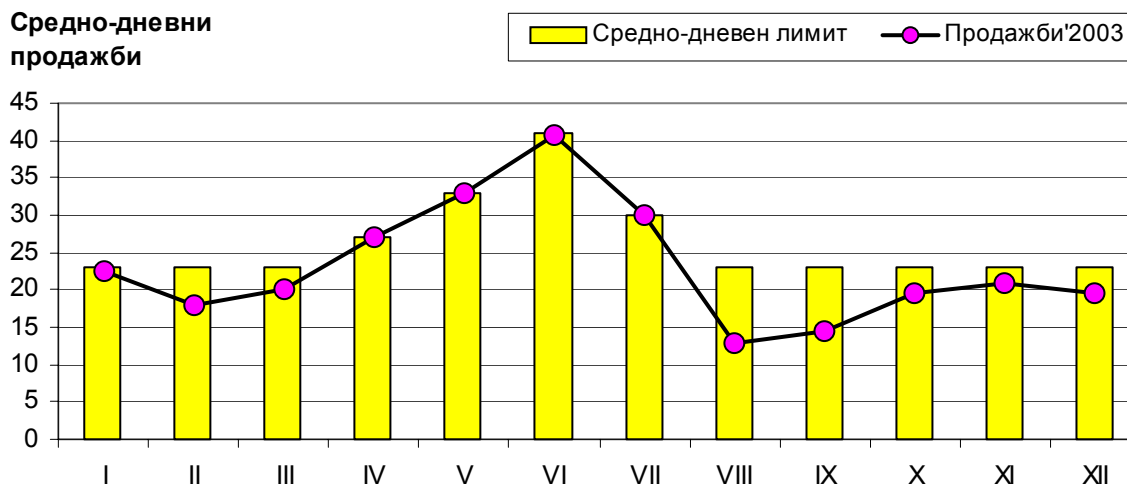


Fig.4. Inferior limit determination for 2004 based on DAS of 2003

The new inferior limit value is the DAS of the month if it is greater than the DAS of the whole year. Otherwise, the year average sales value is chosen.

This way the strategic daily average limit (SDAL) can be calculated for every stock item at the every particular store and for every month of the new year. The SDAL could be used for stores replenishment.

MONTHLY CORECTION OF STRATEGIC DAILY AVERAGE LIMIT

The main disadvantage of this way calculated SDAL is that it is based on the information about a last period of time. It does not take into account the market growth during the present year. This calls for monthly correction of its value according to new market trends. The SDAL and its corrected value are shown on Fig.5.

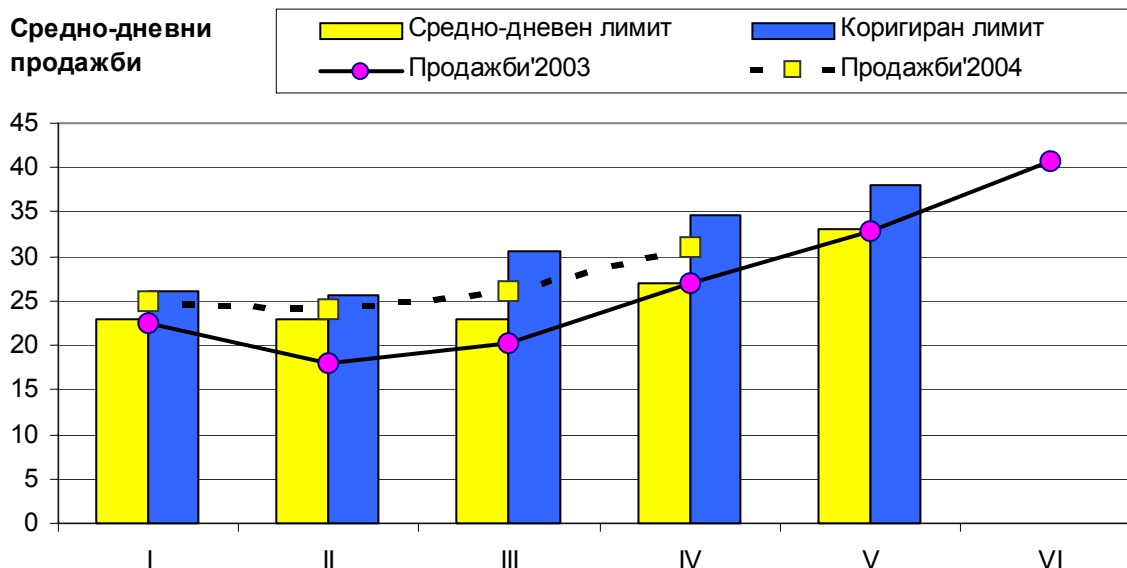


Fig.5. SDAL correction in order to take into account the year market trends

The proportion of the present year sales and the same of the previous one is used as the correction coefficient. An information about the previous month is taken into account for the new month market trends prognostication. For an example, the corrected limit for the May 2004 is calculated on the following formula:

$$\text{Corrected SDAL}_{V.2004} = \text{SDAL}_{V.2004} \frac{\text{DAS}_{IV.2004}}{\text{DAS}_{IV.2003}}$$

It is evident from the graphics that in most of the cases the new corrected limit is closer to the optimal one (the DAS curve for 2004).

WEEKLY CORECTION OF STRATEGIC DAILY AVERAGE LIMIT

The dynamics of the market processes enforces a new additional correction of limits lists to be done. It must response to an expected sales growth in the near future. The reasons of that are some occurrences in the market behavior known as **temporary locality** and **space locality**.

Temporary locality – it is most likely that if some stock item is in great demand then in the near future the market situation will be the same.

Space locality – it is most likely that if some stock item is in great demand in a particular geographic region then in the near future this market situation will expand in the neighbour regions.

There are objective premises for these occurrences. Some of them are: the beginning of a new serial produce from a company with a discrete production, the advertising, the modern trends in different areas and etc. The main purpose of this additional adjustment of the limits lists (usually once per week) is to respond adequately to consumer demand newly coming into the market. The form where the limits lists are generated and modified is shown on Fig.6.

Магазины	Артикул	Описание	Маг.	Прод.	Лимит
МАГАЗИН АСЕНОВГРАД	ГВО СФ	Пл.верт.откл.TV София	10	15	2
МАГАЗИН БЯЛА	ГЛАВА ЗА МЕТАЛОТЪРС Ф28		11	15	3
МАГАЗИН ВАРНА	ГЛАВА ЗА МЕТАЛОТЪРС Ф38		2	2	1
МАГАЗИН ВЕЛИКО ТЪРНОВО	ГЛИМ ЛАМПА		4	11	2
МАГАЗИН ВРАЦА	ГНЕЗДО ПЕТИЦА		13	27	20
МАГАЗИН Г.ОРЯХОВИЦА1	ГНЕЗДО ПРЕД. МИНЬОН		11	17	13
МАГАЗИН Г.ОРЯХОВИЦА2	ГОВОР 08W03ARA 40M		1	1	2
МАГАЗИН ГАБРОВО	ГОВОР 1-502-704-11	SONY 80M/3W	1	1	2
МАГАЗИН ДИМИТРОВГРАД	ГОВОР 2813		4	5	2
МАГАЗИН КАЗАНЛЪК	ГОВОР 377-035-971-A		2	2	2
МАГАЗИН ЛОВЕЧ	ГОВОР 80P-C6WS 160M		2	2	1
МАГАЗИН МОНТАНА	ГОВОР 80M/0.3W		2	3	1
МАГАЗИН ПЕРНИК	ГОВОР S08F07 80M		1	1	1
МАГАЗИН ПЛЕВЕН	ГОВОРТЕЛ Ф15ММ 30 ОМ		4	4	2
МАГАЗИН ПЛОВДИВ 1	ГТ905А	GeP-75V,3A,6W	8	9	3
МАГАЗИН ПЛОВДИВ 2	ГТ906А	GeP-75V,6A,15W	15	34	3
МАГАЗИН ПЛОВДИВ 3	ГХО ВТ	Пл.хориз.откл.заTV В.Търново	3	5	1
МАГАЗИН ПЛОВДИВ 4_1	ГХО Е 380	Пл.хор.откл.	4	4	2
МАГАЗИН ПЛОВДИВ 4_2	ГХО СФ	ГХО СФ	4	4	2
МАГАЗИН ПОПОВО	Д226Б	400V,300mA, изпр.	2	2	4
МАГАЗИН РУСЕ	Д814В	9-10.5V,5mA,0.34W	3	3	20
МАГАЗИН РУСЕ 2	Д814Д	11.5-14V,5mA,0.34W	2	3	10
МАГАЗИН СЛИВЕН	ДЕЛИТЕЛ СФ81	ДЕЛИТЕЛ СФ81	1	1	1
МАГАЗИН СЛИВЕН 2	ДЖЪМПЕРИ	ДЖЪМПЕРИ	3	3	10
МАГАЗИН СТАРА ЗАГОРА	ДИСТ.РЕГУЛ ЗА ОСВЕТЛ		3	3	2
МАГАЗИН ТЪРГОВИЩЕ	ДРТ - 1	БОБИНА ДРТ - 1	4	9	2
МАГАЗИН ШУМЕН 2	ДРЪЖКА ТОНКОЛОНА H4621		1	1	4

Fig.6. The main form for limits lists generation and modification

The algorithm for weekly SDAL correction passes through the following steps:

1. Analysis of the daily sales for the specified period – a request for filling the table below is running. The table will contain the total daily sales quantities of the stock items from the limits list of one strategic store (usually in a big town). There is also a count of daily sales, contained these stock items.

Date	Stock item (from strategic store's list)	Store	Sales count	Total daily quantity
...

2. Initial limits list generation – it is based on the result of step 1. The limit of the considered item is set to the maximum daily sales quantity from all stores. The count of stores, sold this item is also calculated.

Stock item (from strategic store's list)	Stores count	Total sales count	Limit (maximum quantity for one day)
...

3. Futureless stock items elimination from the list – just formed at step 2 list is modified by deleting the accidentally included stock items.

Sifting out is based on the following criteria and algorithm:

- a. Selecting of the rare sales – these are the sales done in one store (Stores count=1) or their total count is smaller than the specified one in the form of Fig.6 (Total sales count < Min specified value);

- b. Eliminating of the stock items with rare sales – the system eliminates only those stock items with rare sales, which have some amount on hand in the selected typical regional stores (marked positions in the table on the left side of Fig.6). The list with eliminated stock items is then given to the managers for additional analysis.
4. Updating the limits lists of selected stores – the system adds new stock items to the local store list or increases existing limit value (where it is possible).

There is a possibility for automatic adding of strategic stock items to the generated list. These are positions, which because of the company policy must be available regardless of their sales.

CONCLUSIONS

The right way of commercial goods planning in all stores promotes the profitability and the competitive power of the company. The effective work of an ERP-system in this area should be based on minimum one-year history of the business processes. The practice indicates that even after several months' usage the positive results come to the front.

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