TRANSPORT & *LOGISTICS:*
the International Journal

Article history:
Received 05 May 2017
Accepted 25 June 2017
Available online 11 July 2017

ISSN 2406-1069

Article citation info: Pitoňák, M. - Malindžák, D. – Volner, D., System analysis for preparation of business plan applied in the Chemosvit Folie a.s.. Transport & Logistics: the International Journal, 2017; Volume 17, Issue 42, July 2017, ISSN 2406-1069

SYSTEM ANALYSIS FOR PREPARATION OF BUSINESS PLAN APPLIED IN THE CHEMOSVIT FOLIE A.S.

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Abstract:
For most enterprises, the present method of business plan preparation is 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.

Key words:
Business plan, dynamic model, forecasting, capacity potential and capacity demands, sales

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 fulfil both the standard market´s demands and the changing ones in the future [1, 2].

Necessarily, customer behaviour is to be known within the demand planning process. Ineffective planning of sales and production results in accumulation of stockpiles and then in consequential tying-up of the funds, over sizing 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. [4, 5, 6]

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. [7]

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 and various competitions and sales promotion focused on attraction of the final customer). [8, 9]

1. ANALYSIS OF CURRENT SYSTEM FOR BUSINESS PLAN PREPARATION

Nowadays, determination of annual corporate business plan means determination-forecasting the volume and value of estimated annual volume of cooperation with each (significant) customer described in details for the assortments including sales development within individual periods of year. Expected modifications in volume (increase or decrease) are based on correction of the indexes for the volume of sales for individual customers and on application of the method of sellers who are most familiar with the situation and changes of individual customer. The annual business plan is to guarantee fulfilment of all corporate financial needs as well as to maximize but not exceed utilization of core technological nodes, at present, for defined assumption of daily operation for 24 hours and 7 days a week – on a continuous basis, except for a year-ahead forecast for short shut-downs such as during banking holidays or during summer period. [7].

Normally, cooperation volume is defined externally and individually in various technical metering units – the mass in kilograms or the area in m^2 of final production or length of production in running – length metres. Internally, the mass in kg is applied. At the same time, dividing based on quality is also used internally for the basic assortment according to needs for technological operation for production.

This volume may or may not be contractually agreed – guaranteed. With some customers, a business plan even on a multi-year basis may be contractually confirmed. Demandingness on technological nodes related to the capacity demands results not only from

the total annual volume of sales for a particular customer but also from the size of individual jobs (orders), frequency, seasonality, development of requirements throughout individual months of the year as well as quantity of motives. The aim is to create a dynamic model which considers not only the total volume of sales for individual customers but also behaviour within individual assortments and/or motives throughout the year, sizes of orders, frequency of orders and at the same time as well as which balances capacity demands for individual technological nodes such as printing, lamination, etc. resulting from their implementation with capacity potential of production centres within the particular period. [10]

For smaller customers, only an annual capacity reserve (ca.10%) is determined.

The position of a particular customer, priority in implementation of the jobs as well as the mutual interconnection in the SCM are characterized by specific criteria. Based on these, customers could be assigned to the following groups. [8, 11]

Multinational enterprises are the companies which associates several big production plants in various countries. Their number ranges in the order of tens up to hundreds. Usually it means to supply several tens up to hundreds products (designs) within the particular territory or plant for the company which "wins" the input tender. Cooperation with the individual plants is governed by the terms and conditions of the mother company including implementation and functioning of the SCM system. Usually, a characteristic feature of these plants is their orientation on a specific segment within which they produce several variations in big lots for various territories. This fact establishes an assumption that the demand of such plant is based on the consumption development in the particular segment.

Regional leaders represent strong companies associating 1-3 plants typically. A size of the plants is usually comparable to the plants of multinational enterprises. However, in the contrary to the multinational enterprises, the companies have wider portfolio of the products what relates to an effort for complex satisfaction of the domestic market demands. In practical terms, this means the products with high turnover in big volumes but also specialized products of small volume for the narrow segment of customers.

Both these groups used to order regularly. The size of production lots depends on development of the demand for the products in the particular segment.

The other group comprises **small companies** with the production assortment represented by the narrow number of products intended for the local market. In some cases (as for specific products), the products may penetrate the foreign markets. [7, 12]

Significant customers – usually multinational enterprises and big customers – represent a majority of volume of sales amounting to 80-85 percent, smaller customers represent ca. 12-20 percent of volume of sales. An overall example of the volume of plan according to the customer size is shown in the Figure 1. However, permanently ongoing acquisition pressure means that the group of companies smaller by that time includes the companies with the position and potential of multinational enterprises and leaders.

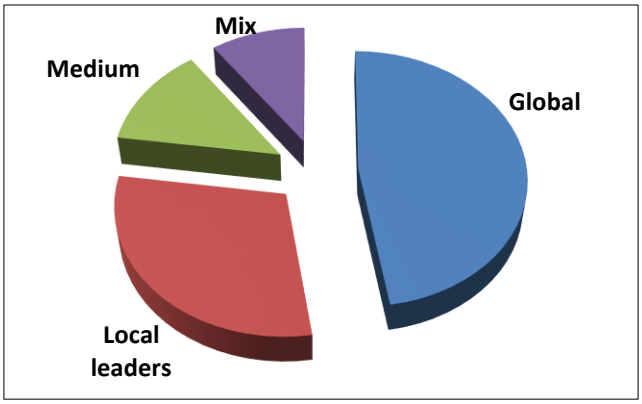

Fig. 1 *Distribution chart of annual sales in kg, to change the company differentiation (Corporate Documents, 2017)*

The financial value of the annual plan (in EUR) is determined as an assumed mean price per production unit in the particular assortment for an estimated annual base. Many customers use mutually accepted price modules that may be evaluated in a specified interval such as according to the price development of commodity raw materials.

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 internal diagram of production nodes and an example of assortments, raw materials is shown in the following figures. Bold frames show the technological nodes that are dominant from the standpoint of capacity planning.

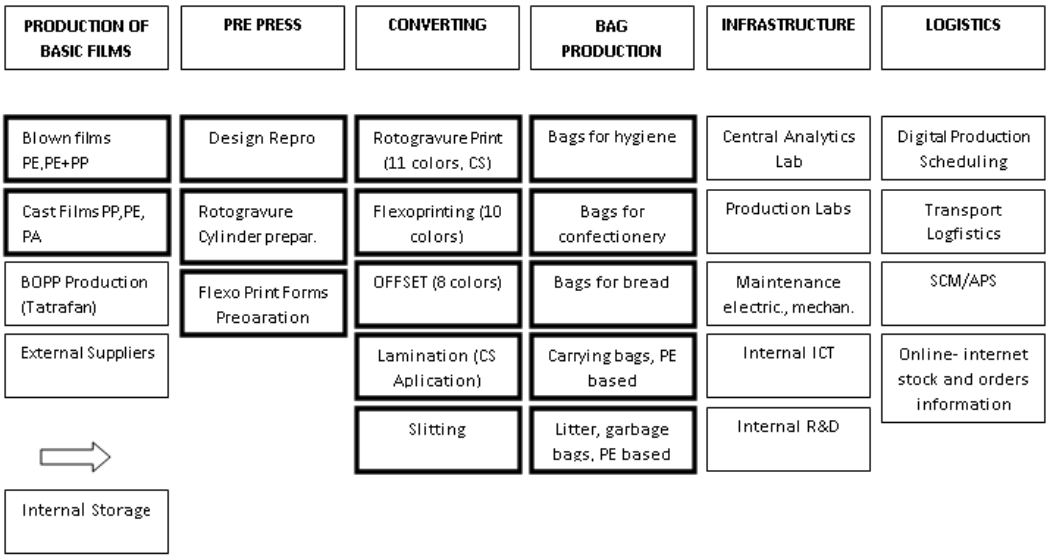

Fig. 2 *Technological nodes of the enterprise (Corporate Documents, 2017)*

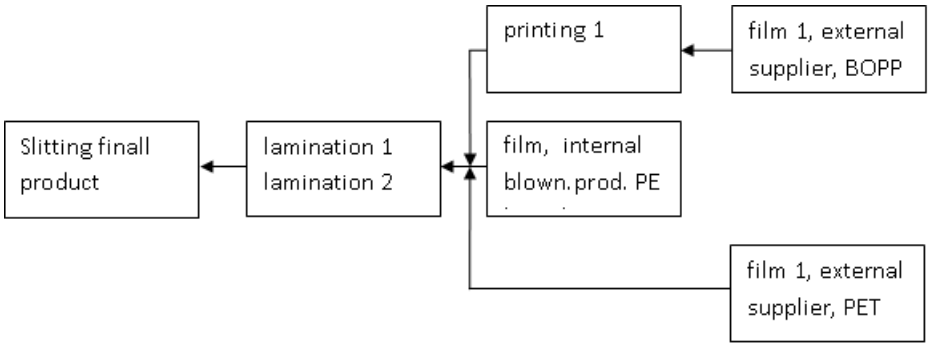

Fig. 3 *Example of defined production diagram of selected assortment – transition through the production nodes (Corporate Documents, 2017)*

Predominantly, the basic raw materials are considered to be the polymer films based on PP (polypropylene), PE (polyethylene), PET (polyethylene terephthalate), PAD and their combinations if appropriate, duplex (two-layer films), triplex (three-layer films), etc. that exhibit various physical-chemical properties, applied according to the needs of packed product and other requirements such as shelf life.

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.

2.METHODOLOGY FOR PREPARATION OF THE DYNAMIC MODEL FOR THE BUSINESS PLAN

Calculation of time demands for production in the technological nodes and of job size.

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.

The model input parameters are as follows:

- the product "i" is defined by an assortment number, thickness, assortment width, total size of job in the technical units, average number of colours, reasonable size of job.

The model output parameters are as follows:

- time of product "i" on the machine "j" in NH- NH_{ij}, needed for production the job in the particular node

The below mentioned lines comprise description of the calculation method for standard hours (capacity) needed for implementation of the job for selected technological node, particularly for printing.

Technological time of model calculation according to input parameters are divided to lost time and time necessary for production.

Lost time comprises the following:

1.Time of installation on the roller (M)

2.Running-in time for the colour (Z)

3.Time of dismantling from the roller (D)

4.Time of other lost time intervals (H)

Then:

Total time for installation = time of installation on the roller x number of installed rollers.

Total running-in time = running-in time for the colour x number of colours to be run-in.

Total time of dismantling = time of dismantling from the roller x number of dismantled rollers.

Total time of other lost time intervals = time of other lost time intervals for a roller x number of dismantled rollers.

Running-in time of the job [min] = film length [m] / machine speed [m/min] – for production of film in reels.

Run time of the job [min] = number of pieces [pcs] / machine speed [pcs/min] – for production of confection from the film.

Run time of the job [min] = 60 x job mass [kg] / machine speed [kg/h] – for basic film production.

And consequently:

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

The lost time intervals for one colour and speed are achieved from the code list of operation parameters and/or they are specified in detail using the data from SCADA.

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. [7, 10, 13]

Tab. 1 *Example – effect of model job size on production time*

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/	150%	300%	500%
Time of production node 2	100% /e.g. 2 h/	200%	300%	2500%

For each customer, the combination of basic raw materials and thicknesses – assortment, technical and marketing selection of assortment for the particular segment, size and frequency of orders is unique. By calculation according to the model, an estimation occurs forth total time scope needed for implementation of production for the customer and assortment on the individual core nodes per period. The blue curve represents the total volume of sales for individual customers, the red one shows time demandingness for its implementation. The graph shows apparently that the customer with smaller total volume may require more capacity for the technological nodes than that one with significantly bigger sales volume. This property is natural for individual customers and various segments in which they operate and confirms relevance and importance for sales forecasting to come from the level of unique motives and their properties as well as from relation between the business plan and forecasting the capacity demands.

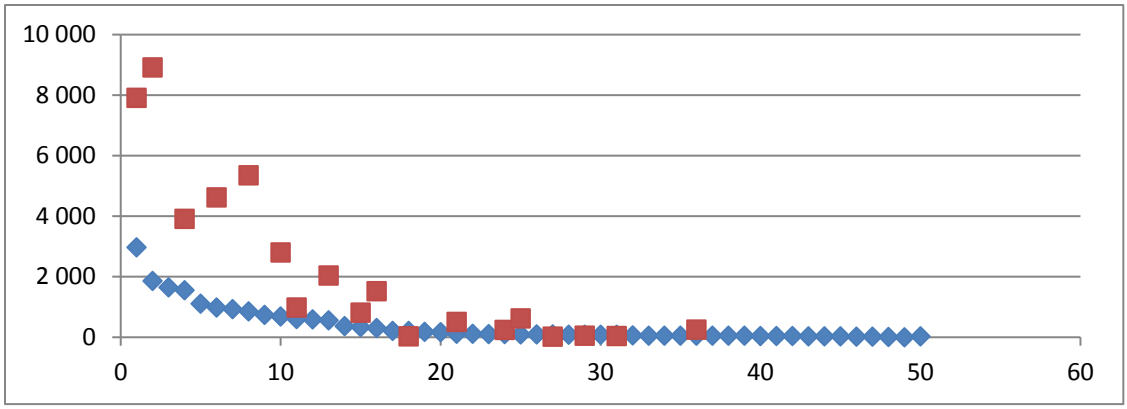

Fig. 4 *Example of the total volume of sales representation in tons /lozenges/ and significantly different time demand of capacity in one of the core technological node /squares/. (Corporate Documents, 2017)*

Taking into account of flexibility in the annual business plan

Modifications – declines or increases of volume of sales resulting from e.g. new tenders, changes of the share in utilization of the production lines in the customer site or the volumes for new customers are readily included into the production process after the capacity potential have been expertly assessed by the internal logistics department. [13]

High impact on the business plan is shown also by flexibility guaranty requested by the customers – i.e. ability of producer contractually supply new and repeated products within agreed period, e.g. 4 up to 6 weeks but also 10 up to 16 days. This parameter is strongly dependent on so called market segment – consumer´s determination of final product application. For delayed supplies, a risk of penalties for delay is highly probable.

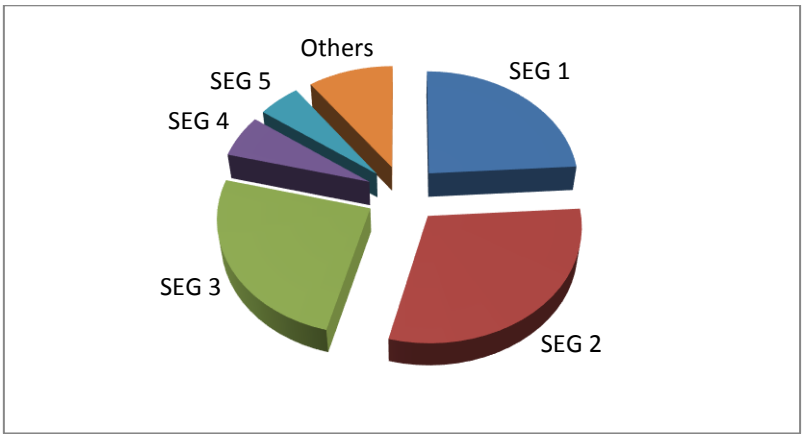

Fig. 5 *Distribution of planned volume of sales in the technical units per year according to the market segments (Corporate Documents, 2017)*

Ability to provide early delivery period – flexibility – is a significant competition advantage. Many new projects as well as those required by the customer´s marketing are subject to obligation to deliver the goods on time for the start of supplies according to e.g. deadlines of advertisement published in the media, for multiple stores, etc.

Potential to produce a big order for long period in advance is feasible only to a very limited extent.

The numbers of product orders from the customers as well as size of orders are affected by the market environment, planning and production process of the customer, status of stock in

the warehouses of the customer and internal stockpiles of the producer and also by practices and competences of individual purchasers.

Some customers provide forecasts of consumption and data for SCM using their information systems.

Elimination of ineffective small orders is supported also by normally used price modules which consider costs for production time towards quantity and thus at the beginning creating opportunities of purchasers for optimization of costs for their orders such as joining and particular re-storing, guaranteed contractually for the period up to several months the guaranty period is sufficient/.

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. [10, 14]

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.

Tab. 2 *Example of monthly plan of capacity utilization for one of the technological nodes for individual customers (Corporate Documents, 2017)*

Company Name	**Capacity reservation (NH)**	**Reservation (%)**	**Non-produced**	**Produced**	**Business Plan**
Company 1	1 21:31	1.1	1 05:53	0 00:00	0 00:00
Company 2	15 10:53	2.9	4 20:46	0 00:00	0 00:00
Company 3	9 01:34	9.2	15 10:45	0 00:00	0 00:00
Company 4	23 18:49	5.4	8 21:07	0 03:55	0 00:00
Company 5	14 18:17	14.1	23 15:21	0 07:28	0 00:00
Company 6	9 16:02	8.8	9 11:37	0 15:37	0 00:00
Company 7	3 15:23	5.8	9 12:53	0 06:04	0 00:00

The existing modelling program of production capacity demands, calculation of period needed for particular operation of each job as well as continuity of individual nodes is used.

Limitations of annual business plan

Nowadays, the limitation of business plan in present format is a possibility of assumption and guaranty of flexibility. Under conditions of continuous production and with maximum utilization of full installed and available capacity – all machinery – the limiting factor of production is time for production in the core node, such as production centres of basic films, rotogravure and flexoprinting. This time is maximally affected by the order size. For production, the production process requires a period necessary for job preparation and frequently this could be comparable with the period for production itself. Thus, significant difficulty to determine the needed annual capacity as well as its reservation only from the total annual technical plan volume is caused. Moreover, no capacity reserve is determined

specifically for seasonality of demand for individual customers, segments and assortments. Another one significant limiting factor is also an effect of delivery terms of external suppliers of raw materials especially of basic films. Variability of type, thickness, width and needed quantity is rather big and guaranteed milestones of delivery of these input raw materials are sometimes longer that the period for total implementation of the order in Chemosvit Folie.

3 CONCLUSIONS

Presently, a direct link to a system of integrated planning, possibility of objective incorporation of modifications within the year into the plan is missing. During the year, overloading of capacities and resulting disability to satisfy the contractual milestones occur. From the standpoint of capacity, it is not possible to assess whether and in which scope the company can contract new jobs and/or customers. [7, 12, 13]

The system analysis shows that the capacity requirements and thus the real business plan can not be designed solely by determining the volume of assortments produced for individual customers, but the capacity requirements for individual production and machine technologies are also dependent on:- the number of orders for which the given volume is made for the customer, as the preparatory print times and after print service times are substantial and not negligible- the capacity is dependent on individual motives-the sale especially for large customers is highly seasonal- capacity requirements ,representation in weight units or in flat units is insufficient, the time needed for the production and execution of the order expressed in normo- hours is decisive.-the business plan is ready for the year, and can not take into account changes, for example, New motifs, discarded motifs, so it needs to be done in a sliding way, quarterly.The new dynamic model takes into account the above shortcomings.

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