

## DESIGN OF A DYNAMIC MODEL OF ENTERPRISE BUSINESS PLAN

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### Abstract

For most enterprises the present method of business plan preparations applied based on index modification of plans related to the previous periods and/or on combination with the sellers' method. The business plan is defined by expected volume of sales for individual customers. However, such business plan type fails to reflect burden on individual technological nodes as well as sales dynamics within individual periods of the year. Moreover, the plan is not prepared in detail up to the level of final products which exhibit significantly different requirements for capacity load of individual production nodes and equipment as well as distinct requirements for inputs, etc.

**Keywords:** Business plan, dynamic model, forecasting, capacity potential and capacity demands

### 1. INTRODUCTION

The business strategy of each company should be established on good recognition of status and orientation of the market for the segment where the company operates. Similarly to other areas of the enterprise, also for trade and sale, the planning represents one of the most important factors affecting the ability of the enterprise to fulfill both the standard market's demands and the changing ones in the future. [1], [2]

Necessarily, the customer behaviour is to be known within the demand's planning process. Ineffective planning of sales and production results in accumulation of stockpiles and then in consequential tying-up of the funds, oversizing of production capacity or, on the contrary, in deterioration of supplier's service. Planning of sales is utmost important for proper allocation of resources - purchase of material, adjustment of needs for labour, for production capacities and for logistics infrastructure. [3], [4]

Sales planning must be based on the analysis of sales historical trends according to assortment and customers completed with the inputs from the department of trade and marketing. Implementation of effective planning for trade and production requires corresponding information tools for gathering, analysis and sharing the data. [5],[4]

The nature of production and market situation in the printing segment, where the company Chemosvit Folie, a.s. operates, generates high demands for all levels of planning, starting from operative planning and production scheduling in the form of production orders and ending with sales planning over a one year period. Bearing in mind the dynamics of environment and permanent modifications in customer's requirements, it is necessary to keep under the microscope the capacity demands and to balance them against the capacity potential of production. As precise as possible planning of future customers' demands and capacity for their implementation establishes a condition for long-term successfulness of company on the market and for satisfying the customers' needs.

The present situation in the market of film converting could be briefly characterized as follows:

- Increase in the share of small job, average job size is in constant decline;
- Pressure on job completion pace, shortening of delivery periods;
- Keen price competition - declining prices of products, increasing prices of inputs;
- Increase in insolvency;
- Prolongation of payment deadlines for the invoices;

- Shortening of product innovation cycle (new designs, quantity of variations for one product, various competitions and sales promotion focused on attraction of the final customer) [6],[7]

## **2. ANALYSIS OF THE CURRENT SYSTEM FOR BUSINESS PLAN PREPARATION**

When proposing elimination for limitations of present business plan, firstly, the list of parameters - coefficients is prepared of those the estimated and calculated values of which create a more accurate picture of demands and modification of ordering process of customers as well as subsequent production. By determination the function relations of new parameters and by permanent and ongoing automatic comparison and verification of facts and assumptions it is possible to achieve long-term stabile prediction of status in capacity demands for individual customers and to resolve possible conflicts in advance. Using a dynamic modelling for incoming demands and tenders a possibility occur to precise the decision making process significantly for both the trade management and the production.

Setting of necessary model parameters is based on analyses and knowledge about orders from previous periods (historic data series from the periods N-1 and N-2) as well as on expert knowledge of personnel (heuristics) serving for individual customers. For some orders, information having a significant impact is that about contractual relationship of the customer with third parties, usually multiple stores, which the customer is undertaken to comply with and such information is unavailable currently.

For preparation the dynamic model of annual business plan, the customer demand is needed to be understood and defined. For the business plan preparation, time of production is significant for particular products, assortments and motives and thus it is the case of job-order production.

Majority of customers are the producers of food and non-food products. In order to pack their products, the customers require particular motives - designs, specific for each company with unique material composition. Minority of customers are the trade enterprises which sale the goods further to a particular producer with added value of communication, re-storing and financing.

For defining parameters, basic information is a destination place of delivery - usually production plant of the customer which need to be long-term supplied on the ongoing and flexible basis during the contractual relationship. Usually, in the particular plant, the contractual share of one supplier is determined, e.g. 30 to 70 % of annual consumption.

The motives - designs of the customers are placed on the market. From the long-term perspective, the motives could be divided to core main motives with frequent occurrence of orders, e.g. 6 - 10 times per year and big volume, less often motives such as also mutation for various countries with less consumption and one-time promotion motives for a specific occasion such as sport, season motives, e.g. for Christmas market. The motives are divided by marketing - design to the own trademarks and the exterior - private marks, e.g. for big trade networks. This factor may significantly affect repeatability and size of the orders.

The customer's products - are their basic products that are produced in their plant as well as packed on installed packaging lines and that have usually default defined composition and long-term forecastable sales including seasonability effect.

## **3. METHODOLOGY FOR PREPARATION OF THE DYNAMIC MODEL FOR THE BUSINESS PLAN**

### **3.1 Calculation of time demands for production in the technological nodes and of job size**

An assortment - a product - is defined by the individual internal number which defines strictly needed raw materials and technological operation for production of the product. The core technological nodes include in particular the print refining by rotogravure or flexoprinting and lamination - splitting the films by an adhesive.

Moreover, own production of basic films mostly that on the PE base by blowing technology is considered as the core node.

For modelling of time necessary for production in the selected node there exist a mathematically defined formula coming from the real production parameters of the assortment and the node.

**Total standard hours of job = Total time for installation + Total time for running-in + Total time for dismantling + Run time of the job**

The nonlinear relation between the volume and time directly affects total time needed for implementation of all customer orders, individually for various production nodes. According to the technological parameters of job, size of order and number of motives, total time for implementation is calculated and incorporated to the production plan in the individual nodes. [9]

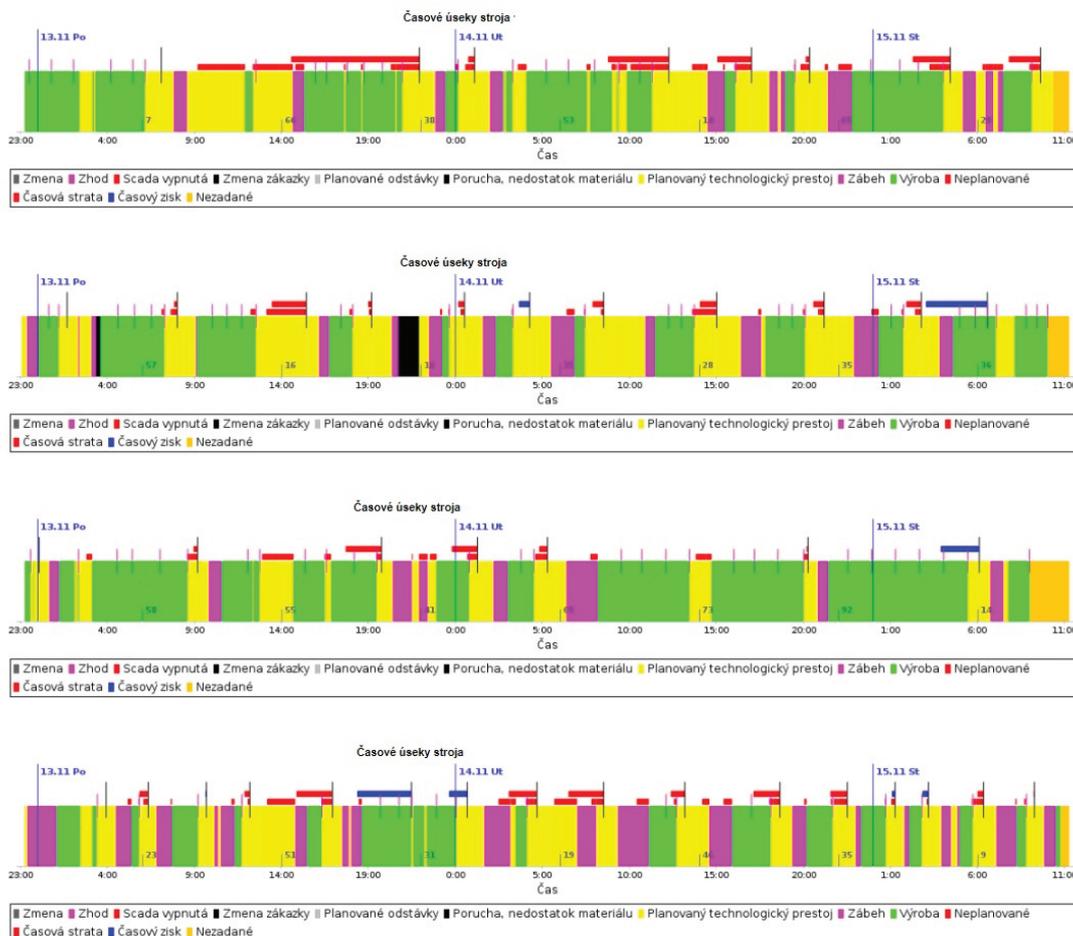


Figure 1 Production time in node - green colour - sample

Size of job e.g. in kg at specified width and assortment	300 kg	500 kg	1000 kg	3000 kg
Time of production node 1	100% /e.g. 3 h/	120%	170%	350%
Time of production node 2	100% /e.g. 2h/	120%	230%	650%

Figure 2 Production time in node - sample of non linear relation between volume in kg and production time

### 3.2 Effect of operative control of production

There is a permanent tension between trade and production departments as the trade department exhibit a natural effort to achieve contracts for new jobs, to achieve new customers as well as to penetrate the new markets. However, production is limited at fulfilling the plans by maximum production capacity. From short-term perspective, „matching“ of capacity potential and capacity demands is provided by operative planning based on the production orders. From long-term perspective in the one-year horizon, this task is satisfied by the business plan. [7], [8]

Under present method of production management, all requirements of customers are transformed into a digital format of production capacity plan in individual nodes according to order and sources needed for implementation of each accepted order within its requested or even postponed deadline.

Basic orders characteristics per year are:

- Unique design,
- Unique order size,
- Unique frequency,
- Design changes during the year,
- Structure changes.

DESIGN	unique structure
	unique combination of 1 -11 printed colours
	different ink coverage, delivered digitally from customer
	unique combination of size - width and length
	unique combination of printig parameters
	different number of pictures horizontally diferet numbers of pictures vertically

Figure 3 Parameters of product design

Structure	unique combination of 1 - 4 layers of basic films, different thicknesses	layer 1 -basic film layer2 - basic film layer 3 - basic film layer 4 - basic film
	different thicknesses are from 15 to 150 microns different chemical polymers structures	
	unique combination of working processes - technology nodes	

Basic film polyme	Basic film types	Basic film types				
		transparent	white	metallised	matt	other
OPP - polypropylene biaxially oriented PE - polyethylene PET - polyester CPP - polypropylen cast PA - polyamid barrier - contain EVOH layer other						

Basic converting technologies /production node/	printing	rotto	surface reverse both side
		flexo	surface reverse
		offset	surface reverse
	lamination	solvent based	
		solvent free	

Basic film productions technology	Blow molding
	Casting OPP

Figure 4 Parameters of product structure

#### 4. DESIGN OF A DYNAMIC MODEL OF BUSINESS PLAN

Aim of project are as follows:

- Propose dynamic model of business plan which reflects orders frequency, order size, seasonality and market changes during the year,
- To recalculate annual business plan to capacity utilization of the basic production nodes according to individual parameters of customers plants, quarterly
- Continuously reevaluate and update business plan according to changes in customer demands and new opportunities

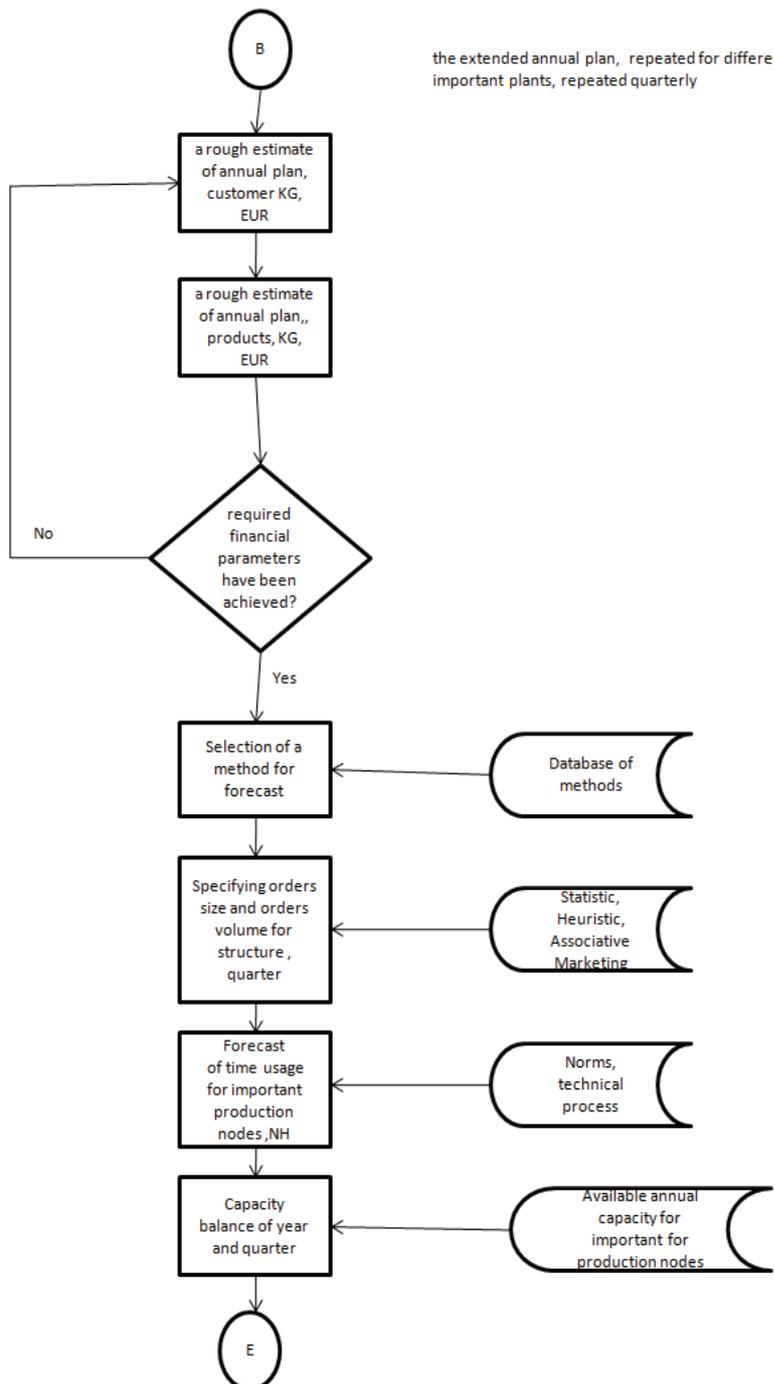


Figure 5 Proposal of steps for new dynamic model

Annual plan for needs of customers manufacturing plants	Totally: /MT/	Average order size /KG/	Number of designs /pieces/ Single/repeated	Number of orders /items	Average of product thickness /um/	Average of product width /mm/	Average of number of colors //	Coefficient of change of plan %		Node1 Printing. 1 /NH/	Node2 Printing. 2 /NH/	Node3 Lamination /NH/	Node 4 Basic film prod. /NH/
Annual matrix of demands and resources:	600 MT							Coefficient of planned volume – inc. Decreases.		250 MT	20 MT	580 MT	500 MT
Character of plant	stable												
Structure 1 - plan	80 MT	S – 350 M - 650 L – 2500	S – 10 M - 15 L – 5	S – 25 M - 35 L – 20	42	1110	7			40	0	80	0
Quarter 1.	V2		26 / 1					20		V1	V1	V1	V1
Quarter 2.	V2		...			...		20		V1	V1	V1	V1
Quarter 3.	V2		...			...		23		V1	V1	V1	V1
Quarter 4.	V2		...			...		27		V1	V1	V1	V1
Structure 2 – plan													
Quarter...													
Structure ... –plan													
Quarter...													
Average of usage plant /node /NH/MT/										5,2	4,5	3,1	3,7

Figure 6 Proposal of application of new dynamic model

## 5. CONCLUSION

The main contribution of the article - the proposed model - is replacement of static method for business plan preparation which is based only on one-time estimation of total assumed volume of future sales for the particular customer by a dynamic model. This model comes from an idea that for the enterprise is not enough to know only the total future volume of sales for the customers or assortment groups but also to analyse in details behaviour of individual customers in individual assortments up to the level of structures and motives. This is because the capacity load but also a need of individual inputs into the production process depend also on the job size, frequency of job occurrence, assortment comprising its specific thickness, width, colour, preparation and termination periods, non-linear relation between the total volume and the capacity demand resulting from its implementation. Dynamics of the model lies also in the rolling re-calculation of the model during the year such as in the quarterly periods, incorporation of capacity changes from the producer's party, modifications of ordered quantities according to the results of tenders in the customers' companies as well as implementation of new products. Active controlling and correction of the business plan during the year in dependence on changes and development of customer's demand and conditions on the market. Active control of portfolio based on the data from individual levels of the model represents also a possibility to propose various cost-saving projects, optimized purchases for the customer what becomes a significant added value.

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